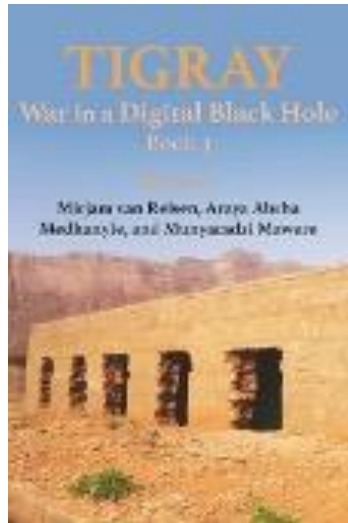


The Impact of the War in Tigray on Undernutrition among Children Under-Five

Znabu Hadush Kabsay & Araya Abrha Medhanyie

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The list of figures in colour can be found here: https://raee.eu/wp-content/uploads/2024/10/Figures_Tigray.-War-in-a-Digital-Black-Hole-Volume-3-1.pdf

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The Impact of the War in Tigray on Undernutrition among Children Under-Five

Znabu Hadush Kahsay & Araya Abrha Medhanyie

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The one who hides his wound, hides his medicine.

Abstract

This study examined the impact of the war in Tigray on undernutrition among children under five in the Tigray regional state of Ethiopia. Applying the conceptual framework Impact of Armed Conflict on Health by Guha-Sapir and Van Panhuis (2002) as a theoretical foundation, the findings indicate that war-induced severe acute malnutrition is prevalent among young children in Tigray, with food shortages directly linked to war-related agricultural damage, the destruction of health infrastructure, and the mass displacement of people, all of which have significantly increased undernutrition. Children from displaced families, government employees facing salary cuts, and mothers experiencing war-related stress are at high risk. Immediate food shortages, compounded by issues like lack of clean water and sanitation have created a dire situation for children under five in Tigray, necessitating urgent intervention. Rebuilding health facilities, providing support to displaced caregivers and trauma survivors, implementing food security programmes, and ensuring access to nutritious food supplements are crucial steps to address the undernutrition crisis and prevent further harm to children in Tigray.

Keywords: Tigray, malnutrition, hunger, Ethiopia, food shortages, children's health

Introduction

Nearly 60% of people in desperate need of food are from countries experiencing conflict (Von Grebmer *et al.*, 2021; Welthungerhilfe, 2020). The correlation between war and undernutrition is well recognised (WFP, 2018; Von Grebmer *et al.*, 2021; United Nations, 2022a). According to a global report, war was a main contributor to undernutrition in eight of the ten countries studied, with an alarming to an extremely alarming risk of hunger in 2020 (United Nations, 2022a). Children under five are one of the most vulnerable segments of the population in terms of war-led undernutrition, which threatens their lives, as well as their physical growth and development (Kinyoki *et al.*, 2017). As defined by Wiesmann *et al.* (2015), the Global Hunger Index is a tracking measure that looks closely at global, regional and national trends in hunger in relation to achieving Sustainable Development Goal (SDG) 2, which aspires to end hunger globally by 2030. The global hunger index considers children's nutritional and health status as a reliable indicator of hunger in a specific region or country. More specifically, the index sums up the score for undernourishment in the general population, child wasting, child stunting and child mortality to predict risk of hunger. Child wasting is measured by severe acute malnutrition, which is also used as an eligibility criterion for admission to hospital for care and treatment, independently or with other medical complications (Von Grebmer *et al.*, 2021).

People in places affected by war are also at greater risk of infection and diseases attributed to undernutrition. Moreover, the association of undernutrition with poor health, social and economic outcomes is well recognised. Globally, each malnourished individual (both over-nutrition and undernutrition) costs the globe an estimated USD 500 per year (Global Panel for Agriculture and Food Systems for Nutrition, 2016).

Ethiopia is among the countries with the highest prevalence of undernutrition in the world, accounting for an estimated 16% of its national GDP (WFP, 2017). The most recent Ethiopian Demographic and Health Survey, which was conducted in 2019 shows that, before the war in Tigray started, 37% of children under

five in Ethiopia were suffering from chronic malnutrition (stunting), peaking at 49% in Tigray regional state (EPHI & ICF, 2019). In addition, severe acute malnutrition, which is used as an indication of short-term poor food intake, was 7% in Ethiopia, with the prevalence stepping up to 9% in Tigray regional state (EPHI & ICF, 2019).

The war in Tigray, the northern-most province of Ethiopia, which began in November 2020 and ended with the Cessation of Hostilities Agreement in November 2022 (ICHREE, 2023), happened in conjunction with a severe locust pest affecting farming in the region, as well as the global COVID-19 pandemic, which began in early 2020. In addition, the Tigray war caused great stress on the region, including on the availability of food.

All of this caused a greater risk of morbidity and mortality among children under five years. During the war, basic infrastructure was destroyed, including health facilities (Gesese *et al.*, 2021; Medhanyie *et al.*, 2024; Taye *et al.*, 2024), and property was looted, including agricultural products (Welday *et al.*, 2022). In addition to the loss of life and destruction of property, the war caused massive displacement, putting millions of residents in Tigray in desperate need of humanitarian assistance (Amnesty International, 2021; Kahsay, 2024). When the Tigray regional government returned to Mekelle, the capital of Tigray, on 28 June 2021, the federal government imposed a complete siege, including on basic services such as communication, banking, transportation, fuel and food, with humanitarian aid severely restricted (Amnesty International, 2021; Melicherová *et al.*, 2024; Gebreslassie *et al.*, 2024). Still, there is an ongoing siege in parts of Tigray which are still occupied by Amharan and Eritrean forces (OMNA Tigray, 2023).

