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Household Livelihood Resilience to Conflict Induced Food Insecurity in North Eastern Ethiopia

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**BAHIR DAR UNIVERSITY
POST GRADUATE STUDIES
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL
STUDIES**

**HOUSEHOLD LIVELIHOOD RESILIENCE TO CONFLICT INDUCED
FOOD INSECURITY IN NORTH EASTERN ETHIOPIA**

**By
DAWIT BEZABIH ESHETU**

**JUNE, 2026
BAHIR DAR, ETHIOPIA**

**HOUSEHOLD LIVELIHOOD RESILIENCE TO CONFLICT INDUCED
FOOD INSECURITY IN NORTH EASTERN ETHIOPIA**

DAWIT BEZABIH ESHETU

**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY AND
ENVIRONMENTAL STUDIES, FACULTY OF SOCIAL SCIENCES, BAHIR DAR
UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY IN SOCIO - ECONOMIC DEVELOPMENT
PLANNING AND ENVIRONMENT**

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JUNE, 2026

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Declaration

This is to certify that the thesis entitled **household livelihood resilience to conflict induced food insecurity in northeastern Ethiopia**, submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in **Socio - economic development planning and Environment** in the Department of Geography and Environmental Studies, Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Dawit Bezabih Eshetu

Name

Signature

Date

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DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES**

Approval of Dissertation for defense

I hereby certify that we have supervised, read, and evaluated this dissertation titled **Household livelihood resilience to conflict induced food insecurity in northeastern Ethiopia**, by Dawit Bezabih Eshetu prepared under our guidance. We recommend the dissertation be submitted for oral defense (mock-viva and viva voce).

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Approval of Dissertation

We hereby certify that we have examined the dissertation entitled “**Household livelihood resilience to conflict induced food insecurity in northeastern Ethiopia**” by Dawit Bezabih Eshetu, and submitted in partial fulfillments for the requirements for the degree of Doctor of Philosophy in Socio - economic Development Planning and Environment with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Dawit Bezabih

Bahir Dar, May 2026

LIST OF ACRONYMS

ACAPS	Assessment Capacity Project
ANOVA	Analysis of Variance
ANRS	Amhara National Regional State
COVID	Coronavirus Disease
CSA	Central Statistical Agency
CSI	Copping Strategy Index
DFID	Department for International Development
ETB	Ethiopian Birr
FANTA	Food and Nutrition Technical Assistant Project
FAO	Food and Agricultural Organization
FCS	Food Consumption Score
FGD	Focus Group Discussion
GEOGLAM	Group on Earth Observations Global Agriculture
GPS	Global positioning System
HFIAS	Household Food Insecurity Access Scale
HH	Household Head
IMF	International Monetary Fund
IFPRI	International Food Policy Research Institute
ILO	International Labor Organization
KA	Kebelle Administration
KII	Key Informant interview
LLZ	Livelihood zone
Masl	Meter above sea level
NGO	Non - Governmental Organization
OCHA	United Nations Office for the Coordination of Humanitarian Affair
PCA	Principal Component Analysis
RCI	Resilient Capacity Index

REACH	Research Evaluation Assessment and Communication in Humanitarian
RIMA	Resilience Index Measurement and Analysis
SAP	Structural Adjustment Program
SLF	Sustainable Livelihood Framework
SPSS	Statistical Package for Social Science
SSA	Sub - Saharan Africa
TLU	Tropical Livestock Unit
TPLF	Tigray People Liberation Front
TVET	Technical and Vocational Education and Training
UN	United Nation
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children’s Emergency Fund
USAID	United States Agency for International Development
USD	United states Dollar
VIF	Variance Inflation Factor
WFP	World Food Program
WHO	World Health Organization
WTO	World Trade Organization

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List of Publications

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ABSTRACT

Despite significant efforts to reduce hunger and poverty, global hunger levels have remained alarmingly high in recent years. Albeit various factors are responsible for the rise of food insecurity and hunger at the global level, conflict has been identified as a key driver. This dissertation assessed and analyzed the resilience of household livelihoods to conflict-induced food insecurity in northeastern Ethiopia by examining changes in livelihood assets, strategies, and coping mechanisms across different phases of conflict and livelihood zones. Using a mixed-methods approach, the study draws on primary data collected from 388 randomly selected households across urban and rural districts in conflict-affected areas. Quantitative data were analyzed using descriptive statistics, Analysis of Variance (ANOVA), multiple linear regression, and the FAO's Resilience Index Measurement and Analysis (Shiny RIMA) framework. Qualitative insights were generated through in-depth interviews and focus group discussions with community members, along with key informant interviews involving local and zonal government officials. The findings reveal that conflict significantly disrupted access to physical, financial, and human assets, while also weakening of the social institutions and degrading of the natural resources. ANOVA results showed significant differences in household income and food security status across the three time periods (pre-, during-, and post-conflict), with $p < 0.001$. Household access to safe drinking water, education, and healthcare had varied significantly by location and time (e.g., mean annual income dropped from ETB 47,196 pre-conflict to ETB 24,002 during the conflict; $p < 0.000$). Regression analysis results showed that ownership of agricultural land, livestock holding, access to agricultural subsidy, engagement in none and off farm activities and membership in social organizations have significantly influenced the rural households' income after the conflict. Exposure and sensitivity to conflict (asset loss, death and displacement) were conversely negatively associated with the rural household livelihood outcome. House ownership for both residence and rent, income from other household members, and exposure and sensitivity to conflict were on the contrary found significantly influencing the urban household income after the conflict. The RIMA analysis confirmed a decline in the Resilience Capacity Index (RCI) from 61.4 pre-conflict to 36.5 post-conflict, highlighting reduced absorptive and adaptive capacities. Qualitative findings supported the quantitative trends, revealing that households adopted diverse coping strategies, including food reduction, borrowing, selling assets, informal trade, and social resource pooling. However, these strategies were often unsustainable and harmful in the long term, particularly for female-headed households. Hence, the conflict in the area negatively affected the livelihood, livelihood strategies and resilience capacity of households in the area. The findings suggest that strengthening household resilience requires interventions that support livelihood recovery, restoration of productive assets, access to basic services, and social support systems. Investments in agricultural rehabilitation, livelihood diversification, infrastructure reconstruction, and resilience-building programs are therefore essential for enhancing household food security and sustainable recovery in conflict-affected areas of northeastern Ethiopia.

Keywords: Conflict; Food insecurity; Household; Livelihood strategies; Livelihood zone, Resilience; Ethiopia

CHAPTER ONE

1. GENERAL INTRODUCTION

1.1. Background of the Study

Historically, the concept of food security was narrowly defined, focusing primarily on the availability of an adequate food supply. Since the mid-1970s, however, the definition has evolved significantly to encompass not only availability but also the physical and economic access to food necessary for a healthy and active life. Today, food security is understood through four interrelated dimensions: availability, accessibility, utilization, and stability. Any disruption in one or more of these dimensions leads to food insecurity (WHO, 2019).

Food insecurity has long been recognized as a global development challenge, and it remains one of the most pressing issues of our time. Efforts to achieve the Zero Hunger target by 2030 are increasingly threatened by the rising number of people experiencing food insecurity year after year. In 2020, approximately 12 % of the global population equivalent to around 928 million people, or nearly one in every seven individuals were severely food insecure. This represents a significant increase from 780 million in 2019, marking an alarming rise of 148 million people within just one year (WHO, 2020).

The geographic distribution of food insecurity also reveals stark regional disparities. Since 2017, the number of people experiencing moderate to severe food insecurity has steadily increased, with Asia accounting for the largest share, followed by Africa. Reports indicate that more than 418 million undernourished individuals reside in Asia, while Africa is home to 288 million (WFP, 2021). Together, these two regions account for the vast majority of the world's undernourished population. Furthermore, between 2019 and 2020, an additional 14 million, 46 million, and 57 million people became food insecure in Latin America and the Caribbean, Africa, and Asia, respectively (WFP, 2021).

