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# Effect of Sudan armed conflicts on under-five children and pregnant women malnutrition: An updated Comprehensive article

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## Abstract

Malnutrition is the major cause of mortality and morbidity globally with undernutrition contributing about 45% of all deaths of under five children and pregnant women . Besides the direct effects of protracted conflicts, the macroeconomic crisis that has greatly increased the national inflation rate hence devastating the purchasing power, the COVID-19 outbreak, flooding, and the Desert Locusts have contributed to a food security emergency. Women are critical actors in most low and middle-income countries food production systems, but they and their children endure disproportionate burdens of malnutrition.Due to their increased nutrition needs, pregnant women are frequently at particularly high risk of experiencing acute malnutrition as a result of armed conflict. Reduction of child malnutrition in conflict settings is on top of the international agenda on sustainable development.This association between child malnutrition and armed conflict has been hypothesised in the academic literature but not rigorously examined empirically till recently.in this review paper we describe the malnutrition in under-five childrens and pregnant womens during armed conflicts in Sudan and how violent events are associated with reduction of nutritional status. Limitations are also highlighted.As efforts to prevent children and pregnant women malnutrition continue, there is a critical need for strategies that effectively supplement the diets in transitional, highly food insecure settings.Federal and state development frameworks should ensure a comprehensive multi-sectoral nutrition policy with strong political commitment and allocation of adequate resources to ensure integrated and quality implementation.

**Keywords:** Children malnutrition; Sudan conflicts 2023; Wars; Pregnant women health

## 1 Introduction

One year after the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) went to war on April 15, 2023, Sudan is now dealing with one of the world's fastest-growing crises, requiring extraordinary measures. Over 14 million of the approximately 25 million individuals who require humanitarian aid and support are children. A severe food insecurity alert (IPC3+) covering 17.7 million people, or over one-third of the nation's population, has been issued by FEWS NET and is supported by the Global IPC Group. This alert pertains to a possible famine. 4.9 million of them are in danger of starvation.[1] According to the UNICEF's article reported on July 2023, the war has led to an increase in the overall estimates of acute malnutrition among under-five children to 3.4 million, of whom 690,000 are severely malnourished. [2] Children showed symptoms of acute undernutrition such as wasting, which debilitates the immune

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system and stunting as a long-term effect resulting in a delay of cognitive and intellectual abilities. Sudan is one of the countries with highest figures of child malnourishment.In 2014, underweight, stunted and wasted children were estimated at 33, 38.2 and 16.3%, respectively, compared to 14.6, 23.8 and 7% globally. In addition, malnourishment among children under-5 has an increasing trend over the period between 2006 and 2014. For instance, underweight prevalence rose from 27% in 2006 to 29.7% in 2010. By 2014, this rate increased further to 33% [3].Pregnant women are also vulnerable to healthcare service disruptions, this aggravates illnesses which in turn will complicate their pregnancies and will make them experience unfavorable conditions during these critical times because of the inability to reach out to Antenatal care or simply the unavailability of drugs and other medical equipments. Some complications were seen during the times of war including miscarriage, stillbirth, prematurity, low birth weight, congenital abnormalities, premature rupture of membranes, and mental health challenges which were associated with mother's exposure to war and this directly jeopardizes the mother's life in the first place then the fetus' [4].The objective of this review is to synthesize factors identified in peer-reviewed literature that relate armed conflict to acute malnutrition in children under 5 years and pregnant and breastfeeding women and to highlight the effect of continuous armed conflicts in Sudan in population especially children and pregnant women, in order to inform the direction of future food security and malnutrition mitigation research,and to call upon policymakers, healthcare providers, and researchers to prioritize maternal and child health in humanitarian responses to the Sudanese conflicts

## 2 Methodology

This study is a narrative review about Effect of Sudan wars in children and pregnant women malnutrition, a review was undertaken of peer-reviewed literature to describe how armed conflict drives acute malnutrition in pregnant and breastfeeding women and their children. the authors followed two search strategies: one for malnutrition in children under-five and one for malnutrition in pregnant women.Data used to prepare this narrative review were retrieved from MEDLINE (PubMed, Google scholar,Scopus and Science-Direct search) using the search terms" Sudan wars""pregnant women malnutrition "under-five children malnutrition "" Dar-Fur wars"in their various combinations, At a certain point, the descriptors used were crossed with each other.the research was conducted by two researchers independently and, then, compared to verify the similarity between the articles found. all search done only by English language and articles written in languages other than English were excluded.All authors involved in this review actively participated in the research process and the writing of the manuscript

## 3 Discussion

The ongoing conflict in Sudan has led to mass displacements, forcing communities to abandon their homes and livelihoods. Collier's research reveals a 2.2% annual decline in gross domestic product per capita during civil wars, with the agrarian sector experiencing heightened physical destruction compared with other sectors.(5)

