

Care Pathways Under Fire: A Scoping Review on Continuity and Coordination of Care in Armed Conflict

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Abstract

Background

Achieving universal health coverage requires more than access to healthcare services. It also depends on the delivery of consistent care over time (continuity of care, CoC) and effective integration across providers and settings (care coordination, CaC). Together, CoC and CaC support the transition from initial contact to sustained care, improving outcomes for both communicable and non-communicable diseases. These principles are difficult to uphold during emergencies, particularly in armed conflict. In 2024 armed conflicts reached the highest level recorded since 1946 and have become increasingly protracted and severe in recent years, with fragmented evidence on their impact on CoC and CaC. This study aims to systematically map how armed conflict disrupts CoC and CaC, describe the causal pathways, and synthesize interventions to strengthen both across the continuum of care in conflict-affected settings.

Methods

This scoping review draws on peer-reviewed literature and grey sources, including reports, policy documents, and publications from international organizations. Purposive text analysis was conducted to build a causal loop diagram and display dynamic interactions among the different domains influencing CoC and CaC.

Results

Evidence from 67 studies was clustered into five interdependent domains: (i) *people*, encompassing violence, displacement and strain affecting health care workers, patients, and caregivers; (ii) *hardware*, referring to the destruction, repurposing and overcapacity of health facilities, as well as supply-chain disruption and shortages of equipment and medicines; (iii) *services*, indicating interruptions to preventive, curative, and follow-up care; (iv) *linkages*, including the breakdown of referral pathways, health information systems, and pre-service and in-service training pipelines; and (v) *governance*, covering fragmented leadership, the politicization or obstruction of humanitarian aid, and the absence of conflict-adapted clinical guidelines and protocols. Across domains, potential leverage points to mitigate these impacts were identified.

Conclusions

Armed conflict disrupts CoC and CaC through cascading, interdependent pathways that often overlap and reinforce one another. Recognizing these causal linkages is essential for designing interventions

that address root causes and system bottlenecks, rather than isolated downstream consequences, across the continuum of care.

Background

Achieving universal health coverage requires more than first-contact access to services; it also depends on sustained care over time (continuity of care, CoC) and effective coordination across providers and settings (care coordination, CaC) [1]. The two concepts are interdependent: CoC refers to the patient's experience of care as coherent and consistent over time, whereas CaC refers to the organizational processes that link services and providers to deliver integrated, timely, appropriate, and effective care [2]. Together they are critical to a functioning health system and to delivering the continuum of care, the full spectrum of services across the life course, from health promotion and disease prevention to palliative and end-of-life care [3]. By enabling stable therapeutic relationships and synchronized services, they also strengthen healthcare access along its full pathway, from recognizing health needs and seeking care to reaching services and receiving appropriate treatment [4, 5].

Both principles are essential across communicable and non-communicable diseases (NCDs). In HIV care, coordinated case-management improves re-engagement and viral suppression [6], while patient-centered models integrating diagnosis, treatment, and social support increase tuberculosis treatment initiation and adherence [7, 8]. They are equally pivotal where chronicity demands long-term, multidisciplinary management: for hypertension and diabetes, CoC is linked to fewer hospitalizations, lower health system costs, reduced complications, and improved survival [9], and coordinated multidisciplinary teams deliver more individualized, integrated cancer care with better outcomes [10].

Maintaining CoC and CaC is complex even in peacetime and becomes substantially harder during disasters and humanitarian crises, particularly armed conflict, now a predominant global hazard. In 2024, 75 non-state and 61 state-based conflicts were recorded, the highest number since 1946, while battle-related deaths have plateaued over the last four years, with nearly 740,000 people killed in 2021–2024 [11]. Intensity and geography have also broadened: conflicts reaching war intensity ($\geq 1,000$ battle-related deaths) have risen since 2022, reaching 11 in 2024, with fatalities concentrated in Ukraine, Sudan, occupied Palestinian territory, and Ethiopia, and more countries hosting multiple simultaneous conflicts [12].

Despite their centrality to effective care delivery, evidence on how, where, and to what extent armed conflict disrupts CoC and CaC remains fragmented across settings and levels of care. Mapping the pathways linking conflict exposure to breakdowns in these functions is necessary to inform preparedness and response policies, target humanitarian interventions, and help explain excess morbidity and mortality beyond direct deaths and injuries. Accordingly, this review aims to: (a) describe the causes and consequences of disruption to CoC and CaC across all levels of care; (b) assess, where possible, the magnitude of these disruptions; and (c) identify and synthesize mitigation strategies to preserve CoC and CaC during active conflict.

Methods

Search string and databases

Given its broad scope, this scoping review of scientific and grey literature was conducted following the Joanna Briggs Institute (JBI) *Manual for Evidence Synthesis* [13], and reported per the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) extension for scoping reviews (PRISMA-ScR) [14].

The search was structured around three concepts: (i) armed conflicts; (ii) continuity of care; and (iii) coordination of care, with relevant synonyms added for comprehensive coverage (Table 1). It was run on 8 August 2024 and updated on 17 February 2026 in PubMed MEDLINE, Scopus, and Web of Science. Grey literature was searched manually between August and September 2024 and updated in February 2026 in Evidence Aid, Research Square, ResearchGate, the Health Systems in Fragile and Conflict-Affected Settings collection, and the websites of international organizations responding to or researching conflict (full list in **Additional file 1**).

Table 1
Operational definitions of main concepts.

Concepts	Definition
Armed Conflict	Defined according to Uppsala Conflict Data Programme (UCDP) definitions: A <i>state-based armed conflict</i> is a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in one calendar year. A <i>non-state armed conflict</i> is an armed confrontation between two or more organized armed groups where none of the groups is the government of a state, and the conflict results in at least 25 battle-related deaths in a year [12].
Continuity of Care (CoC)	The degree to which a series of discrete health care events is experienced by people as coherent and interconnected over time and consistent with their health needs and preferences [2].
Care Coordination (CaC)	A proactive approach to bringing together care professionals and providers to meet the needs of service users to ensure that they receive integrated, person-focused care across various settings [2].

Eligibility criteria

Studies were eligible if they: (i) were available in English, French, Italian, or Spanish; (ii) examined the impact of armed conflicts on CoC or CaC; (iii) focused on conflict-affected or forcibly displaced populations; and (iv) were published between 1 January 2010 and 17 February 2026. No restrictions were applied to study design or outcome. Reviews were included, whereas opinion papers, viewpoints,

and editorials were excluded. Conflict-affected settings were verified against the Uppsala Conflict Data Programme dataset.

Screening and data extraction

Records were imported into Rayyan for duplicate detection [15]. Two reviewers (PM, NSH) independently screened titles and abstracts, with disagreements resolved by a third reviewer (ALC). Retained records underwent full-text screening. Extracted data included publication year, country, conflict type, population, and study design. Drivers, consequences, magnitude of disruptions, and mitigation strategies were coded using the WHO "Continuity and Coordination of care" framework [2]. Findings outside these predefined categories were analyzed inductively and grouped into thematic clusters.

