

## Health management in war and post-war crises: A systematic review of global evidence for emerging priorities for applied research

### Abstract

**Aims:** Armed conflicts and post-conflict crises severely disrupt health systems, exacerbate health inequities, and undermine service delivery. This study aimed to systematically review global evidence on health management in war and post-conflict settings and to identify emerging priorities for applied research and policy guidance.

**Materials & Methods:** This systematic review was conducted in accordance with the PRISMA 2020 guidelines. A comprehensive search was performed in PubMed/MEDLINE, Scopus, and Web of Science for peer-reviewed studies published between 2015 and 2025. Quantitative, qualitative, and mixed-method studies examining health management interventions, strategies, and system-level responses in war and post-conflict contexts were included. Study selection and data extraction were independently conducted by two reviewers. Of the 900 records identified, 87 studies met the inclusion criteria.

**Findings:** The findings indicate that health management in war and post-conflict crises is structured around nine interrelated domains: health policy and governance; healthcare service delivery; mental health and psychosocial support; health of vulnerable populations; health information systems and digital technologies; health economics and equity; health workforce education and capacity-building; health system resilience and reconstruction; and legal, ethical, and humanitarian frameworks.

**Conclusion:** Effective health management in war and post-conflict settings requires integrated, adaptive, and evidence-based approaches that address both immediate humanitarian needs and long-term system recovery. Strengthening crisis-oriented health governance, investing in resilient service delivery models, prioritizing mental health and vulnerable populations, and leveraging digital health innovations should constitute key priorities for future research and policy action.

**Keywords:** War, post-war, Crises, Health management, priorities

## Introduction

Armed conflicts, as one of the most complex challenges facing health systems in the contemporary century, not only result in direct human casualties but also leave profound and long-lasting effects on population health through the destruction of health infrastructure, disruption of pharmaceutical and medical supply chains, and erosion of the health workforce(1). Over the past two decades, the nature of armed conflicts has undergone significant transformation; modern wars increasingly occur in urban and densely populated areas, deliberately target civilians, and systematically devastate essential infrastructure, including healthcare facilities(2, 3). These developments have rendered health management in wartime conditions markedly more complex and challenging.(4)

According to a recent report by the World Health Organization, more than 70% of war-related mortality results from disruptions in the delivery of essential health services rather than direct combat injuries(5, 6). This statistic underscores that the impacts of armed conflicts on health indicators extend far beyond acute trauma and manifest through the collapse of primary care systems, the resurgence of preventable diseases, the exacerbation of the burden of non-communicable diseases, and the emergence of long-standing psychosocial crises (7-9). A study published in *The Lancet* demonstrates that in countries experiencing prolonged conflict, health indicators may take decades after the cessation of hostilities to return to pre-war levels (10).

The health consequences of armed conflicts can be examined at three levels: the first level includes direct effects such as war-related trauma, injuries, and disabilities. The second level encompasses indirect effects, including disruptions in access to primary healthcare, maternal and child health services, and disease prevention and control programs. The third level comprises structural consequences, including the destruction of health systems, the loss of human capital, and the weakening of health governance. These three interrelated layers form a vicious cycle that requires multilayered and integrated interventions to be effectively broken (11-14).

Despite the expansion of studies in this field over the past decade, the existing literature suffers from methodological fragmentation. This fragmentation not only impedes the development of effective policies but also complicates the comparison and synthesis of findings. Moreover, the significant gap between academic research and the practical needs of conflict settings has resulted in many real-world interventions lacking the necessary effectiveness and sustainability. Humanitarian organizations are often forced to act based on practical experience with insufficient scientific grounding, while academic research frequently remains confined to scholarly publications without translating into practice.

One of the main challenges in this field lies in the dynamic and evolving nature of contemporary conflicts. Modern wars are characterized by prolonged duration, asymmetric tactics, intentional targeting of healthcare facilities, and the deployment of new weaponry. These characteristics have transformed health management in war settings into a domain that requires continuous reassessment and up-to-date knowledge.

Using a systematic review methodology, this study seeks to synthesize and critically analyze existing evidence and to propose a comprehensive, structured framework for health management during war and post-conflict crises. The primary goal of this research is to identify emerging research priorities in this domain and to develop a roadmap to guide future applied research, To serve as an efficient tool for policymakers, health system managers, and humanitarian organizations in designing evidence-based and impactful responses under the most critical circumstances.

## Materials and Methods

### - Search strategy and selection criteria

This study is a systematic review conducted and reported in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The purpose of this review was to examine and synthesize existing evidence on health management in war and post-conflict crises. The research question was defined using the PICOS (Population, Intervention, Comparator, Outcomes, Study design) framework:

Population: Communities and human groups affected by war and post-conflict crises

Intervention: Strategies and interventions related to health management (physical, psychological, social, and organizational)

Comparator: Absence of intervention or alternative interventions (when applicable)

Outcomes: Improvement in physical and mental health, rehabilitation, strengthening of the health system, equity in access, health resilience, and related outcomes

Study design: Quantitative, qualitative, and mixed-method studies

Data were collected through a systematic search of leading international scientific databases, including PubMed/MEDLINE, Scopus, and Web of Science (WoS).

