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Exploring The Global Public Health Impacts of Armed Conflict: A Systematic Review

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Abstract

Armed conflicts are catastrophic disasters that significantly impact human health and well-being. Current research on the long-term and indirect health effects of armed conflicts is insufficient, and it often overlooks the unique health requirements of vulnerable populations, such as women, children, the elderly, and those with disabilities. This systematic review aims to investigate these impacts and identify the distinct health requirements of at-risk groups. Following the PRISMA guidelines, a systematic review was conducted on studies published in English from 2019 to 2024. We searched databases like Scopus, Science Direct, PubMed, and Google Scholar using PICO framework. The quality of the included studies was assessed using the JBI appraisal tool. A total of 22 studies met the inclusion criteria, highlighting the notable public health consequences of armed conflicts. Among the included publications, 19 were quantitative studies and three were qualitative studies. Six themes categorized these impacts: health effects, disruptions and shortages in healthcare infrastructure and services, disruptions in food security and malnutrition, environmental health effects, humanitarian crises and displacement, and long-term health outcomes and resilience. The synthesis of existing literature highlights the importance of robust mental health support frameworks, enhanced healthcare access, and integrated recovery strategies that consider social, cultural, political, and environmental factors. Future research should focus on including non-English studies and improving longitudinal data collection to better understand and address the public health impacts of armed conflicts, informing effective policy and practice.

Keywords: Armed Conflict; Public Health Consequences, Systematic Review

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Introduction

Armed conflicts remain one of the most catastrophic disasters to human beings, with devastating effects on people's health and well-being. War is a tragic occurrence that violates the rights of humans. According to the Uppsala Conflict Data Program (UCDP), an armed conflict occurs when two parties, one of which is the government of a state, use military force against each other, resulting in at least 25 battle-related deaths per year (Żakowska, 2020). Geneva Conventions 1949 and Additional Protocols classified armed conflict into two types, which are international armed conflict (IAC) between two or more states, including belligerent occupation, and non-international armed conflict (NIAC) between a State and non-State armed groups. These are commonly referred to as civil wars (Milanovic & Hadzi-vidanovic, 2012). International humanitarian law specifically exists to govern and regulate conduct in armed conflict. International Humanitarian Law (IHL) and International Human Rights Law (IHRL) are vital in defending human lives, health, and dignity from various perspectives. IHL and IHRL are intertwined in the evolution of international law, to safeguard human rights and dignity (Ashri, 2019).

Armed conflicts have affected many countries worldwide, including Afghanistan, Ethiopia, the Democratic Republic of the Congo, Syria, Ukraine, and most recently reported in Gaza. The worldwide landscape of armed conflict has changed progressively over the last few decades. Modern conflicts are predominated by complex sociopolitical processes and extended periods of instability (Badanta et al., 2024). The health implications of these conflicts are serious and diverse.

While there is extensive research on the immediate and long-term health implications of armed conflicts, the existing knowledge is insufficient regarding the long-term and indirect health effects of armed conflicts, especially for the post-conflict disease burden, which includes mental health disorders, chronic diseases, malnutrition, and reproductive health challenges. Furthermore, current research frequently fails to provide a targeted examination of vulnerable populations, including women, children, the elderly, and those with disabilities, resulting in broad conclusions that overlook their unique health requirements. This systematic review seeks to thoroughly investigate the long-term and indirect health impacts resulting from armed conflicts. Furthermore, it aims to pinpoint the distinct health requirements of at-risk groups, including women, children, the elderly, and those with disabilities— tackling the existing research gap. This review synthesizes existing literature to emphasize essential areas for public health intervention and to guide evidence-based policies aimed at alleviating the long-term health consequences of armed conflicts.

Methods

Search Strategy

The research questions and objectives for this systematic review were formulated using the PICO (Population, Interest, Context, Outcome) framework. PICO Framework is a common tool for developing clear and well-defined research questions (Tawfik et al., 2019). The search strategy for this study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards (Tawfik et al., 2019). The electronic search utilised the following search terms: Boolean operators (AND, OR), which were used to combine search terms effectively. Search strategy based on a combination of the following terms was used ("armed conflict" OR "warfare" OR "civil war") AND (“public health implications” OR “health effect” OR “public health consequences”). A systematic search was conducted in

electronic databases such as Scopus, Science Direct, PubMed, and Google Scholar. Keywords related to armed conflict, warfare, public health consequences, public health impact were used to identify relevant studies. The reference lists of included studies and relevant systematic reviews were manually searched for additional articles. Grey literature, including government reports, technical reports, conference proceedings, and policy briefs, was also considered to enhance the dataset.