The incidence of undernutrition in Tigray is expected to have risen exponentially due to the war and siege. The sustained siege has blocked humanitarian aid including food, essential drugs and medical supplies; fuel; and basic services such as banking, transport and telecommunications; this includes severe damage to health facilities (Tigray Regional Health Bureau, 2022), deepening the risk of

undernutrition. This study looks at the following research question: *What was the impact of the war in Tigray and the siege on the undernutrition among under-five years old children in 2021–2022?*

Theoretical framework

This study adopted a conceptual framework based on the impact of armed conflict on health developed by Guha-Sapir & Van Panhuis (2002). This theoretical framework has been used over the last two decades to explain the main pathways by which conflict can affect the health of civilians (Guha-Sapir & D'Aoust, 2011). Specifically, the framework assumes that armed conflict results in three interrelated negative consequences: primary consequences, secondary consequences and impacts. The primary negative consequences consist of:

- Damage to agriculture
- Population displacement
- Damage to healthcare infrastructure
- Decreased health expenditure (Guha-Sapir & D'Aoust, 2011)

The secondary negative consequences, which are considered to be mediators between the primary consequences and the individual level impacts, are:

- Food shortages
- Lack of clean water, sanitation and shelter
- Low immunisation coverage
- Low access to healthcare
- Lack of resources (Guha-Sapir & D'Aoust, 2011)

Finally, the actual impacts of the war on individuals, which are specified and individualised consequences that happen to individuals, fall into the following categories:

- Death, injury and disability due to direct impact of armed conflict
- Mental damage

- Malnutrition
- Increased infectious diseases (Guha-Sapir & D'Aoust, 2011)

Most importantly, the conceptual framework recognises the high proportion of deaths in armed conflict settings from undernutrition and disease immediately after the active war deescalates, in comparison to violent deaths during the war (Guha-Sapir & D'Aoust, 2011). Figure 7.1 shows Guha-Sapir & Van Panhuis' framework:

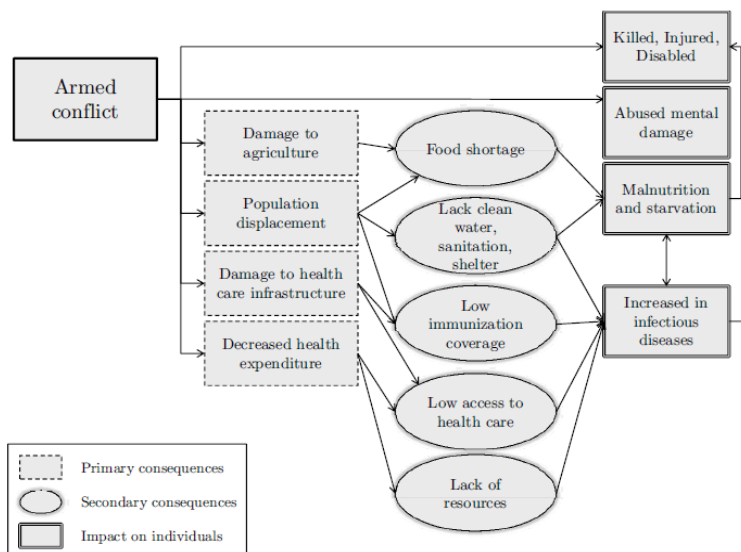


Figure 7.1. Conceptual framework: Impact of armed conflict on health

Source: Guha-Sapir & Van Panhuis (2002)

Methodology

Study design

This research was carried out as a case study with multiple data sources to describe the impact of the war in Tigray on undernutrition among children under five (0–59 months). Undernutrition was defined as the existence of severe acute malnutrition among children under five. In this case undernutrition is operationalised as severe acute malnutrition.

Data sources

The study included: a review of (1) existing reports on undernutrition in Tigray before and after the war and (2) health facility records on undernutrition in children under five admitted for severe acute malnutrition, as well as interviews with; (3) healthcare providers from selected health facilities and (4) caregivers of children under five (0–59 months) admitted to health facilities for severe acute malnutrition.

Table 7.1. Data sources and data collection period

Data Sources	Aim	Description of data sources	Time of data collection
Review of existing reports	To review existing reports generated preceding the current study	Published and unpublished reports were reviewed	15–27 June 2022
Interviews with caregivers	To explore caregivers' opinions on the impact of war on the nutritional status of their child	Interviews were conducted with caregivers with a child admitted in hospital mainly for severe acute malnutrition	2–3 July 2022
Key informant interviews	To explore health workers' observations on the impact of war on the nutritional status of their child	Interviews were conducted with healthcare providers and experts	12 July –13 August 2022
Health facility records	To assess the trend of undernutrition among under-five	Data about severe acute malnutrition were extracted from six hospitals	14–19 July 2022

Data Sources	Aim	Description of data sources	Time of data collection
children since the war			

Document review

Existing reports on undernutrition among children under five before and after the war in Tigray were reviewed including reports from the Ethiopian Demographic and Health Survey, the Tigray Statistical Agency, and the Tigray Institute of Policy Studies, among others. In this regard, five reports were identified that include Gesesew *et al.* (2021), Mulugeta & Gebreegziabher (2021), Mulugeta *et al.* (2019), Tigray regional health Bureau (2022), Welday *et al.* (2022). One of the reports was published before the war and four of them were after the onset of the war. A checklist was developed to extract data from the documents reviewed in this study regarding severe acute malnutrition at the community level in Tigray.

