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Vulnerability assessment tools for infectious threats and antimicrobial resistance: a scoping review protocol

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ABSTRACT

Introduction This protocol will guide and explain the working process of a systematic scoping review on vulnerability assessment tools in the field of infectious disease outbreaks and antimicrobial resistance (AMR) crises. The scoping review will appraise existing tools or methodologies to identify local level vulnerabilities in the context of infectious disease outbreaks and AMR. Due to this focus on infectious threats and AMR, the review also considers articles using a 'One Health' approach to assess the vulnerability of individuals, groups and practices in human–animal–environment interactions. Given the broad nature of vulnerability, we aim to allocate studies discerning the process of identifying vulnerable or at-risk groups during a crisis, instead of studies taking vulnerability only as a starting point. Because considerable research has been conducted on vulnerability, disasters and climate change, we will also assemble tools developed from these fields. To our knowledge, this is the first planned systematic scoping review of vulnerability assessment tools for disease outbreaks and AMR, taking into account practices at the human–animal–environment interface that can lead to increased risk of exposure of individuals to infections, pathogen spillovers or epidemics.

Methods and analysis To develop the protocol, we used the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols checklist (PRISMA-P 2015) in compliance with the PRISMA Extension for Scoping Reviews Explanation and Elaboration. With the assistance of an experienced research librarian, we developed the search strategy, which targeted the following databases: Medline, Global Health database, Web of Science and Embase. A second strategy was developed for Epistemonikos, African Journals Online and Global Index Medicus because these databases do not provide the infrastructure for an advanced search. We consider studies published between 1978 and 2019 and include articles, book chapters, websites and grey literature from selected non-governmental organisations and non-profit organisations working in the health field. We contact them directly regarding whether they are working with or have developed a vulnerability assessment tool. To address the dynamic nature of our investigation, we develop a flow diagram which we continually update to reflect the selection process. Two reviewers (MJ and LL) independently screen the literature and resolve conflicts through discussion rounds. Data extraction will be conducted by four researchers (MJ, LL, EJ and RK) through inductive and deductive coding. Extracted data will be systematically compared and divergences highlighted.

Ethics and dissemination Ethical approval is not required because this study does not involve collection of primary data. The purpose of this review is to disseminate a catalogue of vulnerability assessment tools and a brief summary of key results and recommendations for SoNAR-Global partners in Bangladesh, Ukraine and Uganda. The catalogue will be made publicly available. On the basis of our results, SoNAR-Global partners will pilot one of these tools.

Strengths and limitations of this study

- ► Identification of knowledge gaps in existing studies.
- ► Comprehensive mapping of literature to identify vulnerability in disasters using systematic review methodology.
- ► Exploratory approach taking into consideration multiple research approaches and disciplines.
- ► Application of searches in heterogeneous sources (eg, Global Health database and African Journals Online).
- ► Short duration (6 months) of scoping review.

INTRODUCTION

Rationale

Increased human mobility, global commodity chains, urbanisation and climate change have all altered the interaction of humans, microbes and broader ecological conditions in the 21st century, catalysing the emergence and re-emergence of infectious diseases.[1] Recent outbreaks of Ebola, SARS and Zika have triggered international health emergencies, often exacerbated by the lack of appropriate treatments and preventive vaccines.[2 3]

Similarly, antimicrobial resistance (AMR) has been identified as a substantial threat to global health security with uncontrolled use of antibiotics, antivirals and antiparasitic treatments, rendering microbes increasingly resistant to existing medicines.[4] Humans, animals and the environment, in turn, are mutually affected by these health threats, highlighting

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the need to engage with complex socio-biological ecosystems.[5 6] As a consequence, emerging infectious diseases (EIDs) and AMR urgently require transformations in global public health governance.[7–9]

EIDs and AMR are not only medical problems; they require careful attention to the relationship between infectious events, political, economic and ecological conditions, and to local communities and the marginalised people who often live within them . Such attention remains particularly important when instability (caused by infectious disease outbreaks, conflicts or other stresses) exaggerates local inequalities, hampering effective preparedness and response efforts. Devastating epidemics have struck frequently in countries and among populations already shattered by government neglect, forced migration, social unrest or civil war.[10–12] What these insights reveal is that people living in unstable conditions remain disproportionately vulnerable to infectious threats.

