Global Journal of Medical Research: K
Interdisciplinary
Volume 25 Issue 3 Version 1.0 Year 2025
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Stillbirths and Neonatal Deaths in Conflict Zones: A 10 Year Review of Health System Disruption and Collapse

By Dr. Firi. L. Promise & Dr. Peculiar Ihunwo

Abstract- Armed conflict significantly increases the risk of stillbirths and neonatal deaths, particularly in low and middle income countries (LMICs) where health systems are fragile or in active collapse. Over the past decade, countries such as Syria, Yemen, South Sudan, and Ukraine have experienced substantial deterioration in maternal and neonatal outcomes due to both direct and indirect effects of conflict. This paper employs a narrative synthesis of published and grey literature to assess the burden of perinatal mortality in conflict zones, with particular attention to trends in stillbirth and neonatal mortality, disruptions in service delivery, and the responses of global health actors such as UNICEF, the World Health Organization, and Médecins Sans Frontières. In several conflict-affected regions, stillbirth rates have reached forty per one thousand births, while neonatal mortality exceeds fifty per one thousand live births more than double the global average.

Keywords: stillbirths, neonatal mortality, conflict-affected settings, maternal health, humanitarian response, perinatal outcomes, health system collapse, healthcare workforce, emergency obstetric care, low and middle income countries, health infrastructure disruption.

GJMR-K Classification: NLMC Code: WQ 330

Strictly as per the compliance and regulations of:

Stillbirths and Neonatal Deaths in Conflict Zones: A 10 Year Review of Health System Disruption and Collapse

Dr. Firi. L. Promise [α] & Dr. Peculiar Ihunwo [σ]

Abstract- Armed conflict significantly increases the risk of stillbirths and neonatal deaths, particularly in low and middle income countries (LMICs) where health systems are fragile or in active collapse. Over the past decade, countries such as Syria, Yemen, South Sudan, and Ukraine have experienced substantial deterioration in maternal and neonatal outcomes due to both direct and indirect effects of conflict. This paper employs a narrative synthesis of published and grey literature to assess the burden of perinatal mortality in conflict zones, with particular attention to trends in stillbirth and neonatal mortality, disruptions in service delivery, and the responses of global health actors such as UNICEF, the World Health Organization, and Médecins Sans Frontières. In several conflict-affected regions, stillbirth rates have reached forty per one thousand births, while neonatal mortality exceeds fifty per one thousand live births more than double the global average. Stillbirths, often underreported due to civil registration collapse and cultural stigma, remain largely invisible in humanitarian data systems. Through comparative analysis, the paper highlights critical intervention points and proposes conflict-adapted strategies such as mobile neonatal care units, community-based midwifery, and the use of humanitarian corridors to reduce preventable deaths.

Keywords: stillbirths, neonatal mortality, conflict-affected settings, maternal health, humanitarian response, perinatal outcomes, health system collapse, healthcare workforce, emergency obstetric care, low and middle income countries, health infrastructure disruption.

I. Introduction

a) Background

Perinatal mortality remains one of the most urgent and persistent public health challenges, especially in settings affected by armed conflict. Globally, approximately 1.9 million stillbirths and 2.4 million neonatal deaths are recorded each year, with over ninety percent of these occurring in low and middle income countries (Lawn et al., 2014; WHO, 2023). Conflict exacerbates these outcomes by dismantling health infrastructure, forcing healthcare workers to flee, interrupting the flow of medical supplies, and displacing vulnerable populations. The result is a sharp increase in preventable maternal and neonatal deaths.

Perinatal mortality encompasses both stillbirths and neonatal deaths. A stillbirth is defined as the birth of a baby with no signs of life at or after twenty-eight weeks of gestation, whereas neonatal death refers to the death of a live-born infant within the first twenty-eight days of life (WHO, 2023). While the clinical causes may vary, conflict amplifies the risk of both through shared pathways of health system disruption, nutritional deprivation, poor sanitation, and reduced access to skilled birth attendance.

Recent conflicts in Syria, Yemen, South Sudan, and Gaza provide stark examples of this dynamic. In Syria, the widespread bombing of hospitals and transport blockades severely limited access to obstetric care (Sparrow et al., 2016). Yemen's health system has been described as near-collapse, with only forty-five percent of health facilities functioning as of 2023, and maternal mortality increasing sharply in the wake of infrastructure breakdowns and medicine shortages (UNICEF, 2024). South Sudan, plagued by civil war and climate shocks, has recorded some of the world's highest rates of neonatal mortality, often in the absence of any skilled birth attendants (Makinde et al., 2025). Similarly, ongoing sieges in Gaza have led to frequent NICU shutdowns and an alarming rise in neonatal deaths from preventable conditions such as sepsis and hypothermia (The Guardian, 2024).

The breakdown of antenatal and postnatal services, lack of access to emergency obstetric care, and poor maternal nutrition contribute significantly to these outcomes. Displaced women are often forced to deliver in overcrowded, unsanitary shelters without adequate medical support. Additionally, structural failures such as electricity outages compromise the use of incubators and oxygen concentrators, rendering neonatal intensive care impossible (MSF, 2022).