Interviews

A total of 20 interviews were conducted in 3 rounds of data collection. In the first round, six key informant’s interviews (two senior paediatricians, two paediatrics residents, a nutrition focal person in the under-five paediatric ward, and a nurse in the neonatal intensive care unit) were conducted with healthcare providers in Ayder Comprehensive Specialized Hospital, as this hospital was the only referral hospital admitting children with severe acute malnutrition at the time of the study. In addition, a key-informant interview with a public health nutrition expert from the School of Public Health, Mekelle University, and two in-depth interviews with mothers with children admitted to Ayder Hospital for severe acute malnutrition were conducted in this round.

In the second-round of data collection, additional eight interviews were conducted. Six of the in-depth interviews were with the focal person from the paediatric ward at each hospital (one each from

Mekelle General Hospital, Lekatit 11 Primary Hospital, Lemlem Karl General Hospital, Wukro General Hospital, Mekoni Primary Hospital, and Adigrat General Hospital) as well as two mothers with children admitted to hospital for severe acute malnutrition (one from Mekoni, one from Mekelle Hospital). The final round of data collection consisted of three in-depth interviews with mothers whose children has been admitted to hospital for severe acute malnutrition (one at Adigrat General Hospital, one at Wukro General Hospital and one at Lemlem Karl General Hospital).

Two semi-structured interview guides were developed: one for the healthcare providers and one for caregivers whose children had been admitted for severe acute malnutrition. Interviews from key informants were transcribed, translated and analysed using Atlas.ti software. The researchers conducted interviews with purposively selected key informants (healthcare providers) and caregivers/mothers. Each interview lasted at least for 45 minutes and was audio-taped with a digital recorder. The data were thematically analysed using back and forth review of the transcripts. The qualitative data analysis process followed a mixed deductive-inductive approach. Firstly, the data were deductively coded against the main categories of the conceptual framework as primary consequences, secondary consequences and the impacts on individuals. Then, emerging insights in each category were captured inductively.

Review of medical records

The medical records of several cases of undernutrition in children under five were reviewed. The reports of the patients of two years before the war versus two-year after the onset of the war were compared. The review of records was conducted in six general and referral hospitals (Ayder Hospital, Mekelle General Hospital, Quiha General Hospital, Lemlem Karl General Hospital, Mekoni Primary Hospital, and Adigrat General Hospital).

A checklist was prepared by experts for the medical review in health facilities to extract information on the number of children under five who visited health facilities for severe acute malnutrition in the two years before and two years after the war in Tigray had started. The

trends were assessed in relation to the number of children under five who had visited a health facility for undernutrition in the two years before and two years after the war in Tigray had started (using the Ethiopian fiscal year: July through June).

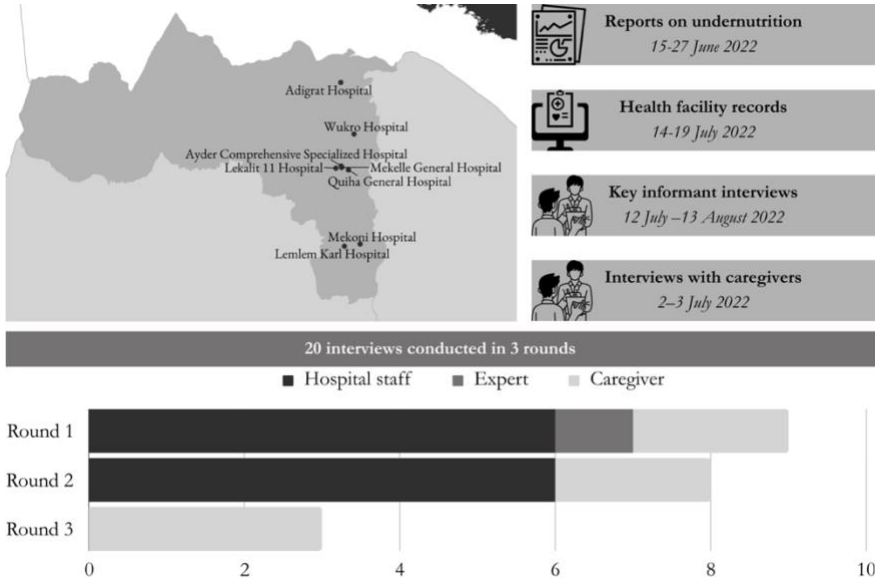


Figure 7.2. Overview of data collected for this study

Findings

The findings are presented in the order of the primary, secondary and tertiary consequences of the war on undernutrition of under five-year-old children.

Theme 1: Primary consequences of the war in Tigray

The primary consequences of the war in Tigray, concern the following categories:

- Damage and destruction of agricultural assets
- Displacement
- Damage to health infrastructure
- Reduced health expenditure

The findings with regards to these elements are discussed below.

Damage and destruction of agricultural assets

An unpublished study conducted by the Tigray Institute of Policy Studies found that 86.5% of 3,262 households surveyed in Tigray experienced war related damage such as destruction of property, looting, and deprivation of basic services (Welday *et al.*, 2022).

As a result of the destruction of household assets, children under five from such households were at risk of undernutrition. A mother from Hagere Selam stated her situation as follows:

The Eritrean soldiers looted our assets. On 27 April 2013 [Ethiopian calendar, which corresponds to 13 April 2021 AD], we left our homes for them and they looted everything they could get, believing that there was nobody to guard them. They destroy all the domestic animals! All the crops! Everything relevant to the household and all the household equipment; just whatever they found in the house. We had a farm, but how can we make it now? There are no crops left, no ox left to do the work. (Interviewee 2020, interview by Znabu H Kahsay, face-to-face, 2 July 2022)

Participants mentioned that their household assets, including agricultural assets and crops, domestic animals, and household equipment were looted and destroyed during the war.