The search strategy was developed using a combination of keywords and relevant MeSH terms. The search strategy included the following:

TS= ( "Health Management" OR "Healthcare Management" OR "Health Services Management" OR "Health Services Administration" OR "Health Policy" OR "Health Planning" OR "Health System\*" OR "Healthcare System\*" OR "Medical Services" OR "Health Governance" ) AND ( "War" OR "Warfare" OR "Armed Conflict\*" OR "Military Medicine" OR "Combat Zone\*" OR "Battlefield\*" OR "Post-Conflict" OR "Wartime" OR "War-related" OR "Post- Armed Conflict\* Health Crisis" OR "Post- war Health Crisis")

Inclusion criteria:

English-language studies that examined health management in war and post-conflict crises between 2015 and 2025; quantitative, qualitative, and mixed-method studies; original research articles published in reputable journals with full-text availability.

Exclusion criteria:

Articles focusing solely on short-term war outcomes without addressing the post-conflict phase; articles without full-text access; non-scientific studies or those lacking a clear methodological framework.

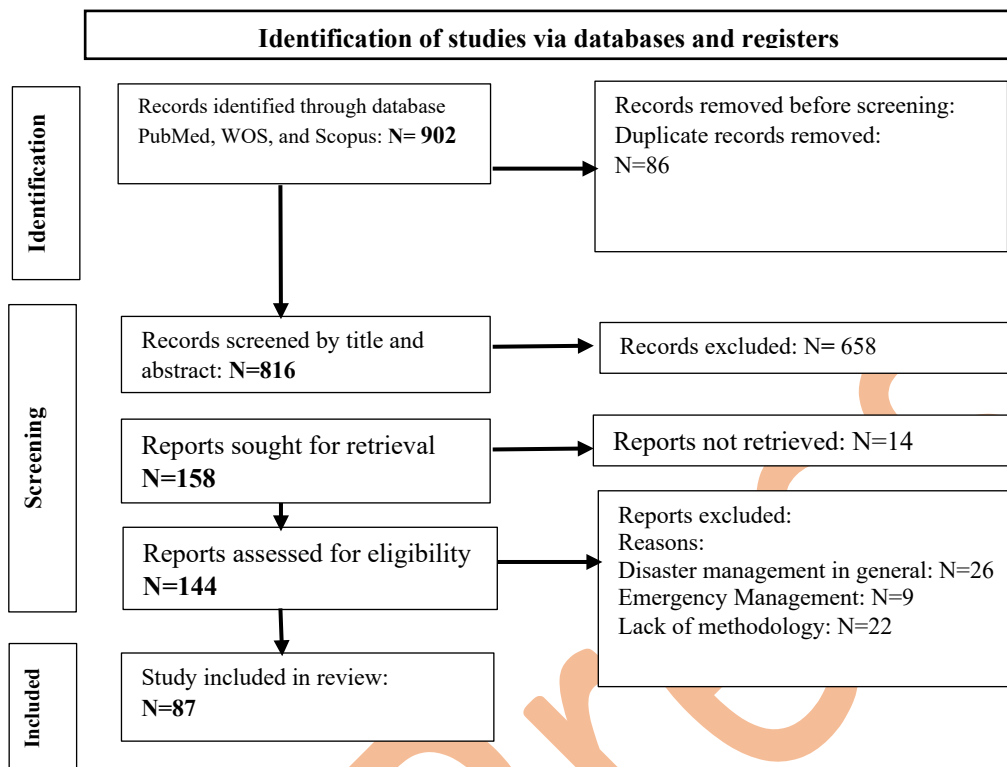
- **Data Analysis**

The data analysis process was conducted in three stages:

- Stage 1: Screening and Selection of Studies
  - ✓ The screening process was carried out independently by two researchers in three steps:
  - ✓ Screening of titles and abstracts
  - ✓ Full-text review of eligible studies
  - ✓ Resolution of disagreements through consultation with a third researcher
  - ✓ EndNote X9 software was used to manage references and remove duplicates.
  - ✓ Out of a total of 900 initially identified studies, 87 studies met the inclusion criteria and were selected for the review.
- Stage 2: Data Extraction

Data were extracted using a standardized extraction form developed by the research team. Extracted information included:

- ✓ Bibliographic characteristics of the study (author, year of publication, country)
- ✓ Study design and methodology
- ✓ Study population and research context
- ✓ Type of health intervention and management strategies (if applicable)
- ✓ Measured outcomes and main findings



**Fig. 1:** Process of screening and selection reviewed studies with PRISMA flow diagram

### Ethical considerations

As a systematic review, this study does not require direct consent, but all ethical considerations were met in citing sources and transparent reporting.

### Result

The findings indicate that the collapse or severe weakening of health governance is a recurring pattern across all geographical regions (15-20). Disruptions in policy formulation, fragmented leadership, lack of coordination among key actors (governments, military structures, and humanitarian organizations), and breakdowns in pharmaceutical and medical supply chains directly undermine service delivery capacity and lead to inefficient resource allocation during crises (15, 18, 21-32). These findings underscore the critical need for pre-established, flexible, and conflict-sensitive health governance mechanisms capable of sustaining core system functions during war and facilitating recovery in the post-conflict phase (27, 33-44).

