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Public health interventions for Non-Communicable Diseases (NCDs) in humanitarian emergencies: an overview of systematic reviews

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Abstract

Background Non-communicable diseases (NCDs) encounter significant challenges in humanitarian emergencies due to limited resources and disrupted health systems. Systematic reviews can provide valuable insights into the effectiveness of interventions for NCDs in these settings. This overview aims to synthesize and critically appraise the current body of evidence from systematic reviews on public health interventions for NCDs in humanitarian emergencies.

Methods We conducted an overview of systematic reviews following the Cochrane guidelines for Overviews of Reviews and the Preferred Reporting Items for Overviews of Reviews (PRIOR). We searched four electronic databases (PubMed, Medline, Scopus, and Global Health) for relevant systematic reviews. We extracted and synthesized data on interventions and outcomes from systematic reviews focusing on cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. We performed a narrative synthesis and used A Measurement Tool to Assess Systematic Reviews (AMSTAR 2) to evaluate the methodological quality of the included systematic reviews.

Results Our search yielded 1,993 citations. Sixteen systematic reviews met our inclusion criteria and were included in the analysis. Six systematic reviews focused on multiple NCDs and combined interventions, five on cancer, five on diabetes, two on cardiovascular diseases, and there were no reviews on chronic respiratory diseases. The included systematic reviews highlighted the effectiveness of interventions such as electronic health records (EHRs) and primary healthcare for managing NCDs. Culturally tailored interventions involving community members and religious leaders were also found to be promising, particularly in improving cancer screening outcomes. Numerous barriers to implementation were also noted, and these included financial, logistical, and cultural challenges. Nonetheless, the overall quality of the included systematic reviews was low, with 81% being rated as "critically low confidence".

Conclusions This overview provides a comprehensive synthesis of the current evidence on interventions for NCDs in humanitarian emergencies. While certain interventions show promise, the quality of evidence is generally low. Future systematic reviews should prioritize implementing rigorous methods and transparent reporting. Additionally, more

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studies are needed to examine the cost-effectiveness of interventions, as evidence on costs and cost-effectiveness was almost non-existent.

Protocol registration The protocol was registered on the Open Science Framework (OSF) and can be accessed at [https://doi.org/10.17605/OSF.IO/HF4QN].

Keywords Noncommunicable diseases, Cardiovascular diseases, Cancer, Chronic respiratory diseases, Diabetes, Humanitarian emergencies, Disasters, Refugees, Systematic review

Background

Non-communicable diseases (NCDs) continue to be a major global health concern and the leading cause of death in the world, killing more than 41 million individuals every year [1]. NCDs are of particular concern in humanitarian emergencies, especially as the toll of emergencies is increasing globally [2]. The United Nations High Commissioner for Refugees (UNHCR) estimates that by the end of 2024, 123.2 million people had been forcibly displaced due to conflict, violence, and other humanitarian emergencies [3]. This corresponds to one in every 67 people worldwide and represents an increase of 7 million compared to 2023 [3]. This alarming trend raises growing concerns about the management of NCDs in humanitarian emergencies where health systems are often strained by the added burden of displaced populations, interrupted services, and a lack of financial resources and medical supplies [4].

Given the predominant focus on acute conditions in humanitarian responses, there is a pressing need to integrate NCD management into the framework of humanitarian operations [5]. Hypertension and diabetes are consistently identified as a considerable burden in humanitarian emergencies, with barriers to care often driven by interruptions in medication availability, limited continuity of services, and fragile supply chains [6, 7]. Cancer care is similarly affected, as oncology services are frequently disrupted due to damaged infrastructure and remain insufficiently integrated into humanitarian response plans [8]. These challenges are compounded by gaps in the evidence base, with prior systematic reviews reporting limited high-quality studies and scarce data on the cost and sustainability of NCD interventions [9].

In recent years, there has been growing global recognition of the burden of NCDs, leading to expanded frameworks and stronger policy attention. One example is the adoption of the "5 × 5" framework, which broadens the focus from the four main NCDs to also include mental health as a fifth condition [10]. In the context of humanitarian emergencies specifically, progress is reflected in global commitments and events such as the 2024 Global High-Level Technical Meeting on NCDs in Humanitarian Settings, organized by the World Health Organization (WHO) and UNHCR [2]. This event signaled a growing shift toward prioritizing NCD care within humanitarian health responses. Operational advances have also been made, including the development of the WHO NCD Kit (NCDK) [11]. As the gap in standardized and evidence-based guidelines persists, international organizations have published operational considerations and frameworks to help address this need [12]. The WHO has also developed a Package of Essential Noncommunicable (PEN) Disease Interventions for primary health care in low-resource settings [13]. PEN emphasizes the importance of integrating NCD care into the primary healthcare level and comprises a set of cost-effective interventions [13].

Despite the growing importance of addressing NCDs in humanitarian emergencies, there is a lack of comprehensive evidence synthesis on effective and feasible interventions. The existing evidence base is fragmented, as individual systematic reviews often focus on different diseases, contexts, or intervention types. An overview of systematic reviews is therefore needed to consolidate knowledge and assess review quality. To our knowledge, no overview of systematic reviews on this topic currently exists.

This overview focuses on the four major types of NCDs identified by WHO as the leading causes of NCD-related mortality globally: cardiovascular diseases, which account for the highest number of NCD deaths, followed by cancers, chronic respiratory diseases, and diabetes [1]. Mental health conditions, while critically important in humanitarian emergencies, were excluded to maintain a focused scope. Mental health interventions often involve different outcome measures and care models that require a separate dedicated synthesis. We acknowledge the importance of integrating mental health into crisis responses and note that recent overviews have specifically examined mental health interventions for displaced populations [14].

The aim of this overview is to (1) synthesize and critically appraise the available evidence from systematic reviews on interventions for NCDs in humanitarian emergencies, and (2) identify gaps in the literature to highlight areas for future research. Findings from this overview will provide decision-makers and humanitarian practitioners with a comprehensive and accessible summary of the best-available evidence from systematic

reviews, enabling evidence-informed policy and program planning in humanitarian emergencies.

Methods

This overview of systematic reviews was conducted in accordance with the Cochrane guidelines for Overviews of Reviews, as outlined in the Cochrane Handbook for Systematic Reviews of Interventions [15]. Prior to conducting the overview, we had a written protocol that included the research question, methodology, search strategy, and inclusion/exclusion criteria. We registered the protocol with the Open Science Framework (OSF) under the following DOI: [https://doi.org/10.17605/OSF.IO/HF4QN] [16]. No changes or deviations from the protocol were made. We also followed the Preferred Reporting Items for Overviews of Reviews (PRIOR) [17].

Table 1 Eligibility criteria for included systematic reviews

Criteria	Inclusion	Exclusion
Population of interest	Populations affected by armed conflict, natural disasters, disease outbreaks, or forced displacement (such as internally displaced people (IDPs) and refugees). We had no restrictions on gender or age.	War veterans and military personnel.
Intervention of interest	Public health interventions and policies aimed at preventing or managing NCDs at the population or health system levels. Examples include, but are not limited to, educational interventions, digital health interventions, screening programs, mobile clinics, and primary care services.	Pharmacological or clinical interventions targeting individual patients; studies reporting only epidemiological trends without interventions.
Comparison	No intervention or alternative intervention.	None.
Outcome of interest	Outcomes related to cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. These included but were not limited to mortality/morbidity outcomes, healthcare utilization, access to health services, feasibility of interventions, facilitators, challenges, and cost-effectiveness.	Studies focusing on mental health, infectious diseases, or sexual and reproductive health.
Study design of interest	Systematic reviews and/or meta-analyses. We had no restrictions on language or publication year.	Primary studies, literature reviews, scoping reviews, protocols, preprints, abstracts, letters, and grey literature.
Setting of interest	Studies from all countries and regions were eligible, and the overview was not limited to low- and middle-income countries (LMICs).	No exclusions based on country income level.