Displaced populations are particularly vulnerable to malnutrition due to the loss of access to food sources, disrupted livelihoods and inadequate shelter. Moreover, displacement often leads to unsanitary living conditions, increasing the risk of infectious diseases that further exacerbate malnutrition.(6)

Malnutrition is not solely a consequence of food scarcity; it is exacerbated by the lack of adequate healthcare and nutrition services(7)

According to the nutrition cluster in Sudan, nutrition services are facing a huge gap as 20% of stabilisation centres, 24% of outpatient therapeutic programmes (OTPs) and 66% of targeted supplementary feeding programmes are not operating, and with low OTP Internally displaced persons - IDP camps coverage in only 48%(8).The WHO is aiding the expansion of stabilisation centres in Sudan, addressing challenges posed by conflict-related constraints. Despite limited access and operational obstacles, WHO has distributed 517 paediatric kits to 91 stabilisation centres in 10 states, containing vital medicines and equipment. This initiative aims to treat and save the lives of 26 000 severely malnourished children, with additional supplies strategically positioned for further deployment(6).

While acute malnutrition is damaging to individual's health all along the life course, it is particularly harmful for young children. Acute malnutrition affects 51 million children under-five worldwide and is one of the greatest contributors to mortality within this age range (9). Analysis of data stratified by the experience of conflict (states undergoing armed conflict vs. states free of conflict) found distinctive high rates of undernourishment in the states going through conflicts, particularly those undergoing low intensity conflicts (the eastern states: Red Sea, Kasala, and Gadaref). More specifically, in 2014, undernourishment was generally more

prevalent in these states, which have been experiencing conflict since 2005 together with North and Central Darfur (states undergoing high intensity conflicts since 2003) and Blue Nile (a state undergoing high intensity conflict since 2011). high rates of undernourishment have also been recorded in some states that have been free of conflict, including the capital Khartoum, which defies the expectation that high prevalence of undernourishment is only to be observed in conflict-affected states. This might be because children from some of the conflict-free states belong to households or live in clusters with lower socioeconomic status (SES) compared to those from the states going through conflicts. For instance, in the 2014 survey, 46% of children from West Kordofan (a conflict-free state) belong to the poorest households. This is compared to 7% in Red Sea [a state classified as low intensity/2005 (LI/2005)] and 11.3% in South Kordofan [a state classified as high intensity/2011 (HI/2011)]. it is also possible that the disproportionate distribution of humanitarian aid across states moderates the association between conflict and undernourishment. For instance, the states in Darfur that have been undergoing high intensity conflict since 2003 alone received 65% of total allocated aid in 2015. Moreover, while the two states that have been experiencing high intensity conflict since 2011 (South Kordofan and Blue Nile) received 14% of aid, the three states that are classified as low intensity/2005 (Red Sea, Kasala and Gedaref) collectively received 3.4%. The other eight states, which are free of conflict, received combined 17.6%(see **figure 1**)(10). There are significant health disparities in maternal health outcomes within Sudan. As of 2005, the maternal mortality ratio (MMR) (maternal deaths per 100,000 live births) in northern Sudan was 590 maternal deaths per 100,000 live births, in comparison to 1,700 maternal deaths per 100,000 live births in southern Sudan. Maternal mortality in southern Sudan has been exacerbated by ongoing violence, civil conflict, and population displacement. Currently, maternal mortality estimates for the three western states of Sudan do not exist, but are expected to exceed Southern Sudan‟s rate of 1,700 maternal deaths, as these areas are the primary conflict regions. A study by Haggaz et al. of the state of maternal health in Darfur revealed a maternal mortality ratio of 640/100,000 live births.xxvii The most common cause of deaths were septicemia followed by pre-eclampsia/eclampsia, hemorrhage, malaria, and viral hepatitis(**see figure 2**)(11). The health situation in Sudan has been seriously affected by the ongoing war. The WHO report on June 20, 2023, indicated that about 66% of Sudanese hospitals in areas affected by the ongoing fighting are out of service, and some maternity hospitals are closed. Eleven million Sudanese people need essential health aid; 2.64 million of them are women and girls of reproductive age; about 262,880 of them are pregnant; and over 90,000 will give birth in the next three months.(12). The military coup in Sudan in October 2021 was one of the periods of political instability and had obvious consequences for the national health system in general and reproductive health in particular. The weakness of the health system has certainly led to the extension of health disparities among the Sudanese people, especially the vulnerable groups(13)