Also table 1 highlights the dual burden faced by health systems: a sharp increase in demand for emergency and trauma care, coupled with the collapse of routine and preventive services, including immunization, maternal and child healthcare, and continuity of care for non-communicable diseases (45-51). These patterns have significant operational implications, emphasizing the necessity of adaptive service delivery models such as field hospitals, mobile clinics, surge capacity planning, and the strategic strengthening of primary healthcare as the backbone of wartime service provision (52-59).

The findings related to mental health and psychosocial interventions reveal a consistently high prevalence of psychological disorders and point to the relative effectiveness of community-based and digitally enabled interventions (60-67). From an implementation standpoint, these results suggest that integrating mental health services into primary healthcare packages and leveraging low-cost digital

platforms can enhance system responsiveness and coverage in resource-constrained and insecure environments(20, 32, 63, 68, 69).

Evidence concerning the health of vulnerable populations indicates that women, children, older adults, and persons with disabilities disproportionately bear the health consequences of armed conflict(19, 60, 67, 70-73). Operationally, this necessitates targeted programming, explicit prioritization in resource allocation, and continuous monitoring of equity indicators to prevent the widening of health disparities during and after conflict (74-77).

Table 1 further demonstrates that health information systems and digital technologies play a compensatory role in maintaining service continuity during conflict (26, 75, 78-81). However, challenges related to data quality, interoperability, cybersecurity, and infrastructure sustainability impose substantial operational constraints (62, 63, 82-85). Finally, findings from the domains of health economics, health workforce development, system resilience, and legal and ethical frameworks collectively indicate that fragmented or short-term interventions are insufficient. Sustainable impact requires integrated, evidence-based strategies aligned across all system components (64, 86-91).

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**Table 1. Coding framework and Summary of the key findings from the included studies**

Categories	Subcategories	Middle East (Yemen, Syria, Iraq, Palestine, Iran)	Africa (Congo, Uganda, Adamawa , Sudan, Sierra Leone, Bamako, Somalia, Liberia , Bougainville Ethiopia/Tigray)	Europe/Asia (Ukraine, Israel, Pakistan, Afghanistan, Denmark, Timor-Leste, Norway, Vietnam, Myanmar)	America/Other (United States, Colombia , Canada)	Outcome
<b>Health Policy and Strategic Governance</b>	<ul style="list-style-type: none"> <li>• Intersectoral coordination</li> <li>• Resource allocation and prioritization</li> <li>• Pharmaceutical supply chain governance</li> <li>• Health financing in crises</li> <li>• Surveillance of war-related diseases and injuries</li> <li>• International legal and policy challenges</li> </ul>	(10, 33, 39, 49, 51, 56, 58, 84, 88)	(19, 22, 30-32, 34, 35, 42, 43, 60, 73, 76, 78, 91, 94)	(20-25, 27-29, 36-38, 40, 41, 44, 77, 83, 92, 93)	(15-18, 68, 82, 90)	<ul style="list-style-type: none"> <li>• Systematic erosion of health governance structures during armed conflict leads to fragmented decision-making, weakened policy authority, and the absence of unified leadership across governmental, military, and humanitarian actors.</li> <li>• Disruptions in pharmaceutical and medical supply chains, combined with the destruction of regulatory and logistical infrastructures, critically undermine the continuity and equity of health service delivery.</li> <li>• The lack of pre-established, conflict-sensitive health policies and wartime governance frameworks results in inefficient resource allocation, delayed responses, and reduced system accountability.</li> <li>• Evidence highlights the necessity of adaptive, legally grounded, and intersectoral governance mechanisms capable of sustaining core health system functions during conflict and guiding post-conflict recovery and reconstruction.</li> </ul>

<b>Management of Healthcare Services</b>	<ul style="list-style-type: none"> <li>• Emergency and trauma care</li> <li>• Triage systems and surge capacity</li> <li>• Mobile clinics and field hospitals</li> <li>• Continuity of care for chronic diseases</li> <li>• Epidemic control and vaccination</li> <li>• Access to essential medicines</li> <li>• Strengthening primary healthcare</li> </ul>	(10, 33, 39, 49, 51-59, 61-63, 72, 88, 97)	(19, 30-32, 34, 35, 42, 43, 45, 73, 85, 94, 96)	(20, 24, 27, 29, 36, 37, 40, 41, 46-48, 50, 75, 77, 81, 93)	(15, 17, 18, 82, 90, 95)	<ul style="list-style-type: none"> <li>• Armed conflict imposes a dual burden on health systems, characterized by an overwhelming demand for trauma and emergency care alongside the collapse of routine, preventive, and chronic disease services.</li> <li>• Triage systems, emergency surgical capacity, and referral pathways experience severe operational strain, while access to essential medicines and continuity of care for non-communicable diseases becomes critically constrained.</li> <li>• Disruptions in immunization programs and disease surveillance contribute to the resurgence of vaccine-preventable and communicable diseases, amplifying avoidable morbidity and mortality.</li> <li>• Adaptive service delivery models—such as mobile clinics, field hospitals, surge capacity planning, and the strategic reinforcement of primary healthcare—emerge as essential mechanisms for maintaining service continuity under wartime conditions.</li> </ul>
<b>Mental Health and Psychosocial Interventions</b>	<ul style="list-style-type: none"> <li>• PTSD, anxiety, and depression</li> <li>• Community-based interventions</li> <li>• Integration of mental health into PHC</li> <li>• Digital mental health services</li> <li>• Psychosocial rehabilitation</li> <li>• Long-term mental health impacts</li> </ul>	(10, 49, 52, 56, 61-63, 71, 72)	(32, 60, 64, 66, 69, 85, 89, 94)	(20, 22, 23, 36, 38, 46, 47, 65, 67, 75, 77, 80, 81, 83, 87)	(15-17, 68, 90)	<ul style="list-style-type: none"> <li>• Armed conflict is consistently associated with a high prevalence of post-traumatic stress disorder, anxiety, depression, and prolonged psychological distress among civilians, combatants, and healthcare workers.</li> <li>• Community-based psychosocial interventions demonstrate relative effectiveness in increasing access, acceptability, and cultural relevance of mental health services in insecure and resource-limited settings.</li> </ul>