Internal displacement

The war in Tigray caused mass internal displacement of people, with people often moving hundreds of miles away from their homes. These families had much hardship to overcome and could pay little attention to the dietary needs of their children during the time of the war:

Last year, most of the undernutrition cases [admitted at a hospital for severe acute malnutrition] were children from internally displaced families. When they [the parents] left their homes, they had to walk great distances, crossing the ups and downs, with little attention to feed their children. (Interviewee 2021, interview by Znabu H Kahsay, face-to-face, 15 July 2022)

Food access was a challenge in centres for Internally Displaced persons (IDPs), and mothers with children under five were forced to

beg for food for themselves and their children outside the camps. A public health expert explained this situation as follows:

At this time, every household in Mekelle town is being visited by 30 to 40 internally displaced individuals begging for food daily. (Interviewee 2022, interview by Znabu H Kahsay, face-to-face, 12 July 2022)

Families also had limited financial capacity to cover food expenditure after arriving at the centres established for IDPs, placing their children at risk of severe acute malnutrition. Participants in this study shared that war-led food insecurity in households was causing disintegration of families, with members using their own ways to seek food to save their lives independently, which puts children under five at further risk of undernutrition:

At this moment, how can he [her husband] earn an income? Now, he has already joined his parents to save his life. We are considered as divorced because of this undernutrition. He joined his family and I came to the hospital without communicating with him. He didn't know where I was and he has not tried to find me; I spent three weeks here in the hospital with my infant. (Interviewee 2020, interview by Znabu H Kahsay, face-to-face, 2 July 2022)

As a result of lack of access to food, families and social support networks disintegrated, putting further strain on the nutritional needs of the infants.

Damage to health infrastructure

In addition to published reports about the damage to healthcare infrastructure during the war in Tigray (Gesesew *et al.*, 2021; Tigray Regional Health Bureau, 2022; MSF, 2021), a recent unpublished assessment of health facility damage (Tigray Regional Health Bureau, 2022) indicates that 71% of the health facilities in Tigray were vandalised and damaged.

The damage to health facilities had a considerable effect on neonatal and child health services. A mother explained how the absence of basic services has affected her infant more than her older child:

The situation is incomparable with my older child. The older one has grown in a better way. When it comes to this child [4-month-old infant], his weight at birth was too low. From the very beginning, I gave birth at home, because I couldn't get an

ambulance. Consequently, I have experienced severe bleeding and I nearly died. If the youth in our village had not taken me to the referral hospital on a traditional stretcher, it was obvious that I would lose my life, and the baby too. (Interviewee 2023, interview by Znabu H Kahsay, face-to-face, 2 July 2022)

Another mother explained that there were no services available in the health facility near her:

I gave birth at home, as there was no service in the nearby health facility at that time [10 months prior to the interview]. The drugs and equipment at the facility were totally looted. By the way, the care providers have not returned to their duty, because they have nothing to eat. You can't get even one provider at the health facilities to get an injection. (Interviewee 2024, interview by Znabu H Kahsay, face-to-face, 3 July 2022)

Participants in the current study emphasised that the unavailability of primary healthcare in their nearby health facility has led to an increase in home deliveries, delays in seeking treatment for sick babies, and a lack of immunisation services for children.

Reduced health expenditure

Participants repeatedly mentioned that parents used their daily allowance (from daily labour) or monthly salary earnings to cover caring and feeding expenditure for their children. However, following the war Tigray and the siege, it has been problematic for parents to access healthcare, as medical supplies are rarely available in health facilities and usually unaffordable. Participants mentioned that the available services are too expensive for parents and there are other survival priorities. Lack of availability and affordability has substantially reduced health expenditure by parents and care givers.

Theme 2: Secondary consequences of the war in Tigray

The main secondary consequences reported were food shortages for pregnant and lactating women, lack of clean water, hygiene and sanitation, and inadequate shelter, as well as lack of immunisation services at health facilities.

Shortage of food for pregnant and lactating women

Children under five were particularly vulnerable to undernutrition during and after the war, as shown in the following excerpt:

I was not able to get adequate food during my pregnancy. I know even additional meal should have been eaten during pregnancy, but I was eating only injera (fermented pancake-like bread often made up of Teff) with salt (with no stew). (Interviewee 2024, interview by Znabu H Kahsay, face-to-face, 2 July 2022)

A lactating woman also added here reflection as:

What I am thinking is, If I could be able to get food, my breastmilk might have had enough milk production for my baby. That is what makes me anxious about my baby. (Interviewee 2023, interview by Znabu H Kahsay, face-to-face, 2 July 2022)

Food shortages among pregnant and lactating mothers are especially of concern. Care providers reported that an increase in miscarriages, still births, preterm births, and babies with low birth weight:

Since the war in Tigray started, we are observing complications that were less common among children less than five years. I personally assume that the reason for the rise is because the mothers are less nourished. (Interviewee 2025, interview by Znabu H Kahsay, face-to-face, 2 August 2022)

Thus, it was observed that it resulted in the death of neonates which can be attributed to undernourishment of mothers. Participants have repeatedly mentioned that the war and siege compromised the feeding practices of caregivers for their children under five in three ways. Firstly, mothers tended to be unable to produce adequate breastmilk for their infants, making timely initiation and the continuation of breastfeeding problematic. Secondly, as a result, mothers tended to supplement breastfeeding with breastmilk substitutes and complements, which hampers exclusive breastfeeding. Thirdly, mothers faced difficulty introducing appropriate complementary feeding for infants aged six-month, due to the shortage of food.