Inclusion and Exclusion Criteria

The inclusion criteria for this systematic review encompass studies published in English from 2019 to 2024, focusing on the overall public health consequences of armed conflicts on civilian populations, the environment, food security, and healthcare access and delivery. Additionally, grey literature, facility-based data, and reports from international organizations were included to ensure comprehensive coverage of the topic. The exclusion criteria for this review included reviewed articles in the form of systematic, scoping, or narrative reviews, as well as books or conference abstracts. Studies without full text, those covering multiple disasters including natural and other man-made disasters, were also excluded to maintain a focused analysis on armed conflicts specifically. Furthermore, articles with a critical appraisal standard of quality below 70% were excluded to ensure the inclusion of high-quality studies.

Quality Assessment

These studies evaluated the risks of bias, sample representativeness, the validity of outcome measures, and the generalizability of the results. Quality appraisal for the finalized article done by 2 appraisers using the Joanna Briggs Institute (JBI) Critical Appraisal tool for quantitative and qualitative studies (Lockwood et al., 2015). Each article was assessed using a pre-defined items checklist, with each item assigned a score of “yes,” “no,” “unclear,” or “not applicable”. A score of 1 point was assigned for each criterion marked as “yes,” while other scores were assigned a value of zero. The scores for each article were then calculated and summed. They are then categorised into “low”, “moderate” and “high” quality. Only studies with a score more than 70 % are termed as high quality and included in this study.

Data Extraction and Data Synthesis

The titles and abstracts of the retrieved publications were evaluated for eligibility using the inclusion criteria. Full-text papers that met the eligibility requirements were assessed, and data was extracted using a standard format. The data synthesis summarized key results comprising the author, year of publication, conflict zone, the population affected, size of sample, and findings of the articles (see Table 2). To identify the recurring consequences of armed wars on public health, a thematic approach was adopted.

Results

Among the included publications, 19 were quantitative studies and three were qualitative studies. Included in the quantitative studies were four cohort studies and 15 cross-sectional studies. The data from these studies is heterogeneous and collectively, they provide a body map of the public health consequences by armed conflict. Articles searched were high indexed article from PubMed, Scopus and Science Direct and Google Scholar. Fig. 1 illustrates the study selection process. The PRISMA flow diagram guided the conduct of this study, which involved four stages: identification, screening, eligibility, and inclusion. The initial database search identified 777 articles; after removing duplicate records and abstracts from conferences

and books, 658 articles remained. The articles were screened based on their titles and abstracts. The full-text review included 117 articles in total.

Among these studies, nine articles were excluded due to their reviewed paper status, 20 articles were excluded due to their lack of standard sampling, 22 articles were excluded for not analyzing the effects of war on public health, 10 articles were excluded for lacking data on the number of affected individuals, 24 articles were excluded for failing to meet the study's objectives, and 10 articles had a low critical appraisal score. The study ultimately included 22 articles.