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						<ul style="list-style-type: none"> <li>Digitally enabled mental health solutions, including tele-counseling, online platforms, and virtual reality-based therapies, show promise in mitigating service disruptions and expanding coverage during conflict.</li> <li>The findings underscore the need for systematic integration of mental health and psychosocial support into primary healthcare and emergency response packages during and after armed conflict.</li> </ul>
<b>Health of Vulnerable Populations</b>	<ul style="list-style-type: none"> <li>Maternal and neonatal health</li> <li>Child health and nutrition</li> <li>Childhood immunization</li> <li>Refugees and internally displaced populations</li> <li>Older adults and persons with disabilities</li> <li>Gender-based violence</li> </ul>	(10, 33, 52, 56-58, 62, 63, 71, 72, 84, 88, 99)	(19, 31, 66, 70, 73, 74, 76, 89, 91, 98)	(22-28, 37, 38, 44, 77, 83, 86, 93)	(15-18, 68, 90)	<ul style="list-style-type: none"> <li>Women, children, older adults, and persons with disabilities disproportionately bear the health consequences of armed conflict due to structural inequities, displacement, and service disruptions.</li> <li>Disruptions in reproductive, maternal, and neonatal health services are associated with increased maternal and neonatal mortality and unsafe delivery practices.</li> <li>Widespread child malnutrition, sharp declines in vaccination coverage, and heightened exposure to sexual and psychological violence are recurrent outcomes across conflict and post-conflict settings.</li> <li>These patterns necessitate targeted, equity-oriented programming, explicit prioritization of vulnerable groups in resource allocation, and continuous monitoring of health</li> </ul>

						equity indicators to prevent long-term disparities.
<b>Health Information Systems and Technology</b>	<ul style="list-style-type: none"> <li>• Health information systems in crises</li> <li>• Disease surveillance and rapid reporting</li> <li>• Telemedicine</li> <li>• Data quality and interoperability</li> <li>• Cybersecurity and data protection</li> </ul>	(33, 51, 52, 55, 57, 62, 63)	(43, 78, 85)	(26, 29, 38, 47, 50, 75, 79-81, 83)	(82, 90, 95)	<ul style="list-style-type: none"> <li>• Health information systems play a compensatory role in maintaining service continuity during conflict by enabling remote care delivery, real-time monitoring, and adaptive decision-making.</li> <li>• The rapid expansion of telemedicine and remote health services partially offsets access barriers caused by infrastructure destruction and population displacement.</li> <li>• However, persistent challenges related to data quality, interoperability, cybersecurity, and digital infrastructure sustainability significantly constrain system effectiveness in crisis settings.</li> <li>• The findings highlight the need for conflict-resilient health information architectures that balance rapid deployment with ethical, legal, and security considerations.</li> </ul>
<b>Health Economics and Equity</b>	<ul style="list-style-type: none"> <li>• Health financing during conflict</li> <li>• Catastrophic health expenditures</li> <li>• Inequities in access to care</li> <li>• Economic impacts of displacement</li> <li>• Health equity</li> </ul>	(51, 55, 71, 72, 75, 84, 88, 99)	(19, 30, 32, 34, 35, 42, 43, 45, 91)	(20, 25, 26, 37, 38, 50, 79, 81, 83, 87)	(15-17, 68, 82)	<ul style="list-style-type: none"> <li>• Armed conflict exacerbates financial vulnerability, resulting in widespread catastrophic health expenditures and increased risk of impoverishment among affected households.</li> <li>• Poverty, forced displacement, and the destruction of healthcare facilities severely restrict equitable access to essential health services.</li> <li>• Existing health financing mechanisms often prove inadequate in absorbing shock-induced demand</li> </ul>