Participants mentioned that children under five from parents whose primary income had been based on daily labour, small trade, and government employment were particularly at greater risk. Children

from educated, higher income, and urban households were increasingly admitted to paediatric wards for severe acute malnutrition, which was not common previously. A public health expert shared the following:

I have never seen such conditions, in which children of government employees are suffering from severe acute malnutrition. Consequently, they [the family] are sending their children to relatives who can afford to care for them and feed them. (Interviewee 2026, interview by Znabu H Kahsay, face-to-face, 12 July 2022)

A paediatric resident shared the following observation:

One month ago, a child of parents who were both employees of Ayder Comprehensive Specialized Hospital was admitted to the paediatric ward for severe acute malnutrition. (Interviewee 2027, interview by Znabu H Kahsay, face-to-face, 15 July 2022)

A midwife from Ayder Hospital also said that his colleague's two children were admitted to the paediatric ward for severe acute malnutrition. He expressed fear that his children were also at risk of developing severe acute malnutrition:

When I took my children with me for shopping, what my older child is currently asking me to buy for him, which is never like before, is bread. I believe that this because we are not providing him adequate diet. [...]. If I should speak honestly, what we are eating at home is only one monotonous food; just if there is wheat powder it is so. No salt, no stew, no tea with it! What concerns me a lot is the children will become undernourished. In fear of this, I measure the weight of the older baby at weekends because I feel that he is becoming more wasted. (Interviewee 2028, Interview by Znabu H Kahsay, 3 August 2022)

Health workers and their children were themselves at risk of severe acute malnutrition for which they needed immediate treatment.

Population displacement due to the war has created an unbalanced distribution of people around urban centres in Tigray, particularly in Shire, Aksum, Adigrat, and Mekelle, which has placed an additional burden on access to safe drinking water, hygiene and sanitation facilities, as well as shelter. These conditions have created a favourable environment for infections and undernutrition among children under five.

(Interviewee 2022, interview by Znabu H Kahsay, face-to-face, 12 July 2022)

Unsafe drinking water, hygiene and sanitation and inadequate shelter contributed to the risks.

Lack of immunisation services

Furthermore, the destruction of health services resulted in a lack of routine and outreach immunisation services, which increased the risk of infectious disease among children under five. Services expected to be provided by primary healthcare were interrupted due to a shortage of medical supplies, lack of transportation, displacement of healthcare providers and no monthly salary for healthcare providers. Consequently, vaccine preventable diseases including pneumonia and measles were common in children under five in Tigray, either independently or combined with severe acute malnutrition. (Interviewee 2027, interview by Znabu H Kahsay, face-to-face, 15 July 2022).

Theme 3: Impacts of the war on children under five and their caregivers

The main individual impacts reported in this study were an increase in severe acute malnutrition among children under five, an increase in communicable diseases among children under five, and a high risk of undernutrition among children of mothers with war-related mental health problems.

Severe acute malnutrition among children under five

A review of existing reports generated by Mekelle University shows that severe acute malnutrition in Tigray reached 28% (Tigray Regional Health Bureau, 2022).

Unlike the situation before the war, care providers repeatedly stated that the war led to an increase in the number of children admitted and readmitted to hospital primarily for severe acute malnutrition. There had been a rise in the number of malnourished children aged less than six months, including neonates (aged less than 28 days). The quantitative reports from health facility records are in line with the observations of care providers collected in this study. A report from

Ayder Hospital comparing data over a period of eight years, indicates that the number of children admitted for severe acute malnutrition per month increased threefold after the onset of the war in Tigray. As hospitals admit only children with severe acute malnutrition, many more children with moderate malnutrition received care in an outpatient department. A paediatric resident explained as follows:

When we see the trend in the last three months [February to April 2022], almost half of the 80 beds in the paediatric ward are occupied by children with severe acute malnutrition. Furthermore, there were times where almost all of our beds in the paediatric ward were occupied by malnutrition cases. (Interviewee 2021, interview by Znabu H Kahsay, face-to-face, 15 July 2022)

Beyond the individual casualties of children under five because of the war, the war in Tigray and the siege increased the risk of undernutrition among children under five. A mother whose husband had been earning income from daily labour whose child had been readmitted for severe acute malnutrition stated the following:

I have been here [in hospital] for a month and a half while he [the baby] was two months old. They told me that he shall be discharged to prevent infection due to prolonged stay in the hospital. Now at his fourth month, I am here for the last two weeks attending to him. There is nothing at home to eat for myself and to feed the baby. Nor am I able to buy the replacements [breastmilk supplements]. (Interviewee 2029, interview by Znabu H Kahsay, face-to-face, 3 July 2022)

In addition, an interview with a nutrition expert in the school of Public Health at Mekelle University described severe acute malnutrition among children under five in Tigray in reference to the global standards as follows:

As per the Integrated Food Security Phase Classification, a community is regarded as in the final stage of a crisis, called catastrophic stage, if the prevalence of acute malnutrition has reached 15% and if there are exacerbating situations like food shortage, displacement, drought and compulsive/forced selling of assets. With all the exacerbating situations, the prevalence in Tigray reached 30% four or five months before. I am not sure if there is any standardised category to capture the situation in Tigray. (Interviewee 2022, interview by Znabu H Kahsay, face-to-face, 12 July 2022)

A review of the health management information system reports from six severe acute malnutrition hospitals revealed a 63% increase in the number of children under five admitted to health facilities for severe acute malnutrition. A total of 600 children were admitted for severe acute malnutrition over the two Ethiopian fiscal years preceding the war (July to August 2018/19 and 2019/20) and the number increased to 1,351 for the two years 2020/21 and 2021/2022. Table 7.2 illustrates hospital admissions of children under five due to acute malnutrition in selected hospitals during the four fiscal years.