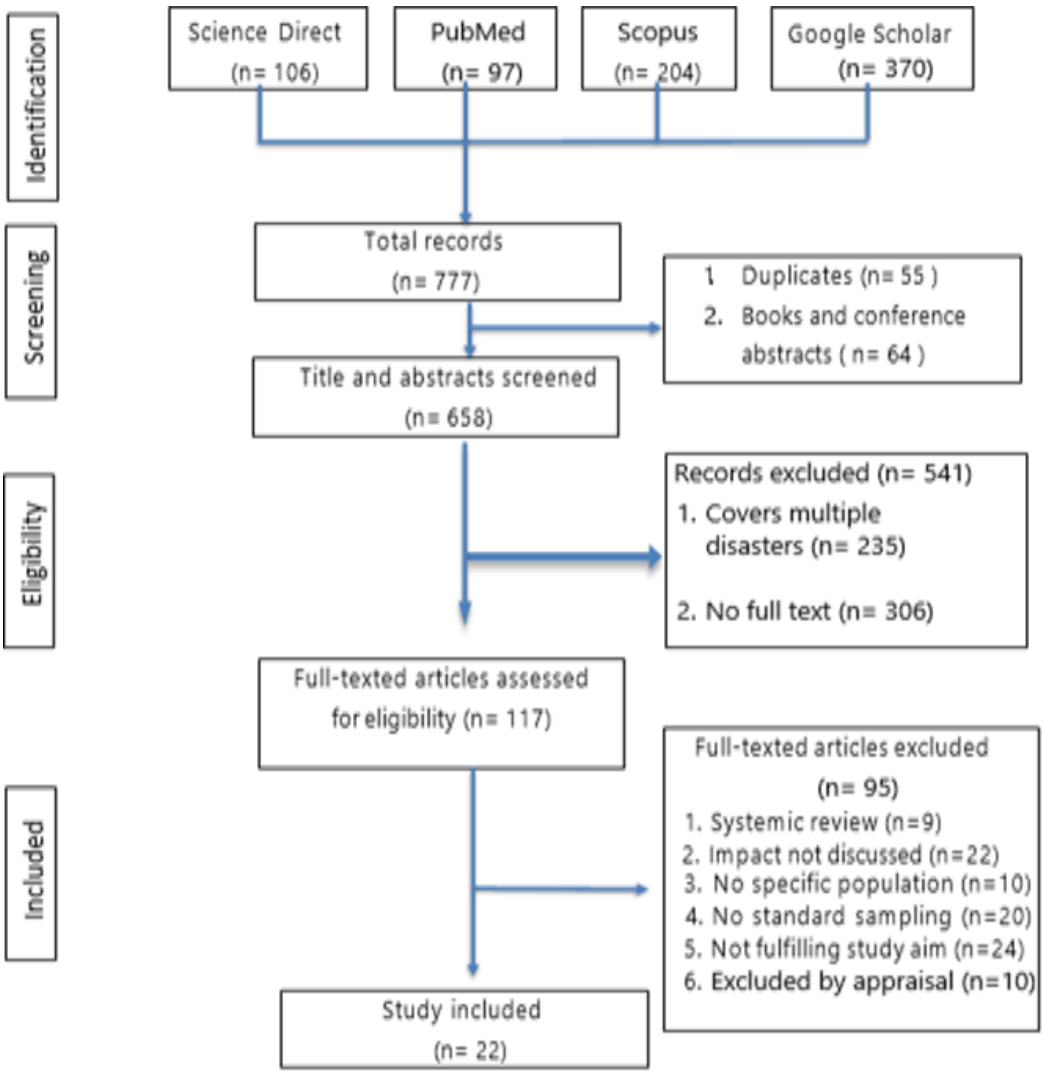

Figure 1: Flow Chart of Included Studies

Table 1 provided information on the author(s), year of publication, study source, study design, and JBI critical appraisal. This table helped summarizes the characteristics of the included studies. Findings from included articles are summarized in Table 2.

Table 1: Study characteristics of the reviewed literature

No	Author (year)	Database Source	Study Design	JBI Critical Appraisal
1	(Tarabay & Golm, 2024)	Science Direct	Cross-Sectional	No strategy for confounding factors, but met all other review criteria
2	(Smeeth et al., 2023)	PubMed	Cross-Sectional	Unclear on participants status at the beginning if the study and no strategies described to address incomplete follow up. Met all other criteria.
3	(Haas & Ramirez, 2022)	Google Scholar	Cohort	Unclear on participants status at the beginning if the study and no strategies described to address incomplete follow up. Met all other criteria.
4	(Haque et al., 2022)	Scopus	Cross-Sectional	No strategy for confounding factors but met all other review criteria.
5	(Belew et al., 2023)	Scopus	Cross-Sectional	Comply all Criteria
6	(Zhang et al., 2023)	Scopus	Cohort	Unclear on participants status at the beginning if the study and no strategies described to address incomplete follow up. Met all other criteria.
7	(Rawers et al., 2024)	Science Direct	Cross-Sectional	Comply all Criteria
8	(Goliaei et al., 2023)	Scopus	Qualitative	No statement locating the researcher culturally or theoretically and the influence of the researcher on the research not addressed
9	(Dwanyen et al., 2024)	Science Direct	Qualitative	Comply all Criteria
10	(Rahman et al., 2024)	Science Direct	Cross-Sectional	Unclear measurement of the exposure
11	(Kakaje et al., 2022)	Scopus	Cross-Sectional	Unclear strategy for confounding factors but met all other review criteria.

12	(Piotrowicz et al., 2022)	Scopus	Cross-Sectional	Comply all criteria
13	(Malytska et al., 2024)	Science Direct	Cross-Sectional	Comply all criteria
14	(Rudolfsen et al., 2024)	Google Scholar	Cross-Sectional	Comply all criteria
15	(Boos et al., 2022)	PubMed	Cohort	Unclear on follow up completion. Met all other criteria
16	(Fisseha et al., 2023)	Scopus	Cross-Sectional	Comply all criteria
17	(Rzońca et al., 2024)	Science Direct	Cross-Sectional	Comply all criteria
18	(Kassaye et al., 2023)	Scopus	Cross-Sectional	Comply all criteria
19	(Arage et al., 2023)	Google Scholar	Qualitative	No statement locating the researcher culturally or theoretically and the influence of the researcher on the research not addressed
20	(Lushchak et al., 2024)	Scopus	Cross-Sectional	No strategy for confounding factors but met all other review criteria.
21	(Béné et al., 2024)	Science Direct	Cross-Sectional	No strategy for confounding factors but met all other review criteria.
22	(Ruhnke et al., 2024)	Science Direct	Cross-Sectional	Comply all criteria