						<p>and sustaining service delivery during prolonged crises.</p> <ul style="list-style-type: none"> <li>• These outcomes emphasize the importance of equity-oriented financing models, crisis-responsive insurance mechanisms, and international financial support to mitigate widening health inequalities.</li> </ul>
<b>Education, Capacity-Building, and Health Workforce Empowerment</b>	<ul style="list-style-type: none"> <li>• Health workforce shortages and migration</li> <li>• Emergency and short-term training</li> <li>• Interprofessional education</li> <li>• Occupational health of health workers</li> <li>• Workforce motivation and sustainability</li> <li>• Ethical challenges for health professionals</li> </ul>	(39, 49, 51, 56, 59, 71, 72, 83, 97, 100)	(32, 64, 69, 91, 94)	(25, 27, 37, 46, 47, 86, 87, 92, 93)	(17, 68, 82, 90, 95)	<ul style="list-style-type: none"> <li>• Armed conflict accelerates health workforce attrition through burnout, forced migration, targeted violence, and deteriorating working conditions.</li> <li>• Severe shortages of trained health personnel compromise service quality, coverage, and system resilience, particularly in frontline and rural areas.</li> <li>• Short-term, context-specific training programs and rapid skill-upgrading initiatives emerge as critical strategies for sustaining frontline service delivery.</li> <li>• Psychological support and occupational health interventions for healthcare workers are essential to maintaining workforce functionality during prolonged conflict.</li> </ul>
<b>Health System Resilience and Reconstruction</b>	<ul style="list-style-type: none"> <li>• Health infrastructure reconstruction</li> <li>• Health system resilience</li> <li>• Hospital surge capacity</li> </ul>	(33, 49, 51, 53, 56, 57, 59, 61, 62, 71, 97)	(34, 42, 43, 45, 66, 78, 85, 89, 96)	(25, 27, 38, 41, 46, 52, 79, 86, 92)	(15-18, 67, 68, 82, 90, 95)	<ul style="list-style-type: none"> <li>• The destruction of health infrastructure represents a major structural barrier to service recovery and long-term system functionality in post-conflict settings.</li> <li>• Health system reconstruction requires sustained investment in infrastructure rebuilding, human</li> </ul>

	<ul style="list-style-type: none"> <li>• Emergency preparedness</li> <li>• International cooperation</li> </ul>					<p>resource recovery, and institutional capacity strengthening.</p> <ul style="list-style-type: none"> <li>• International cooperation and technical assistance play a pivotal role in mobilizing resources and supporting evidence-based reconstruction strategies.</li> <li>• The findings indicate that resilience is not solely a post-conflict objective but must be embedded within pre-conflict preparedness and wartime response planning.</li> </ul>
<b>Legal Frameworks, Ethics, and International &amp; Humanitarian Collaboration</b>	<ul style="list-style-type: none"> <li>• Legal protection of healthcare services</li> <li>• International humanitarian law</li> <li>• Ethics of wartime triage</li> <li>• Humanitarian coordination</li> <li>• Health diplomacy</li> </ul>	(49, 52, 54, 57, 61-63, 71, 72)	(74, 76, 78, 91)	(37, 40, 44, 47, 77, 80, 86)	(68, 90, 95)	<ul style="list-style-type: none"> <li>• Repeated attacks on healthcare facilities and health personnel constitute serious violations of international humanitarian law and systematically undermine health system capacity.</li> <li>• Weak accountability mechanisms and inadequate enforcement of legal protections perpetuate insecurity for both providers and patients.</li> <li>• Ineffective coordination among humanitarian organizations leads to service duplication, coverage gaps, and inefficient use of limited resources.</li> <li>• Ethical dilemmas—including triage under extreme scarcity and the use of emerging technologies in conflict settings—remain insufficiently addressed, highlighting the need for strengthened legal, ethical, and diplomatic frameworks.</li> </ul>

The present thematic tree provides a comprehensive conceptual framework for the field of health management in war and post-conflict crises. It is important to emphasize that the sequence of topics and subtopics within this structure does not reflect any inherent hierarchy or prioritization among them. Rather, this framework is designed solely to facilitate systematic classification and to enhance the understanding of the complexity and multidimensionality of this field. All levels and components of this framework are equally important, interacting dynamically and interdependently to form an integrated, holistic perspective essential for managing health in the face of this major global challenge.

This diagram illustrates that health management in conditions of armed conflict requires a systemic and multi-level perspective, in which policy-making, service delivery, human resources, health technology, health economics, and legal considerations dynamically and reciprocally influence one another. Each branch of this tree represents an independent intervention domain that is nevertheless highly interdependent with the other domains.

For example, the branch of health governance and policy-making functions as the backbone of the system, and its decisions directly affect the efficiency of service delivery, resource allocation, and intersectoral coordination. In the absence of effective governance, even technically sound interventions are likely to fail. The health services management branch emphasizes an operational focus on rapid response, continuity of essential services, and adaptability to resource constraints.

The branches related to mental health, vulnerable populations, and the health workforce demonstrate that the sustainability of the health system is not solely dependent on physical infrastructure, but that human and social capital play a decisive role. From an implementation perspective, this underscores the necessity of simultaneous investment in training, psychological support, and motivation of health personnel.