Ex-post development of causal loop diagram

Extracted findings were iteratively analyzed to identify causal relationships and map them into a causal loop diagram (CLD) representing interdependencies and feedback pathways across the CoC and CaC domains [16]. The CLD offers a structured visual synthesis showing how disruptions propagate and how mitigation strategies may offset reinforcing cycles during hostilities.

Results

Screening process

A total of 22,330 records were identified. After removing duplicates ($n = 5,614$), 16,716 were screened for relevance; 16,603 were excluded on title and abstract, leaving 113 for assessment. Seven were excluded because full texts could not be retrieved despite contacting the authors, leaving 106 for full-text screening. A further 42 were excluded, yielding 64 included studies; grey literature added 10, for a final total of 74 (Fig. 1).

Source: *Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71* [17].

Overview of retrieved studies

Research on conflict-related care disruption increased sharply, with 41 of 74 studies published in 2023–2025, paralleling the global rise in armed conflicts (Fig. 2). Studies focused mainly on Syria, Ethiopia, Ukraine, and Israel, while 14 covered multiple countries (Fig. 3). Excluding multi-country studies ($n = 14$), all examined state-based conflicts. Designs varied: 27 quantitative, 19 qualitative, 17 mixed methods, and 11 literature reviews (Table 2).

Table 2
Types of retrieved studies.

Original studies n = 63	
Quantitative studies n = 27	● Analysis of secondary data = 20 ● Survey = 6 ● Prospective cohort study = 1
Qualitative studies n = 19	● Document analysis = 11 ● Interview-based = 7 ● Focus group discussion = 1
Mixed methods n = 17	● Interviews + analysis of secondary data = 9 ● Interviews + survey = 2 ● Survey + analysis of secondary data = 1 ● Survey + Focus group discussion = 1 ● Other combinations = 4
Literature reviews n = 11	

N.B.: Multi-countries studies are not included in the figure.

Results synthesis

Drawing on the WHO "Continuity and Coordination of care" framework, all findings were synthesized into five interrelated domains through a combined deductive–inductive approach: (i) people; (ii) hardware; (iii) services; (iv) linkages; and (v) governance. Their definition and subdomains are reported in Table 3. For each subdomain we synthesized drivers of disruption to CoC and CaC across all levels of care, assessed the magnitude of reported disruptions where data permitted, and identified leverage points to preserve CoC and CaC during hostilities.

Table 3
– Definition of continuity of care (CoC) and care coordination (CaC) domains.

Domain	Definition	Subdomains
People	All human actors involved along the continuum of care: healthcare professionals of every cadre and specialty, patients irrespective of diagnosis or acuity, and informal or formal caregivers such as family members, friends, and social workers.	Healthcare workers
		Patients
		Caregivers and communities
Hardware	The physical assets that enable service delivery, including fixed infrastructure, basic utilities, transport and logistics assets, medical equipment, and pharmaceutical supplies.	Facilities
		Drugs and equipment
Services	The discrete service modalities that form the continuum of care, encompassing health promotion and disease prevention, curative interventions, rehabilitation, and long-term follow-up.	Health promotion/prevention
		Curative care
Linkages	The mechanisms connecting actors, assets, and services, such as referral systems, information systems, and workforce planning and development to ensure a continuous supply of competent personnel.	Referral system
		Information system
		Training and education
Governance	The normative and operational frameworks that regulate stakeholder interactions, including policies, standard operating procedures, and evidence-based clinical guidelines.	Stewardship
		Plans and protocols

1. People

Healthcare workers (HCWs)

Healthcare workforce shortages are a central barrier to CoC and CaC and arise through multiple interacting pathways. A key driver is violence against HCWs: in 2024, 927 were reported killed, a 21% rise on the previous year [18]. Beyond killings, violence includes harassment, intimidation, extortion for money or medicines, coercion to prioritize combatants, and abduction or detention [19–23], creating an insecure environment that restricts staff mobility and facility access [24, 25]. Together with demoralization and psychological distress, these threats prompt resignations or relocation, further reducing capacity [19]. Irregular or unpaid salaries compound shortages – during the Syrian conflict, only about 30% of trauma hospitals reportedly covered staff salaries fully [26] – pushing HCWs toward better-paid private roles (as in Yemen, where some worked exclusively in private clinics [20])

or posts with NGOs and humanitarian agencies [20, 26–29]. In some settings the withdrawal of expatriate personnel created vacancies that local HCWs moved to fill [23, 30].

These shortages have several consequences. Limited staffing disrupts interpersonal continuity by undermining stable, trust-based provider–patient relationships and weakens the managerial continuity and multidisciplinary collaboration needed for individualized care plans [31]. Workforce gaps also limit the appointment of dedicated care coordinators (e.g., case managers) [32], forcing scarce staff to prioritize critical functions while coordination and follow-up roles go unfilled, and services deemed non-essential may be deprioritized [29]. Where shortages are severe, remaining staff become overburdened [19, 33–35], especially in volatile settings and areas receiving displaced patients: workload rose by 15% in Lviv (Ukraine) after Russia's full-scale invasion [36], while in the Gaza Strip rapidly changing facility availability forces staff to reorganize delivery and reroute patients [37]. Excessive workloads bring prolonged shifts, cancelled leave, and shortened consultations [31], eroding well-being and care quality in a vicious cycle that deepens shortages.

Mitigation measures span multiple approaches. Pre-conflict investment in workforce recruitment can buffer shortages [38], and psychosocial support from peers, community leaders, and faith groups may reduce distress [33, 39]. Security coordination with higher authorities, such as UNRWA's collaboration with the UN Department for Safety and Security, can help protect staff and patients [40]. When violence curtails routine services, adaptable staffing becomes critical: multitasking and task-shifting help maintain essential functions, and broadening the cadre distributes workload [40], with reported examples including cleaners supporting crowd control [31], dialysis technicians running nephrology units [32], and general physicians performing orthopedic procedures instead of specialists [26, 41].

Patients

As with HCWs, insecurity discourages care-seeking and drives relocation to safer areas [23, 42–45]. Displacement disrupts long-term therapeutic relationships, limits individualized care, and creates treatment gaps, worsening outcomes [24, 32, 46–49]: in Syria, about half of 260 patients with diabetes struggled to reach medical centers [46], and another study reported a 50–60% fall in daily visits at UNRWA centres owing to fear of violence [40]. Financial barriers compound these constraints, as conflict erodes household income while raising the cost of medicines and services [28, 50], so care is often deferred or abandoned when weighed against competing survival needs [48]. Limited access to care prompts reliance on self-management, traditional medicines, home remedies, religious healers, or unqualified providers, raising the risk of complications [19, 20, 28, 33, 43, 51–54]. In Ethiopia, a study reported that 38.4% of patients resorted to traditional medicine and home remedies during illness due to disrupted access to health services during conflict [55], while in Ukraine shortages of opioid-agonist therapy led some to use pregabalin, analgesics, or alcohol, increasing dependence and injury risk [54]. Conversely, decentralization of services, particularly through mobile clinics and community health posts, has been reported as effective in restoring access for displaced populations and preserving continuity [40, 56].