In this context, the SoNAR-Global H2020 project aims at building a social science network to engage the active participation of social sciences and to promote complementarity and synergy in the governance of prevention and response to infectious threats and AMR. Eventually, in order to do this effectively, it is crucial to engage relevant stakeholders in addressing susceptibilities and lack of coping and adaptive capacities. This requires a solid understanding of those aspects that can be obtained through vulnerability assessments.

Until now, several disciplines—be it anthropology, sociology, psychology, geography or ecology—but also organisations outside the academic context take a stance on vulnerability. However, there is no universally valid model of vulnerability and 'no standardised procedure for measuring vulnerability' (Hufschmidt, p636).[13] Birkmann *et al*[14] synthesise four factors of vulnerability from disaster-risk reduction and climate change adaptation in order to provide a holistic conceptual framework to operationalise vulnerability: '(…) exposure of a society or system to a hazard or stressor, the susceptibility of the system or community exposed and its resilience and adaptive capacity' (Birkmann, p207).[14] Factors contributing to vulnerability change over a period of time and are place specific.[14]

Similarly, our understanding of vulnerability is dynamic. We are less interested in tools that work with predetermined categories of vulnerability (eg, demographic characteristics such as age, gender and ethnicity) but wish to explore vulnerability specifically in local contexts. In our opinion, the most effective assessment tools allow populations affected by a disaster to identify their own needs rather than the vulnerability label is imposed on them.[15] This means to include local knowledge, to involve local people in identifying vulnerable groups and to pay attention to culture in order to gain an understanding of local perceptions of vulnerability and risk.[16]

Objectives

In our scoping review, we seek to map vulnerability assessment tools with (or without) conceptual underpinnings and procedures for identifying vulnerability. We take into consideration vulnerability assessment tools or methodologies that assess locally relevant case definitions of vulnerability[11] and identify specific groups at greatest risk of marginalisation and thus at greatest risk of suffering disproportionately the consequences of a disaster. This could be due to social, cultural, political, economic or other context-specific reasons that influence people's exposure, susceptibility, resilience (and coping mechanisms), adaptive capacity or capacity to recover. Additionally, we seek to find vulnerability assessment tools that are tailored to infectious threats (and AMR). This is why we look for both local-level assessments and tools targeted at infectious threats.

A preliminary search of literature and already existing reviews yielded few studies on vulnerability assessment tools tailored to infectious threats, but a significant amount of literature in the field of climate change. To fill the assumed gap of studies in the context of vulnerability assessment tools and infectious threats, we will also take into account studies exploring practices at the human–animal–environment interface, providing insights on practices that expose certain groups of people to infections or pathogen spillovers.

Main objective

- Systematically review and appraise existing instruments to assess local-level vulnerability in the context of infectious threats and AMR.

Secondary objective

- Identify factors associated with exposure to infectious threats and AMR—that is, through interactions of humans, animals and surrounding environments.

METHODS

The scoping review builds on the Preferred Reporting Items for Scoping Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist.[17] The protocol draws from the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) 2015 checklist and is applied in compliance with the PRISMA-ScR.[17 18]

Eligibility criteria

We used the Population, Intervention, Comparator, Outcome (PICO) framework for diagnostic studies to develop our search strategy.[19] The PICO framework is derived from evidence-based medicine and might not be considered applicable to our scoping review as its main focus is on qualitative research. However, following further consideration, the PICO for diagnostic studies was deemed suitable as a framework for structuring the search of vulnerability assessment tools. The following offers a breakdown of this reasoning:

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Population

The review focuses on tools that seek to identify social groups most vulnerable to infectious threats. As of now, it is unclear how much literature on methods discerning vulnerable groups in disease outbreaks exists. Therefore, comparable tools from the climate change field (eg, vulnerability assessment in natural hazards) will also be considered. We will include all infectious diseases but will have a special focus on infectious threats that specifically affect SoNAR-Global partner countries, such as influenza, measles and certain viral haemorrhagic fevers (Ebola virus disease, Lassa fever, Crimean Congo haemorrhagic fever and Rift Valley fever). The selection of these threats was discussed with SoNAR-Global partners.