Furthermore, the inclusion of health technology and health economics branches within this framework indicates that an effective response to wartime crises is not feasible without information tools, data analysis capabilities, and sustainable financing models. Finally, the branch encompassing legal and ethical frameworks and international cooperation serves as a reminder that health management in war is not merely a technical issue, but is deeply intertwined with human rights obligations and health diplomacy. (Table 2)

**Table 2. The Thematic Framework of Health Management in War and Post-Conflict Crises:**

- └─ **1. Health Management in War and Post-Conflict Crises**
  - └─ **1.1. Health Policy and Strategic Governance**
    - └─ 1.1.1. Analysis of Health Governance Structures in Wartime and Post-Conflict Crises
    - └─ 1.1.2. Review of Country Experiences in Developing War-Oriented Health Policies
    - └─ 1.1.3. Feasibility Study on Establishing Health Policy Units for Wartime Management
    - └─ 1.1.4. Analysis of Legal and International Challenges in Wartime Health Management
    - └─ 1.1.5. Evaluation of Intersectoral Coordination (Military, Health System, Red Crescent, etc.)
    - └─ 1.1.6. Study of Resource Allocation Methods Under Wartime Constraints
    - └─ 1.1.7. Examination of Prioritization Models for Wartime Health Services
    - └─ 1.1.8. Analysis of Global Experiences in Managing Pharmaceutical and Equipment Resources
    - └─ 1.1.9. Feasibility Study of Creating a Strategic Database of Critical Health Resources
    - └─ 1.1.10. Analysis of National Policy Responses in Recent Armed Conflicts
    - └─ 1.1.11. Feasibility of Developing a National Plan for Wartime Health Crisis Management
    - └─ 1.1.12. Surveillance Systems for War-Related Diseases and Injuries During and After Conflict
    - └─ 1.1.13. Security and Confidentiality of Health Data During Armed Conflicts
    - └─ 1.1.14. Migration, Displacement, and Their Impacts on Population Health
    - └─ 1.1.15. Evaluation of Health Financing Systems in Wartime
  - └─ **1.2. Management of Healthcare Services**
    - └─ 1.2.1. Study of Rapid Trauma Response Models in Battlefield Conditions
    - └─ 1.2.2. Review of Training and Empowerment of Frontline Personnel for First Aid
    - └─ 1.2.3. Analysis of the Effectiveness of Triage Systems in War
    - └─ 1.2.4. Feasibility Study of Deploying Mobile and Field Hospitals

- └─ 1.2.5. Evaluation of Emergency Surgical Protocols in Resource-Limited Settings
- └─ 1.2.6. Analysis of Epidemic Emergence and Control in War and Post-Conflict Conditions
- └─ 1.2.7. Examination of Consequences of Treatment Disruptions for Chronic Patients
- └─ 1.2.8. Feasibility Study on Digital Health Services for Wartime Patients
- └─ 1.2.9. Evaluation of Emergency Vaccination Interventions
- └─ 1.2.10. Analysis of Disease Surveillance Systems and Post-Conflict Weaknesses
- └─ 1.2.11. Study of Substance Use Disorders and Addiction-Related Issues After War
- └─ 1.2.12. Burden of Cardiovascular Diseases, Diabetes, and Cancer in Post-Conflict Settings
- └─ 1.2.13. Analysis of Access to Non-Communicable and Communicable Disease Services
- └─ 1.2.14. Crisis of Access to Essential Medicines After War
- └─ 1.2.17. Assessment of the Role of Primary Health Care in Strengthening Wartime Health Systems

└─ **1.3. Mental Health and Psychosocial Interventions**

- └─ 1.3.1. Study of Mental Health Among Military Personnel and Civilians
- └─ 1.3.2. Epidemiological Study of PTSD, Anxiety, and Depression Among Survivors, Combatants, and Affected Groups in War and Post-War Phases

- └─ 1.3.3. Examination of Psychological Impacts of War on Children, Women, and Older Adults
- └─ 1.3.4. Feasibility Study on Mobile Mental Health Clinics
- └─ 1.3.5. Evaluation of the Effectiveness of Short-Term Psychosocial Interventions
- └─ 1.3.6. Analysis of Long-Term Mental Health Consequences of War at the Societal Level
- └─ 1.3.7. Study of Social Support Models for War Survivors
- └─ 1.3.8. Analysis of Successful Psychosocial Rehabilitation Experiences
- └─ 1.3.9. Feasibility Study of Telephone/Online Counseling Services in Wartime
- └─ 1.3.10. Design of Community-Based Interventions to Enhance Resilience
- └─ 1.3.11. Review of Post-War Mental Health Services

└─ **1.4. Health of Vulnerable Populations**

- └─ 1.4.1. Study of Women's Health and Reproductive Health in War and Post-Conflict Settings
- └─ 1.4.2. Examination of Challenges in Maternal Care During and After Conflicts
- └─ 1.4.3. Analysis of Access to Safe Delivery Services in Conflict Zones
- └─ 1.4.4. Feasibility Study of Mobile Maternal and Child Health Clinics
- └─ 1.4.5. Analysis of Population-Level Impacts of Disrupted Reproductive Health Services
- └─ 1.4.6. Assessment of Children's Specific Health Needs in Conflict Situations
- └─ 1.4.7. Review of Malnutrition Outcomes and Incomplete Immunization
- └─ 1.4.8. Study of Special Care Needs for Older Adults and People with Disabilities in Wartime
- └─ 1.4.9. Feasibility Study of Vaccination Programs for Vulnerable Populations Post-War
- └─ 1.4.10. Prevalence of Malnutrition Among Children and Mothers During and After Conflict
- └─ 1.4.11. Review of Health Rights of Vulnerable Groups Within International Frameworks