Caregivers and communities

Disrupted health and social services, combined with displacement, shift the care burden onto family members and informal caregivers, straining support networks, particularly for highly dependent patients [38, 53]. In the Gaza Strip, the destruction of mental-health infrastructure reportedly forced families in overcrowded shelters to sedate relatives with severe psychiatric disorders to prevent acute crises [37]. Beyond the physical burden, conflict and displacement impose financial strain on caregivers and undermine the familial structures on which continuity increasingly depends [53]. At community level, when pre-hospital services collapse, emergency care falls on untrained bystanders and poorly equipped volunteers [57]. Strengthening community-based workforces can therefore sustain delivery during hostilities: in Ukraine and Ethiopia, social workers supported adherence through free home medicine delivery and regular follow-up [33, 53], and community health workers in northwestern Central African Republic maintained malaria case management during fighting [56].

1. Hardware

Facilities

Violence against health facilities is another major obstacle to CoC and CaC during armed conflicts. In 2024, 1,100 such incidents were documented, nearly double the previous year [18], extending beyond hospitals to clinics, warehouses, and pharmacies. One study from the Central African Republic noted that NGO-run facilities may be particularly vulnerable, as combatants may expect greater spoils from better-resourced sites [19]. Attacks range from destruction and looting to military takeover and repurposing. In Ukraine, the Poltava HIV was converted into a military medical center, and the National Cancer Institute into a trauma hospital [24, 53]. Even intact structures lose functionality when electricity and water systems are damaged [21, 35]; in the Gaza Strip, damage to power networks reportedly left around 70% of hospitals with little or no night-time lighting [37]. The consequences are broad. First, service delivery capacity is reduced: in Syria a facility attack was associated with subsequent average reductions of 51% in outpatient consultations, 38% in trauma consultations, and 23% in obstetric deliveries. Quality and care-seeking are also affected, as power cuts restrict radiological investigations, forcing reliance on history and examination alone [20, 37, 50], while repeated forced closures create chronic uncertainty about availability [58]. When attacks involve primary-care facilities, patients spill over to nearby centers or bypass them for secondary and tertiary care. This undermines coordinated entry and referral pathways, disrupting longitudinal continuity, and overburdening higher-level services [35, 37, 42, 54, 59]. In the Gaza Strip, bed occupancy has repeatedly exceeded 200%, prompting onward patient movements to less burdened facilities [37], while in Sudan the destruction of a cancer center in Khartoum nearly doubled registrations at nearby centers [42].

Overcrowding is compounded when displaced people shelter within facilities, straining capacity, compromising hygiene, and requiring staff to meet basic non-medical needs [20, 24, 25, 60]. Mitigation strategies focuses on sustaining essential services despite damage, insecurity, and looting risk. These include decentralizing care adopting satellite sites, as done in Syria, where peripheral dialysis units replaced destroyed hospital-based services [32], and restoring utilities by drilling wells and leasing

generators [40]. Where formal governance and protection are absent, continuity has depended on ad hoc security arrangements: in Colombia, basic health posts in FARC-controlled areas were maintained by the armed group itself [61]. To curb looting incentives, facilities may also adopt lean-cash policies and minimal on-site inventories [19].

Drugs and equipment

Shortages of medicines and consumables were described in few studies. Reported drivers included inappropriate forecasting, disrupted production, supply- and cold-chains breakdowns, sanctions, and currency collapse [31, 37, 60, 62, 63]. In Syria, the pharmaceutical production, previously covering 90% of national needs, collapsed during the war, leaving critical gaps in insulin, oxygen and anesthetics [41], while confiscation of stocks at checkpoints worsened shortages in besieged areas [32]. Shortages delay treatment and fracture management continuity, exposing patients with chronic conditions to unplanned substitutions, including substandard products or inert placebos [28, 35, 46, 49]. A study from Syria noted that 75% of patients with diabetes reported stopping medication for at least a month, mainly through unavailability [46]. Facilities may restrict enrolment or reduce dosages to ration supplies [36], while procurement burdens shift to clinicians and families buying medicines out of pocket or using private pharmacies stocking unregulated products [41]. Conflicts can thus foster counterfeit medicines and black-market distribution, although findings are inconsistent. One study documented a decline in illicit drug sales in Syria [64], whereas in Armenia fake anticancer drugs forced patients to pay premiums for verified imports [60]. Maintenance interruptions also render diagnostic and life-saving equipment inoperable, and donated devices often proved unusable due to incompatibilities (e.g. voltage or tubing) [19, 26, 32, 42]. Reported countermeasures include routine pre-conflict stock assessments, contingency reserves, and decentralized distribution to local providers [36, 38, 40, 65]. Extended dispensing may also be beneficial: in the Central African Republic, people living with HIV received up to six-month antiretroviral supplies, reducing travel and exposure to violence [19].

1. Healthcare Services

Health promotion and prevention

Interruptions in preventive and curative services are another key barrier to CoC and CaC. Disruption to immunization, outreach activities, and disease surveillance has several causes, including direct vaccine destruction or looting, and indirect effects such as power outages that disable cold-chains and electronic registries [20, 35]. Insecurity also constrains mobile campaigns and confines activities to fixed sites; in some settings, HCWs negotiated safe passage or employed combatants, compromising independence [19, 66]. Preventive services may further lose salience, since their benefits are less visible than food assistance or acute care [28], rendering them particularly vulnerable to deprioritisation when fiscal constraints tighten and resources shift toward military and security needs [34]. One of the main consequences is a decline in vaccination coverage, though its magnitude varies across settings. In Tigray, Ethiopia, completion of the basic immunization schedule fell to about one third during hostilities [62], and a Nigerian study reported a 41.9–48.0% lower probability of vaccination [67]. Lower coverage

has been linked to conflict intensity and duration, frontline proximity, and rural residence [21, 43, 68, 69]. Notably, one study found improved coverage despite hostilities, possibly reflecting humanitarian presence [70]. Damage to power infrastructure and laboratories also weakens surveillance and case-finding. Examples include Studies report declines in tuberculosis notifications, suspended cancer screening and chronic-disease monitoring, and increases in vector-borne infections where control activities cease [31, 48, 62, 71].

Evidence was most substantial for family planning, antenatal care (ANC), delivery care, and postnatal care (PNC). Violence constrains access to sexual and reproductive health services, pushing women toward costly private care and raising unintended pregnancies [21, 50, 59]. A 35-country difference-in-differences analysis found that conflict exposure during pregnancy lowered the probability of adequate ANC visits (-3.6 points percentage, pp) and reduced core ANC elements, such as blood-pressure measurements (-3.4 pp), blood testing (-2.6 pp) and iron supplementation (-3.3 pp) [72]. Greater intensity, longer exposure, and closer proximity have all been associated with fewer ANC visits [29, 37, 61, 67, 68, 72–76], though impacts were not uniform. Where humanitarian actors sustained and adapted outreach, contraceptive uptake, early ANC attendance, and maternal vaccination improved despite ongoing hostilities [70, 77].