Food insecurity also exhibits significant disparities across gender and age groups. Women are more vulnerable to food insecurity than men, with the number of food-insecure women increasing by 10 % in 2020 compared to the previous year (FAO, 2021). Children, too, are disproportionately affected, with over 80 percent of global child malnutrition cases concentrated in Asia and Africa.

A variety of interlinked factors contribute to the persistence of global food insecurity. Conflict, climate variability and extremes, and economic slowdowns are among the primary drivers. These challenges have been particularly acute over the past five years, during which a marked rise in food insecurity has been observed, largely attributed to ongoing conflicts and climate-related disruptions (UN, 2019). Other underlying causes identified in the literature include rapid population growth, natural disasters, and political instability. While these drivers often interact and manifest simultaneously, some - such as conflict, economic downturns, and climate shocks are particularly influential in low- and middle-income countries (FAO, 2021).

Among these factors, conflict has emerged as a dominant and escalating threat to food security. Armed conflict can severely disrupt local food systems, particularly when markets and supply chains are interrupted, livestock are destroyed, agricultural fields are burned, or food producers are killed or displaced. Warfare often damages critical infrastructure such as water and sanitation systems, further complicating food preparation and negatively affecting nutritional outcomes. In such contexts, household security is undermined, making it increasingly difficult for communities to maintain adequate nutrition and build resilience to food insecurity. Therefore, understanding the relationship between conflict and food insecurity, how conflict affects the livelihood assets and strategies of the household, what factors affects households' resilience capacity to food insecurity in conflict contexts are timely and essential.

1.2. Conflict Context in the Study Area

The northern Ethiopia conflict emerged from a series of political disagreements between the Federal Government of Ethiopia and the Tigray People's Liberation Front (TPLF). Following the outbreak of the COVID-19 pandemic in 2020, Ethiopia's national elections, originally scheduled for August 2020, were postponed by the federal government due to public health concerns. The decision was contested by the TPLF, which argued that the postponement lacked constitutional legitimacy. Subsequently, the Tigray Regional State conducted its own regional election in September 2020 despite the federal government's decision to suspend elections nationwide (International Crisis Group, 2021; de Waal, 2023). The political tensions between the two sides continued to escalate throughout 2020. The federal government declared the Tigray regional election illegal, while the TPLF rejected the authority of federal institutions whose mandates had been extended following the election postponement.

The dispute further deepened amid growing disagreements over political reforms, governance arrangements, and federal-regional relations (Aalen et al., 2021). On 4 November 2020, armed conflict erupted following attacks on the Northern Command of the Ethiopian National Defense Force (ENDF), which was stationed in Tigray. The federal government subsequently launched what it described as a law-enforcement operation against the TPLF. The confrontation rapidly evolved into a large-scale armed conflict involving multiple actors and expanded beyond Tigray into neighboring Amhara and Afar regions (International Crisis Group, 2021; OCHA, 2022).

North Wollo Zone became one of the areas most affected by the conflict due to its strategic location between the Tigray, Amhara, and Afar regions. The zone serves as a major transportation corridor linking these regions and consequently became a focal point of military operations and territorial contests. Several districts of North Wollo, including Kobo, Gubalafto, and Lasta, experienced repeated military engagements, temporary occupation, population displacement, and prolonged insecurity during different phases of the conflict.

The conflict in North Wollo was characterized by armed confrontations, changes in territorial control, restrictions on movement, disruption of public administration, and widespread displacement of civilians. Kobo district was particularly affected because of its proximity to both the Tigray and Afar regional borders and its location along the principal transportation route connecting northern Ethiopia. Gubalafto and Lasta districts also experienced varying degrees of conflict exposure and insecurity.

The magnitude of the conflict was substantial. Humanitarian assessments indicate that large numbers of households in North Wollo and surrounding areas were displaced during different phases of the conflict, while schools, health facilities, roads, water infrastructure, and communication services were disrupted or damaged (OCHA, 2022; IOM, 2022). Although the intensity of direct military confrontation varied across districts and over time, the effects of insecurity were felt throughout the study area.

Given the duration, intensity, and geographic spread of the conflict in North Wollo, Kobo, Gubalafto, and Lasta districts provide an appropriate setting for examining household livelihood resilience to conflict-induced food insecurity. Understanding the conflict context is essential for interpreting the livelihood, food security, and resilience outcomes investigated in this study.

1.3. Statement of the Problem

Conflict-induced food insecurity has become an increasingly pervasive threat to human well-being at both global and local scales. The recent surge in armed clashes, civil wars, violent disputes, and terrorism has led to a substantial increase in the number of people experiencing food insecurity across many parts of the world (FAO, 2021). Evidence shows that ongoing and emerging conflicts are directly contributing to food insecurity, undermining all four dimensions of food security -availability, access, utilization, and stability. For instance, FAO (2021) identified conflict as the primary driver of the rise in global hunger in 2020 and 2021. Similarly, Brinkman and Hendrix (2011) and FAO (2018) highlight that conflict not only disrupts food systems but also erodes households' ability to cope, adapt, and recover, thereby reducing their overall resilience.

Among the dimensions of food security, availability and access are most immediately affected by conflict (Malancha, 2021). Conflict disrupts agricultural production and productivity, which directly impacts food availability. In developing countries - where agriculture forms the backbone of national economies and livelihoods - this effect is particularly severe. Messer et al. (1998) estimated that food production in conflict-affected sub-Saharan African countries declined by an average of 12.3% between 1970 and 1994. FAO (2003) further illustrated this impact in Bosnia and Herzegovina, where armed conflict led to an estimated \$4.5 billion in agricultural production losses and a drastic reduction in livestock numbers.

Conflict also undermines food access by destroying critical infrastructure such as roads and bridges, which impedes the transportation of food from surplus to deficit areas. As a result, local markets are disrupted, and food prices rise sharply - exacerbating inequality and increasing dependency on humanitarian assistance (Concern Worldwide, 2018; Verwimp, 2012). Moreover, in many conflict settings, combatants weaponized hunger by intentionally blocking food aid and restricting access to food for opposing groups (Stewart & Fitzgerald, 2000). This practice has been documented in numerous contexts, including the civil war in Sudan (1983–84), refugee camps in Zaire (Cohen, 1999), and more recently, the armed conflict in northern Ethiopia (Weldegiargis. et.al, 2024).

The conflict that erupted in November 2020 between the Tigray People's Liberation Front (TPLF) and the Federal Government of Ethiopia has had devastating consequences for food

security in the country. The fighting, which extended into the Amhara Region, led to widespread destruction of agricultural assets, mass displacement, and restricted humanitarian access. In North Wollo Zone, one of the most affected areas, USAID (2021) estimated that up to five million people were at risk of experiencing Integrated Food security Phase classification (IPC) Phase 3 (Crisis) levels of acute food insecurity. The Office for the Coordination of Humanitarian Affairs (OCHA, 2021) reported that only three out of nine districts in North Wollo were accessible to humanitarian organizations, severely limiting emergency relief efforts.

This conflict has not only compromised households' access to food but has also eroded their livelihood assets and coping strategies. In rural areas, traditional livelihoods such as farming and livestock rearing have been disrupted. In urban areas, small businesses and wage labor opportunities have diminished. The loss of income sources, physical assets, and social support networks has significantly reduced households' capacity to withstand and recover from food insecurity shocks. Many now rely heavily on humanitarian assistance with limited prospects for self-reliance and recovery.

Household livelihood resilience - the capacity of households to absorb, adapt to, and recover from conflict-related shocks - has become a critical area of concern. In northeastern Ethiopia, rural households traditionally rely on subsistence farming, livestock, and informal networks, while urban households depend on small businesses, daily wage labor, and public services (Mohammed, 2017). The ongoing conflict has eroded these coping mechanisms by damaging infrastructure, limiting mobility, fragmenting social support systems, and reducing income opportunities. Many households in both settings have become increasingly dependent on humanitarian assistance, with limited means for self-recovery. Understanding and strengthening household livelihood resilience in both rural and urban conflict-affected settings is therefore essential for informing interventions that support not just immediate survival but long-term food security and recovery.