Table 2: Summary of Included Articles

No	Author	Conflict Zone	Population	Sample Size, N	Findings
1	(Tarabay & Golm, 2024)	Lebanon	Lebanese parent and adult offspring who had experienced the Lebanese civil war	220	Results showed an interaction effect between parents' war exposure intensity and their perceived social support. War exposure predicted psychopathology for parents with moderate (B= 2.00, SE=.54, t = 3.74, p < .001, 95% CI [.94, 3.07]) and high levels of social support (B = 3.02, SE =.78, t = 3.86, p < .001, 95% CI [1.47, 4.57])
2	(Smeeth et al., 2023)	Syria	Syrian refugee children and adolescents aged 6 to 18 years	1,591	Hair cortisol concentrations were linked to war-related events in children and adolescents, especially those aged 12 and above. This represents a 0.32% increase in HCC for each point on the PTSD symptom scale, equivalent to a 17.7% increase in HCC In comparison, the same model estimates females to have 72.5% higher HCC than males.
3	(Haas & Ramirez, 2022)	Europe	Older European cohorts aged fifty and above who had experienced war during their childhood years.	19,181	The findings conclude that there is a significant association between war exposure and a profound lifetime risk of cardiovascular disease, diabetes, high cholesterol, and hypertension.
4	(Haque et al., 2022)	Ukraine	People of Ukraine	24,000	The Russia-Ukraine war caused 5552 civilian deaths and 8513 injuries in Ukraine. The war has destroyed homes, schools, roads, bridges, and healthcare facilities in 21 cities resulting in interruptions to healthcare services. The increase in infectious diseases such as HIV/AIDS, tuberculosis, and COVID-19 cases further creates health challenges with medication shortages. The war poses risks of exposure to toxic chemicals, radiation, and air pollution.
5	(Belew et al., 2023)	North Gondar, Northwest Ethiopia	Pregnant and lactating mothers	1,560	The study showed that over 34.3% of pregnant and lactating women in war-affected areas are severely malnourished.

6	(Zhang et al., 2023)	Chad, the Central African Republic (CAR), the Democratic Republic of Congo (DRC), and the Republic of Iraq.	Women aged 15-49 years	55,683	Women in conflict-affected regions faces challenges in accessing comprehensive maternal and child health services, including limitations in sustaining ANC8+ throughout pregnancy due to security issues, collapse of the medical system, and unsustainability of health assistance.
7	(Rawers et al., 2024)	Syria	Displaced Syrian refugee in Turkey	593	The study identified three latent trauma classes among Syrian refugees in Turkey: multiple traumas, war and human suffering, and low exposure, combat-exposed.
8	(Goliaei et al., 2023)	Afghanistan	Afghan refugee families in the San Joaquin Valley, California	24	Afghan refugees face challenges: religious practices, financial difficulties, language barriers, limited transportation access, and lack of culturally specific food items can further exacerbate food insecurity.
9	(Dwanyen et al., 2024)	Liberia	Liberian refugees in the U.S	20	War-affected Liberian refugees are experiencing unresolved traumatic stress, engaging in substance use as a coping mechanism, and mental health stigma, which could act as a barrier to seeking and accessing mental health services. The long-term effects of war trauma and resettlement have disrupted community dynamics, leading to challenges in functioning and cohesion.
10	(Rahman et al., 2024)	Myanmar	Forcibly Displaced Myanmar Nationals (Rohingya)	679	The study found that 66.42% of the refugee camp's population was infected with scabies, indicating a significant burden of scabies infection among the FDMNs in Cox's Bazar with individuals aged 19–36 and those over 55 exhibiting the highest prevalence rates.
11	(Kakaje et al., 2022)	Syria	Secondary school students in Syria	1,369	Study found that 53% of the students suffered from PTSD, 62% of the students experienced problematic anger, 46% reported fair or worse general health and 61% of the students had moderate or severe mental health issues. War-related stressors were associated with negative habits like cigarette and shisha smoking. War exposure was found to have significant impact on PTSD, anger, and health-related quality of life (HRQL).
12	(Piotrowicz et	Ukraine	Older Ukrainian	109, 985	The study highlighted the expected increase in burden of diseases such as hypertension,