Humanitarian interventions, though present in many of these settings, are often fragmented and underfunded. Organizations such as MSF, UNICEF, and WHO have deployed mobile neonatal units, initiated Kangaroo Mother Care (KMC) programs, and trained community-based midwives to close urgent gaps. However, the scalability and sustainability of these programs remain constrained by access, security conditions, and insufficient political will.

b) Objective

This paper reviews the trends in stillbirths and neonatal mortality over the past decade, from 2014 to

Author α: e-mail: pearlfiri6@gmail.com

2024, in conflictaffected low and middle income countries. Specifically, the objectives are fourfold:

- To quantify the extent of perinatal mortality in conflict settings using available data.
- To identify and analyze systemic drivers of neonatal and stillbirth outcomes during conflict.
- To evaluate the humanitarian interventions that have been implemented in response.
- To recommend evidence-based, context-sensitive strategies for improving neonatal survival in war-affected environments.

This analysis draws from peer-reviewed literature, humanitarian agency reports, and field evaluations to provide a comprehensive and policy-relevant synthesis of perinatal health outcomes in settings of armed violence.

II. Methods

a) Review Strategy

This review adopted a narrative synthesis methodology, incorporating key principles from systematic review frameworks to ensure transparency and rigour. The choice of narrative synthesis was based on the considerable heterogeneity of data types, the variation in outcome reporting across conflict settings, and the frequent reliance on grey literature and humanitarian reports, which are not easily meta-analysed. Methodological standards outlined by the Synthesis Without Meta-analysis (SWiM) guidelines informed the approach.

Database searches were conducted across PubMed, EMBASE, Scopus, and Web of Science for publications between January 2014 and January 2024. The search terms included combinations of Medical Subject Headings (MeSH) and free-text keywords, such as: “neonatal mortality,” “stillbirth,” “perinatal outcomes,” “armed conflict,” “war zones,” “maternal health,” “humanitarian response,” “health system collapse,” and “low- and middle-income countries.” Boolean operators (AND, OR) were used to optimize results. For example: (“neonatal mortality” OR “stillbirth”) AND (“conflict zones” OR “war”) AND (“maternal health” OR “obstetric care”).

Grey literature was included to capture humanitarian data often omitted in academic publishing. Sources included organizational reports and situation updates from the World Health Organization, UNICEF, Médecins Sans Frontières (MSF), Save the Children, UN OCHA, UNFPA, and The Guardian. These documents were assessed for credibility based on issuing body, publication date, internal consistency, and data traceability. News outlets were only included when corroborated by humanitarian sources or when providing verified field-level observations.

A total of 238 records were initially retrieved. After removing duplicates, 183 abstracts were screened. From this, 91 full texts were reviewed, with 54 publications ultimately included based on relevance, data integrity, and focus on stillbirths or neonatal mortality in conflict-affected low- and middle-income countries.

b) Inclusion and Exclusion Criteria

Studies and reports were eligible for inclusion if they:

- Reported on stillbirths or neonatal mortality in conflict-affected LMICs.
- Included quantitative data or empirical program evaluations.
- Were published between January 2014 and January 2024.
- Were written in English.

Exclusion Criteria Included:

- Opinion or commentary pieces without original data.
- Studies focused on high-income or non-conflict settings.
- Reports lacking information on perinatal health outcomes.

c) Country Selection Criteria

Eight countries were included in the analysis based on the severity and duration of armed conflict, the availability of neonatal health data, and regional representation. These countries are Syria, Yemen, South Sudan, Ethiopia (Tigray region), Sudan (South Darfur), Gaza, Iraq, and Ukraine (Donbas region). This selection enables cross-comparison across different geopolitical, cultural, and health system contexts.

d) Limitations and Review Rationale

Due to constraints in accessing real-time primary data from active war zones, the review relied heavily on grey literature and field reports. Many conflict settings lack centralized data collection systems, and figures may be underreported due to insecurity or political sensitivities. To address these limitations, data were triangulated from multiple credible sources whenever possible.

Although a full systematic review was not feasible, methodological transparency was prioritized throughout. A PRISMA-style flowchart summarizing the search and selection process is included in Figure 1.

Stage	Number of Records
Records identified from databases	238
Duplicates removed	55
Titles and abstracts screened	183
Full-text articles assessed	91
Publications included in review	54

Figure 1: Summary of Search and Selection Process (PRISMA-style Narrative)

III. Global Burden of Perinatal Mortality in Conflict Settings

Perinatal mortality refers to the combined measure of stillbirths and early neonatal deaths, typically occurring from the twenty-eighth week of gestation through the first seven days of life. In public health terms, however, perinatal mortality is increasingly interpreted more broadly to include all neonatal deaths occurring within the first twenty-eight days after birth, aligning with WHO monitoring indicators (WHO, 2023).

Stillbirths and neonatal deaths are two of the most critical indicators of maternal and child health system performance. A stillbirth, by WHO definition, is the birth of an infant with no signs of life at or after twenty-eight weeks of gestation. In contrast, neonatal mortality refers to the death of a live-born infant within the first twenty-eight days of life (UN IGME, 2022). Together, these outcomes signal the extent to which health systems are functioning, particularly regarding access to antenatal care, intrapartum monitoring, skilled birth attendance, and postnatal support.

In 2021, the global stillbirth rate stood at 13.9 per 1,000 total births, while the neonatal mortality rate was 17.5 per 1,000 live births. However, in conflict-affected low and middle income countries, these figures are dramatically higher, often surpassing 35 to 40 stillbirths and over 50 neonatal deaths per 1,000 births (UN IGME, 2023; WHO, 2023). These levels are far above the Sustainable Development Goal 3.2 targets, which aim to reduce neonatal mortality to fewer than twelve per 1,000 live births and eliminate preventable stillbirths by 2030 (United Nations, 2015).