Despite the recognized importance of resilience in conflict settings, globally, few studies have directly addressed households' resilience to conflict-induced food insecurity. For example, Swesi (2019) conducted a study on household resilience in a conflict-affected area of Libya. However, this study lacked a clear methodology for identifying resilient households within the conflict setting. Similarly, Alinovi et al. (2008) examined household resilience to food insecurity in the

Palestinian context, but the study did not incorporate livelihood assets as a core pillar of resilience measurement. Brück et al. (2019) also explored the effect of violent conflict on household resilience and food security during the 2014 Gaza conflict. Yet, the study covered only a small population and suffered from sampling limitations due to security concerns during data collection.

Within Ethiopia, resilience studies have largely focused on natural hazards such as drought and climate shocks (Demeke & Tefera, 2013; Mulugeta, 2014; Debessa, 2018; Getachew, 2021). These works offer valuable insights into the dynamics of household resilience, but they do not capture the unique and complex challenges posed by armed conflict. As a result, there remains a critical gap in the literature regarding how households in conflict-affected regions of Ethiopia, particularly in the northeastern areas, cope with and recover from food insecurity shocks.

This study seeks to fill that gap by investigating household livelihood resilience to conflict-induced food insecurity in both rural and urban settings of northeastern Ethiopia. It aims to identify key livelihood assets and strategies that support resilience, examine the ways in which conflict has reshaped household coping mechanisms, and inform the design of interventions that strengthen food security and sustainable recovery in conflict-affected communities.

1.4. Objectives of the Study

1.4.1. General objectives

The general objective of the study is to assess and analyze the resilience of household livelihoods to conflict-induced food insecurity in conflict areas of northeastern Ethiopia.

1.4.2. Specific objective

In line with the above general objective, the following specific objectives were articulated:

1. To assess and rank the severity of conflict impacts on household livelihood assets;
2. analyze the livelihood strategies, livelihood strategy outcomes and key determinants influencing the outcomes across three distinct livelihood zones;
3. evaluate the extent of conflict induced food insecurity in the conflict affected area of north eastern Ethiopia;
4. examine the coping mechanisms adopted by households in response to conflict-induced food insecurity and assess the extent to which these mechanisms help households maintain food consumption and livelihoods in the short term; and

5. examine the factors affecting household livelihood resilience to food insecurity in conflict-affected areas.

1.5. Research Questions

In alignment with the stated objectives, the study addresses the following key research questions

- ✚ How have household livelihood assets (human, natural, physical, financial, and social capital) changed before, during, and after the conflict in the northeastern regions of Ethiopia?
- ✚ What livelihood strategies have households employed across the three livelihood zones during the conflict, and how have these strategies impacted their total annual incomes?
- ✚ What are the key factors influencing the outcomes of household livelihood strategies, as measured by total annual income, in conflict-affected areas?
- ✚ To what extent are households in conflict-affected areas exposed to conflict induced food insecurity resulting from the conflict?
- ✚ What coping mechanisms have households in conflict-affected areas adopted to mitigate conflict-induced food insecurity?
- ✚ What factors influence the resilience of household livelihoods to food insecurity in conflict-affected areas of northeastern Ethiopia?

1.6. Research Methods

1.6.1. Study area description

The study was conducted in the North Wollo Zone of the Amhara National Regional State (ANRS); Ethiopia (Figure 3.1). This was one of the areas experiencing a protracted conflict in Ethiopia. It is astronomically laid between 11°30′ and 12°30′N and 38°30′ and 40°00′E. The relief of North Wollo is characterized by a rugged topography. Most parts of the area experience two rainfall seasons and a high number of locals follow a bimodal farming system. Agriculture is the major source of livelihood in the area. Almost all the people practice crop-livestock mixed farming. Teff (*Eragrostis teff*), barley (*Hordeum vulgare*), wheat (*Triticum aestivum*), sorghum (*Sorghum bicolor*), and maize (*Zea mays*) are major crops. The livestock of the area includes cattle, pack animals, sheep, goats, and chicken and also camels in the *Kolla* (lowland) areas.

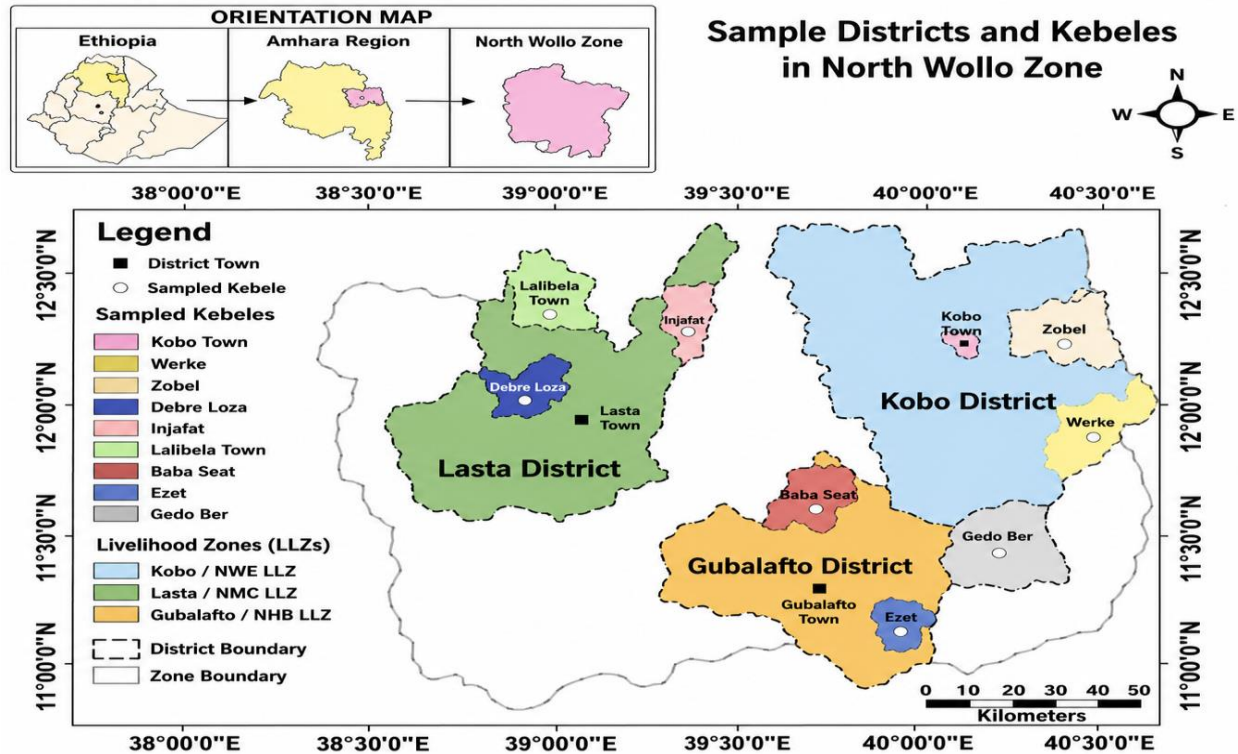


Figure 1.1. Location map of the study area

The climatic conditions of the area can be grouped on the basis of the four traditional thermal zones namely: *Kolla* (semi-arid zone), includes those areas with an altitude of 500 –1,500 mamsl; *Woina-Dega* (warm temperate zone) covering the temperate highlands between 1,500 and 2,500 mamsl; and *Dega* (cool temperate zone), which includes the temperate highlands between 2,500 and 3,200 mamsl; and *Wurch* (cool zone) that covers the highest plateau areas above 3200 mamsl.