└─ **1.5. Health Information Systems and Technology**

- └─ 1.5.1. Study on Designing a Wartime Health Events Registry System
- └─ 1.5.2. Evaluation of the Efficiency of Rapid Reporting Systems
- └─ 1.5.3. Analysis of Data Quality Under Crisis Conditions
- └─ 1.5.4. Feasibility Study on Developing Conflict-Oriented Managerial Dashboards
- └─ 1.5.5. Evaluation of the Role of Artificial Intelligence in Real-Time Surveillance
- └─ 1.5.6. Assessment of Telemedicine Effectiveness for Wartime Health Services
- └─ 1.5.7. Feasibility Study on the Use of Drones in Pharmaceutical Logistics
- └─ 1.5.8. Evaluation of the Application of Robots and Automated Equipment in Emergency Response
- └─ 1.5.9. Examination of Cybersecurity Infrastructure in Wartime Health Systems
- └─ 1.5.10. Analysis of Ethical and Legal Implications of Health Technologies in War

└─ **1.6. Health Economics and Equity**

- └─ 1.6.1. Cost-Effectiveness Analysis of Wartime Health Services
- └─ 1.6.2. Examination of Health Financing Models in Armed Conflicts
- └─ 1.6.3. Feasibility Study of Crisis Health Insurance
- └─ 1.6.4. Evaluation of Indirect Costs (Disability, Displacement, Migration)
- └─ 1.6.5. Analysis of the Economic Sustainability of Health Systems During War

- └─ 1.6.6. Assessment of Inequities in Access to Health Services in Conflict Settings
- └─ 1.6.7. Human Rights–Based Examination of Access to Health in Wartime
- └─ 1.6.8. Evaluation of Gender Equity in Access to Health Services
- └─ 1.6.9. Analysis of the Role of International Organizations in Reducing Inequities
- └─ 1.6.10. Analysis of Supportive Policies for Vulnerable Populations
- └─ **1.7. Education, Capacity-Building, and Health Workforce Empowerment**
- └─ 1.7.1. Needs Assessment of Health Workforce Training in War
- └─ 1.7.2. Evaluation of the Effectiveness of Short-Term Training for First Responders
- └─ 1.7.3. Analysis of Interprofessional Education (Physicians, Nurses, Paramedics) in Conflict Settings
- └─ 1.7.4. Feasibility Study of Online Education in Wartime Conditions
- └─ 1.7.5. Assessment of the Role of Simulators in Crisis Training
- └─ 1.7.6. Examination of Volunteer Health Workforce Mobilization Models
- └─ 1.7.7. Analysis of Workforce Sustainability in Conflict Zones
- └─ 1.7.8. Study of Motivational and Supportive Policies for Health Workers in Wartime
- └─ 1.7.9. Evaluation of Occupational Health of Frontline Workers
- └─ 1.7.10. Post-War Health Workforce Shortage and Migration
- └─ 1.7.11. Examination of Ethical Challenges Confronting Health Workers in War
- └─ **1.8. Health System Resilience and Reconstruction**
- └─ 1.8.1. Resilience Models for Emergency and Critical Care Systems
- └─ 1.8.2. Reconstruction of Destroyed Health Infrastructure
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- └─ 1.8.4. National Health Drills for Wartime Scenarios
- └─ 1.8.5. Pathology of Health Facility Destruction and Reconstruction
- └─ 1.8.6. National Health Drills for Wartime Scenarios
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- └─ **1.9. Legal Frameworks, Ethics, and International & Humanitarian Collaboration**
- └─ 1.9.1. Examination of International Obligations in Wartime Health
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- └─ 1.9.8. Analysis of WHO and ICRC Experiences in Wartime Health Management
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- └─ 1.9.10. Feasibility Study of Establishing a Regional Network for Wartime Health

## Discussion

This systematic review synthesizes empirical evidence from 87 studies conducted between 2015 and 2025 across various domains of health management during war and post-conflict crises in countries such as Yemen, Syria, Ukraine, Afghanistan, the Democratic Republic of Congo, Ethiopia/Tigray, Somalia, Iran, Iraq, Israel, Colombia, and Sierra Leone ,.... The findings reveal complex and multidimensional challenges and highlight several priority areas for policy-making, practice, and future research.

The results indicate that health management in war and post-conflict crises is structured around nine major thematic domains. In the area of health policy and governance, the collapse or severe disruption of health governance structures during wartime and in the post-conflict period is a consistent finding across all settings—from Yemen and Syria to Ukraine (47, 101, 102). Some studies highlight the fragmentation of health authority, disruptions in the supply chain of essential medicines, and the destruction of infrastructure. Other studies emphasize the absence of coordinated leadership among military, governmental, and humanitarian actors, which often results in inefficient allocation of resources. Experiences from countries such as Somalia and Sudan show that weak governance

exacerbates health inequities, particularly for internally displaced populations (103, 104). Several studies underscore the urgent need for pre-established and flexible health governance frameworks capable of maintaining core functions during conflict and guiding the transition toward post-conflict recovery.