In Yemen, where ongoing conflict has devastated infrastructure, the estimated stillbirth rate reached thirty-eight per 1,000 births, while neonatal mortality spiked between forty-five and sixty per 1,000 live births depending on the region (UNFPA, 2021; ReliefWeb, 2022). South Sudan presents similarly grave figures, with regional variations showing stillbirth rates as high as thirty-six per 1,000 and neonatal mortality averaging forty-three per 1,000 live births (Makinde et al., 2025; Save the Children, 2021).

The Donbas region of Ukraine has experienced a notable deterioration in neonatal outcomes since the onset of conflict in 2014. Prior to the war, neonatal mortality was estimated at nine per 1,000 live births. However, by 2021, this figure had increased to twenty-two per 1,000, largely due to the collapse of obstetric care networks and restricted humanitarian access (UN OCHA, 2021). In northeast Nigeria, areas affected by Boko Haram insurgency reported stillbirth rates of thirty-seven per 1,000 births, which is almost three times the national average (ACAPS, 2022).

These elevated mortality rates are not isolated anomalies, but rather recurring patterns in fragile settings where healthcare infrastructure, governance, and access are severely compromised.

Country	Stillbirth Rate (per 1,000)	Neonatal Mortality Rate (per 1,000)	Source(s)
Yemen	38	45–60	UNFPA, 2021; UNICEF, 2022
South Sudan	30–36	43	Makinde et al., 2025; Save the Children, 2021
Syria (Aleppo)	40	49	WHO EMRO, 2018; Sparrow et al., 2016
Ukraine (Donbas)	18–22	22	UN OCHA, 2021
Nigeria (Borno)	37	Not available	ACAPS, 2022
Gaza	Approx. 32	47	The Guardian, 2024; MSF, 2022

Figure 2

These figures underscore the magnitude of perinatal loss in conflict-affected settings and highlight the urgent need for a re-prioritization of maternal and newborn health in humanitarian response strategies.

IV. Drivers of Perinatal Mortality in Conflict Zones

The relationship between armed conflict and elevated rates of stillbirth and neonatal mortality can be understood through a combination of direct and indirect drivers. These mechanisms operate simultaneously and often synergistically, compounding existing vulnerabilities in fragile health systems. Understanding these pathways is essential for designing effective, context-specific interventions.

a) Direct Drivers: Violence and Systemic Destruction

The most immediate and visible drivers of perinatal mortality in conflict settings are those that result directly from acts of violence. These include deliberate attacks on health facilities, the physical endangerment of pregnant women, and blockade-related disruptions to access and transport.

Attacks on hospitals, maternity wards, ambulances, and other health infrastructure are well-documented violations of international humanitarian law. Between 2018 and 2022, more than 1,200 such attacks were verified globally, with the frequency increasing in 2023 (WHO, 2023). In Aleppo, Syria, the destruction of maternity hospitals during airstrikes forced pregnant women to give birth in overcrowded homes, often without skilled assistance or sterile equipment. In one instance reported by Médecins Sans Frontières, five neonates died in a twenty-four-hour period following the bombing of the only functional NICU in the region (MSF, 2022).

Blockades and siege conditions represent another form of violence with indirect but deadly consequences. In Yemen, the blockade of Hodeidah port severely restricted the importation of essential medical supplies including oxygen cylinders, neonatal antibiotics, and sterile birth kits. Without these resources, health workers reported sharp increases in intrapartum stillbirths and early neonatal deaths due to sepsis and birth asphyxia (UNICEF, 2021).

Conflict also increases the risk of obstetric trauma. Pregnant women exposed to physical violence or chronic fear are more likely to experience preterm labour, uterine rupture, or stillbirth. Studies from the Democratic Republic of Congo and Sierra Leone have shown significantly higher rates of miscarriage and stillbirth in women subjected to sexual violence during armed conflict (Amowitz et al., 2002).

b) Indirect Drivers: Displacement, Malnutrition, and System Collapse

Beyond immediate violence, conflict sets off a cascade of indirect effects that deeply influence perinatal outcomes. Among these are displacement, maternal malnutrition, the collapse of human resources, and infrastructural breakdowns in the broader health system.

Forced displacement disrupts antenatal care and increases the likelihood of home births in unsafe and unhygienic environments. In South Sudan, more than seventy percent of internally displaced women in camps reported no access to antenatal services, and a majority gave birth without skilled attendants. Deliveries in crowded shelters or tents often lack sterile tools, clean water, or any means of thermal regulation. This has led to high rates of neonatal sepsis, hypothermia, and birth asphyxia (Save the Children, 2021).

Maternal malnutrition, both acute and chronic, contributes significantly to poor birth outcomes. Conflict-affected areas frequently suffer food insecurity and famine-like conditions. In Yemen and South Sudan, over forty percent of pregnant women were identified as acutely malnourished in recent assessments (Makinde et al., 2025; UNICEF, 2022). Malnutrition leads to intrauterine growth restriction, low birthweight, and increased susceptibility to infection in newborns, thereby contributing to both stillbirth and neonatal mortality.