Rainfall in the area varies from place to place and from season to season. Hence, most parts of North Wollo experience two rainfall seasons and a high number of locals follow a bimodal farming system. The two seasons are known as - *Belg*, which falls between mid-February to the end of April, and - *Meher*, from June to August. The annual average rainfall ranges from 800 – 1,200 mm. The small rainy season is erratic and highly variable (Mohammed *et al.*, 2017). In the northeast highlands, where the study area is part of, throughout the year temperature shows little variations (roughly between 3-6°C) from the warmest month (between April and June) to the coldest month (between November and February). The hottest period is March to May, before the onset of the major rains. The variation of temperature and rainfall due to the effect of altitude

in this region is significant (Conway, 2000). A range of variation of temperature and rainfall occur along differences of agro-ecological zones and/or altitude. Highlands of North Wollo laying between 1,500 –2,500 mamsl have annual average temperatures of 15 – 20°C. Eastern, northwestern, and southwestern parts of North Wollo have an altitudinal range of 500 –1,500 mamsl., and the annual average temperature is 20–25°C (Conway, 2000).

1.6.2. Research philosophy / paradigm

A research philosophy or paradigm encompasses a comprehensive set of beliefs and assumptions that guide a researcher's approach to inquiry. It also influences the selection of methods, strategies, and the overall design of the study (Creswell, 2021). The statement offers an epistemological and ontological foundation that shapes the conceptualization, generation, and interpretation of knowledge. Depending on the disciplinary orientation, the nature of the research problem, prior research experience, and methodological guidance, scholars may adopt different philosophical perspectives such as post positivism, constructivism, transformative, or pragmatism (Panya & Nyarwath, 2022; Paudel, 2024).

Among these perspectives, pragmatism has been widely recognized as a suitable philosophical foundation for mixed-method research. Pragmatism recognizes that there are various ways to understand reality. It highlights the practical outcomes of research and the importance of knowledge in solving real-world problems. This perspective encourages the integration of both quantitative and qualitative approaches within a single research framework to provide a more comprehensive understanding of complex phenomena (Creswell, 2009; Tashakkori & Teddlie, 2021). A key feature of pragmatism is its emphasis on the connection and combination of methods, enabling researchers to develop a coherent and context-sensitive methodological strategy that best addresses the research problem (Creswell, 2009). Within this perspective, researchers are not restricted to a single method but can employ multiple techniques and analytical tools simultaneously or sequentially to generate meaningful and actionable evidence (Masrizal, 2012).

Consistent with these considerations, the study adopts pragmatism as its guiding philosophical stance, since the research problem inherently demands the integration of diverse data types and analytical approaches. It investigates the spatiotemporal dynamics of climate variability and its impacts on major cereal crops, along with the perceptions of smallholder farmers and adaptation strategies within the Ayehu Watershed. Addressing such a complex and multidimensional issue

requires the use of both quantitative and qualitative evidence. Quantitative data, including long-term climate records and crop yield statistics, was analyzed using statistical and econometric techniques to identify climate trends and examine crop–climate relationships. Simultaneously, qualitative data obtained from household surveys, focus group discussions, and key informant interviews were used to elucidate farmers' perceptions, lived experiences, and context-specific adaptation practices. Integration of these datasets and methodological approaches generates complementary insights that would not be attainable through a single methodological paradigm alone. Therefore, the pragmatic paradigm was considered to be the most appropriate because it allows methodological flexibility and prioritizes the research problem rather than adherence to a single philosophical tradition. By integrating multiple data sources and analytical methods, this study generates practically orientated and contextually grounded evidence that improves understanding of climate variability, crop yield dynamics, and farmers' adaptation strategies. In doing so, the pragmatic perspective enables the study to bridge empirical climate analysis with farmers' lived experiences, producing findings that are both scientifically robust and relevant for informing climate-resilient agricultural policies and practices.

1.6.3. Research Approach

This study employed a mixed-methods research approach to investigate household livelihood resilience to conflict-induced food insecurity in northeastern Ethiopia. A mixed-methods approach combines quantitative and qualitative research methods within a single study to provide a more comprehensive understanding of complex research problems than either approach alone (Creswell & Plano Clark, 2018). The approach was considered appropriate because resilience, food insecurity, livelihood strategies, and conflict impacts are multidimensional phenomena that require both numerical measurement and contextual understanding.

The quantitative component was used to measure changes in livelihood assets, livelihood strategies, food security status, and resilience capacities across pre-conflict, conflict, and post-conflict periods. Quantitative data were collected through structured household surveys and analyzed using descriptive statistics, Analysis of Variance (ANOVA), multiple linear regression, and the Resilience Index Measurement and Analysis (RIMA) framework.

The qualitative component was employed to gain deeper insights into households' experiences of conflict, coping strategies, livelihood recovery processes, and resilience-building mechanisms. Qualitative data were collected through focus group discussions (FGDs), key informant

interviews (KIIs), and in-depth interviews with selected participants. These qualitative findings complemented and enriched the quantitative results by providing contextual explanations for observed patterns and relationships. The use of a mixed-methods approach enabled the study to triangulate findings from different sources, thereby enhancing the validity, credibility, and comprehensiveness of the research outcomes.

1.6.4. Research Design

The study adopted a Convergent Parallel Mixed-Methods Design. In this design, quantitative and qualitative data are collected during the same phase of the research process, analyzed separately, and then integrated during interpretation and discussion of the findings (Creswell & Creswell, 2018). The convergent parallel design was selected because it allows researchers to obtain complementary information about the same phenomenon from different perspectives. While the quantitative data provided measurable evidence regarding changes in livelihood assets, livelihood strategies, food security status, and resilience capacities, the qualitative data offered detailed explanations of how households experienced conflict, responded to shocks, and recovered from livelihood disruptions.

Under this design, neither the quantitative nor the qualitative component was given priority; instead, both strands were considered equally important in addressing the research objectives. Data collection for both components occurred concurrently within the same study period. The quantitative and qualitative datasets were analyzed independently using appropriate analytical techniques and were subsequently compared, merged, and interpreted together. Areas of convergence, complementarity, and divergence between the two datasets were examined to develop a comprehensive understanding of household livelihood resilience to conflict-induced food insecurity.

The convergent parallel mixed-methods design was particularly suitable for this study because it facilitated the integration of statistical evidence with lived experiences and contextual realities of conflict-affected households, thereby providing a richer and more nuanced understanding of livelihood resilience in northeastern Ethiopia.

1.6.5. Data sources and collection techniques

The integration of diverse data types and sources allows for a richer, more nuanced analysis of the research problem. Primary data were collected through interviews, focus group discussions, household surveys, and direct field observations, while secondary data were drawn from

reputable humanitarian and development organizations. This section outlines the procedures and instruments used for data collection in detail.

1.6.5.1. Primary data collection

1. Qualitative Data:

Qualitative data were primarily gathered through key informant interviews, household interviews, focus group discussions (FGDs), and observations via transect walks.

Key informant interview: Key Informant Interviews (KIIs) were conducted to provide further insights into the study. Fifteen key informants were selected based on their expertise, professional roles, and relevance to the research goals. These informants included experts from non-governmental humanitarian organizations, risk prevention and food security specialists at district and zone levels, and local administrators and religious leaders. The KIIs followed a semi-structured format, guided by open-ended questions aimed at gathering detailed, context-specific information. Each interview lasted between 35 and 50 minutes and was conducted in Amharic and then translated into English by professional translators and reviewed by the research team for accuracy and cultural relevance. The KII data were analyzed thematically alongside the FGD data to identify key themes and patterns.