	al., 2022)		refugees, defined as aged 55 years or older		myocardial infarctions, strokes, and tuberculosis among older Ukrainian refugees, necessitating assessment, medications, and active screening for these conditions.
13	(Malytska et al., 2024)	Ukraine	Analyzing the effects of hostilities on tropospheric NO2 levels in Ukraine	-	The crisis in Ukraine has had a mixed effect on NO2 emissions, with localized rises in NO2 levels in conflict-affected areas as a result of fires linked to the conflicts and a decrease in industrial emissions as a result of economic interruptions.
14	(Rudolfsen et al., 2024)	Ukraine	Ukrainian citizens aged 18-55 residing in settlements	1,081	The study shows that Ukrainians experienced food insecurity that is one in every three people, indicating a significant proportion of the population is affected by armed conflict and experiencing food insecurity. Geographical proximity to violence also played a crucial role in determining food insecurity.
15	(Boos et al., 2022)	Afghanistan	Male adult UK combat veterans (UK-Afghanistan War 2003–2014)	1,144	The study highlighted that CRTI was associated with an increased prevalence of MetS and arterial stiffness. Factors such as age, injury severity (New Injury Severity Score), physical activity, and socioeconomic status also influenced cardiovascular risk in individuals with CRTI.
16	(Fisseha et al., 2023)	Tigray, Northern Ethiopia	Women of reproductive age (15–49 years)	5,171	Studies found that 43.3% of women experienced gender-based violence. Among them 9.7% of the women faced sexual violence, 28.6% experienced physical violence, and 40.4% underwent psychological violence. 82.2% of sexual violence cases were rape, with 68.4% gang-raped. Young women aged 15-24 years were predominantly affected by sexual violence. Common issues: physical trauma, STIs, HIV, unwanted pregnancy, depression.
17	(Rzońca et al., 2024)	Ukraine	Ukrainian civilian physicians and paramedics	435	The study showed that more physicians than paramedics met the criteria for PTSD according to the ICD-11 diagnostic rule (5.1% of physicians vs. 1.2% of paramedics). More physicians than paramedics met the criteria for anxiety disorders (16.5% of physicians vs. 10.0% of paramedics). The criteria for depression were met by 14.5% of participants.
18	(Kassaye et al., 2023)	North East Ethiopia	Adult residents of Woldia town in	597	Prevalence of PTSD was 56.28% among war-affected residents in Ethiopia. Factors like property destruction (AOR =1.6,95%CI,1.11–2.47) and family member murder increased

			North East Ethiopia		PTSD risk (AOR = 2.1,95% CI,1.37–3.22). Direct witness to family member murder raised PTSD likelihood by 1.6 (AOR = 1.6,95% CI,1.01–2.71). According to research, those who have been unlawfully imprisoned are 1.7 times more likely (AOR = 1.7, 95%CI, 1.06–2.74) to acquire PTSD than those who have not experienced such imprisonment.
19	(Arage et al., 2023)	North Wollo, Ethiopia	Patients, pregnant women, elders, community and religious leaders, and health professionals	100	The conflict has significantly affected the population's health, leading to violence, insecurity, forced crisis and displacement. It disrupted the healthcare system, causing medication shortages, famine, and food insecurity. Long-term effects include medical facility devastation, immunization suspension, posttraumatic stress disorders, and permanent disabilities.
20	(Lushchak et al., 2024)	Ukraine	Adult residents of Ukraine at the time of the invasion	3,173	The research highlighted disparities in stress, anxiety, and PTSD prevalence among NDPs, IDPs, and refugees. Refugees appeared to be the most vulnerable group, while IDPs reported higher levels of distress compared to NDPs.
21	(Béné et al., 2024)	Burkino Faso, Western Africa	Food traders operating in conflict zone	-	The study emphasized the disruptions caused by armed conflicts on the local food system and the need for adaptation by food traders to navigate the challenges posed by insecurity and conflict
22	(Ruhnke et al., 2024)	Syria	Syrian refugees residing in Lebanon and Turkey	2,491	The study found that Syrian refugees in Lebanon experienced higher levels of mental distress compared to those in Turkey. Factors such as poverty, unemployment, discrimination based on nationality and religion, and challenges in accessing healthcare services were identified.

The themes emerged from a systematic thematic analysis focused on the recurring public health consequences. Essential processes included methodical data extraction, coding of the impacts, and the grouping of the identified impacts into larger themes, resulting in the establishment of six main themes illustrated in Fig 2. The themes underwent a thorough refinement process, validated against the included articles to ensure they accurately reflect the most significant and frequently reported health consequences of armed conflicts. The summary of principal findings is summarized in Table 3.