Ethics approval was not required for this overview of systematic reviews. We adhered to ethical standards in research conduct by ensuring transparency at all stages, including comprehensive reporting of methods and findings, acknowledgment of all systematic reviews included in the overview, and clear documentation of decisions made throughout the review process.

Eligibility criteria

The eligibility criteria for this overview are summarized in Table 1. We adopted the Humanitarian Coalition's definition of a humanitarian emergency: "A humanitarian emergency is an event or series of events that represents a critical threat to the health, safety, security or wellbeing of a community or other large group of people, usually over a wide area" [18]. We also adopted Cochrane's definition of a systematic review: "A systematic review attempts to collate all the empirical evidence that fits prespecified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made" [19].

Literature search

We conducted the initial search on October 17th, 2023, and subsequently updated it on February 19th, 2025 to capture any new studies published after the initial search and ensure that our overview reflects the most current evidence available. The following electronic databases were searched: PubMed, Ovid Medline, Scopus, and Global Health. The search strategy was developed in consultation with an expert health sciences librarian and a senior systematic reviewer. We used free text terms and MeSH terms related to the following three concepts: non-communicable diseases, humanitarian emergencies, and systematic reviews. The full search strategy is provided in [Supplementary Material 1]. We did not restrict the search to any specific language or year of publication.

Grey literature was not searched, as it was expected to primarily yield policy papers and evaluation reports rather than systematic reviews that met our eligibility criteria. Therefore, given the scope of our overview and resource constraints, we limited our search to systematic reviews published in peer-reviewed academic journals and indexed in bibliographic databases.

Study selection

The results from the initial search in 2023 were imported into EndNote, where duplicates were removed. The results from the updated search in 2025 were imported into Covidence, and the same selection process was followed. Two independent reviewers conducted initial screening of titles and abstracts, followed by full-text

screening, based on the above eligibility criteria. Disagreements were resolved through discussion, or if necessary, by consulting a senior researcher.

Data extraction

Two reviewers independently extracted data from the selected studies into a standardized and piloted data extraction form using Excel. Any disagreements were resolved through consensus or with the assistance of a third reviewer. We extracted the following information from the included studies:

- Author, date of publication, and language.
- Type of study design (systematic review with/without meta-analysis).
- Study objectives.
- Eligibility criteria.
- Search strategy characteristics and databases searched.
- Number and characteristics of primary studies included in the review.
- Geographic setting.
- Type of humanitarian emergencies.
- Type of NCDs.
- Type of interventions and their outcomes.
- Key findings.
- Risk of bias assessment of primary studies included in the systematic review.
- GRADE certainty of evidence assessment.
- Additional information (conclusion, systematic review limitations, competing interests, funding source).

Quality assessment

Two reviewers independently assessed the quality of the included systematic reviews using AMSTAR 2, a critical appraisal tool for systematic reviews that include randomized or non-randomized studies of healthcare interventions, or both [20]. The AMSTAR 2 tool consists of 16 items, seven of which are considered critical domains. Each item was scored as "Yes," "Partial Yes," or "No". The overall confidence in the results of the systematic review was determined based on weaknesses in critical and non-critical items, and rated as "High", "Moderate", "Low", or "Critically Low". Disagreements between reviewers were resolved through discussion, and a third reviewer was consulted when consensus could not be reached.

Data synthesis

Due to substantial heterogeneity in interventions and outcomes, a meta-analysis was not feasible. In addition, most of the included systematic reviews reported results narratively. Therefore, narrative synthesis was the most appropriate method to synthesize findings across NCD categories. We organized the findings from the included systematic reviews into five categories: interventions for cardiovascular diseases, cancers, chronic respiratory diseases, diabetes, and a final category for "multiple NCDs and combined interventions." In the last category, we included findings from systematic reviews where interventions targeted more than one NCD or where the types of NCDs were not specified.

Managing overlapping systematic reviews

We did not exclude overlapping systematic reviews as the aim of our overview was to present and describe the available evidence from all relevant systematic reviews on the topic [15]. Given the narrative nature of the synthesis and the absence of statistical pooling or quantitative effect estimates, we judged that the impact of overlapping primary studies on our findings was minimal.

Results

Our search yielded a total of 1,993 citations (Search 1 on October 17, 2023: 1,555 citations; Search 2 on February 19, 2025: 438 citations), of which 666 were from Medline (Search 1: 527; Search 2: 139), 396 from PubMed (Search 1: 319; Search 2: 77), 684 from Scopus (Search 1: 518; Search 2: 166), and 247 from Global Health (Search 1: 191; Search 2: 56). After removing duplicates, 1,277 citations remained for screening (Search 1: 1,015; Search 2: 262). We excluded 1,234 articles based on title and abstract screening (Search 1: 976; Search 2: 258), leaving 43 for full-text screening (Search 1: 39; Search 2: 4). Only 16 studies met our inclusion criteria and were included in our overview of systematic reviews (Search 1: 15 studies; Search 2: 1 study). We excluded the other 27 citations based on the following reasons: Not disease of interest ($n=4$), Not intervention of interest/No interventions reported ($n=10$), Not setting of interest ($n=7$), Not study design of interest ($n=2$), No access to full text ($n=2$), and Duplicate studies ($n=2$). A list of these 27 articles that were reviewed in full text and subsequently excluded, along with the reasons for exclusion for each, can be found in [Supplementary Material 2]. The PRISMA flowchart in Fig. 1 summarizes the screening and selection process.

Characteristics of included studies

The characteristics of the included systematic reviews are presented in Table 2. All systematic reviews were published in English. Among the included systematic reviews, only one conducted a meta-analysis [21]. Similarly, only one systematic review utilized the GRADE approach [22]. The types of NCDs studied varied, with 6 systematic reviews (33%) focusing on multiple NCDs and combined interventions, 5 (28%) on cancer, 5 (28%) on diabetes, 2 (11%) on cardiovascular diseases, and 0 (0%)