Table 7.2. Number of children under five admitted for severe acute malnutrition in selected hospitals

Name of hospital	Year (Ethiopian fiscal year July to August)			
	2018/19	2019/20	2020/21	2021/22
Adigrat Hospital	12	0	85	169
Quiha Hospital	0	0	14	60
Ayder Hospital	140	134	216	325
Mekelle Hospital	147	161	108	117
Lemlem Karl Hospital	239	75	53	56
Mekoni Hospital	47	58	72	176
Total	600 (Before the war)		1,351 (After the war)	

Source: Health Management Information System Reports (2022)

Communicable diseases among children under five

Due to the interruption of immunisation services in primary healthcare facilities, the prevalence of infectious diseases among under five-year-old infants increased: pneumonia, diarrhoea, and sepsis were frequently identified, while malaria, dermatosis and measles were also mentioned by a few informants. In addition, care providers working at the neonatal intensive care unit also specified congenital abnormalities, prematurity, low birth weight and hypothermia as being the most common complications among children aged one month (28 days) and below. A care provider from

Adigrat Hospital and a nutrition expert in the School of Public Health (Mekelle University) specified upper respiratory tract infection as the most frequently reported illness among children aged less than five years followed by diarrhoeal diseases. A nutrition expert also stated the following:

According to my observations during field visits, there is increasing number of children infected by water-borne diseases related to poor hygiene and sanitation. The sanitation facilities were looted and damaged during the war and access to safe water is limited. Consequently, diarrhoea is on the rise to the level of outbreak, which has led to the sickness and death of children. (Interviewee 2022, interview by Znabu H Kahsay, face-to-face, 12 July 2022)

Medical complications were commonly reported among children admitted to the hospital with undernutrition, which is consistent with the bidirectional effect of undernutrition on complications among children.

Undernutrition among children of mothers with war-related mental health problems

Participants mentioned that the war in Tigray also created critical war-related stress factors on children under five from mothers who experienced mental health problems. Being victims of rape during the war in Tigray, psychological trauma related to bombardments, stress concerning a family member who joined military service, and other stresses related to the ongoing war were specified as reasons for mental health problems among mothers (Kidanu & Van Reisen, 2024; Kidanu & Tefera, 2024). The review of available evidence on gender-based violence in the war in Tigray shows that more than 22,000 women and girls had been reported as survivors of rape since the war commenced (Tigray Regional Bureau of Health, 2022).

Consequently, depression and anxiety among mothers in Tigray has reduced their ability to care for and feed their children. A mother shared her experience as follows:

I was pregnant when the Ethiopian defence force arrived in our area. They were bombing everything [...]. I heard a heavy explosive near my home while I was sleeping, as I am suffering from morning sickness. I saw many of our neighbours die and those remained were running out of their homes. Instead of running with them,

I froze and sat there. Since that event, I have not been able to be myself. (Interviewee 2024, interviewee with Znabu H Kahsay, face-to-face, 2 July 2022)

A mother with a child who had been admitted to hospital for severe acute malnutrition reported that women in Tigray, in general, are experiencing a stressful situation due to the ongoing war, which is especially so for women whose husbands or other family members have joined the military service. They lack the support they are used to in feeding and caring for their children and family.

Related to these situations, care providers also frequently mentioned that the psychological distress and anxiety related to the war and food shortages affected the initiation and continuation of breastfeeding. A public health expert said that he knows mothers who had attempted suicide after being raped and, subsequently, became pregnant. It was indicated that mothers who are rape survivors tend to be less willing to breastfeed their new-borns. Meanwhile, some new-borns from rape survivors were abandoned at hospitals and in the community. A nurse working in the neonatal intensive care unit shared the following on how war-led anxiety created serious problems in caring and feeding new-borns:

Soon after the war started, there were five children admitted to this hospital who were found unattended by mothers. Three of them were found in open fields in the community and two mothers who were rape survivors abandoned their children, because they were not willing to feed their child due to the mental trauma they were experiencing related to the rape. (Interviewee 2022, interview by Znabu H Kahsay, face-to-face, 12 July 2022)

A mother also shared the following about the stress related to food insecurity as:

The care providers always tell me that I should not be anxious about food insecurity, as it affects my breastmilk production. However, how could I forget for a while that there is no mouthful of food at home to eat for myself and my children? (Interviewee 2023, interview by Znabu H Kahsay, face-to-face, 2 July 2022)

The delayed initiation or discontinuation of breastfeeding has put children in Tigray at greater risk of undernutrition. This is a concern that in part stems from the trauma experienced by the mothers.

Discussion

The connection between war and child undernutrition is well established (Dahab *et al.*, 2020; Malik *et al.*, 2021), as children under five are dependent on their caregivers to meet their nutritional and energy needs. War exerts substantial pressure on the ability of families to meet these needs, reducing food intake and care, which hampers children's growth and development. In countries like Ethiopia, which already have a high prevalence of undernutrition, conflict and war considerably worsen the magnitude of undernutrition and its negative health consequences. Furthermore, the 2023 decision of the United States Agency for International Development (USAID) and United Nations World Food Programme (WFP) to stop all food aid to Ethiopia, including Tigray, due to alleged misappropriation of food aid may have added vulnerability to malnutrition (The Guardian, 2023; Associated Press, 2023).