Conflict

exposure during pregnancy also worsened delivery and immediate PNC. In the same 35-country analysis, it was linked to lower use of skilled birth attendants, facility delivery, and caesarean section [72]. Conflict severity and frontline proximity were likewise associated with reduced facility delivery, skilled attendance, and caesarean sections across countries [21, 30, 43, 67, 68, 72, 73]. Findings were not uniformly negative, however, and some studies found no association, possibly reflecting humanitarian presence or limited conflict scale [77, 78]. Transient increases in caesarean-section rates were also documented, as teams deliberately scheduled deliveries to minimize maternal time spent in high-risk facilities [23, 70, 74]. PNC and child health-seeking also deteriorate; in Tigray, PNC coverage fell from 81% pre-war to 30% during hostilities [66]. Acute, unpredictable violence such as incursions or kidnappings reportedly harmed child health more than constant armed presence, since communities could not mobilize coping mechanisms quickly [61].

Curative care

Disruptions to curative care span a broad clinical spectrum, from outpatient visits and diagnostics to surgical and medical treatment [21, 31, 37, 39, 41, 42, 79]. During the Israeli-Hamas conflict, daily outpatient visits fell by 11%, from 6% for oncology and cardiology to 19–20% for psychiatry and pediatrics, with longer waits for surgery (+ 1.0 day) and imaging (+ 1.1 day) [71]. Long-term care is especially vulnerable, with increased loss to follow-up (LTFU) reported for both communicable diseases and NCDs [27, 37, 52, 53, 80]. Magnitudes vary widely by context and disease. In Tigray, service utilization among patients with diabetes dropped by 80% [80], while in Gaza follow-up adherence among

patients with NCDs fell from 96.7% to 40.7% [63]. A meta-analysis on HIV care found LTFU rates ranging from 5.4% to 80% across settings [27]. Interrupted monitoring undermines adherence and therapeutic success. Among 399 Ethiopian patients with NCDs, over half interrupted treatment, and about half of those reported adverse consequences [52]. Treatment interruption, particularly for HIV and tuberculosis, also increases the risk of drug and antimicrobial resistance [19].

Mitigation strategies range from resource-intensive service relocation to protected spaces (e.g., shelters and basements) to adaptation of care packages to evolving needs [24, 81]. In Syria, prosthetic and rehabilitation capacity was expanded for the surge of war-related injuries [40], while in Ethiopia an ANC first-visit checklist, with weekly checks on laboratory availability and staff psychosocial support, increased adequate ANC coverage [82]. Telemedicine can also sustain continuity: in the first month of the Israeli-Hamas war, one study found a marked shift to telemedicine, largest in primary conflict zones (around + 20 pp), and a threefold rise in remote mental-health consultations [83]. Its effectiveness, however, is often limited by low digital literacy, intermittent connectivity, and the inability to assess patients in person when needed [32].

1. Linkages

Referral system

Patient transfer becomes highly complex during hostilities, requiring ad hoc coordination across providers and facilities, often with limited clarity regarding the final destination. Drivers include attacks on or lack of medical transport, fuel shortages, violations of humanitarian corridors, curfews, and road blockades [24, 29, 37, 38, 42, 49, 50, 52–54, 60]. Patients may then rely on private vehicles, which further disadvantages people with disabilities and women facing mobility restrictions [43, 54, 84]. Visitors dependent on short-term medical visas face compounded barriers. In Gaza, suspended referral permits reportedly stranded over 1,500 oncology patients [37], while in Nagorno-Karabakh, patients had to negotiate checkpoint passage personally, missing cancer follow-ups [60]. The consequences extend beyond care delays. Where referral systems collapse, primary-care staff lack reliable transfer options, resulting in patients remaining in under-resourced centres or bypassing primary care entirely, overloading higher-level facilities [50, 57, 64]. An Israeli study found that rocket attacks increased late arrivals of myocardial infarctions patients (28.8% vs. 10.2% pre-war), reduced ambulance arrivals (34.8% vs. 59.1% pre-war), and raised referrals from emergency centers (57.6% vs. 25.2%) [85]. Cross-sectoral care plans and integrated primary–specialist pathways are thereby hindered, obstructing longitudinal and management continuity and raising the risk of complications, morbidity, and mortality [21, 71]. Mitigation includes strengthening inter-provider coordination to preserve referral pathways and offering accommodation near facilities to reduce transfers [39]. Where referrals are unsafe or infeasible, equipping primary centres with hospital-level resources, such as caesarean kits, can also cut unnecessary transfers [19].

Information system

Displacement, facility destruction, and staff dispersion often cause loss of medical records. A capacity survey in Syria noted that, in some regions, one in ten hospitals kept no record of treated patients [26]. Reliance on paper, limited interoperability, and slow record retrieval further compound disruptions to health-information systems and delay informational continuity [26, 54, 63]. Two Ukrainian examples illustrate this: in one study oncology teams had to turn away displaced patients requiring radiotherapy because prior treatment plans and dose records were unavailable [86], while in another study the lack of a central registry for opioid-agonist therapy prevented dose verification, causing re-induction at subtherapeutic doses [36, 54]. Conflicts also weaken monitoring, including surveillance of sexual violence, communicable and combat-related diseases, and community health indicators [22, 34, 56, 79]. Weak monitoring in turn undermines needs assessment, resource allocation, and evaluation, risking that interventions are misaligned with needs [20, 21]. Communication outages amplify these gaps: telephone and internet blackouts block record-sharing and verification, disrupt emergency calls, and fragment pre-hospital referrals [22, 37, 57]. Digital platforms have been described as critical for information flows during hostilities. A few studies used social media to document treatments, transmit records, direct patients to functioning facilities, share real-time bed availability, and give tailored advice [25, 32]. Messaging groups have also been used to circulate safe evacuation routes [24], while hotlines and standardized protocols, such as one for clinical management and data-sharing for HIV refugees from Ukraine, enabled continuity across European countries [65]. A cohort study of 205 Ukrainian refugees registering for HIV care in Poland found 63.4% retained under a shared protocol, with antiretroviral effectiveness declining in fewer than 10% [87].

Training and education

Conflicts

also hinder education and training, shrinking the pipeline of skilled personnel and curtailing continuing professional development. Drivers are the destruction or closure of academic institutions, cancelled refresher courses as clinicians meet urgent demands, and insecurity that reduces capacity and motivation to train [29, 31, 35, 47, 57]. These disruptions reduce graduate entry and skills development, worsening staff shortages and concentrating workload on a smaller, less-supported workforce. Training and staffing gaps can then erode clinical competence, protocol adherence, and quality of care [19, 30]. Targeted on-site training may be beneficial, especially when tailored to high-risk conditions and skills that drive morbidity and mortality; examples include hepatitis A training in Syria and mass-casualty management training in Iraq [31, 58].