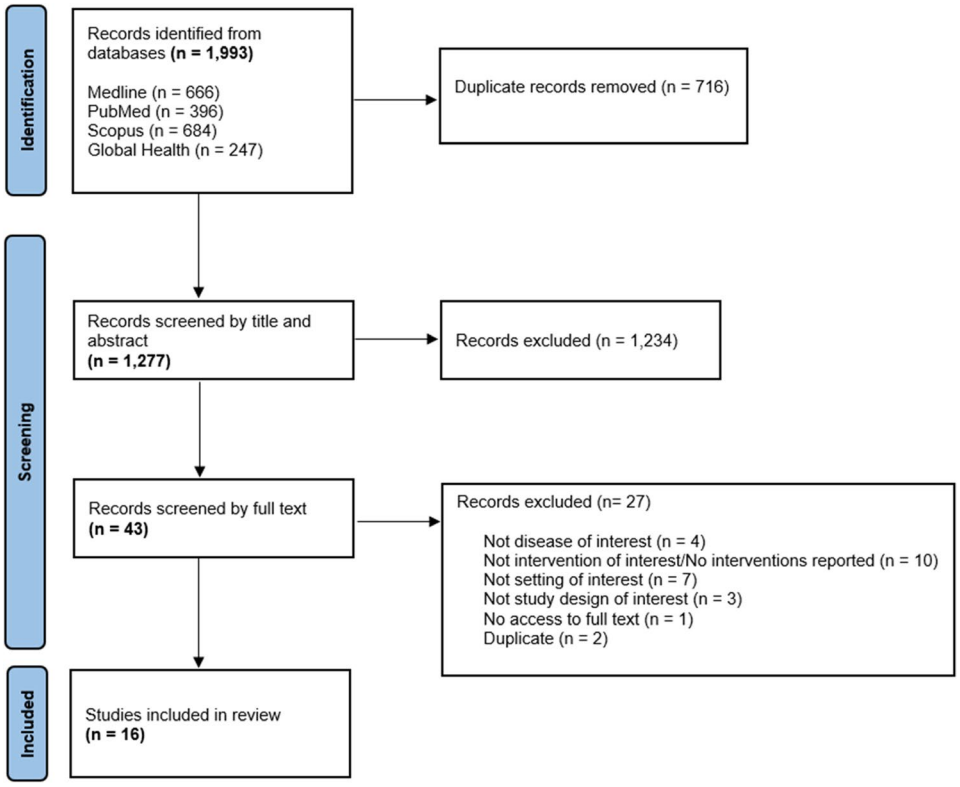

Fig. 1 PRISMA Flow Diagram

on chronic respiratory diseases (see Fig. 2). Additionally, 13 systematic reviews (81%) included randomized controlled trials (RCTs) in their analysis.

The systematic reviews included studies on a variety of humanitarian emergencies, with 10 systematic reviews addressing refugee settings (62.5%), 7 focusing on armed conflict (44%), and 8 on natural disasters (50%). Among the natural disasters, earthquakes were the most frequently studied (6 systematic reviews), followed by hurricanes (5 systematic reviews). Geographically, 8 systematic reviews focused on low- and middle-income countries (LMICs) (50%), 5 on both high-income countries (HICs) and LMICs (31%), and 2 on HICs (12.5%). The number of primary studies included in the systematic reviews varied widely, ranging from 5 to 269. The publication dates of the systematic reviews spanned from 2015 to 2025, while the publication dates of the included primary studies ranged from 1980 to 2022 (see Fig. 3).

Quality assessment

The quality assessment revealed several weaknesses in both critical and non-critical domains of the AMSTAR 2 tool. The individual quality assessment results for the included systematic reviews can be found in [Supplementary Material 3]. Figure 4 shows the overall AMSTAR 2 ratings. Of the 16 included systematic reviews, 13 (81%) were assessed as having "critically low confidence," and the remaining 3 systematic reviews (19%) were assessed as "low confidence". None of the included systematic reviews were rated as "high confidence" or "moderate confidence".

None of the included systematic reviews provided a list of excluded studies with justification for exclusion, which is a critical domain in AMSTAR 2 (item 7). Another common critical weakness was the absence of a registered protocol before conducting the review (item 2). Additionally, most of the systematic reviews did not report on the sources of funding for the primary studies they included (item 10).

In contrast, the majority of the systematic reviews reported research questions and inclusion criteria that included components of PICO (item 1), conducted study selection and data extraction in duplicate (items 5 and 6), and reported any potential sources of conflict of interest (item 16).

Cardiovascular diseases

Two systematic reviews identified interventions for cardiovascular diseases (CVDs) and were included in our overview [9, 23]. Babaie et al. focused on various CVDs in natural disasters [23]. The systematic review highlighted several key strategies for reducing the prevalence of CVDs, including both medication and non-medication measures to control stress, as well as incentives for

Table 2 Characteristics of included systematic reviews ($n = 16$)

Review	Meta-analysis	NCDs studied	Humanitarian context	Countries/Regions of included primary studies	Date last searched	Number of primary studies included in the review	Publication date range of included primary studies	Design of primary studies included	Quality assessment tool	GRADE use
Asgary et al., 2022 [30]	No	Multiple NCDs and combined interventions	natural disaster, Political conflict, refugee setting, Earthquake, Tsunami, Civil conflict, armed conflict, Nuclear reactor accident, Hurricane Katrina, Typhoon Haiyan	US, Puerto Rico, Japan, Ukraine, Syria, Iraq, Iran, Jordan, Sudan, Lebanon, West Bank, Gaza Strip, DRC, Turkey, Pakistan, Thailand, China, India, Philippines, Kurdistan, Armenia, Middle East, Eastern Europe, South Asia **Countries income level**: Both HICs and LMICs	Not specified	48	2000–2021	review, cross-sectional, systematic review, cohort, Simulation Model, Mixed methods, Case Series Study, qualitative, cost-analysis, pilot study, Descriptive analysis, RCT, Modeling, Reports, brief communication	N/A	No
Babaie et al., 2021 [23]	No	Cardiovascular diseases	natural disasters such as earthquake, flood, storm, hurricane, cyclone, typhoon, and tornado.	Japan, China, New Zealand, Italy, Taiwan, US, Armenia, UK, Greece **Countries income level**: Both HICs and LMICs	Not specified	104	1980–2020	case-control, cohort, Cross Sectional, observational, qualitative, Longitudinal, RCT	N/A	No
Bitterfeld et al., 2025 [24]	No	-Cancer -Diabetes	Refugee populations	USA **Countries income level**: HICs	14/Jan/2023	37	2005–2022	cohort, non-randomized experimental studies, qualitative, randomized controlled trials, retrospective studies, quality improvement projects, mixed-methods, and cross-sectional.	Mixed Methods Appraisal Tool (MMAT)	No
Buford et al., 2022 [31]	No	Multiple NCDs and combined interventions	internally or externally displaced populations	USA, Canada, Lebanon, Germany, The Netherlands, Jordan, Colombia, Switzerland, Turkey, Finland **Countries income level**: Both HICs and LMICs	Not specified	32	2009–2021	cohort, cross-sectional, descriptive studies, RCT	modified Cochrane risk of bias assessment tool, Newcastle-Ottawa tool, Joanna Briggs Institute assessment	No

Table 2 (continued)