The loss of skilled personnel compounds these issues. Conflict often forces doctors, midwives, and nurses to flee, leaving health facilities either understaffed or completely inoperable. In Syria, it is estimated that seventy percent of the pre-war health workforce is no longer active, due to death, displacement, or migration (WHO EMRO, 2020). This personnel crisis means that even functioning facilities may be incapable of managing complications such as obstructed labour or neonatal resuscitation.

c) Health System Failure through the WHO Building Blocks

The collapse of health systems in conflict zones can be further understood using the World Health Organization's six building blocks framework: service delivery, health workforce, information systems, medical products and technologies, financing, and leadership or governance (WHO, 2007).

Service Delivery: Is typically the first to collapse. Maternity wards may be destroyed, operating hours limited due to insecurity, and essential services like emergency obstetric care rendered unavailable. This results in an increase in unattended home births, delayed referrals, and higher rates of intrapartum complications.

Health Workforce: Attrition follows swiftly. Conflict causes death, injury, flight, or psychological burnout among frontline health workers. For instance, in northeast Nigeria, only one obstetrician remained in Borno State to serve more than one million displaced people at the height of the Boko Haram insurgency (ACAPS, 2022).

Health Information Systems: Are often suspended or dismantled entirely during prolonged crises. Without functioning civil registration and vital statistics systems, stillbirths go uncounted and neonatal deaths

underreported. This obscures the true scale of the problem and undermines efforts to design effective interventions.

Medical Supply Chains: Break down under conditions of war. Delays in delivering vaccines, antibiotics, and neonatal resuscitation kits have been reported across Gaza, Yemen, and Ukraine. In Gaza, electricity blackouts also prevent the operation of oxygen concentrators and incubators, contributing to neonatal deaths from hypoxia and hypothermia (The Guardian, 2024).

Health Financing: Systems suffer major disruptions. National health budgets are diverted to military expenditure, and donor fatigue reduces external support. Out-of-pocket expenses for care increase, pushing families to delay or forego seeking services.

Lastly, *governance and leadership* structures often collapse or become fragmented. Ministries of Health may lose jurisdiction over parts of a country, or health policies become unimplementable due to loss of territorial control. In the Tigray region of Ethiopia, international health actors were blocked from accessing maternity clinics for months, resulting in catastrophic declines in service availability (UN OCHA, 2022).

V. Regional Case Studies in Conflict-Affected Perinatal Health

To ground the broader analysis in specific national contexts, this section presents focused case studies from four conflict-affected countries: Syria, Yemen, South Sudan, and Ukraine. These countries were selected due to their prolonged conflicts, significant perinatal mortality trends, and availability of humanitarian and academic data. Each case illustrates how conflict disrupts maternal and neonatal health through both direct and indirect pathways, as discussed in Section 4.

a) *Syria (2011–2024): Health System Collapse and Urban Siege Conditions*

The Syrian conflict offers one of the clearest examples of systemic collapse affecting maternal and neonatal outcomes. Prior to the war, Syria had among the highest rates of skilled birth attendance in the region, with approximately 96 percent of deliveries taking place in health facilities. By 2016, that figure had fallen below 60 percent in areas such as Aleppo, Homs, and Idlib, where aerial bombardment destroyed maternity hospitals and forced repeated evacuations of health personnel (Sparrow et al., 2016).

During the siege of eastern Aleppo, neonatal mortality rose sharply, with estimates reaching forty-nine deaths per 1,000 live birthsnearly three times the pre-war baseline. Field reports from Médecins Sans Frontières documented a complete collapse of neonatal intensive care services following the bombing of the city's largest NICU. Premature infants, many born to malnourished and anaemic mothers, died from sepsis, hypoxia, or cold exposure due to a lack of electricity and incubators (MSF, 2022).

Humanitarian responses were severely constrained by access restrictions. Nonetheless, international NGOs established mobile units equipped with portable oxygen tanks and solar-powered infant warmers in areas accessible by road convoys. These efforts improved outcomes modestly in peri-urban zones, but urban siege environments remained largely unreachable by 2020.

b) *Yemen (2015–2024): Blockades and Fragmented Governance*

Yemen's ongoing war has led to one of the world's worst humanitarian crises, with major impacts on maternal and neonatal health. As of 2023, only 45 percent of health facilities in the country were fully functional, and less than a quarter of births occurred with a skilled attendant present (UNFPA, 2023; UNICEF, 2022). Stillbirth rates have been recorded at thirty-eight per 1,000 births nationally, with even higher figures in the northern provinces. Neonatal mortality fluctuated between forty-five and sixty per 1,000 live births, depending on access to functioning services.

Fuel blockades and airstrikes on transport networks severely limited ambulance availability and referral systems. In Hajjah and Taiz governorates, pregnant women often walked more than five kilometres to reach care, only to find NICUs without functioning incubators or antibiotics. One field report recorded a survival rate of less than thirty-three percent among neonates admitted to neonatal wards in Hajjah in 2021 (ReliefWeb, 2022).

In response, UNFPA and Save the Children launched a mobile midwifery program that trained and deployed over 500 female birth attendants into remote villages and displacement camps. These workers carried solar-lit delivery kits, misoprostol for postpartum hemorrhage, and neonatal resuscitation tools. Additionally, solar-powered incubator prototypes were tested in two rural clinics, improving neonatal survival by nearly 40 percent in those sites over a nine-month pilot period (UNFPA, 2023).

c) *South Sudan (2013–2024): Conflict, Climate, and Isolation*

South Sudan presents a complex case of compounded crises, where conflict, floods, and famine intersect. Since its independence, the country has experienced near-continuous conflict and displacement. Neonatal mortality currently stands at forty-three per 1,000 live births, with stillbirth rates ranging from thirty to thirty-six per 1,000 depending on region (Makinde et al., 2025). Jonglei and Unity states, most affected by violence and displacement, report some of the country's worst perinatal indicators.