Figure 2: Public Health Consequences of Armed Conflict

Table 3: Summary of Principal Findings

Findings	Articles
Health Effects	(Smeeth et al., 2023), (Haas & Ramirez, 2022), (Haque et al., 2022), (Zhang et al., 2023), (Rawers et al., 2024), (Dwanyen et al., 2024), (Rahman et al., 2024), (Kakaje et al., 2022), (Piotrowicz et al., 2022), (Fisseha et al., 2023), (Arage et al., 2023)
Healthcare Infrastructure and Services	(Haque et al., 2022), (Zhang et al., 2023), (Piotrowicz et al., 2022), (Rahman et al., 2024), (Fisseha et al., 2023), (Kassaye et al., 2023), (Arage et al., 2023)
Food Security and Malnutrition	(Belew et al., 2023), (Goliaei et al., 2023), (Rudolfsen et al., 2024), (Fisseha et al., 2023), (Arage et al., 2023), (Béné et al., 2024)
Environmental Health Effects	(Haque et al., 2022), (Zhang et al., 2023), (Malytska et al., 2024), (Arage et al., 2023), (Béné et al., 2024)
Humanitarian Crisis and Displacement	(Haque et al., 2022), (Rawers et al., 2024), (Zhang et al., 2023), (Goliaei et al., 2023), (Rahman et al., 2024), (Arage et al., 2023)
Recovery and Resilience	(Tarabay & Golm, 2024), (Haas & Ramirez, 2022), (Rawers et al., 2024), (Dwanyen et al., 2024), (Kakaje et al., 2022), (Piotrowicz et al., 2022), (Boos et al., 2022), (Rzońca et al., 2024), (Arage et al., 2023), (Lushchak et al., 2024), (Ruhnke et al., 2024)

Discussion

According to UCDP, numerous violent conflicts persist worldwide as of 2024, with catastrophic consequences (Conflict et al., 2023). The confrontation between Israel and Hamas in Gaza has escalated substantially since October 2023, leading to grave humanitarian catastrophes (Elfversson, 2021). The enduring confrontation between Russia and Ukraine continues to be one of the most prominent and lethal, resulting in extensive devastation and the loss of human lives. Afghanistan is currently facing ongoing hostilities with the Taliban, ISIS, and other rebel organizations, which are causing significant security and humanitarian issues (Davies, 2023).

The physical health consequences are extensive and grave, since multiple studies indicate a high prevalence of trauma-induced injuries such as gunshot wounds, shrapnel injuries, burns, and explosion injuries. These injuries frequently lead to enduring disability, persistent suffering and catastrophic mortality (Sidel & Levy, 2008). Limb amputations and traumatic brain injuries are most commonly reported injuries and physical disability (Bendavid et al., 2021). According to Al Jazeera news reports, at least 37,266 people have been killed and 85,102 wounded in Israel's war on Gaza in 6 months (Abudayya et al., 2023). In Gaza, a total of 148 UN personnel and non-governmental organization staff have been killed, and 134 United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) facilities have been damaged (UNHCR, 2023). This data only takes into consideration reported deaths, bodies, and injuries, however, the data could be lacking the actual figure due to underreporting or unrecovered bodies buried amid a catastrophic event.

The sustained injuries and disabilities are further complicated by disruption of healthcare services due to damaged infrastructure and injured healthcare personnel. Conflict inflicts damage on healthcare facilities, interrupts medical supply chains, and results in the destruction of medical equipment and all related infrastructure. According to the BBC's report, the ongoing crisis in Gaza has resulted in the unfortunate loss of 37,000 lives in the Palestinian War. Over 83,000 individuals have sustained injuries. To worsen the condition, the destruction of all 25 hospitals left the injured untreated, leading to their eventual death. In Tigray, Ethiopia reported that the region has been under a de facto blockade and siege, preventing the entry of medications, medical equipment, and humanitarian aid (Gesesew et al., 2021). This situation becomes a bottleneck in delivering the necessary health services and hampers the healthcare workers from providing medical services to sufferers.

The interruption in healthcare service worsens public health crises, particularly infectious disease transmission. The deterioration of sanitation and healthcare systems resulted in higher rates of cholera and AIDS in conflict-affected communities. Various infectious diseases occur, including AIDS, Hepatitis B, Tuberculosis, Cholera, in regions affected by conflicts in Europe, the Middle East, Asia, and Africa (Marou et al., 2024). Factors that contribute to disease emergence and transmission in conflict situations include population displacement, destruction of vital infrastructure, reduced healthcare systems and personnel, disruption of disease control programs (e.g., reduced surveillance, diagnostic delays, and interrupted vaccinations), limited access to healthcare providers, and increased population vulnerability (Malek & Okhuysen, 2022). Conflict-affected countries require disease-specific interventions to educate populations, improve healthcare infrastructure, and provide necessary medical services. Such interventions include healthcare system investments, mobile clinics, telemedicine, and primary and emergency care gaps. To avoid vaccine-preventable disease outbreaks, especially in displaced and vulnerable communities, intensify immunization campaigns. Mobilizing resources, implementing sustainable public

health policies, and building resilience in war-torn areas require political commitment and interagency engagement. Managing the long-term health effects of violent wars requires a multi-sectoral approach combining governments, humanitarian agencies, and local organizations (Babakura et al., 2021).