1. Governance

Stewardship

Fragmentation of healthcare governance is another central driver of CoC and CaC disruptions, often compounded by pre-existing weaknesses. Contributing factors include frequent leadership shifts, competing actors, unclear policy guidance, inadequate emergency-preparedness planning, and heavy

reliance on international donors [36, 38]. In the resulting stewardship vacuum, services end up operating on auto-pilot, shaped by development partners or funders, with limited strategic direction and minimal local engagement [21, 34, 35]. Roles and responsibilities thus remain poorly defined, and the formal coordination agreements essential to effective care coordination are often absent or unenforced, letting competing priorities proliferate, exacerbating geographic inequities, and eroding public trust [41, 43, 54, 64]. Political or religious interference can exacerbate these challenges. During the Yemeni civil war, immunization coverage differed between areas under the internationally recognised government and those under de facto authorities, reflecting discretionary priorities and uneven access to preventive services [20]. Counterbalancing strategies hinge on robust, multi-level coordination. In Syria, UNRWA's work with governmental, local, and international partners sustained supply deliveries, adapted service delivery, and extended services to IDPs and hard-to-reach areas despite hostilities [40]. Similarly, in western Ukraine, institutional partnerships sustained HIV care for people displaced from the east through cross-facility linkage and uninterrupted treatment access [65].

Beyond governance fragmentation, administrative obstacles affecting people and goods also impair CoC and CaC. In Ukraine, IDPs struggle to access specialist services because eligibility requires prior registration with a local primary-care provider [53]. Lengthy permits can impede supply chains, delay reopening of damaged facilities, and block referrals for specialized care, especially across borders [19, 24, 36, 54]. Some barriers are deliberate: in Colombia, the government restricted anti-leishmaniasis drugs, viewing the disease as linked to guerrilla forces and raising risks in high-prevalence communities [34]. Restrictions on humanitarian access to opposition-held areas can likewise interrupt services and referral pathways, widening gaps [20, 40, 47]. In such settings, strengthening civil society and local actors is critical, both reducing reliance on delayed international deployment and leveraging their proximity to communities and knowledge of local needs [35].

Plans and protocols

In conflict settings, peacetime protocols quickly become impractical. Context-adapted protocols are critical to manage predictable disruptions (e.g., stockouts, degraded infrastructure) while keeping minimum safety standards. Without such guidance, clinicians may resort to unsafe, non-evidence-based practices [21, 79]. During the Syrian conflict, stockouts led hospitals to transfuse untested blood, raising the risk of transfusion-transmitted infections [26]. In dialysis, the absence of water-treatment standards left dialysate contaminated with chemical residues or microbes [25, 32]. Conversely, up-to-date preparedness, response, and recovery plans and wartime-adapted protocols help standardize decisions and preserve continuity [38]. In Syria, the 2012 revision of emergency preparedness secured medicine supplies by pre-positioning contingency stocks, partly buffering delivery in hard-to-reach communities [40]. Guidance adapted to resource-constrained settings also helps. In Ukraine, early conflict-specific dialysis recommendations were issued, and patients were retrained in strict dietary measures and emergency arterio-venous fistula disconnection for evacuations [25]. Simplified guidance on care and equipment maintenance, with point-of-care kits for viral hepatitis, hemoglobin, and potassium, further sustained dialysis services [32].

Causal loop diagram

The causal loop diagram shows how these pathways interact and amplify one another through three self-reinforcing cycles that risk locking conflict-affected health systems into chronic deterioration (Fig. 4). The first loop (R1) links staff psychological distress and workforce capacity: violence, moral distress, and excessive workloads burden HCWs, accelerating attrition and concentrating workload on those who remain, which deepens distress. The second loop (R2) operates through training, workload, and capacity: as conflicts disrupt academic institutions and cancel in-service training, the supply of competent personnel narrows and skills degrade, amplifying workload and hastening depletion, leaving still less capacity for training. The third loop (R3) connects care-seeking behavior, care quality, and the state of CoC and CaC: declining quality erodes patient trust and reduces care-seeking, which further undermines continuity through more loss to follow-up and delayed diagnosis, depressing quality further.

Discussion

This study combines a scoping review with a systems-thinking approach to identify the causal pathways through which CoC and CaC are disrupted in armed conflicts, together with leverage points to mitigate them. By synthesizing disruptions into five interdependent domains (people, hardware, services, linkages, and governance) and mapping their causes and consequences, it adds operational insight to how armed conflicts harm health systems.

The evolving nature of conflict underscores this rationale. Contemporary wars generate increasingly complex needs, as initial surges in trauma, infrastructure destruction, and displacement give way to protracted crises marked by poorly controlled chronic disease, mental ill-health, malnutrition, and recurrent outbreaks [88, 89]. Conflicts also degrade the environment and intersect with natural hazards, turning acute emergencies into prolonged polycrises [90–92]. Sudan offers an example: recurrent floods, droughts, and crop failures punctuated by unrest and, since 2023, nationwide war causing more than 40,000 deaths and 12 million internally displaced persons [93]. In such settings, health systems must both respond to immediate casualties and sustain longitudinal and coordinated care for ongoing and emerging health needs.

The causal loop diagram captures self-reinforcing cycles that can lock systems into chronic deterioration. The R1 dynamic, in which burnout and staffing shortages reinforce one another, is especially harmful where psychosocial support is itself disrupted [94, 95], producing a cycle that is hard to interrupt once established [96]. The workforce-training loop (R2) is corroborated across settings: in Syria, the exodus of over 70% of the workforce sharply curtailed continuing medical education [97], and in Iraq students reported low competence after conflict-related disruptions, most intending to emigrate [98, 99]. The trust-utilization loop (R3) is likewise consistent with fragile-setting evidence, where poor care experiences erode trust and low trust reduces utilization in a cycle difficult to reverse [100, 101]. Critically, the loops are not independent: workforce depletion (R1) degrades care quality, feeding R3, and training disruptions (R2) weaken competence, degrading quality further. The implication is clear.

Fragmented, domain-specific interventions are unlikely to break the spiral. Effective mitigation must simultaneously target staff support, training continuity, and the patient-facing dimensions of quality and trust, since gains at one node reverberate across all three.

Three implications follow. First, mitigation must integrate immediate relief with long-term health-system strengthening and conflict resolution, explicitly safeguarding access, continuity, and coordination. Second, because conflicts and natural hazards often co-occur, disaster-preparedness approaches should be adapted to conflict settings. Third, protracted, large-scale conflicts call for systematically integrating digital innovation into mitigation.

One framework to align relief, development, and peacebuilding is the Triple Nexus [102]. In active conflict, however, its implementation is hampered by divergent mandates, siloed funding, and political sensitivities, as seen in Syria [103], remaining stronger in theory than in routine practice. Findings from this review point to four practical shifts to operationalize it. First, a joint service planning across providers, with a shared map of available services and referral routes, explicit continuity targets (uninterrupted NCD treatment, timely ANC/PNC, immunization coverage) and interoperable referral and patient-information system. Second, clear mandates and role delineation: humanitarian providers deliver defined service packages while development partners cover operating costs, supervision, and supply chains, with peace functions kept outside clinical delivery to reduce governance fragmentation and administrative bottlenecks. Mandates should also cover workforce deployment and safety, establishing transparent arrangements for HCW mobility between public services and NGOs, and defining explicit security thresholds for service proximity in active hostilities, consistent with the "do no harm" principle. Third, flexible pooled funding: multi-year, area-based mechanisms with contingency reserves to surge, stabilize, and sustain priority services, with disbursements tied to continuity indicators (referral completion, treatment retention, medication refill) rather than short-term activity. Finally, community-anchored delivery: formalize community-based continuity nodes by contracting and equipping community health workers, local organizations, and pharmacies to support follow-up, medication dispensing, and patient tracing, offsetting workforce shortages and extending coverage through decentralization. Collectively, these shifts target recurrent breakdowns identified in the review and can reinforce CoC/CaC functions under protracted insecurity.