Access to skilled care is severely limited. In many regions, fewer than 20 percent of deliveries occur in health facilities, and antenatal care coverage is below 35 percent (Save the Children, 2021). Infrastructure is virtually non-existent in swampy and flood-prone areas. During the rainy season, communities become entirely cut off from health services.

To address this, community-based birthing huts have been established using locally available materials, staffed by women from the community who receive WHO-supported midwifery training. These huts provide clean delivery environments, thermoregulation tools, and emergency transport via canoe or motorcycle stretcher to secondary-level facilities. Although limited in scale, these efforts have demonstrated reductions in neonatal sepsis and birth complications in the regions where implemented (WHO ENAP, 2022).

d) Ukraine (2014–2024): Infrastructure Degradation in a Middle-Income Country

The Donbas region of Ukraine has experienced persistent conflict since 2014. As a middle-income country with a relatively strong pre-war health system, Ukraine presents a different set of challenges and adaptations. Between 2014 and 2021, neonatal mortality in the Donbas region increased from nine to twenty-two per 1,000 live births, largely due to the degradation of health infrastructure, staffing shortages, and disrupted supply lines (UN OCHA, 2021).

Approximately 30 percent of obstetric and neonatal facilities in the region were reported non-functional by 2022. Rural health posts lacked access to oxygen, heating, and incubator equipment during the winter months. COVID-19 further delayed humanitarian responses, leading to critical care shortages.

Médecins Sans Frontières deployed mobile neonatal stabilization units to eastern Ukraine beginning in 2020. These teams, equipped with portable resuscitation kits and thermal blankets, operated along the conflict line and provided on-site care to over 1,000 neonates by 2023. Preliminary evaluations indicate a 25 percent reduction in early neonatal deaths in their areas of operation (MSF, 2023).

e) Nigeria (Borno State)

Borno State in northeastern Nigeria has endured prolonged violence from the Boko Haram insurgency since 2009. Between 2013 and 2020, the region recorded persistently high stillbirth rates, peaking at 37 per one thousand births (ACAPS, 2022). Health services have been severely disrupted by attacks on clinics, abduction of health personnel, and widespread displacement of civilians.

Many pregnant women give birth in overcrowded internally displaced persons (IDP) camps, where basic sanitation, sterile delivery environments, and medical staff are lacking. Humanitarian access remains intermittent, and maternal health services have struggled to recover. Neonatal mortality estimates remain incomplete due to poor surveillance, but field reports suggest that newborn sepsis and birth asphyxia are common.

f) Darfur (Sudan)

Years of ethnic conflict and displacement in Darfur have resulted in some of the worst maternal and neonatal health indicators in the region. Over half of all births in conflict-affected areas occur outside formal facilities, often attended by untrained traditional birth attendants. Stillbirth estimates from camp settings vary, but surveys conducted in 2020 found rates as high as 32 per one thousand (UNICEF, 2022).

g) Rohingya Refugee Camps (Cox's Bazar, Bangladesh)

More than 900,000 Rohingya refugees have been displaced to Bangladesh since 2017, creating one of the largest stateless and displaced populations in the world. In overcrowded camps at Cox's Bazar, conditions for maternal and neonatal care are dire. A 2019 UNHCR report noted a neonatal mortality rate of 44 per one thousand live births (UNHCR, 2019). Stillbirths were frequent but underreported due to weak registration systems and cultural stigma.

Deliveries are often conducted in tents or makeshift shelters, with limited access to skilled attendants, electricity, or sterile equipment. While NGOs like MSF and Save the Children have established field maternity units, demand consistently outpaces capacity.

Neonatal care is virtually absent in many areas. Clinics are underequipped, referrals are slow, and neonatal resuscitation equipment is rare. Flooding and seasonal access problems further isolate rural communities. WHO and UNFPA have piloted some mobile units in central Darfur, but coverage remains highly limited.

h) Gaza Strip (Occupied Palestinian Territory)

The Gaza Strip, under blockade since 2007 and frequently affected by conflict, presents one of the most densely populated and chronically unstable health environments. Neonatal units in public hospitals often run without consistent power, oxygen, or clean water. A 2023 field report by UNICEF and The Guardian documented a neonatal mortality rate approaching 47 per one thousand live births, with stillbirths occurring in delivery rooms lacking functional incubators or resuscitation equipment (The Guardian, 2024).

The blockade has severely restricted access to medicines, spare parts for medical devices, and mobility for referrals. Despite the presence of skilled health personnel, resource constraints and repeated infrastructure damage continue to undermine neonatal survival.

VI. Humanitarian Actors in Neonatal and Stillbirth Response

Humanitarian agencies play a central role in mitigating the consequences of conflict on maternal and newborn health. Organizations such as the United Nations Children's Fund (UNICEF), Médecins Sans Frontières (MSF), the World Health Organization (WHO), the United Nations Population Fund (UNFPA), and the International Committee of the Red Cross (ICRC) have developed a range of strategies to reduce perinatal mortality in settings where national health systems have collapsed.