The preterm birth rate in Sudan is estimated to be 13.3%. Accurately defining perinatal outcomes and relating them both to events in the pregnancy and the eventual infant outcomes is a critical step in the development of interventions to improve perinatal and population health. As the burden of disease in Sudan is always affected by poverty and is complicated by geography, politics, armed conflict, and mismanagement, it remains high during political transition time(14).A series of papers by Bendavid et al., published in 2021, focused on the direct and indirect health effects of armed conflict on women and children. They mentioned several serious facts in this regard. Women and children bear considerable morbidity and mortality as a result of armed conflicts. According to international databases of refugees and internally displaced populations worldwide, nearly 36 million children and 16 million women were estimated to be displaced in 2017. From 185 million women and 250 million children in 2000, the number of non-displaced women and children living dangerously close to armed conflict (within 50 km) increased to 265 million women and 368 million children in 2017. Women's and children's mortality risk increases considerably in response to nearby conflict. Between 1995 and 2015, there were over 10 million deaths worldwide among children under the age of five, which can be linked to conflicts. Women of reproductive age living near high-intensity conflicts have three times higher mortality rates than women in peaceful settings. The number of women and children affected by armed conflict has grown steadily since 2000, due to different reasons. How health can be affected by conflict is variable, but systematic evidence links conflict to malnutrition, physical injuries, acute and infectious diseases, poor mental health, and poor sexual and reproductive health. Clearer information on the indirect health effects of armed conflicts could greatly help in the design and implementation of vital interventions for reducing the harms of armed conflicts. Women and children who experience conflict and displacement are more susceptible to harassment, early marriage, sexual assault, isolation, and exploitation. Several studies mentioned that maternal mortality is increased by 28% in relatively more intense conflicts compared with conflict-free periods and that fertility in conflict settings might decrease because of demographic changes such as reduced frequency of marriages and spousal separation and biological effects like reduced fecundity or increased abortion. Contrariwise, reduced access to modern contraceptives coupled with increased sexual violence might increase the number of unintended pregnancies and abortions(15).

The food security predicament in Sudan is characterised by a critical state, impacting 20.3 million individuals who confront food insecurity. Predominant contributors to food insecurity in Sudan include conflict, economic downturn and the influence of climate change. Policy recommendations stemming from the food security crisis advocate for

heightened investment in agriculture, the establishment of social safety nets, legislative framework enhancements and financial provision(6).