Studies addressing mutual engagements and interaction between humans, animals and environments will also be considered eligible.

Intervention

We aim to find tools that assess local-level vulnerability in the context of infectious threats and AMR. As mentioned above, we also include vulnerability assessment tools linked to natural hazards or disasters in our search. Of interest are tools that explore recently emerging, less visible and locally relevant vulnerable groups.[11 20] Ideally, populations affected by a disaster are involved in identifying their own needs.

Comparators

Studies that systematically compare different vulnerability assessment tools will be included in our review.

Outcomes

Outcomes of interest are as follows:

- Methodological characteristics of vulnerability assessment tools or practices (eg, quantitative, qualitative and mixed methods).
- Conceptual or theoretical frameworks of vulnerability assessment tools.
- Degree of involvement of the affected population.
- Utility and applicability of assessment tools; (eg, is the tool easy to use for local stakeholders or are experts involved?).
- Specific information or guidance on EIDs and AMR (eg, is the tool tailored to infectious threats?).
- Specific information on vulnerable groups (eg, who is identified as vulnerable? Why and what makes people vulnerable in a specific context?).

Publication type, study design, language and time frame

Articles, websites, book chapters and grey literature from non-governmental organisations (NGOs) and non-profit organisations (NPOs) working in the field of health will be considered relevant. Publications in English, French, Ukrainian, Russian or Bangla will be included. SoNAR-Global partners in Ukraine and Bangladesh will assist in reviewing papers in Ukrainian, Russian or Bangla. In this review, we consider studies published between 1978 and 2019 because the key role of primary healthcare in promoting health for everyone was agreed on in the declaration of Alma Ata in 1978. This marks a critical waypoint in considering socio-structural determinants as influencing an individual's health and degree of vulnerability.[21] Qualitative, quantitative, mixed methods and integrated qualitative/quantitative tools are covered, including ethnographic investigations and systematic reviews, among others.

Information sources

We conducted an initial search for reviews on vulnerability (assessment tools) in selected databases (Epistemonikos, PubMed, Scopus, Web of Science and Prospero). We have done so to avoid duplicating existing reviews of the same subject matter and to refine our search terms.

We used a vulnerability assessment tool as a reference paper[11] of one of the authors (ADN), which has been successfully applied in various emergency settings. It is an easy to use manual for identifying local-level vulnerabilities and for determining effective resource allocation. It, therefore,reflects what we look for in our search.

The search strategy was developed by a trained librarian of the University Library, Medical University of Vienna, and the first author (MJ) and was revised according to feedback from co-authors (MLAD). The selection of databases was also discussed by the librarian and the first author. Ovid's Medline was chosen over PubMed because a more nuanced search could be configured in Medline.[22] Instead of searching two similar databases, we decided to use heterogeneous sources (eg, Global Health database, Web of Science, African Journals Online (AJOL) and grey literature databases) to allow for differing contents.

We developed a first search strategy for the Global Health database and, following further reflection, agreed to expand the search by including literature on disasters and risk reduction. We applied the second (revised) search strategy to Medline and made further minor adjustments. The results from the Medline search varied considerably from the first Global Health database search. The reason for these different results emerged out of adjustments made to the search strategy, but could also be the consequence of differing contents in the two databases. The final search strategy was applied to Medline and can be found in the online supplementary file.