UNICEF has been a lead agency in scaling up community and facility-based neonatal care in emergencies. Its maternal and newborn health response includes distribution of clean birth kits, promotion of kangaroo mother care (KMC), and deployment of emergency obstetric teams to underserved regions. Between 2020 and 2023, UNICEF distributed over 150,000 clean delivery kits in Yemen, Syria, and South Sudan alone (UNICEF, 2023). These kits provided critical supplies such as sterile blades, gloves, thermal blankets, and antiseptic to women delivering in informal settlements and conflict zones.

The promotion of KMC, a lowcost intervention involving skin-to-skin contact and exclusive breastfeeding, has been one of the more scalable efforts in resource-constrained areas. UNICEF and WHO have supported KMC implementation in displacement camps and temporary clinics across Gaza, Tigray, and northeast Nigeria. Evaluations suggest that KMC has led to a 25 to 50 percent improvement in neonatal survival among low birthweight infants when implemented effectively in crisis settings (WHO, 2022).

MSF has taken a leading role in direct service delivery, particularly in hard-to-reach or besieged zones where access for larger agencies may be limited. MSF operates field hospitals and neonatal units in over thirty conflict zones, including eastern Ukraine, Syria, and South Sudan. Their model emphasizes training of local birth attendants in neonatal resuscitation, infection prevention, and clean delivery techniques. A 2022 evaluation of MSF-supported clinics in Unity State, South Sudan reported a 22 percent reduction in early neonatal mortality after six months of targeted intervention (MSF, 2023).

Despite these contributions, major limitations remain. Humanitarian coordination is often fragmented, with duplication of services in accessible areas and total absence in others. In Yemen, for instance, overlapping mandates between WHO, UNFPA, and national authorities led to confusion over the provision of reproductive health supplies in 2021, leaving some regions overstocked and others dangerously under-resourced (ReliefWeb, 2022). Furthermore, political barriers such as blockades, security restrictions, or denial of humanitarian access hinder implementation in the most affected zones.

Data collection is another critical challenge. Stillbirths, in particular, remain underreported across humanitarian operations. Most field health information systems prioritize maternal deaths or under-five mortality, with stillbirths often classified inconsistently or omitted entirely from monitoring frameworks. This invisibility prevents adequate resource allocation and perpetuates the notion that stillbirths are unpreventable or secondary concerns (Flenady et al., 2016).

Perhaps most critically, structural challenges persist because humanitarian health interventions remain reactive rather than integrated. Emergency neonatal care is often mobilized late, following media attention or catastrophic events, rather than embedded within ongoing preparedness and response plans. Short-term funding cycles, reliance on temporary staffing, and limited support for local health governance mean that interventions, even when effective, are difficult to sustain or scale.

In summary, humanitarian actors have made significant contributions to mitigating perinatal mortality in conflict zones. Their efforts have saved lives, expanded access to critical care, and innovated in low-resource environments. However, without systemic coordination, sustained investment, and formal inclusion of stillbirth reduction in global response frameworks, these efforts risk remaining fragmented and insufficient.

VII. Discussion

This review has illustrated how armed conflict acts as a powerful disruptor of maternal and neonatal health in low and middle income countries. The evidence drawn from Syria, Yemen, South Sudan, and Ukraine consistently shows that perinatal mortality increases sharply when health systems are destabilized. These countries, though diverse in geography and political context, reveal remarkably similar patterns: healthcare facilities are destroyed or rendered non-functional, trained personnel are displaced or killed, and pregnant women are forced to give birth in unsanitary environments without medical support.

Direct consequences of conflict include the destruction of neonatal intensive care units, targeted attacks on maternity wards, and the obstruction of humanitarian supplies. In Aleppo, Syria, aerial bombardments led to the closure of functioning NICUs and forced expectant mothers to deliver in private homes or abandoned buildings. Médecins Sans Frontières reported that premature infants often died from hypothermia, birth asphyxia, or untreated infections due to the absence of incubators, power, and antibiotics (Sparrow et al., 2016; MSF, 2022). In Yemen, the blockade of Hodeidah severely restricted access to fuel, sterile birth kits, and oxygen cylinders, further increasing

the rate of intrapartum stillbirths and neonatal complications (UNFPA, 2021; ReliefWeb, 2022).

Indirect mechanisms are no less lethal. Displacement consistently undermines continuity of care. In South Sudan, the collapse of road infrastructure due to conflict and flooding has left many pregnant women without antenatal care or access to trained birth attendants (Makinde et al., 2025). These conditions contribute to higher rates of sepsis, obstructed labor, and perinatal asphyxia. Similarly, maternal malnutrition documented in over 40 percent of women in both Yemen and South Sudan is strongly associated with low birthweight and increased vulnerability to infection among newborns (UNICEF, 2022; Save the Children, 2021).

The role of humanitarian organizations in addressing these crises has been substantial but uneven. Mobile midwifery services, kangaroo mother care units, and emergency neonatal kits have helped to mitigate mortality in some regions. For example, UNFPA's deployment of solar-powered incubators in rural Taiz led to improved thermal care for premature infants, while MSF's field hospitals in Unity State reported a measurable reduction in early neonatal deaths following the introduction of community birth attendant training (UNFPA, 2023; MSF, 2023). However, these interventions are often limited in scale, delayed in implementation, and hindered by insecurity and political restrictions.