Because conflicts and disasters co-occur, disaster-risk management can be adapted to conflict-prone settings. Two studies highlighted the value of preparedness and risk reduction for health systems at risk of armed conflict so that services can absorb shocks rather than collapse [38, 40]. Practical measures include contingency planning for essential services, emergency and trauma care training, reinforced facilities with backup utilities, and interoperable information and referral tools resilient to state-system failure. Preparedness should also reach communities, training members in first aid and basic chronic-care self-management for local continuity when facilities are inaccessible, consistent with the WHO Health Emergency and Disaster Risk Management (H-EDRM) whole-of-society approach [104]. This is not merely conceptual: comparative evidence suggests that countries investing in health-system resilience and emergency preparedness are more likely to preserve essential services during armed

conflicts [105]. National health plans should therefore integrate conflict risk into routine health-sector preparedness, including continuity plans for essential services, clearly defined cross-sector coordination processes, and protected financing mechanisms to sustain CoC/CaC during insecurity.

This review also synthesizes mitigation strategies, including pre-conflict workforce recruitment, service decentralization, stock assessments and contingency reserves, stronger inter-agency coordination, and conflict-adapted protocols. Technological and digital advances should be more systematically integrated into these strategies. Early-warning and geospatial tools can reduce staff and patient exposure to attacks; modular, mobile facilities with off-grid energy and water can preserve functionality; local manufacturing, including 3D printing, can offset equipment and spare-part shortages; and unmanned aerial vehicles can bridge interrupted supply chains [106–111]. *elemedicine*, connected diagnostics, and service-availability dashboards with AI-assisted triage can match needs to capacity and reduce unnecessary referrals, while remote e-learning and virtual-reality platforms support distance training [112–120] (Table 4). Implementation should include data-protection and cybersecurity safeguards, account for connectivity constraints, and avoid widening inequities. Adoption requires joint coordination bodies, shared real-time platforms, protocols embedding these tools into workflows, and sustainable financing for full life-cycle costs – maintenance, consumables, training, supervision – and local repair markets.

Key strengths include the adoption of a comprehensive analytical framework and causal loop diagram to integrate overlapping pathways and cause–consequence linkages across peer-reviewed and grey literature. Limitations include an uneven evidence base, with most studies addressing attacks on healthcare, service reductions, and referral breakdowns, and fewer examining effects on communities and caregivers, supply chains, rehabilitation and palliative care, or health-worker training. Most studies were context-specific, limiting causal inference and generalisability. Evidence came from only about ten conflict-affected countries, indicating substantial under-representation of conflicts recorded by the UCDP and concentration in a few high-visibility settings (Fig. 3). Reporting heterogeneity and language restrictions may also have excluded some regions, and no formal quality appraisal was undertaken. Nevertheless, the broad search, inclusion of multiple settings, and synthesis of mitigation strategies provide useful evidence for humanitarian and health-system planning.

Table 4
Current and innovative interventions to mitigate armed conflict impacts on care continuity and coordination.

CoC and CaC Domain	Mitigation strategies reported in included studies	Potential digital and technology-enabled strategies (not identified in included studies)
People	• Pre-conflict investments in health workforce recruitment and retention • Peer-, community-, and faith-based psychosocial support • Security coordination with competent authorities • Flexible staffing models (e.g. multitasking, task-shifting, and task-sharing) • Decentralized service delivery and expansion of community-based cadres	• AI-enabled early-warning applications to support rapid staff and patient evacuation • GPS-enabled wearables to monitor field-team safety
Hardware	• Routine stock assessments; pre-positioned contingency reserves near conflict zones; and decentralized distribution systems • Multi-month dispensing of medication	• Truck-, bus-, or rail-based modular mobile hospitals • Solar microgrids and on-site water purification to enable off-grid operation • Portable 3D printers for prostheses and spare parts • Vehicle-based “mini-labs” for compounding essential medicines • Cargo drones to deliver cold-chain medicines to isolated clinics
Services	• Relocation of essential services to protected spaces (e.g. bomb shelters and basements) • Adaptation of outreach activities and service packages to prioritize high-impact, conflict-related needs • Telemedicine and remote mentorship to enable real-time consultation and clinical support	• Drones for casualty search and sample transport • Satellite-linked portable ultrasound and point-of-care diagnostics with remote supervision • Telemedicine integration with, and interoperability across, health systems
Linkages	• Strengthening of inter-provider referral coordination • Alternative referral routes for specialist care (e.g., cross-border referral networks for displaced populations)	• SMS- and social-media dashboards for real-time facility capacity and service availability • AI-assisted triage algorithms and tele-triage hotlines

CoC and CaC Domain	Mitigation strategies reported in included studies	Potential digital and technology-enabled strategies (not identified in included studies)
	• Equipping primary care centres with higher-level supplies and capabilities • Use of social media and digital platforms to transmit medical records and disseminate patient information • Targeted training aligned with disease burden and workforce needs	• Satellite internet terminals to maintain connectivity during network outages • Portable digital health records for refugees and IDPs (e.g., blockchain-enabled solutions) • Remote e-learning supported by VR/AR simulators for refresher training • Fast-track certification pathways for displaced medical trainees and professionals
Governance	• Robust, multi-level, and cross-borders stakeholder coordination • Empowerment of civil society and local actors • Development of preparedness, response, and recovery plans • Development of conflict-adapted clinical protocols and guidelines	• AI/ML predictive analytics to anticipate demand surges, outbreaks, and displacement-related needs • AI-enabled systems for monitoring and independent verification of attacks on healthcare • Institutional learning mechanisms (e.g., after-action reviews) to strengthen system memory

CoC = continuity of care; CaC = care coordination.; AI = artificial intelligence; VR = virtual reality; AR = augmented reality; IDPs = internally displaced people; ML = machine learning.

Conclusions

Armed conflicts exert complex, interlinked pressures on people, hardware, services, linkages, and governance, collectively undermining continuity and coordination of care. This review consolidates disparate evidence and offers a structured lens through which clinicians, policymakers and humanitarian actors can anticipate vulnerabilities and design context-appropriate interventions. The catalogue of mitigation strategies highlights practical options for both immediate response and longer-term resilience building. Findings underscore the urgency of integrating humanitarian, development, and peace agendas to safeguard essential health services amid protracted violence. Continued research, especially on under-studied domains such as community care and supply-chain innovation, is essential to refine and scale these approaches.