Focus Group Discussion (FGD): A series of nine Focus Group Discussions (FGDs) were organized, each comprising eight participants who were carefully chosen for their knowledge and experience in conflict-related matters to ensure meaningful input. The participants were three conflict victims (injured or lost family members, lost their assets), two religious leaders, one health officer, one teacher and one kebele administrative officer. Six of these discussions took place in rural areas, while the remaining three were held in urban locations to capture a wide range of perspectives. Each FGD was facilitated by two trained moderators responsible for steering the conversation, encouraging participation, and managing group interactions. These facilitators completed an extensive training program that covered FGD moderation, group dynamics management, and the use of probing questions to extract detailed information. Each discussion lasted around 90 minutes and followed a semi-structured approach, with probing questions used to delve deeper into the topics. All sessions were conducted in Amharic, the native language of the participants. The audio recordings were transcribed verbatim in Amharic and later translated into English by professional translators. To maintain accuracy and cultural sensitivity, the research team reviewed the translations.

A team of three experienced coders, skilled in qualitative data analysis, handled the coding and analysis of the FGD transcripts. They underwent specialized training in thematic analysis, which included data familiarization, initial code generation, and theme identification. The transcripts were analyzed using thematic coding to identify recurring terms and phrases related to participants' experiences with livelihood asset.

Transect walks

Transect walks were organized to observe and document the extent of destruction to houses, infrastructure, and agricultural land. These walks serve to validate information collected through individual interviews, FGDs, and household surveys. Conducted together with kebele administrators and local residents who remained in the area during the conflict, the transect walks utilize instruments such as GPS devices, cameras, and video recorders to capture audiovisual evidence.

2. Quantitative Data

Quantitative data are primarily generated through **household surveys**.

Household survey

A structured and semi-structured questionnaire was employed as the principal tool for collecting quantitative data. The questionnaire was initially developed in English, informed by an extensive review of relevant literature and consultations with academic supervisors. Subsequently, it was translated into the local language, Amharic, to facilitate effective communication with respondents. The questionnaire included both closed- and open-ended questions, covering a range of topics such as demographic and socio-economic characteristics, and households access to livelihood assets and strategy, food security and livelihood resilience. Nine trained enumerators, recruited from the respective sample districts, were engaged to administer the survey. To ensure data quality and integrity, the responses were back-translated into English for final analysis.

1.6.5.2. Secondary data collection

Secondary data are utilized to complement and triangulate the primary data. These data encompass information on the conflict and its impacts on assets, household food access, and broader socio-economic conditions. Sources include reports and datasets from international humanitarian and development organizations such as USAID, UNHCR, the United Nations

(UN), the Food and Agriculture Organization (FAO), and the World Health Organization (WHO), among others.

The combination of qualitative and quantitative methods, along with the triangulation of primary and secondary data sources, ensured the reliability and validity of the findings. The use of multiple instruments - such as structured surveys, key informant interviews, FGDs, and field observations - provided comprehensive insights into the impacts of conflict on household access to livelihood assets. Furthermore, the methodological rigor applied throughout the data collection process had enhanced the credibility of the study and supported the robustness of the subsequent analysis and interpretation.

1.6.5.3. Sampling design and Technique

The study followed a multi-stage sampling design and procedure to select specific sample sites and households. In the first stage, the North Wollo Zone was purposively selected. It was selected because the conflict lasted a long time and was believed to affect the area more. The purposively selected zones were then clustered into three dominant livelihood zones. Hence, the Kobo district from the North Wollo East Plain Livelihood Zone (NWE), Gubalafto district from the North Wollo Highland Belg Livelihood Zone (NHB), and the Lasta district from the Northeast Midland Mixed Cereal Livelihood zone (NMC) were selected randomly (figure 1.1). The assumption was that in similar livelihood zones, households have similar opportunities and constraints. The Kebele Administrations (KAs) in the selected districts were again selected using a cluster sampling approach. All KAs from the three selected districts were first clustered as rural and urban. Then, proportionally, two KAs from rural areas and one KA from urban (a total of six rural and three urban KAs) were selected in a random sampling procedure.

Sampling units for quantitative datasets: For the quantitative data set, a statistically proven approach was applied to determine the minimum sample size to be drawn considering the distribution and size of the population of the study area. Yemanes' (1967) sample size determination formula was employed to determine the sample size.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{12702}{1 + 12702 * 0.052}$$

$$n = 388$$

Where : n = sample size N = population size e = error (0.05) reliability level 95%

Table 1.1. Distribution of Sample Households by District, Livelihood Zone, and Kebele

District	LLZ	Rural Kebeles	Urban Kebele	Total Households	Sample Rural HHs	Sample Urban HHs	Total Sample HHs
Kobo	NWE	Worke, Zoble	Kobo 01	5,470	111	56	167
Gubalafto	NHB	Babsat, Ezet	Gedober	3,344	65	37	102
Lasta	NMC	Debrloza, Enjafat	Lalibela 02	3,888	65	54	119
Total	—	—	—	12,702	241	147	388

Finally, a total of 388 households, (147 from urban and 241 from rural kebeles) were sampled for the questionnaire survey from the nine KAs using a proportional to size sampling technique based on the sampling frames obtained from each KA office (table 1.1). A systematic random sampling technique was employed to select sample households. A complete list of households was obtained from kebele administrations and used as a sampling frame. The sampling interval was determined by dividing the total number of households by the required sample size. A random starting point was selected using a lottery method, after which every k^{th} household was chosen until the total sample size of 388 households was achieved. (See Table 1.1).

1.6.3. Ethical Considerations, Validity and Reliability

Ethics are the moral principles that direct the actions of an individual or a group of people. To commence the research activities, this study initially received support letters from the Doctoral Programs Coordination Office of the School of Graduate Studies at Bahir Dar University. From the beginning up to the end of the research work, the study has strived for academic honesty and overcome the tendency to discount data that did not match our requirements. This study duly informed the participants about the objectives and benefits of the research, and their consent was obtained voluntarily. Moreover, the study explained to the participants that the collected data were merely utilized for academic reasons, no fees were offered, how participant anonymity was safeguarded, how data collection was done, the ability to request questions, the freedom to revoke consent at any time, the lack of penalty for doing so, and the research benefits. Finally, the participants provided verbal consent to the researcher. All subjects gave their informed consent verbally. The study acknowledged and respected their verbal agreement, considering

their privacy concerns related to age, educational background, and apprehensions about signing documents or being recorded. This approach helped to establish rapport and trust between the researcher and the participants, thereby increasing the likelihood of their continued participation in the study.

Before the actual survey analysis, a preliminary survey was conducted to confirm the validity and reliability of the survey instruments and variables used in this study. Validity refers to how well the obtained data corresponds to the actual field of inquiry (Taherdoost, 2016) and is concerned with the accuracy and authenticity of the study's findings. Various procedures were implemented to ensure the validity of the data and instruments used in the present study. For example, a robust research design and precise methodologies were employed, and the study variables were triangulated from relevant sources. Additionally, related literature was reviewed to develop a comprehensive understanding of this study.

Kothari (2004) and Taherdoost (2016) define reliability as the consistency and dependability of study findings or measurements. As a result, the consistency and replicability of the instruments and variables utilized in this study were assessed using Cronbach's alpha, which was implemented using SPSS version 22. Cronbach's alpha is a measure of internal consistency that determines how closely linked a group of items are to one another. It is used to test the dependability of a summated scale, which combines multiple elements to provide a total score (George et al., 2005).

1.7. Significance of the Study

In the contemporary discourse on food security, resilience has emerged as a pivotal concept in addressing the multifaceted challenges posed by conflict-induced food insecurity. Understanding the core of households' resilience mechanisms is of paramount importance, both theoretically and practically, especially in regions like the northeastern highlands of Ethiopia that have been profoundly affected by recent conflicts.

From a theoretical standpoint, this study contributes to the existing body of literature on resilience and food security in several ways. Firstly, it introduces new insights into the dynamics of conflict-induced food insecurity, expanding the understanding of how households navigate and adapt to such adversities. Secondly, by identifying and analyzing the factors that influence households' resilience in conflict settings, the research provides valuable information that can

inform both local and global agencies working towards enhancing food security. Moreover, the study serves as a catalyst for future research by highlighting existing knowledge gaps and suggesting areas that warrant further investigation.