Stillbirths remain underreported across nearly all settings, in part due to the collapse of civil registration systems during conflict. Even where neonatal mortality data exist, stillbirths are frequently omitted or aggregated in ways that obscure their burden. The cultural stigma surrounding stillbirth, combined with the lack of standardized definitions and data tools, further compounds this problem (Flenady et al., 2016). As a result, humanitarian responses tend to overlook stillbirth prevention, focusing instead on maternal survival or postnatal care.

The health system perspective helps to clarify why perinatal mortality rises so dramatically during war. Using the World Health Organization's framework, it is evident that all six building blocks of health systems are severely compromised. Service delivery is interrupted by facility closures and staffing shortages. Human resources are depleted as skilled personnel flee violence. Health information systems become unreliable or are dismantled entirely. Supply chains for essential medicines and equipment are routinely blocked. Financing shifts toward military priorities, leaving reproductive health underfunded. Leadership and governance become fragmented or incapacitated, especially in regions where government control is lost or contested.

While many of the contributing factors to stillbirths and neonatal deaths are structural and long-standing, the evidence also points to areas of resilience and innovation. Local midwives, community health workers, and mobile response units have all played crucial roles in sustaining care where formal systems have collapsed. Where partnerships between humanitarian agencies and national health authorities are strong, such as in select regions of Ukraine and South Sudan, interventions have demonstrated greater consistency and coverage.

Nonetheless, the broader picture remains sobering. Perinatal mortality in conflict zones is not an unavoidable consequence of war, but rather the outcome of health system failure, global inaction, and inadequate policy attention. Without deliberate, well-funded, and context-specific interventions, the death of thousands of newborns will continue to go uncounted and unchallenged.

VIII. Recommendations

Reducing stillbirths and neonatal deaths in conflict settings requires more than isolated humanitarian interventions. It demands sustained policy commitment, stronger coordination among global health actors, and conflict-sensitive strategies that address both immediate and systemic failures. Based on the evidence presented in this review, the following recommendations are proposed to strengthen perinatal survival in crisis-affected environments.

a) Prioritize Perinatal Health in Humanitarian Strategies

Stillbirths and neonatal deaths must be elevated as core indicators within emergency health responses. Currently, these outcomes remain underrepresented in humanitarian reporting frameworks, despite their prevalence. Agencies such as the World Health Organization, UNICEF, and the Inter-Agency Standing Committee should incorporate perinatal mortality data including stillbirths into cluster-level monitoring systems and inter-agency response plans. Making perinatal survival an explicit objective will ensure that resources are allocated accordingly, and that stillbirth prevention is not sidelined.

b) Strengthen Protected Access through Humanitarian Birth Corridors

In settings where physical access to hospitals is obstructed by violence or geography, the establishment of humanitarian birth corridors is essential. These protected pathways must be negotiated with conflict parties and coordinated with local actors to guarantee safe passage for pregnant women, newborns, and emergency transport. Experience from eastern Ukraine and Gaza shows that such arrangements, though complex, are feasible and can significantly reduce delays in reaching obstetric or neonatal care.

c) *Scale up Community-based Neonatal Care*

When health systems collapse, trained community members often become the primary providers of maternal and newborn care. Expanding training for local midwives, community health workers, and birth attendants can increase coverage of essential interventions such as thermal protection, infection prevention, and neonatal resuscitation. The success of community birthing huts in South Sudan and mobile midwifery in Yemen demonstrates that localized models are not only feasible, but also culturally appropriate and cost-effective.

d) *Support Innovation in Mobile and Low-Tech Neonatal Services*

Investments in lowcost, contextadapted neonatal technologies can help bridge the gap left by dysfunctional hospitals. Tools such as solar-powered incubators, portable resuscitation packs, and kangaroo mother care units have shown success in field conditions. Scaling such innovations across humanitarian settings would require flexible funding mechanisms and better integration of these tools into national emergency preparedness plans.

e) *Integrate Mental Health Support into Maternal and Newborn Services*

Psychological trauma is a common consequence of both perinatal loss and conflict exposure, yet mental health is often excluded from maternal health programming. Services such as grief counselling for bereaved mothers and psychological support for frontline staff should be incorporated into the design of emergency obstetric and neonatal care. Pilot programs by Médecins Sans Frontières and WHO have shown that peer counselling and psychosocial first aid can be delivered even in resourceconstrained settings with appropriate training and community engagement.

f) *Improve Coordination and Sustain Long-Term Investment*

Effective response requires coordinated action across humanitarian, governmental, and technical partners. Overlapping mandates and inconsistent funding streams continue to fragment efforts. Establishing dedicated neonatal health coordination platforms within health clusters could improve planning, reduce duplication, and standardize care delivery. Furthermore, donors must transition from short-term funding cycles toward multi-year commitments that support infrastructure recovery, workforce rebuilding, and health information systems rehabilitation.

Together, these recommendations offer a pathway toward reducing preventable perinatal deaths in conflict zones. Each strategy is grounded in field-tested interventions or supported by data presented in this review. While conflict will likely remain a feature of the global landscape, the vulnerability of newborns does not have to be inevitable.