Review	Meta-analysis	NCDs studied	Humanitarian context	Countries/Regions of included primary studies	Date last searched	Number of primary studies included in the review	Publication date range of included primary studies	Design of primary studies included	Quality assessment tool	GRADE use
Daalen et al., 2022 [27]	No	Diabetes	Man-made crises (human conflict, IDP camps, refugees, Civil war), Environmental (drought, food crisis, flooding, COVID-19 pandemic)	Niger, Somalia, Afghanistan, Jordan, Lebanon, Yemen, Palestine, Democratic Republic of Congo, Syria, Cameroon, Uganda, Bangladesh, Ecuador, Mexico, Kenya and Togo. **Countries income level**: LMICs	Not specified	23	2010–2022	randomised control trials, cohort studies, quasi-experimental studies, non-randomised control trials, a cross-sectional study and qualitative study designs using in-depth interviews, focus group discussions or observations.	Joanna Briggs Institute critical appraisal tool	No
Doocy et al., 2023 [32]	No	Multiple NCDs and combined interventions	armed conflict, disease outbreaks and environmental disasters, refugees and internally displaced persons.	Africa, Asia, Middle East, Latin America and the Caribbean, and Europe **Countries income level**: LMICs	2013	269	2013–2021	experimental and quasi-experimental studies, observational studies, mixed-methods studies, economic evaluations	criteria adapted from Cochrane risk of bias tools, criteria adapted from Campbell Collaboration for economic evaluations, an adapted version of a mixed-methods assessment tool developed by Pluye et al.	No
Ghazanchaei et al., 2022 [33]	No	Multiple NCDs and combined interventions	earthquakes, hurricanes, natural and man-made disasters, floods, mass gatherings.	USA, Japan, Iran, Australia, Denmark, Korea, Iraq, Jordan, Canada, Italy **Countries income level**: Both HICs and LMICs	Not specified	42	1997–2019	Systematic reviews, quantitative studies, qualitative studies, cohort, experimental, cross-sectional, longitudinal.	Critical Appraisal Skills Program (CASP)	No
Gorji et al., 2018 [25]	No	Cancer	Earthquake, Tsunami, Hurricane, natural disasters, nuclear accident	Not specified	Not specified	7	2005–2016	Not specified	N/A	No

Table 2 (continued)

Review	Meta-analysis	NCDs studied	Humanitarian context	Countries/Regions of included primary studies	Date last searched	Number of primary studies included in the review	Publication date range of included primary studies	Design of primary studies included	Quality assessment tool	GRADE use
Jaung et al., 2021 [34]	No	Multiple NCDs and combined interventions	armed conflict, earthquake, tsunami, tropical cyclone, hurricane	Democratic Republic of Congo, Mali, Jordan, Myanmar, Philippines, Syria, Turkey, Lebanon, West Bank, Iraq, Gaza Strip, Nepal, Pakistan, China, India **Countries income level**: LMICs	01/Nov/2020	45	2000–2019	Mixed methods design, cohort studies, cross-sectional studies, qualitative investigations, case studies, randomized control designs	The Mixed Methods Appraisal Tool (MMAT)	No
McGowan et al., 2020 [28]	No	Diabetes	Armed conflict	Occupied Palestinian Territory (OPT), Haiti, DRC, Afghanistan **Countries income level**: LMICs	03/Apr/2019	5	2011–2019	quasi-experimental longitudinal study, retrospective longitudinal studies, a cross-sectional, case study, qualitative studies	Quality in Qualitative Evaluation framework and the NIH Quality Assessment Tool for Observational Cohort and Cross-sectional Studies	No
Mohamed et al., 2024 [22]	No	Cancer	Somali immigrants and refugees	Somalia **Countries income level**: LMICs	Not specified	8	2013–2021	randomized controlled trials and non-randomized studies	RoB 2: A revised Cochrane risk-of-bias tool for randomized trials and risk of bias in non-randomized studies-of interventions (ROBINS-I)	Yes
Racine et al., 2023 [21]	Yes	Cancer	Muslim refugee and immigrant women	United States of America, Israel, Turkey, and Jordan **Countries income level**: Both HICs and LMICs	Not specified	14	2010–2020	quasi-experimental, randomized clinical trials, and longitudinal retrospective study	Critical Appraisal Skills Programme (CASP)	No
Ruby et al., 2015 [9]	No	-Cardiovascular diseases -Diabetes	armed conflict, earthquake, refugee settings	Afghanistan, Georgia, India, Jordan, and Turkey **Countries income level**: LMICs	Not specified	8	1997–2014	RCT, observational studies, cohort, case series, interrupted time series	Newcastle-Ottawa Quality Assessment Scale (NOS) and Cochrane Risk of Bias Tool	No

Table 2 (continued)

Review	Meta-analysis	NCDs studied	Humanitarian context	Countries/Regions of included primary studies	Date last searched	Number of primary studies included in the review	Publication date range of included primary studies	Design of primary studies included	Quality assessment tool	GRADE use
Shah et al., 2020 [35]	No	Multiple NCDs and combined interventions	women and children in conflict settings	Thailand, Turkey, Jordan, Lebanon, Iraq, Syria, Palestine, Sudan, Mali, DRC, Nepal, Pakistan, India **Countries income level**: LMICs	Not specified	27	1997–2018	Observational studies, Mixed methods, Case Study, RCT	N/A	No
Siddiq et al., 2020 [26]	No	Cancer	Muslim refugee women	USA **Countries income level**: HICs	Not specified	20	2002–2019	qualitative studies, quasi-experimental studies, prospective analyses, Intervention studies	Critical Appraisal Skills Program (CASP) and a tool developed by Fowkes and Fulton	No
Song & Lee, 2021 [29]	No	Diabetes	Refugees, IDPs and host communities in LMICs	Jordan, Iraq, Lebanon, Syria, Palestine (Gaza Strip, West Bank), Democratic Republic of Congo (DRC), Thailand, and Malaysia **Countries income level**: LMICs	July 2020	19	2014–2020	cohort studies, cross-sectional studies, qualitative studies, field reports, mixed-methods, quasi-experimental studies, randomised controlled trial (RCT)	Newcastle Ottawa Quality Assessment Scale (NOS), Cochrane collaboration's tool, Risk of Bias in Non-randomised studies of intervention tool (ROBINS-I), Mixed Methods Appraisal Tool (MMAT), Critical Appraisal Skills Programme (CASP)	No

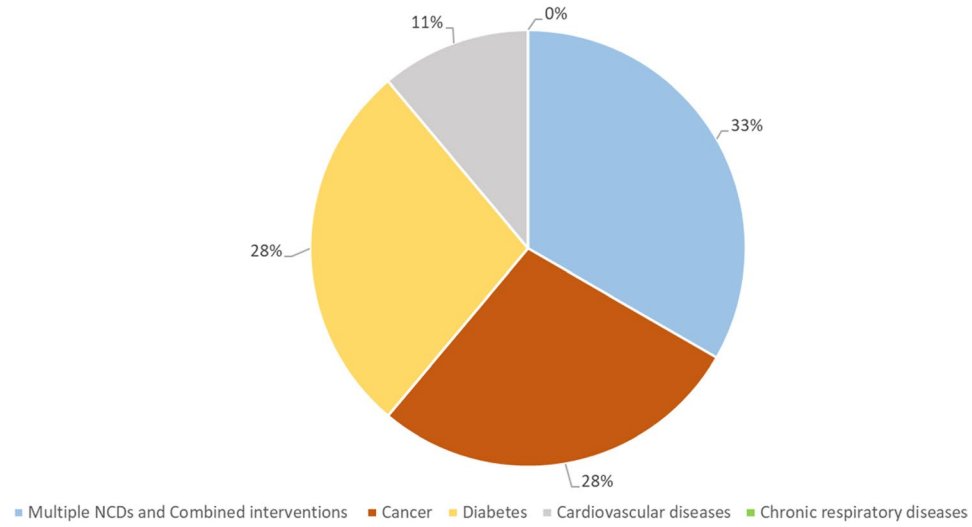

Fig. 2 Types of NCDs studied in the included systematic reviews ($n=16$)