Abbreviations

ANC
antenatal care
CoC
continuity of care
CaC
care coordination
HCW
healthcare worker
IDPs
internally displaced people
LTFU
loss-to-follow-up
NCDs
non-communicable diseases
PNC
postnatal care
H-EDRM
Health Emergency and Disaster Risk Management Framework

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

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Competing interests

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Author Contribution

PM and ALC conceptualized the study. PM, NSH and ALC designed the methodology, with methodological input from KB, FBA, LR and CT. PM, NSH and ALC conducted the literature search, study selection and data analysis. PM, ALC and CT developed and refined the domains' framework and the causal loop diagram. PM and NSH wrote the original draft. KB, FBA, LR, ALC and CT reviewed and edited the manuscript. All authors validated the work and read and approved the final manuscript.

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Availability of data and materials

All data generated or analysed during this study are included in this published article and its supplementary information files. The full search strings are provided in the Additional file 1.

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Figures

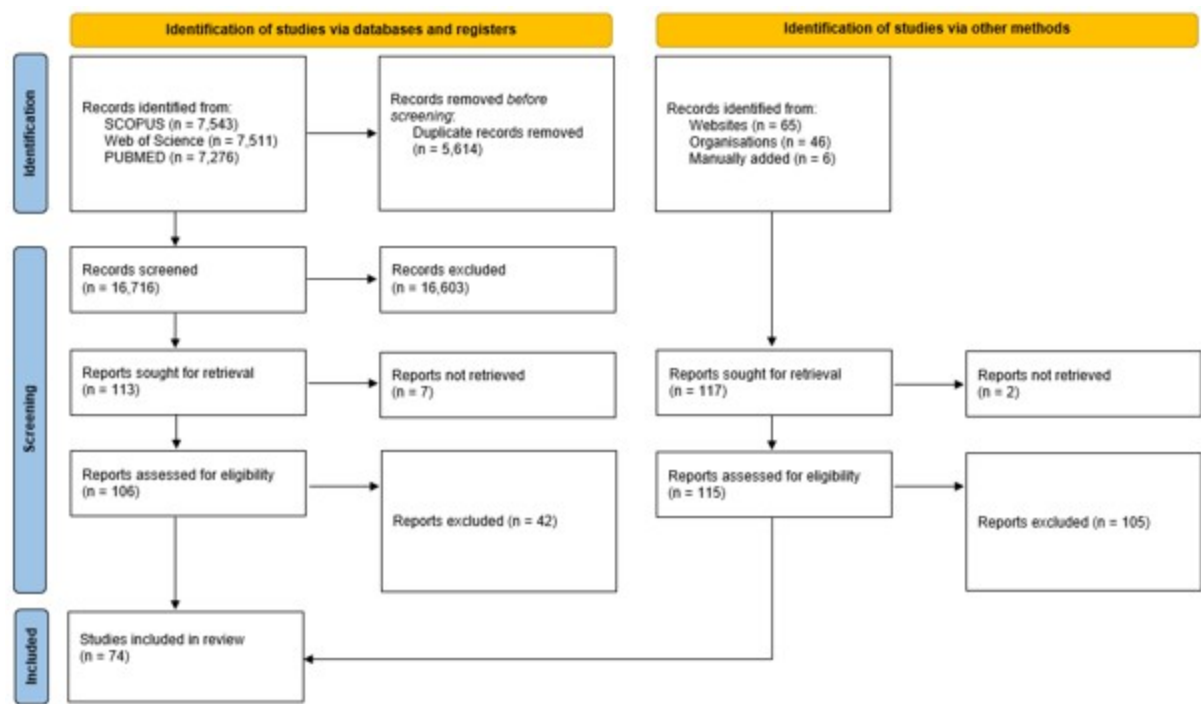


Figure 1

PRISMA flow diagram of the scoping review on armed conflicts and care continuity and coordination.

Source: Page MJ, et al. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71 [17].

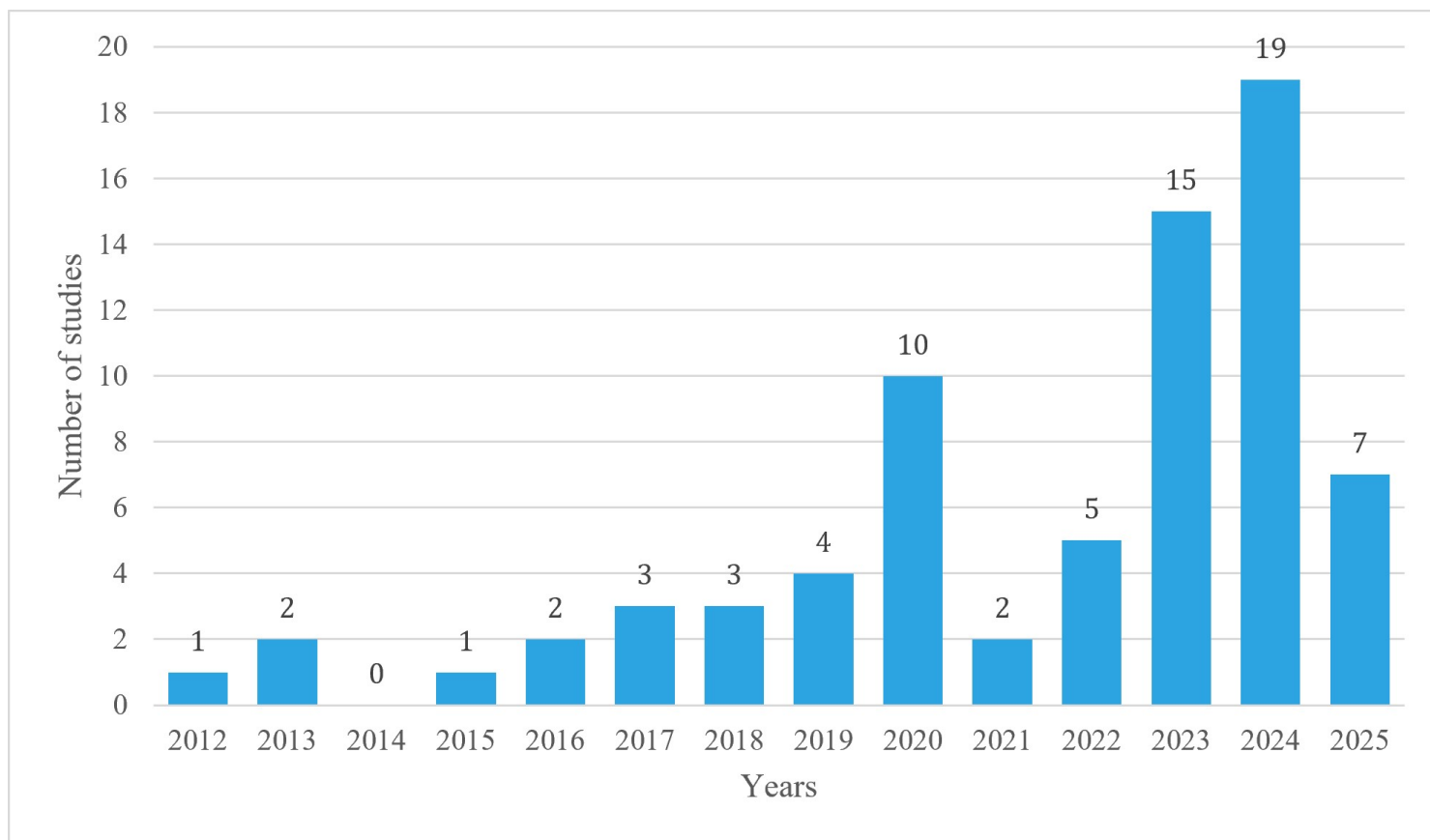


Figure 2

Number of retrieved studies per year.