Tigray is one of the regions in Ethiopia with a high prevalence of acute and chronic malnutrition (stunting) (Mulugeta *et al.*, 2019; EPHI & ICF, 2019), and the food shortages associated with the war in Tigray and the siege have, and will continue to, impact on the nutritional status of children under five. Evidence shows that the prevalence of severe acute malnutrition in Tigray tripled, from 9% before the war in 2019 (EPHI & ICF, 2019) to 28% in 2021 (Mulugeta & Gebregziabher, 2021). According to the Integrated Food Security phase classification, such a sharp increase in severe acute malnutrition is often a precursor to catastrophic famine (IPC Global Partners, 2021; Mulugeta & Gebregziabher, 2021). Not only is severe acute malnutrition a major contributor to the death of children under five, it also results in long-term physical, cognitive and social impairment in survivors (Bwakura-Dangarembizi *et al.*, 2019). As the figures of severe acute malnutrition in Tigray are likely to be underreported, its prevalence may have crossed the 30% threshold for catastrophic famine.

As with wars elsewhere (Zurayk, 2013), the damage and destruction of agricultural assets in Tigray has exacerbated the risk of undernutrition among children under five. War is a main factor in disrupting the stability of food systems, affecting food from

production and distribution to consumption, with considerable risk of undernutrition locally and globally. Armed conflict often leads to the destruction of crops, livestock, land, and water systems, as well as infrastructure.

Denying vulnerable segments of a population, such as children and IDPs, access to food during and after war contributes to undernutrition (Lafta *et al.*, 2017). During and after the war, IDPs from different parts of Tigray were gathered in and around urban centres, creating additional demand for food, water and sanitation, as well as healthcare. This aggravated the spread of COVID-19 and other communicable diseases. Although the war ended in November 2022, IDPs have not (as at time of writing) all been able to return to their homes and people living in areas under external forces have been denied access to humanitarian aid. Children of IDPs in Tigray have faced critical food shortages, leading to undernutrition, before and after arrival at IDP centres. In addition, mothers who temporarily reside in IDP centres are less likely to have adequate food intake, which can hamper breastmilk production and breastfeeding. The negative consequence of conflict-driven displacement on access to health services is also reported elsewhere (Malik *et al.*, 2021).

Another negative consequence of war on under five undernutrition is caused by damage to health infrastructure (Das *et al.*, 2020; Medhanyie *et al.*, 2024). The destruction and closure of a high number of health facilities, which are supposed to provide basic and indispensable services in primary healthcare, has worsened the negative health and nutritional outcomes for children. The war in Tigray, siege and continued occupation of some areas have resulted in direct war-related damage to healthcare facilities, lack of healthcare providers, many of whom fled health facilities, and lack of and inadequate supply of drugs and medical equipment. This situation has prevented the Tigray Regional Health Bureau from resuming healthcare services in many areas that are still under Eretria and Amhara forces. At the time when severe acute malnutrition was prevalent, a substantial proportion of displaced people from Western Tigray continued to live in IDP centres. This has made it difficult for pregnant and lactating mothers to access healthcare. The reduction in human

resources and shortage of medical supplies has affected the provision of basic services, including antenatal care, skilled birth attendants, and immunisation services.

Due to the bidirectional effect of infection and undernutrition, the situation in Tigray has put children under five at high risk of infection of vaccine preventable diseases and undernutrition. The literature also indicates that deaths from disease and undernutrition often account for a higher share of total deaths in (and directly after) a war than direct violent deaths (Guha-Sapir & D'Aoust, 2011), as the negative health consequences increase if initiatives for the restoration of damaged health facilities are not implemented quickly. A previous study showed that after six months into the war, none of the 712 health posts and 17.5% of health centres in Tigray were functional (Gesese *et al.*, 2021). Consequently, child diseases and deaths in Tigray increased at an alarming rate.

The preliminary results of a maternal and child autopsy study from Tigray shows that under-five mortality has increased twofold since the war, while neonatal mortality has increased fourfold. The severe acute malnutrition report found that the maternal mortality rate has relapsed back to where it was 22 years ago, to 840 per 100,000 women who give birth. Immediately before the war, the rate was estimated to be 186 in 2019 and increased to 840 in 2022 (Tigray Regional Health Bureau, 2022). A study from Pakistan also highlighted the specific consequences of war on the healthcare system in general and mainly the lagging behind of antenatal care, skilled birth attendants, and infant and young children feeding services (Das *et al.*, 2020). As primary healthcare services are a basic and indispensable intervention for the health and nutrition of children under five, ensuring access to these services demands further initiatives by governments and humanitarian organisations.

The current study also found that there is a greater risk of undernutrition among children under five who have traumatised or psychologically stressed mothers, which is not reflected in the theoretical framework. A mother's psychological distress from experiencing sexual and other violence during the war, as well as the uncertainty around access to food for themselves and their children,

considerably affects their child's nutritional status. More specifically, infants and young children who are dependent on breastfeeding suffer from inadequate breast milk caused by stress and lack of food intake for mothers, either temporally or permanently. In line with the current study, previous studies also indicate that caregivers from food insecure households are more likely to fail to sustain exclusive breastfeeding, in comparison to their counterparts (Frazier *et al.*, 2021; Orr *et al.*, 2018). Mothers who are survivors of rape and suffering from psychological distress were also reported to be unable to provide the necessary care for their children, hence, affected their nutritional status. The mental health status of caregivers affects their feeding practices of their children. Evidence from a review of studies in countries experiencing conflict indicates that caregivers' feeding practices for children tend to be suboptimal during times of conflict, which is attributed to displacement, stress and maternal undernutrition caused by the conflict (Rabbani *et al.*, 2020).