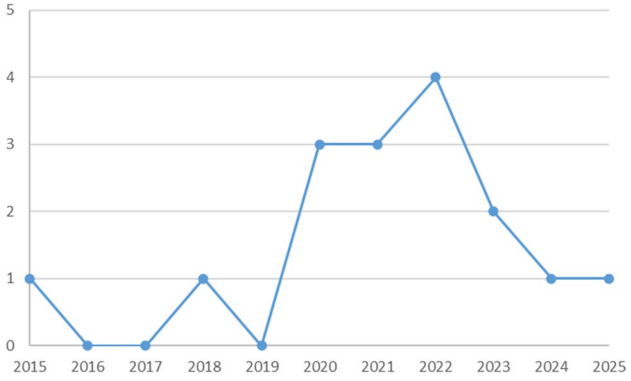

Fig. 3 Number of published systematic reviews per year ($n=16$)

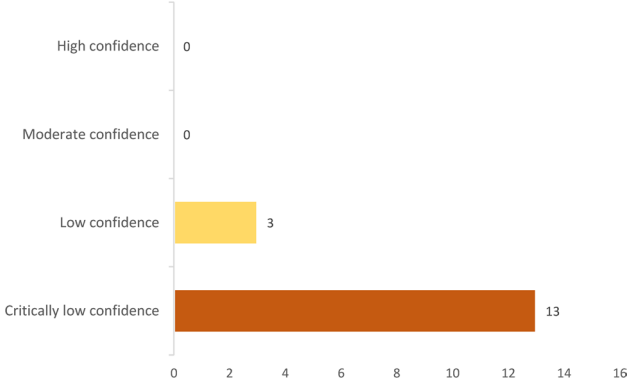

Fig. 4 Overall AMSTAR 2 Rating

self-care. It emphasized the importance of quick establishment of health clinics after disasters and improving access to care by providing medications and blood pressure measuring devices. One primary study in this systematic review underscored the significance of strengthening buildings before earthquakes to reduce the risk of CVDs. The systematic review also discussed the potential benefits of electronic health records in enhancing CVD control during emergencies. Additionally, it identified some challenges in managing CVDs, such as the lack of access to medications and BP monitors due to destruction, as well as the physical and mental stress experienced after disasters [23].

The systematic review by Ruby et al. reported findings from one primary study that highlighted a successful heart failure disease management program in a war setting [9]. Another primary study in this systematic review indicated that electronic medical records (EMR) can aid in cohort monitoring of hypertension patients. The systematic review found no studies that examined the implementation costs or cost-effectiveness of interventions [9] (Table 3).

Cancer

Five systematic reviews focusing on cancer were included in our overview [21, 22, 24–26]. Breast cancer was the most frequently studied type, being included in all five systematic reviews. One systematic review examined cancer care during both natural and man-made disasters [25]. It highlighted the importance of disaster preparedness plans to ensure patients and caregivers are well-prepared and to maintain continuity of care. This involves establishing clear guidelines for cancer care in disasters, ensuring effective communication, patient education, and community capacity building. Outreach interventions like mobile clinics can improve access to cancer care. Additionally, electronic medical databases can preserve patient history and treatment information during and after disasters. Challenges to managing cancer exist as disaster response often prioritizes treating the injured and caring for displaced individuals [25].

Table 3 Key findings of systematic reviews addressing cardiovascular diseases ($n = 2$)

Review	Type of NCDs	Type of interventions	Intervention Target	Outcomes reported	Key Findings
Babaie et al., 2021 [23]	myocardial infarction (MI), acute coronary syndrome (ACS), hypertension (HTN), arrhythmia such as atrial fibrillation (AF), ventricular tachycardia (VT), ventricular fibrillation (VF), and paroxysmal supraventricular tachycardia (PSVT), pulmonary edema, and heart failure (HF)	medication and non-medication measures, stress control, establishment of health clinic, providing access to medications and BP measuring device, electronic health records	Prevention of NCDs, management of NCDs, health system strengthening	prevalence of CVDs, incidence of CVDs, access to services	-Measures for stress control, rapid establishment of clinics, and providing access to medication and treatment are effective in managing CVDs in disasters. -Electronic health records are helpful for controlling CVDs in emergencies.
Ruby et al., 2015 [9]	Hypertension, Heart Failure	heart failure disease management programme, HTN care using EMR system	Management of NCDs	HTN and HF clinical measures, health services and medication usage	-Heart failure disease management program can be successful in conflict settings. -Electronic medical records (EMR) can be helpful for cohort monitoring of hypertension patients. The intervention had mixed clinical results. -No studies examined implementation costs or cost-effectiveness of interventions.

Four systematic reviews examined cancer screening interventions, highlighting the effectiveness of culturally and religiously tailored approaches [21, 22, 24, 26]. Several interventions were found to improve adherence to cervical cancer screening, including home HPV tests, educational workshops for women, and educational sessions for general practitioners [22]. Involving community members and religious leaders was found to be particularly effective in improving screening rates among refugee populations [21, 22, 26]. Educational interventions can motivate women and enhance their knowledge regarding cancer screening [21, 22, 24, 26]. Additionally, patient navigator interventions can facilitate and improve access to cancer screening [21, 22, 24, 26].

Barriers to cancer screening included factors such as limited proficiency in English, inadequate knowledge about cancer and screening, lack of access to transportation to healthcare facilities, and stigma or other cultural factors [26] (Table 4).

Diabetes

Five systematic reviews focused on diabetes in humanitarian emergencies [9, 24, 27–29]. One systematic review highlighted the effectiveness of combining health education with conditional cash transfers for controlling diabetes, based on findings from one primary study [27]. Another systematic review reported that mobile clinics can be more effective than fixed facilities for diabetes control in humanitarian emergencies [28]. Additionally, Ruby et al. suggested that clinical algorithms can enhance treatment outcomes in refugee settings, and electronic medical records can improve cohort monitoring and patient retention [9].

The systematic review by Bitterfeld et al. focused on interventions for refugees in the United States [24]. The authors presented results from one group visit program at a community health center and a video education intervention, but neither led to a decrease in A1C levels. The authors also reported findings from a primary study on a pharmacist-run clinic intervention, which resulted in medication changes and a decrease in the average A1C levels among refugees [24].

One systematic review reported that mHealth interventions for diabetes, such as educational SMS messages, can be cost-effective and beneficial [29]. Task shifting can also be effective and affordable in humanitarian emergencies. Similarly, electronic medical records, community-based interventions, lifestyle modifications, psychosocial support, and provision of glucometers can have positive impacts on diabetes management [29]. Identified barriers included inadequate drug supplies, out-of-pocket expenses, the complexity of insulin therapy, and poor physician adherence to guidelines [29]. Challenges specific to mHealth interventions included technical issues as well as language and literacy barriers [29] (Table 5).

Multiple NCDs and combined interventions

Six systematic reviews provided general findings on interventions for NCDs or discussed interventions that targeted multiple NCDs [30–35]. One systematic review highlighted the success and cost-effectiveness of electronic medical records (EMR) and primary care programs [30]. Moreover, capacity building, clinical guidelines and practice recommendations, and training of healthcare workers and refugee populations were noted as crucial measures to address NCDs. This systematic review also identified various barriers to the implementation of interventions, including financial, logistical, organizational, sociocultural, and security-related challenges [30].