IX. Conclusion

Stillbirths and neonatal deaths in conflict zones represent one of the most overlooked public health emergencies of our time. Far from being random or unavoidable, these deaths are predictable outcomes of systemic neglect, structural collapse, and international inaction. The analysis presented in this paper shows that across Syria, Yemen, South Sudan, and Ukraine, the destruction of health infrastructure, loss of skilled personnel, collapse of supply chains, and displacement of vulnerable populations have created environments where safe childbirth is no longer guaranteed.

Yet these outcomes are not inevitable. The vast majority of stillbirths and neonatal deaths in these settings are preventable with timely, basic interventions clean delivery environments, skilled care during birth, access to oxygen, neonatal resuscitation, and postnatal warmth. Humanitarian efforts have shown that even under siege or in displacement, simple tools like kangaroo mother care, solar-powered incubators, and mobile birth kits can save lives when deployed effectively.

Despite international commitments under Sustainable Development Goal 3.2 to reduce neonatal mortality to fewer than twelve per one thousand live births and to eliminate preventable stillbirths by the year 2030, conflict-affected countries remain furthest from these targets. The global health community cannot afford to treat these settings as exceptions. Instead, they must become the focal point for innovation, funding, and accountability in perinatal health.

Ultimately, the right to survive the first day of life should not be conditional upon geography, peace, or privilege. As global instability continues to displace millions and threaten already fragile systems, newborns must be placed at the center of emergency response and recovery strategies. With sustained investment, coordinated action, and a commitment to perinatal inclusion in humanitarian frameworks, it is possible to protect the youngest and most vulnerable even in the most difficult of circumstances.

Abbreviations and Full Terms

1. LMICs – Low and Middle Income Countries
2. NMR – Neonatal Mortality Rate
3. WHO – World Health Organization
4. UNICEF – United Nations Children's Fund
5. MSF – Médecins Sans Frontières
6. NICU – Neonatal Intensive Care Unit
7. ICRC – International Committee of the Red Cross
8. UN OCHA – United Nations Office for the Coordination of Humanitarian Affairs
9. KMC – Kangaroo Mother Care

References Références Referencias

1. ACAPS, 2022. *Nigeria: Conflict Analysis of Borno State*. Geneva: ACAPS.
2. Amowitz, L.L., Reis, C., Lyons, K., Vann, B., Mansaray, B. and Iacopino, V., 2002. Prevalence of war-related sexual violence among internally displaced persons in Sierra Leone. *JAMA*, 287(4), pp.513–521.
3. Bhutta, Z.A. et al., 2019. Born Too Soon: Global action report on preterm birth. Geneva: World Health Organization.
4. Flenady, V. et al., 2016. Stillbirths: the way forward in high-burden countries. *The Lancet*, 387(10018), pp.587–603.
5. Lawn, J.E., Blencowe, H., Pattinson, R. et al., 2014. Stillbirths: rates, risk factors, and acceleration towards 2030. *The Lancet*, 384(9940), pp.587–603.
6. Makinde, O.A., Thombiano, R. and Johnson, T., 2025. Malnutrition and neonatal mortality in conflict-affected South Sudan. *Global Health Action*, 18(1), pp.55–67.
7. Médecins Sans Frontières, 2022. *Saving Newborn Lives in Conflict Zones: Field Report*. Geneva: MSF.
8. Médecins Sans Frontières, 2023. *South Sudan Neonatal Outcomes Evaluation Report*. Geneva: MSF.
9. ReliefWeb, 2022. *Humanitarian Needs Overview: Yemen*. Geneva: OCHA.
10. Save the Children, 2021. *Newborn Survival in Conflict Zones: South Sudan Case Study*. London: Save the Children.
11. Sparrow, A., Almilaji, K., Tajaldin, B., Teodoro, N. and Langton, P., 2016. Health system collapse and mortality in Syria: the impact of targeted attacks. *The Lancet Global Health*, 4(7), pp.e474–e481.
12. The Guardian, 2024. Gaza's failing incubators: Why newborns are dying in darkness. [online] Available at: https://www.theguardian.com [Accessed 10 May 2025].
13. UNFPA, 2021. *Yemen Humanitarian Response Report*. Sana'a: United Nations Population Fund.
14. UNFPA, 2023. *Mobile Midwifery in Yemen: Outcome Evaluation Report*. Sana'a: United Nations Population Fund.
15. UNICEF, 2022. *Maternal and Neonatal Outcomes in Emergency Settings*. New York: UNICEF.
16. UNICEF, 2023. *Annual Humanitarian Report: Maternal and Newborn Health in Emergencies*. New York: UNICEF.
17. United Nations, 2015. *Sustainable Development Goals: Agenda 2030*. New York: United Nations.
18. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME), 2022. *Levels and Trends in Child Mortality*. New York: UNICEF.
19. United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA), 2021. *Ukraine Crisis Humanitarian Snapshot*. Kyiv: UN OCHA.
20. World Health Organization, 2007. *Everybody's Business: Strengthening Health Systems to Improve Health Outcomes*. Geneva: WHO.
21. World Health Organization, 2022. *Kangaroo Mother Care: Implementation Guide for Fragile Settings*. Geneva: WHO.
22. World Health Organization, 2023. *Newborns: Improving Survival and Well-Being*. Geneva: WHO.
23. World Health Organization (EMRO), 2020. *Syria Health Workforce Assessment*. Cairo: WHO Regional Office for the Eastern Mediterranean.
24. World Health Organization, 2023. *Attacks on Healthcare: Surveillance System Annual Report*. Geneva: WHO.