Implication of findings for Sustainable Development Goals

According to a report by Global Hunger Index, achieving zero hunger by 2030 is becoming distant for many countries and it predicts that 47 countries will fail to achieve the SDG 2, resulting in the world as a whole not achieving the target (zero hunger by 2030) (Von Grebmer *et al.*, 2021). Protracted wars, such as the ongoing war in Ukraine (FAO, 2022; United Nations, 2022b) and the war in Tigray, make it even more unlikely that we will reach the SDGs, especially targets that are directly or indirectly related to food security. The data collected for the current study shows clear evidence of the negative consequences of the war in Tigray on undernutrition among children under five. The findings underline that the war in Tigray, as well as ongoing wars elsewhere, are undermining efforts to meet the SDG targets at national and international levels.

Implication of findings for using hunger as weapon of war

The use of starvation as a weapon of war is a grave concern (Von Grebmer *et al.*, 2021; Welthungerhilfe, 2020; Save the Children, 2018). The pathways to undernutrition in the current study show that the massive displacement of people, destruction and looting of

agricultural products, and blockage of access to basic health services all amount to the use of starvation as a weapon of war. However, further studies should be undertaken to substantiate this claim. It is important to note that some aspects of the siege have lingered in Tigray and basic services have not been fully restored. Communication services have also not fully resumed in all areas of Tigray, and humanitarian access has been denied to areas still occupied by Eritrean forces, and Amhara forces, which have not yet left Tigray, as per the Cessation of Hostilities Agreement signed in Pretoria on 2 November 2022. United Nations Security Council Resolution 2417 in 2018 stipulated that using deliberate hunger as a method of war and blocking the delivery of humanitarian aid is a war crime (Security Council Resolution 2417, 2018).

Limitations of study

The ability to furnish live and contextualised data about the effect of the war is crucial, so as not to miss an important element. This study was able to collect data while the war was taking place, which sets it apart from most the studies, which are usually conducted after war and armed conflicts have happened.

However, the study has the following limitation. Firstly, the consequences investigated were limited to the immediate and short-term consequences of the war in Tigray, focusing on severe acute malnutrition in children under five as a proxy for undernutrition. The long-term impacts of the war on under five years children who have suffered undernutrition, including cognitive impairment and decreases in learning capacity, as well as the economic burden linked to these, have not been addressed. Secondly, only internal displacement was considered in the current study, while the negative consequences could be worse in the case of war-led displacement that crosses state and federal borders. Thirdly, the figures from health facility reports should be used cautiously, as the percentages could be underestimated for two reasons: the hospitals included in the study do not always admit all children in need of care and treatment because of the shortage of medical supplies, and only children of parents who have access to transportation and can afford to cover transportation expenses are likely to seek care and treatment at health facilities.

Conclusions

This study aimed to understand the impact of the war in Tigray on undernutrition among children under five in Tigray regional state, Ethiopia. The study used severe acute malnutrition as a proxy for malnutrition and applied the theoretical framework of Guha-Sapir and Van Panhuis (2002) to explore the pathways of the impacts of the war on undernutrition. The study found that war-induced severe acute malnutrition is evident among children aged under five in Tigray. The food shortages in Tigray can be directly attributed to war-related damage to agriculture, which, combined with damage to healthcare infrastructure and massive displacement, have substantially increased undernutrition in the state. The study found that the displacement of people, the destruction of agricultural products, and damage to healthcare infrastructure were the pathways to the crisis.

A greater risk of severe acute malnutrition was reported among children from displaced families, who are especially prone to severe acute malnutrition; children with parents who are government employees, as their salaries have been cut; and children whose mothers have suffered psychological stress due to the war. While food shortage was found to be an immediate factor causing undernutrition due to the war in Tigray, it was also accompanied by other aggravating factors, including lack of clean water and sanitation and limited access to primary healthcare (such as skilled birth attendants and immunisation).

The blanket food shortages in Tigray are yielding a new normal for children aged less than six months, who are being admitted and readmitted to health facilities for severe acute malnutrition. The risk of severe acute malnutrition is endangering millions of children under five in Tigray, including children from urban areas and of government employees. In addition, the mental health problems faced by mothers who are survivors of rape or other war-related trauma are further increasing the risk of undernutrition among children under five in Tigray.

Reconstructing damaged health facilities to ensure access to basic healthcare services and supporting displaced caregivers and rape

survivors is necessary to address child undernutrition in Tigray. This situation calls for more food security resilient programmes, which links to immediate relief interventions to support long-term sustainable agricultural growth. Food supplements must be brought to meet the nutritional demands of children under five. This is urgently needed to avert the ongoing catastrophic situation in Tigray.

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Authors' contributions

This chapter is conducted in the framework of a PhD research. Znabu Hadush Kahsay is the primary author, he designed the study, set up the theoretical and methodological framework, carried out the data collection and analysis and wrote and reviewed the different versions of the chapter. Araya Abrha Medhanyie is the second author participated in designing the data collection tools, guiding the data collection and analysis. In addition, he critically reviewed the first and second drafts of the book chapter. Finally, he reviewed and approved the final draft of the book chapter.

Ethical considerations

Approval of the study was secured from the ethical review committee of College of Health Sciences, Mekelle University (Notification of Protocol Approval: MU-IRB 1985/2022). A letter of cooperation was sought from the management body of the respective health facilities to extract data from medical review. Data owners of previous reports were acknowledged and consulted for re-use of the available data. Consent was sought from key informants after explaining the purpose and confidentiality of the study. This chapter should be read in conjunction with the 'Note on Content and Editorial Decisions'.

Disclosure statement

No potential conflict of interest was reported by the authors.

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