Table 4 Key findings of systematic reviews addressing cancer ($n=5$)

Review	Type of NCDs	Type of interventions	Intervention Target	Outcomes reported	Key Findings
Bitterfeld et al., 2025 [24]	Breast cancer and cervical cancer	patient navigator programs, education (video intervention)	Prevention of NCDs	Mammography screening completion rate, Cervical Cancer Knowledge and Screening Awareness and Intentions.	-Patient navigator programs improved breast cancer screening rates among refugee women. -The video educational intervention improved cervical cancer screening knowledge and awareness.
Gorji et al., 2018 [25]	Breast cancer, Head and neck cancer, other types of cancer	Outreach Programs, Patient education, Mobile Clinics, scheduled pickup and drop-offs at local sites	Management of NCDs	access to health services	-Comprehensive disaster preparedness plans are needed to ensure the continuity of cancer care. -Both patients and caregivers should be prepared to better respond to disasters. -Patient education, mobile clinics and electronic medical databases can improve access to and continuity of cancer care during and after disasters.
Mohamed et al., 2024 [22]	Cervical cancer, colorectal cancer, breast cancer	Educational interventions and workshops, home HPV test, Patient navigator intervention	Prevention of NCDs, capacity building	screening adherence rate	-Home HPV tests, educational workshops for women, and patient navigator interventions were effective in increasing cancer screening. -Educational workshops can motivate women and improve their knowledge. -Religiously tailored educational materials and involving religious leaders in interventions can increase adherence to cancer screening.
Racine et al., 2023 [21]	Breast cancer	education-based interventions, access-focused interventions, cultural and faith-based interventions	Prevention of NCDs	breast self-examination, clinical breast examination, mammogram screening rates	-Meta-analysis results on educational interventions for breast cancer screening showed a mean difference of −0.40 [−0.70; 0.00] ($p>0.05$), yet this difference is not significant. -Meta-analysis results indicated that patient navigator interventions improved breast cancer screening using both clinical breast examination (CBE) (WMD 4.58%, 95% CI 0.35–8.8) and mammography (WMD 6.62, 95% CI 1.21–12.03). -Cultural, community-based, faith-based, and religious-tailored interventions improved cancer screening.
Siddiq et al., 2020 [26]	Breast cancer, cervical cancer, and colorectal cancer	educational programs, peer navigators	Prevention of NCDs	screening rate, knowledge and intent to screen, Barriers and facilitators to screening	-Community-based and culturally appropriate health education improves knowledge and cancer screening rates. -Interpreters, peer navigators, and community-based refugee-serving organizations can facilitate screening interventions. -Barriers to screening include language barriers, lack of knowledge, stigma, and limited access to transportation.

Findings from a systematic review suggested that Electronic Health Records (EHRs) can enhance hypertension and diabetes management among displaced populations by improving monitoring and ensuring provider adherence to clinical guidelines [31]. The systematic review identified barriers to software development, including infrastructure issues, associated costs, and patient literacy. It also highlighted issues in EHR deployment and challenges in data entry and analysis [31]. Facilitators included interlinking with other systems, customizing apps, and consulting with providers for improved software design [31].

One systematic review mapped health interventions in humanitarian emergencies and found that diabetes and hypertension were the most commonly studied NCDs [32]. Primary care provision was the most prevalent intervention, followed by education and eHealth interventions [32]. Studies focusing on health systems and service delivery commonly reported interventions to improve diabetes and hypertension management and quality of care at primary healthcare centers [32].

One systematic review underscored the significance of pre-disaster strategies and preparedness plans in ensuring the continuity of care and effective management of NCDs during disasters [33]. These strategies included training healthcare workers and patients ahead of disasters, community-level preparedness efforts, establishment of evacuation plans, and ensuring the availability of necessary equipment and medication [33].

A systematic review conducted by Jaung et al. focused on examining models of care for hypertension and diabetes within humanitarian emergencies [34]. The authors developed a conceptual framework to describe and compare various models of NCD care. Primary care services delivered by physicians were the most common model of care [34]. Few primary studies addressed aspects such as financing and governance, health policy, and the effectiveness and costs of interventions. Barriers to NCDs

Table 5 Key findings of systematic reviews addressing diabetes ($n = 5$)

Review	Type of NCDs	Type of interventions	Intervention Target	Outcomes reported	Key Findings
Bitterfeld et al., 2025 [24]	Diabetes	group visit program at a community health center, culturally and linguistically tailored video message, pharmacist-run clinic	Management of NCDs	A1C values, Confidence and motivation, Frequency of pharmacy interventions	-Neither the group visit program nor the video education intervention led to a decrease in A1C. -The pharmacist-run clinic intervention resulted in medication changes and a decrease in the average A1C levels among refugees.
Daalen et al., 2022 [27]	Diabetes (type 2)	combined health education and conditional cash transfers (CCT) intervention	Management of NCDs	medication adherence, blood glucose self-monitoring, haemoglobin A1C (HbA1C) levels, Body Mass Index (BMI)	-The combined health education and conditional cash transfers (CCT) intervention programme was effective for diabetes control.
McGowan et al., 2020 [28]	Diabetes (type 2)	Diabetes Comprehensive Care Model (DCCM) delivered via a mobile diabetes care team (mobile clinic)	Prevention of NCDs, Management of NCDs	relevance/appropriateness, efficiency, and effectiveness (defined as comparative improvements in various indicators of glycemic control), Mortality/Morbidity	-Mobile diabetes clinics were associated with improved diabetes control compared to treatment in fixed facilities.
Ruby et al., 2015 [9]	Diabetes	Standardized DM algorithm, cohort monitoring using EMR in refugee context	Management of NCDs	DM clinical measures, health services utilization, adherence to care, incidence/prevalence of DM	-The use of clinical algorithms can improve treatment outputs in refugee settings. -Electronic medical records can improve cohort monitoring and patient retention. -No studies examined implementation costs or cost-effectiveness of interventions.
Song & Lee, 2021 [29]	Diabetes (type 1 and type 2)	mHealth tools, lifestyle interventions, Community-based activities, Provision of glucometers, Task shifting in care, Mental health and psychosocial support (MHPSS), Multidisciplinary approaches	Prevention of NCDs, Management of NCDs	Glycaemic control, diabetes clinical measures, patients' knowledge and behaviors, adherence to treatment, Cost-effectiveness, Facilitators and barriers	-mHealth can improve diabetes care in humanitarian settings. Educational SMS messages were a cost-effective intervention. -Electronic medical records can improve diabetes monitoring and management. -Community-based interventions can improve patient engagement. -Lifestyle interventions and provision of glucometers can help in controlling diabetes. -Task shifting is effective and affordable. -Psychosocial support can improve diabetes care. -Barriers include insufficient drug supply, out-of-pocket cost, the complexity of insulin therapy and low adherence to guidelines.

management included the absence of guidelines, limited routine data collection, as well as financial and cultural barriers [34].

Another systematic review addressing interventions for women and children in conflict settings reported that screening and medication for cardiovascular disease and diabetes were the most frequently studied interventions [35]. Additionally, interventions for NCDs were often delivered by doctors. This systematic review did not identify any studies that examined the effectiveness of interventions among women or children. Barriers to intervention delivery included limited population access and logistical challenges [35]. Using technology, training healthcare workers, and implementing multidisciplinary approaches were highlighted as facilitators for delivering NCD interventions [35] (Table 6).

Chronic respiratory diseases

No systematic reviews focusing on chronic respiratory diseases were identified in our overview.