Practically, the findings of this study offer critical information on the current state of food security and the resilience capacities of households in conflict-affected areas. It sheds light on the availability and accessibility of social and basic services, which are essential components of resilience. Furthermore, the research identifies specific areas where interventions are needed to bolster resilience and ensure food security. By providing a comprehensive picture of the challenges faced by households in the conflict zones, the study equips policymakers, development practitioners, and local actors with the necessary insights to design and implement effective resilience-building strategies at the local level.

In summary, this study holds significant value in enhancing the understanding of household resilience to conflict-induced food insecurity, offering both theoretical contributions to academic literature and practical guidance for policy and intervention strategies aimed at mitigating food insecurity in conflict-affected regions.

1.8. Scope and limitation of the study

This study focuses on assessing household livelihood resilience to conflict-induced food insecurity in the northeastern highlands of Ethiopia, specifically selected districts within the Amhara Region that have been significantly affected by recent conflicts. These areas encompass diverse agro-ecological zones and livelihood systems, providing a comprehensive context for examining variations in household resilience.

Conceptually, the study is grounded in the Sustainable Livelihoods Framework (SLF) and the Resilience Measurement Framework, particularly drawing on the Resilience Index Measurement and Analysis (RIMA) approach. It conceptualizes livelihood resilience as a multidimensional construct comprising key pillars, including assets, adaptive capacity, access to basic services, and social safety nets. The study also integrates concepts of coping strategies, livelihood diversification, and food security outcomes to examine how households respond to and recover from conflict-induced shocks.

The study adopts a comparative temporal perspective, examining household conditions across three critical periods: pre-conflict, during conflict, and post-conflict phases. This temporal scope

enables the analysis of changes in livelihood assets, strategies, and resilience over time, although data are collected retrospectively due to the cross-sectional design.

A mixed-methods approach is employed, integrating both quantitative and qualitative techniques. Quantitative data are collected through structured household surveys and analyzed using econometric and statistical models, including descriptive statistics, income-based livelihood outcome analysis, and regression models to identify determinants of livelihood strategy outcomes. In addition, resilience is quantified using composite indexing approaches consistent with RIMA methodology. Qualitative data are gathered through key informant interviews and focus group discussions to complement and triangulate quantitative findings.

Despite its contributions, the study has several limitations. The findings of this study should be interpreted in light of several limitations arising from the challenging research environment in conflict-affected northeastern Ethiopia. First, security concerns and restricted access to some conflict-affected localities limited the geographical coverage of the study. As a result, households residing in the most insecure and inaccessible areas could not be included in the survey. Since these households may have experienced more severe livelihood disruptions and food insecurity than those included in the study, the findings may underestimate the full magnitude of conflict impacts and should therefore not be generalized to all conflict-affected populations in the region.

Second, the cross-sectional nature of the study required respondents to retrospectively recall their pre-conflict and conflict-period experiences. This reliance on recall may have introduced measurement errors, particularly regarding income, asset ownership, food security status, and livelihood conditions across different periods. Although efforts were made to minimize recall bias through careful questionnaire design and triangulation with qualitative evidence, some inaccuracies may remain.

Third, resilience is a multidimensional concept that includes social, psychological, institutional, and economic dimensions. Due to resource and data limitations, the study primarily focused on measurable livelihood, food security, and asset-related dimensions of resilience. Consequently, important aspects such as psychological resilience, mental health impacts, and long-term social cohesion were not comprehensively examined. The absence of these dimensions may limit a fuller understanding of household resilience in conflict settings.

Finally, because the study relied on a single-round survey rather than longitudinal data, it could not directly observe how household resilience evolved over time. Instead, changes in livelihood conditions were reconstructed using retrospective information. As a result, the study provides evidence on patterns of livelihood disruption and recovery but cannot fully capture the dynamic and long-term processes through which households adapt to and recover from conflict-related shocks.

Despite these limitations, the study generated valuable empirical evidence on household livelihood resilience, livelihood strategies, and food insecurity in one of Ethiopia's most conflict-affected regions. The use of mixed methods, triangulation of data sources, and inclusion of both urban and rural households helped strengthen the credibility and robustness of the findings.

1.9. Conceptual and Theoretical Foundations of the Study

1.9.1. Introduction

Understanding household livelihood resilience to conflict-induced food insecurity requires a comprehensive conceptual and theoretical foundation capable of explaining the complex interactions among conflict, livelihoods, food security, coping mechanisms, and resilience outcomes. Food insecurity in conflict-affected areas is not merely the result of inadequate food production or environmental shocks; rather, it emerges from a combination of political, economic, social, and institutional factors that affect households' ability to access and utilize food resources (Sen, 1981; Devereux, 2001). In conflict settings, households experience destruction of productive assets, disruption of markets and public services, displacement, and erosion of social support systems, all of which undermine their livelihood capacities and food security status (Maxwell & Wiebe, 1999; Barrett, 2010).

This study is anchored in Political Economy Theory as its principal theoretical foundation and is further informed by the Sustainable Livelihood Framework and Resilience Theory. These perspectives provide complementary explanations for understanding how conflict affects household livelihood systems and food security conditions and how households respond to, adapt to, and recover from conflict-induced shocks (Scoones, 1998; Folke, 2006). Together, these theoretical perspectives provide the analytical basis for examining household livelihood resilience to food insecurity in northeastern Ethiopia.

1.9.2. Theoretical Foundations of the Study

1.9.2.1. Political Economy Theory

Political Economy Theory serves as the primary theoretical foundation of this study. The theory argues that food insecurity cannot be understood solely in terms of food shortages or agricultural production failures. Rather, food insecurity is shaped by broader political, institutional, and economic processes that determine access to food, resources, and livelihood opportunities (Bohle et al., 1994; Devereux, 2001). Political decisions, governance systems, market structures, power relations, and institutional effectiveness significantly influence household welfare and food security outcomes.

The political economy perspective is particularly relevant in conflict-affected settings because armed conflict often disrupts economic systems, destroys infrastructure, weakens institutions, and constrains access to productive resources. In such situations, food insecurity becomes a consequence of governance failures, market disruptions, insecurity, and social exclusion rather than simply insufficient food availability (Watts & Bohle, 1993; Maxwell & Wiebe, 1999). The theory emphasizes that access to food is influenced by political and institutional arrangements that determine how resources are distributed and who benefits from them.

In conflict-affected regions, destruction of roads, markets, irrigation systems, schools, and health facilities weakens households' ability to maintain their livelihoods. Conflict also disrupts labor markets, inflates food prices, restricts mobility, and reduces access to humanitarian assistance. Consequently, households become increasingly vulnerable to food insecurity and poverty (FAO, 2017; WFP, 2022). The theory therefore provides an appropriate framework for understanding how conflict-induced disruptions create conditions that undermine household food security and resilience.

The political economy perspective further highlights the role of institutions in shaping household resilience. Effective governance systems, social protection programs, and public services can mitigate the adverse impacts of conflict and facilitate recovery. Conversely, institutional collapse and weak service delivery increase household vulnerability and limit adaptive capacities (Bohle et al., 1994; Devereux, 2001). Thus, Political Economy Theory provides a useful lens through which the structural causes of conflict-induced food insecurity can be understood.

1.9.2.2. Entitlement Perspective

The study also draws insights from the entitlement perspective advanced by Sen (1981). According to the entitlement approach, food insecurity and famine occur not necessarily because food is unavailable but because individuals and households lose their ability to access food through production, exchange, labor, or transfers (Sen, 1981). Households may experience food insecurity when they lose productive assets, employment opportunities, income sources, or social support mechanisms.

In conflict situations, entitlement failures become particularly pronounced. Households may lose access to farmland, livestock, employment opportunities, markets, and social networks that traditionally provide food and income. Consequently, even when food exists within a region, households may be unable to obtain it because their entitlement systems have been disrupted (Devereux, 2001). While Entitlement Theory explains how households lose access to food, Political Economy Theory provides a broader explanation of the political and institutional factors responsible for such entitlement failures. Therefore, the entitlement perspective complements the political economy approach adopted in this study.