A critical finding in the domain of health service delivery is the dual burden of trauma care and the collapse of routine health services. Studies detail the pressure placed on triage systems and emergency response, (82, 105) studies show sharp increases in vaccine-preventable diseases (such as measles and diphtheria) and infectious diseases (such as malaria and diarrheal illnesses) (106, 107). As shown in studies from Syria and Afghanistan, the management of non-communicable diseases (NCDs), including diabetes, cardiovascular diseases, and cancer, becomes severely disrupted (4, 97). In the South Sudan and Myanmar studies, the reliance on mobile clinics and maintaining the cold chain for vaccines underscores the need for innovative and resilient models of health service delivery (77, 94).

Findings from the mental health and psychosocial support domain indicate high prevalence of PTSD, anxiety, depression, and psychological distress among civilians, military personnel, and combatants (108, 109). A promising finding is the effectiveness of community-based psychosocial interventions and the emerging role of digital tools, such as online counseling and virtual reality therapy, as demonstrated in Israel (particularly for healthcare workers) (81). However, substantial gaps remain in the scalability and long-term sustainability of these interventions, especially in resource-poor settings.

The health of vulnerable populations is addressed in most studies, showing that women, children, the elderly, and individuals with disabilities bear a disproportionate burden of health inequities (110, 111). Evidence from Yemen, Tigray, and the Democratic Republic of Congo indicates increases in maternal and neonatal mortality due to disruptions in reproductive health services (112-114). High rates of child malnutrition and declining vaccination coverage are recurring themes, identified not only during wartime but also as persistent crises in post-conflict periods (6). Moreover, specific groups—survivors of gender-based violence—face unique and often overlooked health challenges requiring targeted interventions (115).

The pivotal role of technology in sustaining health services emerges as a key insight in the domain of health information systems and digital innovation. Studies from Israel highlight the successful use of telemedicine to maintain access to care, including mental health services (38, 81). However, challenges related to data quality, cybersecurity, and digital infrastructure in crisis settings remain significant barriers (116). The potential of artificial intelligence for disease surveillance and drones for logistics, though promising, requires further operational research in conflict contexts (117).

The domain of health economics and equity reveals that war leads to catastrophic health expenditures and deepening inequalities (118). Studies from Sierra Leone and Iraq document how households suffer severe financial hardship or bankruptcy due to healthcare costs (45, 99). Access to healthcare is severely affected by poverty, displacement, and the destruction of health facilities, creating profound inequities (119). The economic sustainability of health systems during war and post-conflict periods is also threatened (120).

Another key finding concerns the systemic crisis in health workforce training and capacity-building. Studies report high levels of burnout, migration, and targeted attacks against healthcare workers, this results in severe shortages of personnel, particularly in rural and conflict-affected regions (91, 121). There is a clear need for short-term, practical training for frontline workers as well as strong psychological support mechanisms for the health workforce (122, 123).

The theme of health system resilience and recovery emphasizes that rebuilding health systems requires long-term commitment to restoring destroyed infrastructure and recovering human resource capacities (124). Studies stress the importance of international cooperation in providing financial resources and technical assistance (125, 126). However, recovery efforts are often disrupted by ongoing insecurity and political instability, as seen in Syria (97). Ultimately, strengthening health systems prior to conflict serves as the foundation for post-conflict resilience (121).

Within the domain of legal, ethical, and international cooperation frameworks, a consistent and serious finding is the widespread violation of international humanitarian law, characterized by repeated attacks on healthcare facilities and personnel, that the lack of accountability for such attacks remains a major challenge (127, 128). Furthermore, ineffective coordination among humanitarian organizations often

leads to duplication of services or inadequate coverage of populations in need. Ethical dilemmas—such as triage decisions during resource scarcity or providing care to individuals with substance use disorders—are insufficiently addressed by existing guidelines (80, 127). Field evidence from Myanmar specifically demonstrates that displaced children under five years of age have been deprived of essential vaccinations. This deprivation is not only a humanitarian crisis but also a direct violation of the Geneva Conventions, which mandate the provision of essential healthcare for civilians—particularly children—during armed conflict (77). In such cases, ineffective and delayed cooperation among international organizations has played a major role in perpetuating the crisis.

### **Conclusion**

The findings of this systematic review clearly identify significant knowledge gaps and areas requiring urgent research in health management during war and post-conflict crises. These findings directly serve as a roadmap for future research. The results indicate that managing health in war and post-conflict settings requires a fundamental transformation in policy and operational approaches. Health systems in these environments face multidimensional and interlinked challenges that can only be addressed through integrated and proactive strategies. Designing health resilience frameworks, developing unified surveillance systems, strengthening the health workforce, and expanding digital health services are key research priorities in this field.

At the operational level, strengthening primary healthcare, implementing targeted interventions for vulnerable groups, and establishing rapid crisis response systems are essential. At the macro level, developing standardized health governance protocols for crisis settings, ensuring adherence to international obligations, and creating innovative financing models form the essential foundations for rebuilding health systems. Together, these measures can enhance health system resilience and ensure equitable access to healthcare services even under the most challenging conditions.

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