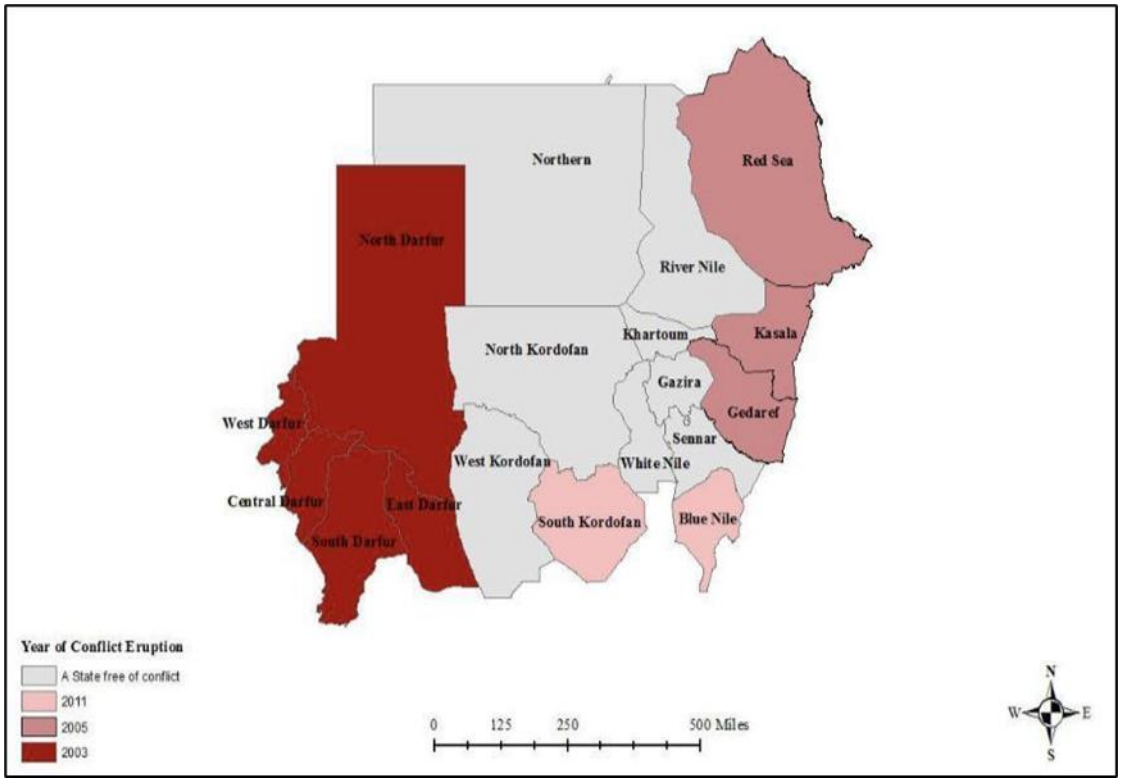


**Figure 1** Map of the current armed conflicts in The Sudan by year of eruption

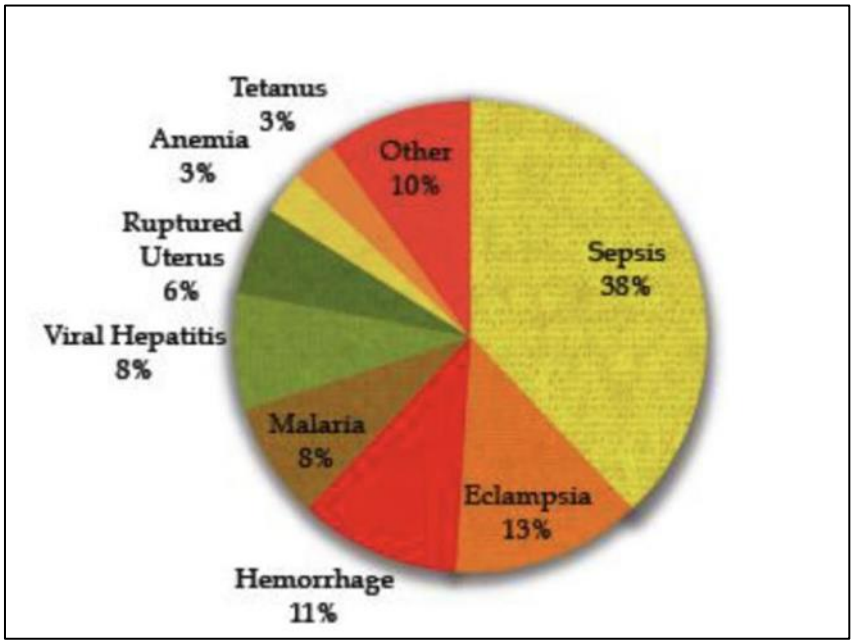


**Figure 2** Causes of Maternal Mortality in Darfur, Sudan

Furthermore, a multifaceted approach involving policies and interventions is deemed requisite to redress the food security crisis in Sudan. Effectively tackling food security in Sudan necessitates comprehensive and sustainable solutions, with emphasis on fostering peace and stability, investing in climate-resilient agriculture, expanding irrigation

infrastructure, augmenting agricultural extension services, providing financial support to farmers, improving market accessibility, and intensifying investments in research and development(16).This must be coupled with addressing severe malnutrition in under-five children and pregnant women during conflicts in Sudan through a comprehensive approach. Moreover, it is imperative for international organisations, non-governmental organisations and the global community to collaborate in providing immediate humanitarian aid, encompassing food assistance, medical supplies and personnel. The focus of efforts should extend to rebuilding health infrastructure, ensuring the availability of essential services, and implementing sustainable, long-term healthcare strategies in conflict zones.

## 4 Conclusion

In conclusion, the health and wellbeing of expectant mothers and children have been severely impacted by the Sudanese conflicts, especially in terms of hunger. Throughout this review, we have examined the multifaceted impact of these conflicts on maternal and child health, shedding light on critical issues that demand urgent attention. First, in areas of Sudan affected by violence, our data showed concerning prevalence rates of malnutrition among children under five and pregnant women.

According to these results, tailored treatments are desperately needed to address dietary deficits and avoid long-term health effects.

Furthermore, we have drawn attention to the unique difficulties pregnant women encounter while trying to get access to critical medical services like dietary assistance and prenatal care. Women are more vulnerable in conflict areas due to obstacles such as supply chain disruptions, insecurity, and inadequate healthcare facilities (17). Similarly, children under five bear the brunt of malnutrition, facing heightened risks of stunted growth, cognitive impairment, and increased susceptibility to diseases. The long-term health implications of early childhood malnutrition are profound and demand sustained efforts to mitigate its impact. Despite these challenges, there is hope. The various interventions that we have discussed, such as mobile clinics, community health programs, and nutritional supplements initiatives, have the potential to enhance the quality of healthcare provided in conflict areas in Sudan. In light of these findings, we call upon policymakers, healthcare providers, and researchers to prioritize maternal and child health in humanitarian responses to the Sudanese conflicts. For interventions to be implemented effectively and for no pregnant woman or child to be left behind, cooperation and resource mobilization are crucial.The most vulnerable population's immediate medical needs can only be met by coordinated action and unwavering commitment, which will also pave the road for a healthier and more resilient future for Sudan.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

All authors don't have any interest

### *Statement of informed consent*

We have consent and all authors agreed for this article to be published.

### *Availability of data and materials*

All data and materials are available.

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