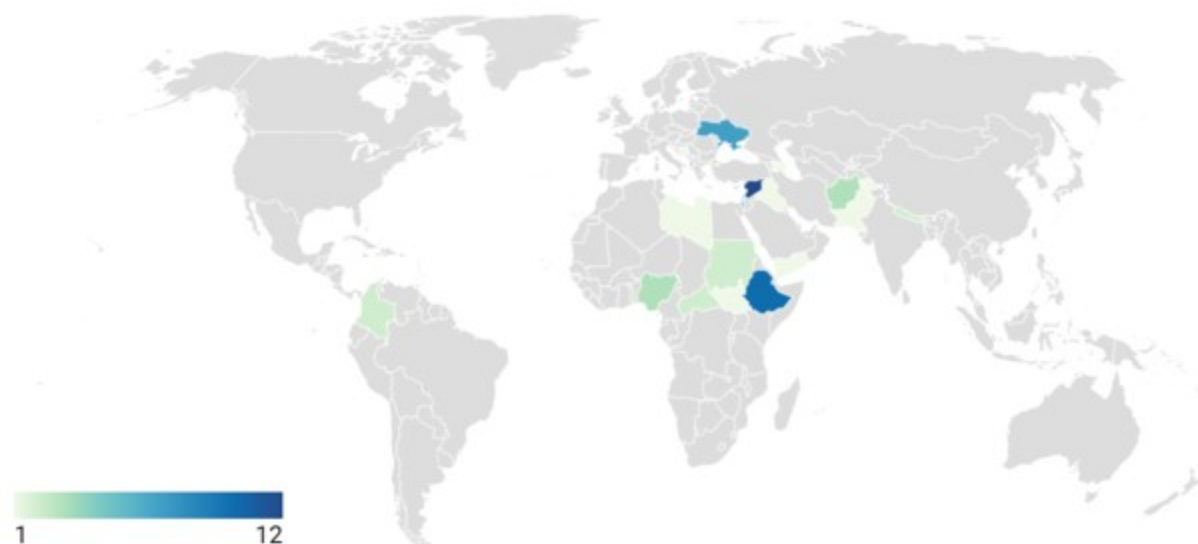


Figure 3

Geographical distribution of retrieved studies.

N.B.: Multi-countries studies are not included in the figure.

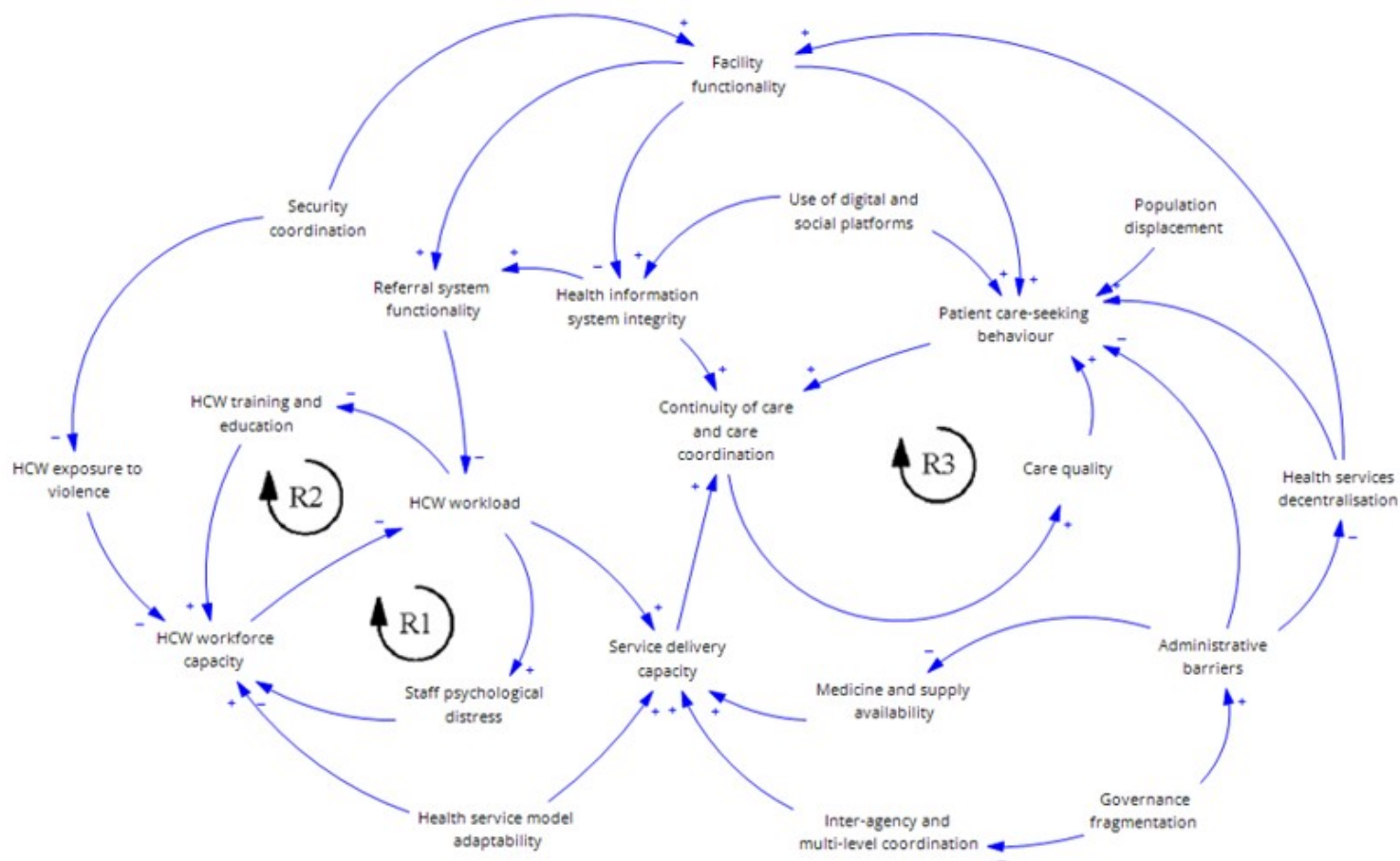


Figure 4

Causal loop diagram of continuity of care and care coordination disruption in armed conflicts

Supplementary Files

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