1.9.2.3. Sustainable Livelihood Framework

The Sustainable Livelihood Framework (SLF) provides the principal analytical framework for examining household livelihood systems. The framework explains how households utilize available resources and capabilities to pursue livelihood strategies and achieve desired livelihood outcomes (Scoones, 1998; DFID, 1999). According to the framework, livelihood sustainability depends on households' access to five forms of capital: human, natural, physical, financial, and social capital.

Human capital refers to education, skills, health status, labor availability, and indigenous knowledge. Natural capital includes land, water resources, grazing areas, forests, and livestock resources that support agricultural production and livelihood activities. Physical capital encompasses housing, infrastructure, farm equipment, transportation facilities, communication networks, and public utilities. Financial capital consists of income, savings, credit, remittances, and other financial resources. Social capital refers to social networks, trust, community organizations, traditional institutions, and collective support systems (DFID, 1999; Ellis, 2000).

The Sustainable Livelihood Framework recognizes that households operate within a vulnerability context characterized by shocks, stresses, and trends. Conflict represents one of the most severe shocks affecting household livelihood systems. Through destruction of assets, displacement of populations, disruption of markets, and weakening of institutions, conflict reduces households' ability to maintain sustainable livelihoods (Scoones, 1998; Chambers & Conway, 1992). The framework therefore provides a useful analytical structure for assessing how conflict affects livelihood assets and livelihood strategies and how these changes influence food security and resilience outcomes.

1.9.2.4. Resilience Theory

Resilience Theory provides the conceptual basis for understanding households' ability to withstand, adapt to, and recover from conflict-induced shocks. Resilience refers to the capacity of households or communities to absorb disturbances, adapt to changing conditions, and restore essential functions following a crisis (Folke, 2006; Walker et al., 2004).

In the context of food insecurity, resilience reflects the ability of households to maintain or regain food security despite exposure to conflict and other shocks (FAO, 2016; Alinovi et al., 2010). Resilience is not viewed as a static condition but rather as a dynamic process that evolves over time. Households continuously adjust their livelihood strategies, mobilize resources, and utilize support systems to cope with changing circumstances. Three major dimensions of resilience are commonly identified. The first is absorptive capacity, which refers to the ability of households to withstand shocks while maintaining essential functions. The second is adaptive capacity, which involves adjusting livelihood strategies in response to changing conditions. The third is recovery or transformative capacity, which reflects the ability to rebuild livelihoods and improve conditions following a crisis (Béné et al., 2012; Folke, 2006).

The resilience perspective is highly relevant to this study because it focuses on the factors that enable households to recover from conflict-induced food insecurity. Livelihood assets, access to services, social safety nets, and adaptive livelihood strategies all contribute to resilience outcomes (FAO, 2016; Alinovi et al., 2010). Consequently, Resilience Theory provides an appropriate framework for examining variations in household recovery capacities in conflict-affected areas.

1.9.3. Conceptual Foundations of the Study

1.9.3.1. Food Security Concept

Food security is a multidimensional concept that extends beyond food production and availability. According to the Food and Agriculture Organization, food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2008). The concept encompasses four interrelated dimensions: food availability, food access, food utilization, and food stability (FAO, 2008; Barrett, 2010). Food availability refers to the physical presence of food within a particular area through production, trade, or transfers. Food access concerns households' ability to obtain sufficient food through income, production, or social support mechanisms. Food utilization relates to the effective use of food through adequate nutrition, health, sanitation, and dietary diversity. Food stability refers to the ability to maintain food security over time despite shocks and stresses. Conflict affects all four dimensions simultaneously. Agricultural production declines, markets become disrupted, food prices increase, public services deteriorate, and household incomes decrease. As a result, conflict significantly increases the likelihood of food insecurity and malnutrition among affected populations (FAO, 2017; WFP, 2022).

1.9.3.2. Household Resilience to Food Insecurity

Household resilience to food insecurity refers to the ability of households to maintain or restore acceptable levels of food security despite exposure to shocks and adverse conditions (Alinovi et al., 2010; Béné et al., 2012). Resilient households are able to absorb disturbances, adapt their livelihood strategies, and recover from crises while sustaining their food security status. The literature indicates that resilience is influenced by multiple factors, including livelihood assets, access to basic services, social safety nets, adaptive capacities, and livelihood diversification (FAO, 2016; Alinovi et al., 2010). Households possessing stronger asset bases and diversified income sources are generally better positioned to cope with shocks and recover from disruptions. Similarly, access to markets, healthcare, education, and social support systems enhances adaptive capacity and facilitates recovery.

1.9.3.3. Role of Basic Services and Social Safety Nets

Access to basic services represents an important component of household resilience. Health facilities, educational institutions, transportation systems, water supply services, markets, and

agricultural extension services contribute significantly to livelihood sustainability and food security (DFID, 1999; Scoones, 1998). In conflict settings, disruption of these services often increases household vulnerability and weakens adaptive capacity. Social safety nets constitute another critical component of resilience. Formal and informal support mechanisms such as cash transfers, food assistance, public works programs, remittances, community support systems, and humanitarian aid help households withstand shocks and avoid negative coping strategies (FAO, 2016; Béné et al., 2012). Social safety nets protect productive assets, support consumption, and facilitate recovery during periods of crisis.

1.10. Organization of the Thesis

This dissertation is organized into an article-based format consisting of eight chapters. Chapter one offers a general introduction to the study, addressing its overall concerns. It also outlines the objectives and significance of the research. Additionally, it presents synthesized literature review about conflict, livelihood, food insecurity and resilience. Chapter two presents article I, which discusses households access to livelihood assets in conflict-affected areas of northeastern Ethiopia in the three time periods. Chapter Three contains Article II, which deals with household's livelihood strategies and livelihood strategy outcomes in the conflict areas. Chapter Four provides Article III, detailing conflict induced household level food insecurity in conflict affected areas of northeastern Ethiopia. Chapter Five, Article IV, deals with coping strategies to the conflict induced food insecurity. Chapter six presents Article V, which provides households livelihood resilience to conflict induced food insecurity. Additionally factors affecting households resilience to food insecurity is presented in this chapter. Finally, Chapter Seven concludes the dissertation by summarizing the study's contributions, offering recommendations, and suggesting directions for future research.

1.11. Conceptual Frameworks

The conceptual framework for this study illustrates the dynamic relationship among conflict, livelihood assets, livelihood strategies, food insecurity, coping mechanisms, and household resilience across three major time periods: pre-conflict, conflict, and post-conflict periods. The framework was developed based on insights from the Sustainable Livelihood Framework, resilience theory, food security frameworks, and conflict vulnerability perspectives. It provides a systematic understanding of how violent conflict affects household livelihoods and food security

conditions over time and how households respond and recover from conflict-induced shocks (Figure 1.2).