The search terms were adjusted and applied to the following databases: Global Health database (Ovid), Web of Science and Embase. For Epistemonikos, Global Index Medicus (WHO database) and AJOL, we used a simplified search strategy because these databases do not allow for complex searches. The terms used for these databases are presented in the online supplementary file. Grey literature was searched in OpenGrey and on the following websites: Medbox, Social Science in Humanitarian Action, Social Science Research Network, Assessment Capacities Project and Measure Evaluation. Additional sources were identified using snowball strategies and, in particular, the mining of references in published reviews and articles. Further, we contacted NGOs, NPOs and selected

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governmental organisations directly to enquire whether they worked with or had developed vulnerability assessment tools. We imported the search results into Endnote and removed all duplicates. The remaining references were imported into Rayyan QCRI for further screening.[23]

Selection process and data extraction

We defined the following inclusion/exclusion criteria:

Inclusion criteria

- Vulnerability assessment tools or practices in the context of disease outbreaks, AMR and natural disasters.
- Humans or human-animal interaction (One Health).
- Concepts (eg, vulnerability, resilience, coping and adaptive capacity).
- Any geographic location (special focus on Uganda, Ukraine and Bangladesh).
- Publication type: articles (peer-reviewed and non-peer-reviewed), websites, book chapters and reports from NGOs and NPO working in the area of health.
- Period between 1978 and 2019.
- Languages: English, French, Ukrainian, Russian and Bangla.
- Study design: quantitative, qualitative, mixed-methods studies and integrated qualitative/quantitative studies, ethnographies, systematic reviews and case studies.

Exclusion criteria

- Studies dealing with vulnerable groups but not describing how these were identified.
- Studies which do not address tools, methodologies or practices to discern vulnerability.

Two reviewers with a social science background (MJ and LL) will independently examine titles and abstracts in Rayyan Qatar Computing Research Institute (QCRI), a web application to screen literature.[23] Each study will be labelled with reasons for inclusion and exclusion. Distinct labels will be used for vulnerability assessment tools used in the field of climate change and in the context of disease outbreaks. Discussion rounds between reviewers (MJ and LL) are planned for the first two weeks of screening to clarify questions concerning the screening process and to specify inclusion criteria. The screening will be blinded, so that reviewers' decisions will not be visible until all conflicting decisions are resolved.

Throughout the search—starting from numbers of records retrieved from databases to final search results—we provide a search flow diagram to visualise our selection process.[17] Following this step, four reviewers (MJ, LL, EJ and RK) will independently review the full texts and will extract data from the selected studies with focus on author, article type, type of threat (natural hazard, infectious disease or AMR), year, country and type of intervention. As all authors have a social science background, the data extraction will most likely resemble a thematic analysis. Variables for data extraction will be defined inductively (variables come up while familiarising with the data) and deductively. According to the review objectives and outcomes, we predefined the following variables: methodology used (eg, qualitative, quantitative or mixed methods), conceptual or theoretical framework of the assessment tool, degree of involvement of the affected population and applicability and utility of the tools and results of vulnerability assessments (eg, specific vulnerable groups or communities). Finally, extracted data will be systematically compared and divergences acknowledged; limitations of the vulnerability assessment tools will be noted.

Before extracting the relevant information, we will sample five papers and test the extraction criteria, which will subsequently be revised, if necessary (Tricco, p4).[24] We will not assess each study's methodology for quality, pursuant to guidelines for scoping reviews.[25]

Data synthesis

The results of the scoping review will be presented in a table. A narrative summary of the findings and how they relate to our objectives will be provided.

ETHICS AND DISSEMINATION

Ethical approval is not required because this study does not involve collection of primary data. Findings of the scoping review will be summarised in a one-page brief containing details on key results and recommendations for the SoNAR-Global partners in Bangladesh, Ukraine and Uganda.[26(p.16)] The review of existing assessment tools will be disseminated to our programme partners and the public. Local resources permitting, key partners and regional stakeholders will pilot the tool best suited to infectious disease or AMR-related emergencies.

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Contributors MJ and RK conceptualised the research, MJ wrote the protocol, LL helped in writing and editing the protocol, TG-V, MLAD, ADN, EJ and RK reviewed and edited the protocol.

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