Summary of intervention effects

In addition to presenting findings by NCD category, we summarized the direction of effect across interventions. Table 7 presents the direction of the effect and quality of evidence for interventions targeting NCDs in humanitarian emergencies. The direction of effect indicates whether systematic reviews reported desirable (+), undesirable (−), or mixed/inconclusive (±) impacts. A desirable effect reflects a beneficial impact on NCD management, an undesirable effect reflects a lack of benefit, and a mixed/inconclusive effect reflects inconsistent or unclear findings across studies.

Table 6 Key findings of systematic reviews addressing multiple NCDs and combined interventions ($n=6$)

Review	Type of NCDs	Type of interventions	Intervention Target	Outcomes reported	Key Findings
Asgary et al., 2022 [30]	Cardiovascular disease, cancer, diabetes	web-based/mobile health strategies, pharmacy-level interventions, portable imaging, capacity building, staff training, forging collaborations, guideline development, point-of-care labs, field hospitals, mobile clinics, health promotion activities, EMR, and monitoring interventions.	prevention of NCDs, management of NCDs, capacity building	NCD detection rate, incidence of NCDs, mortality/morbidity outcomes, healthcare utilization, access to care, cost-effectiveness, feasibility of interventions, barriers to interventions	-EMR and web-based approaches can be effective for managing NCDs. -Primary prevention strategies can decrease the incidence of NCDs. -Capacity building interventions are important to address NCDs. -Barriers to implementation were financial, logistical, or organizational.
Buford et al., 2022 [31]	Hypertension and diabetes	Electronic Health Records (EHR)	prevention of NCDs, management of NCDs, health system strengthening	markers of disease severity (blood pressure and haemoglobin A1c, HbA1c), access to care and continuity of care, adherence to guidelines and delivery mechanisms, morbidity and mortality of NCDs, facilitators and barriers to implementation	-EHRs can improve health outcomes of displaced populations. Yet, there are barriers to software design, implementation, and data analysis.
Doocy et al., 2023 [32]	diabetes, hypertension, cardiovascular disease, respiratory health, cancer	primary care provision, health education, mobile/eHealth, medication management, community-based interventions, mobile/outreach, school-based and self-care interventions	Prevention of NCDs, management of NCDs, and health system strengthening	Characteristics of included studies	-Diabetes and hypertension were the most common NCDs in the included studies. -Primary care provision was the most common intervention.
Ghazanchaei et al., 2022 [33]	cardiovascular disease, respiratory disease, diabetes and cancer	Patient Education, Community-level emergency preparedness, Developing effective communication channels and collaboration, Emergency program for NCD patients	Management of NCDs	Patient outcomes and access to care	-Comprehensive preparedness plans are needed to ensure continuity of NCD care during disasters.
Jaung et al., 2021 [34]	Hypertension and diabetes	Models of care for hypertension and diabetes, mobile clinics, primary care, education, mobile messages	Prevention of NCDs, management of NCDs, health system strengthening, capacity building	Patient and system outcomes	-The most common model was primary care interventions for hypertension and diabetes, delivered by physicians. -Few studies discussed financing and governance, health policy, as well as interventions' effectiveness and costs.
Shah et al., 2020 [35]	Cardiovascular disease, diabetes, cancer, respiratory disease	Inpatient facility-based interventions, Outpatient interventions, Outreach Interventions, Community-based Interventions	prevention of NCDs, Management of NCDs	Characteristics of intervention delivery, Barriers to and facilitators of NCD intervention delivery	-Screening and medication for cardiovascular disease and diabetes were the most common interventions. -Limited access and logistical challenges were identified as key barriers.

Discussion

NCDs pose unique challenges in humanitarian emergencies, where resources are scarce and health services are often disrupted. This overview examines systematic reviews of public health interventions targeting NCDs in humanitarian emergencies to provide guidance for practice and decision-making. Our overview included 16 systematic reviews that met our eligibility criteria. All of the included systematic reviews had critical weaknesses according to AMSTAR 2, with 13 of them rated as "critically low confidence" and 3 systematic reviews rated as "low confidence". A range of interventions was identified across the included systematic reviews, such as EHRs, health education, primary care services, capacity building, mobile clinics, and community-based programs. Nonetheless, significant barriers were prevalent, including financial constraints, logistical challenges, lack of transportation, language and literacy barriers, as well as stigma and other cultural factors.

Among the various interventions, EHRs and digital interventions were commonly discussed across all NCD groups, highlighting their potential to enhance the monitoring and management of NCDs in humanitarian emergencies [9, 23, 25, 29–31]. These findings are consistent with another recent scoping review that highlighted a promising role for digital health interventions in fragile

Table 7 Summary of direction of effect for NCD interventions

Intervention	Study	NCD category	Effect	AMSTAR 2 rating
Electronic health records	Asgary et al., 2022 [30]	Multiple NCDs	+	Critically low confidence
	Babaie et al., 2021 [23]	Cardiovascular diseases	+	Critically low confidence
	Buford et al., 2022 [31]	Multiple NCDs	+	Critically low confidence
	Gorji et al., 2018 [25]	Cancer	+	Critically low confidence
	Ruby et al., 2015 [9]	Cardiovascular diseases	±	Critically low confidence
	Ruby et al., 2015 [9]	Diabetes	+	Critically low confidence
	Song & Lee, 2021 [29]	Diabetes	+	Critically low confidence
Educational interventions	Bitterfeld et al., 2025 [24]	Cancer	+	Critically low confidence
	Bitterfeld et al., 2025 [24]	Diabetes	-	Critically low confidence
	Daalen et al., 2022 [27]	Diabetes	+	Low confidence
	Gorji et al., 2018 [25]	Cancer	+	Critically low confidence
	Mohamed et al., 2024 [22]	Cancer	+	Critically low confidence
	Racine et al., 2023 [21]	Cancer	±	Critically low confidence
	Siddiq et al., 2020 [26]	Cancer	+	Critically low confidence
Patient navigator programs	Bitterfeld et al., 2025 [24]	Cancer	+	Critically low confidence
	Mohamed et al., 2024 [22]	Cancer	+	Critically low confidence
	Racine et al., 2023 [21]	Cancer	+	Critically low confidence
	Siddiq et al., 2020 [26]	Cancer	+	Critically low confidence
Religiously and culturally tailored interventions/Community-based interventions	Mohamed et al., 2024 [22]	Cancer	+	Critically low confidence
	Racine et al., 2023 [21]	Cancer	+	Critically low confidence
	Siddiq et al., 2020 [26]	Cancer	+	Critically low confidence
	Song & Lee, 2021 [29]	Diabetes	+	Critically low confidence
Mobile clinics/Outreach	Babaie et al., 2021 [23]	Cardiovascular diseases	+	Critically low confidence
	Gorji et al., 2018 [25]	Cancer	+	Critically low confidence
	McGowan et al., 2020 [28]	Diabetes	+	Low confidence
Primary care	Asgary et al., 2022 [30]	Multiple NCDs	+	Critically low confidence
	Bitterfeld et al., 2025 [24]	Diabetes	+	Critically low confidence
	Song & Lee, 2021 [29]	Diabetes	+	Critically low confidence
Preparedness plans	Ghazanchaei et al., 2022 [33]	Multiple NCDs	+	Critically low confidence
	Gorji et al., 2018 [25]	Cancer	+	Critically low confidence
Capacity building	Asgary et al., 2022 [30]	Multiple NCDs	+	Critically low confidence
Clinical algorithms	Ruby et al., 2015 [9]	Diabetes	+	Critically low confidence
mHealth tools	Song & Lee, 2021 [29]	Diabetes	+	Critically low confidence
Task shifting	Song & Lee, 2021 [29]	Diabetes	+	Critically low confidence

(+) = Desirable effects reported

(–) = Undesirable effects reported

(±) = Mixed or inconclusive effects

states and conflict settings [36]. In systematic reviews focusing on cancer, culturally-tailored interventions and the involvement of community members and religious leaders were particularly emphasized, especially for improving cancer screening [21, 22, 26]. This aligns with previous studies that have indicated that religiously-tailored health messages and collaborations with religious authorities can promote healthy behaviors and behavioral change [37]. Similar findings from another systematic review also showed benefits of community participation in humanitarian healthcare responses, namely improving health outcomes of conflict-affected populations, increasing access to care, and ensuring quality and sustainability of services [38].