Armed conflicts force millions of people to flee their homes, seeking safety and refuge in neighboring countries or within their borders. Israel's military operations in Gaza have forcibly displaced 1.9 million civilians, or an astounding 85% of Gaza's total population (UNHCR, 2023). Displaced populations face numerous health challenges, including overcrowded living conditions, inadequate sanitation, and limited access to healthcare, increasing their vulnerability to infectious diseases and malnutrition (Forces et al., 2024). Within displaced populations, specific demographic groups like women, children, the elderly, and those with disabilities encounter increased vulnerabilities and distinct health obstacles (United Nations High Commissioner for Refugees, 2023). UNICEF is collaborating with partners to build sanitary facilities to address the declining sanitation services for internally displaced individuals residing in overcrowded shelters (Response & Status, 2024). It is crucial for humanitarian efforts to prioritize their efforts, in particular women, children, the elderly, and individuals with disabilities (United Nations High Commissioner for Refugees, 2023).

The psychological and emotional consequences of armed conflict are significant, with a high incidence of mental health illnesses such as PTSD, depression, anxiety, and acute stress reactions among combat populations. Civilians, soldiers, healthcare workers, as well as humanitarian workers are subject to high levels of violence and trauma, which greatly increase the likelihood of developing mental health problems. Research repeatedly indicates that individuals residing in areas of conflict frequently suffer from high prevalence rates of post-traumatic stress disorder, primarily due to their exposure to traumatic incidents such as bombings, shootings, and the bereavement of close relatives (Carpiniello, 2023). The disturbance of everyday existence, the deprivation of means of subsistence, and the collapse of social frameworks contribute to a widespread feeling of hopelessness and desolation. Internally displaced individuals (IDPs) and refugees are particularly vulnerable to harm, as the emotional distress resulting from forced displacement exacerbates the challenges, they already encounter due to violence (Alemi et al., 2023).

Social support networks and coping techniques are essential in mitigating the mental health impact of armed conflict, given the significant psychological suffering experienced. Communities and individuals employ diverse coping mechanisms, such as seeking assistance from relatives and acquaintances, practicing religious or spiritual rituals, and participating in communal events (Schwarzer, 2024). Mobile psychiatric units and community-based support groups have demonstrated the potential to deliver essential mental health care in areas affected by war. These initiatives can assist in addressing the disparity in mental health treatment by providing accessible and culturally sensitive care. The involvement of international organizations and non-governmental organizations (NGOs) is critical in the execution and support of these mental health efforts. However, it is vital to have consistent funding and lasting dedication to achieve their desired outcomes.

Warfare poses significant environmental health risks, resulting in water contamination, the destruction of agricultural land, soil degradation, and air pollution from explosives. Aerial bombing exacerbates these effects by damaging trees, disrupting soil, and decimating wildlife populations, leading to further air and water contamination. These environmental hazards create long-term health risks for inhabitants, such as poisoning and respiratory diseases, while post-war restoration efforts are often limited and insufficient. According to Solokha et al. (2023), the occurrence of metals in soil profiles is heightened by armed conflict. Certini et al.

(2013) found that hazardous elements such as Cd, Cu, Ni, Pb, and Fe in war metal and non-metal debris led to soil degradation. Furthermore, military activities had an impact on dams, water wells, and water reservoirs (Schillinger et al., 2020). An important aspect of the environment that is affected during war is air pollution. The use of various military weapons and explosive material increases greenhouse gases. Significant air pollution was seen during the Russia-Ukraine War (Tollefson, 2022), leading to an increase in greenhouse gas emissions in the atmosphere. (Kicaj et al., 2023). In situations where conflicts arise, establishing no-fight zones can effectively protect the delicate environment.

There is a widespread issue of insufficient access to food and inadequate nutrition because of interrupted agricultural output and supply networks. Conflicts disrupt food production and supply lines, destroy means of livelihood, and inflict food deficit, price hikes, and acute malnutrition. Consequently, in numerous cases, conflict-affected populations of vulnerable groups are at higher risk of malnutrition (United Nations High Commissioner for Refugees, 2023). Conflict disrupts economies, affecting numerous people with poverty, unemployment, and loss of livelihoods. The 2022 global report on food crises revealed that 140 million individuals in Africa were experiencing severe food insecurity, while in the 2023 report, it was highlighted that over 22.6 million Ethiopians require food assistance due to drought, conflict, and rising food prices (Figures, 2024). Rapid distribution of emergency food assistance through strategic provisions and quick response teams to ensure immediate access. Supplementary feeding programs that specifically focus on vulnerable populations, such as children, pregnant women, and the elderly, play a crucial role in preventing acute malnutrition. The World Food Programme (WFP), which is affiliated with the United Nations, reported that 1.1 million individuals are experiencing cataclysmic levels of starvation. The organization requires US$341 million to fund its operations until the end of 2024 (Food and Agriculture Organization, 2024). UNICEF is collaborating with UNRWA in Gaza to provide safe drinking water to displaced families, treatment for critically malnourished children, medical supplies and vaccines for children in hospitals and shelters, and other life-saving items. Ready-to-use therapeutic food (RUTF) can assist malnourished children in regaining strength and recovering from malnutrition (Response & Status, 2024).