Primary care interventions were also frequently reported in several systematic reviews, underscoring their critical role in delivering accessible care for NCDs in emergency contexts [21–23, 25, 26, 29, 30, 32, 34, 35]. This supports the WHO's recommendations to integrate NCDs into primary healthcare to promote equity and sustainability in low-resource settings [13]. Strengthening and training the primary care workforce is therefore crucial to ensure continuous care and high-quality service delivery [39, 40]. Additionally, task-shifting presents a promising and cost-effective strategy for managing

NCDs, particularly in addressing shortages of healthcare personnel and resources [39, 41]. Mobile clinics were also identified in our overview as a strategy to expand outreach and service delivery for NCD care [25, 28]. Previous systematic reviews have shown that mobile clinics can improve vaccination coverage in humanitarian contexts by reaching marginalized populations [42]. Their use in NCD programming could similarly enhance access to primary care and continuity of treatment, particularly in hard-to-reach or unstable environments.

Our overview revealed substantial gaps in the current body of evidence on this topic. In fact, it was challenging to formulate recommendations for effective interventions due to the low quality of all the included systematic reviews based on the AMSTAR 2 quality assessment. Similar observations were made in another overview of systematic reviews that examined research on NCDs in the Eastern Mediterranean region, and reported that the majority of the included reviews (83.2%; 74 out of 89) were rated as low quality using AMSTAR [43]. This low quality raises concerns about the strength of the evidence base currently informing policies and programs for NCDs in humanitarian emergencies. In such contexts, decisions based on low-certainty evidence may lead to ineffective or unsustainable interventions. It is important to note that not all systematic reviews in our overview were of uniformly low quality. The overall AMSTAR 2 rating is determined by the presence of weaknesses in critical domains [20]. For instance, the three systematic reviews that were rated as "low confidence" had a single critical weakness, which was the absence of a list of excluded studies, while they met the criteria for all other critical domains.

Furthermore, our overview did not identify any systematic reviews focusing on chronic respiratory diseases. This underscores the need for future systematic reviews to synthesize primary studies in this category of NCDs in humanitarian emergencies, given the high burden of respiratory conditions in conflict-affected and displaced populations, as well as the impacts of conflict on chronic respiratory diseases like asthma [44–46]. Additionally, the lack of evidence on the costs and cost-effectiveness of interventions is concerning, due to the financial constraints often faced in such settings with limited resources. This is particularly important as the majority of systematic reviews in our overview focused on LMICs. This representation was expected given that 77% of all NCD deaths occur in LMICs [1]. It also helps explain why many reported interventions may face added financial and logistical challenges.

As LMICs continue to be disproportionately affected by both NCDs and humanitarian emergencies, this calls for reflection beyond the four major NCDs. The Lancet Non-Communicable Diseases and Injuries (NCDI) Poverty Commission has highlighted the large burden of neglected conditions that disproportionately affect the poorest populations [47]. These include neurological disorders, musculoskeletal diseases, mental and substance use disorders, and various injuries, among others [47]. Such conditions are often underrepresented in research and global policy agendas but contribute substantially to health inequities. Future research and policy efforts should therefore consider this broader spectrum of NCDIs to ensure comprehensive and equitable health interventions in humanitarian and resource-limited settings.

Strengths and limitations

To our knowledge, this is the first overview of systematic reviews on this topic. We implemented a comprehensive search strategy, and we had no restrictions on language, geographic area, or publication year, ensuring inclusion of all relevant studies. We also followed well-established guidelines while adhering to transparent methods throughout the review process [15].

Despite its strengths, our overview has some limitations. Due to significant heterogeneity in the interventions and reported outcomes across the included systematic reviews, it was not possible to perform a comparative analysis of intervention types or to compare the effectiveness of interventions across different reviews. This limited our ability to draw conclusions about the relative effectiveness of specific interventions. As a result, our narrative synthesis presents findings segregated by NCD category, with the goal of mapping out the general trends and key insights across the systematic reviews.

The inclusion of overlapping systematic reviews may have introduced bias in the results, as the same primary studies might be included in multiple systematic reviews. Future overviews with a narrower scope, such as those focusing on specific NCDs, interventions, or populations, may wish to address overlap by re-extracting and re-analyzing data from primary studies. Additionally, all the included systematic reviews scored low on quality assessment, which may affect the reliability of the overall conclusions.

Furthermore, we did not search grey literature sources, which might have led to the exclusion of potentially relevant systematic reviews. Lastly, our overview was limited to four types of NCDs, while other non-communicable diseases like mental health disorders were excluded from our analysis.

Conclusions

This overview of systematic reviews identified various interventions and strategies to address NCDs in humanitarian emergencies. Several financial, logistical, and cultural barriers were also reported. A notable finding was

the overall low quality of the systematic reviews on this topic. Future systematic reviews should prioritize rigorous methods and transparent reporting. In addition, more studies are needed to assess the cost-effectiveness of interventions. Moving forward, strengthening health systems and building community capacity are vital for preventing and controlling NCDs in times of emergencies. Interventions should be culturally sensitive and address potential financial and cultural barriers to ensure equitable access to care. At the policy level, more efforts should be made to integrate NCD prevention and management into primary care and humanitarian response frameworks. Enhanced coordination and partnerships among humanitarian agencies, governments, affected communities, and other stakeholders are also needed to ensure a comprehensive response to NCDs during emergencies.

Abbreviations

AMSTAR 2	A Measurement Tool to Assess Systematic Reviews
CVDs	Cardiovascular diseases
EHR	Electronic Health Records
HICs	High-income countries
IDPs	Internally displaced people
LMICs	Low- and middle-income countries
NCDs	Non-communicable diseases
PEN	Package of Essential Noncommunicable Disease Interventions
PRIOR	Preferred Reporting Items for Overviews of Reviews
UNHCR	United Nations High Commissioner for Refugees
WHO	World Health Organization

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

Supplementary Material 5.

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Authors' contributions

AA was responsible for the study concept, design, and writing of this manuscript. FEJ and LBK were responsible for the study concept, design, and supervision. AA and NC contributed to the screening of articles, data extraction, and quality assessment. DIW contributed to updating the search, including screening and extraction of new articles, as well as manuscript review. All authors read and approved the final manuscript.

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Data availability

All data generated or analyzed during this study are included in this published article and its supplementary information files. The data extraction sheets can be found in [Supplementary Material 4].

Declarations

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Not applicable.

Consent for publication

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Competing interests

The authors declare no competing interests.

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