Chronic health conditions and social disruptions, along with disabilities, continue to affect populations for years or even generations after conflicts end. Therefore, efforts to rebuild health systems and address ongoing health needs must be long-term (Haas & Ramirez, 2022). Armed conflicts result in significant and long-lasting health effects that extend beyond the immediate generation directly affected by violence. The transmission of trauma between generations is an intriguing problem, as the offspring of individuals who have experienced violence often acquire psychological and emotional wounds (Tarabay & Golm, 2024). Furthermore, the persistent consequences of violence frequently hinder their parents' capacity to provide stable and prosperous conditions, exposing these children to socio-economic inequalities.

Therefore, recovery and resilience following armed conflicts necessitate a multi-sectoral approach to reconstruct healthcare systems, reinstate essential services, and guarantee long-term stability. Efforts should prioritize rebuilding healthcare infrastructure, strengthening public health systems, and integrating mental health and psychosocial support to effectively address trauma in affected populations. Programs for economic empowerment, educational initiatives, and social protection policies are crucial for enhancing community resilience. Additionally, effective governance and international collaboration support sustainable recovery. Investment in disease surveillance, access to clean water, and advancements in digital health are essential for preventing secondary crises and fortifying health systems

against future challenges. These interventions restore stability, improve health outcomes, and enhance the resilience of conflict-affected communities, thereby reducing their vulnerability to future crises.

Strength

The comprehensive scope of this study encompasses a broad range of research methodologies and geographic settings, allowing for a deeper understanding of the diverse health effects of armed conflicts. Incorporating contemporary research on environmental health hazards and food scarcity provides up-to-date insights and aids in propagating actions and interventions. Furthermore, the study places strong emphasis on continuous engagement and assistance, underscoring the critical importance of ongoing international involvement and support.

Limitation

Conflict settings pose significant challenges to data quality, with chaotic environments, security risks, and population displacement posing potential inaccuracies and incomplete datasets. Besides, the systematic review primarily synthesized English-language articles, which could potentially exclude valuable research from non-English-speaking regions, thereby reducing the reliability and validity of the studies. Longitudinal research is also lacking, which is crucial for understanding the long-term impacts of armed conflicts. Current research mostly provides snapshots of health impacts at specific points in time, lacking the continuity to observe how health outcomes evolve. Longitudinal studies help capture chronic health conditions and the cumulative effects of repeated trauma, enabling the development of comprehensive public health strategies.

Conclusion

This systematic review highlights the extensive and multifaceted public health impacts of armed conflicts, encompassing direct health effects, crises and displacement, healthcare access and delivery, food security and malnutrition, environmental health risks, and long-term health consequences and resilience. It emphasizes the importance of robust mental health support frameworks, enhanced healthcare access, and integrated recovery strategies that consider social, cultural, political, and environmental factors. Moving forward, future research should focus on expanding geographic representation of armed conflicts including non-English studies. Studies using mixed method approach and longitudinal data collection will provide a more comprehensive understanding of the public health impacts of armed conflicts and inform effective policy and practice.

Recommendation

The systematic review recommends establishing a comprehensive framework for mental health care to effectively address the needs of populations affected by traumatic events or recurring disasters. This framework should include a methodical process for identifying previous traumatic experiences and PTSD, actively providing mental health services with a focus on vulnerable populations such as children and families and creating trauma-sensitive counselling protocols. It is crucial to establish psychosocial support programs to promote resilience and provide training for local professionals to assess the health impacts of past disasters. Enhancing communication and collaboration among governments, NGOs, and communities, as well as creating channels for sharing information and community involvement, is critical. Holistic healing programs must consider historical trauma and incorporate social, cultural, political, and environmental factors. Ultimately, supportive public

policies and consistent funding are vital for the sustained operation and effectiveness of mental health services. Addressing food security in conflict zones involves a multifaceted approach, including rapid emergency food aid distribution, support for local food production, and the implementation of supplementary feeding and nutrition education programs. Establishing a pooled funding system would streamline resource collection and allocation, enhance resource management, and ensure equitable and strategic distribution of aid. This would address the challenges associated with currently collecting funds independently.

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