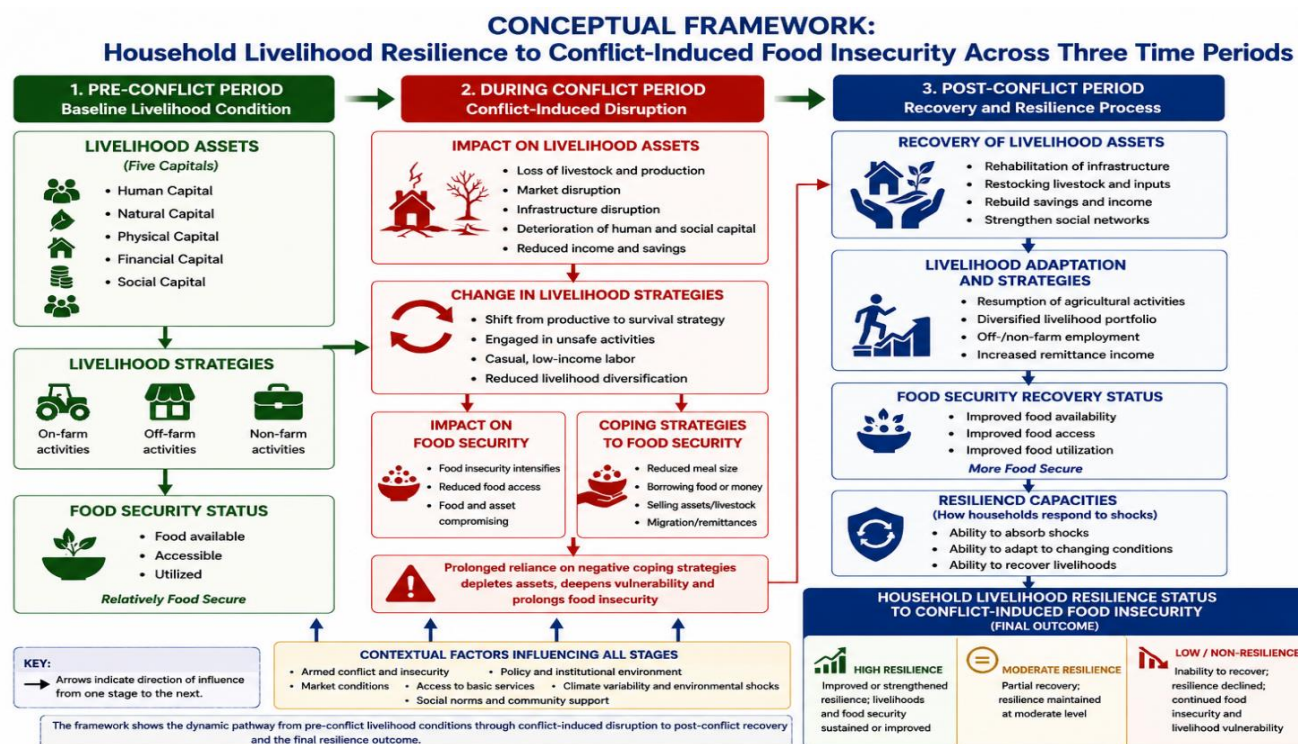


Figure 1.2. Conceptual frame work of the study

The framework begins with the pre-conflict period, which represents the baseline livelihood condition of households before the occurrence of violent conflict. During this period, households possess varying levels of livelihood assets, including human, natural, physical, financial, and social capital. Human capital includes household labor availability, education, skills, health status, and indigenous knowledge. Natural capital consists of land, water, forest resources, grazing areas, and livestock ownership that support agricultural production and rural livelihoods. Physical capital includes housing, infrastructure, farm equipment, roads, irrigation facilities, and communication services. Financial capital refers to household income, savings, remittances, and access to credit and financial services, while social capital represents social networks, community cooperation, trust, local institutions, and traditional support systems.

These livelihood assets determine the livelihood strategies households pursue to sustain their living conditions and food security status. Under relatively stable pre-conflict conditions, households engage in agricultural production, livestock rearing, petty trade, wage labor, and diversified income-generating activities. The combination and effectiveness of these livelihood

strategies influence household food security outcomes, including food availability, food access, food utilization, and dietary diversity. Therefore, the pre-conflict period establishes the initial livelihood capacity and food security condition of households before the emergence of conflict-related shocks.

The second stage of the framework represents the conflict period, which is characterized by violent conflict and widespread livelihood disruptions. The framework assumes that conflict acts as a major external shock that directly and indirectly affects household livelihood systems. Conflict leads to the destruction of physical infrastructure, loss of productive assets, displacement of populations, disruption of markets, inflation of food prices, reduced access to farmland and grazing areas, and weakening of social institutions and public services. In addition, conflict affects education, healthcare, agricultural extension services, transportation systems, and market functionality, thereby undermining both livelihood opportunities and household wellbeing.

As livelihood assets are eroded during the conflict period, households experience significant changes in livelihood strategies. Agricultural production declines because of insecurity, displacement, labor shortages, and reduced access to productive resources. Many households shift from productive and long-term livelihood activities toward short-term survival mechanisms. Some households engage in low-return casual labor activities, temporary migration, petty trade, or dependence on humanitarian assistance and remittances. Others resort to distress sale of livestock and household assets in order to survive during the crisis period. These changes indicate that conflict not only destroys assets but also constrains households' ability to pursue sustainable livelihood strategies.

The disruption of livelihood assets and strategies consequently intensifies household food insecurity. Food availability declines because of reduced agricultural production and market disruption, while food access becomes limited due to income loss, unemployment, and rising food prices. Conflict also affects food utilization through deteriorating health conditions, poor sanitation, inadequate healthcare access, and declining dietary quality. As a result, households experience meal reduction, poor dietary diversity, hunger, and malnutrition. The framework therefore demonstrates that conflict-induced livelihood disruption is a major pathway through which households become food insecure. In response to worsening food insecurity, households

adopt different coping strategies to minimize the immediate effects of food shortages and livelihood stress. These coping mechanisms include reducing meal frequency and portion size, consuming less preferred foods, borrowing food or money, relying on social support networks, selling livestock and productive assets, withdrawing children from school, engaging in casual labor activities, and temporary migration. Although these coping strategies may help households survive during periods of crisis, repeated reliance on negative coping mechanisms can further weaken livelihood assets and increase long-term vulnerability. For example, distress sale of livestock, depletion of savings, and reduced food consumption may undermine future livelihood recovery and adaptive capacity. The framework therefore recognizes the dynamic and cyclical relationship between food insecurity and coping mechanisms during conflict situations.

The final stage of the framework focuses on the post-conflict period, which reflects the recovery, adaptation, and resilience outcomes of households following the decline or cessation of violent conflict. During this period, households attempt to rebuild livelihood assets, restore livelihood activities, and improve food security conditions. Recovery processes may include rehabilitation of infrastructure, restoration of agricultural production, rebuilding savings and income sources, re-establishment of markets, return of displaced populations, and strengthening of local institutions and social networks.

The conceptual framework conceptualizes resilience as a dynamic process rather than a single outcome. Households first utilize their absorptive, adaptive, and recovery capacities to respond to conflict-induced shocks. These capacities influence the extent to which households can restore livelihood assets, resume livelihood activities, and recover food security. The ultimate outcome of this process is reflected in the household livelihood resilience status, which may range from low resilience to moderate or high resilience depending on households' ability to maintain and recover their livelihoods and food security following conflict-related disruptions. Overall, the conceptual framework demonstrates that household resilience to conflict-induced food insecurity is shaped by the complex interaction among conflict exposure, livelihood asset conditions, livelihood strategies, food insecurity experiences, coping responses, and recovery opportunities across time periods.

CHAPTER TWO

2. Household livelihood Assets in Conflict-Affected Areas of Northeastern Ethiopia

Abstract

This study examines the dynamics of household livelihood assets across three time periods - before, during, and after armed conflict in the northeastern region of Ethiopia. Utilizing the Sustainable Livelihood Framework (SLF), the analysis focuses on five core livelihood capitals: human, physical, social, natural, and financial. The research integrates quantitative survey data and qualitative insights from focus group discussions (FGDs), key informant interviews, and field observations, enabling a comprehensive assessment of asset degradation and recovery. To examine statistically significant changes over time, one-way repeated measures ANOVA was applied to key indicators across the three reference periods. The findings reveal that all five forms of capital were adversely affected by the conflict, albeit to varying degrees. Physical capital, including access to markets, water, and shelter, was significantly disrupted, leading to increased vulnerability and transaction costs. The average distance to market increased from 2.03 km pre-conflict to 4.8 km during conflict, then dropped to 2.0 km post-conflict ($F = 369.8$, $p < 0.000$). Human capital suffered due to widespread destruction of educational infrastructure and diminished health outcomes, while social capital - particularly indigenous informal institutions such as idir, equib, and mahiber - largely collapsed during the conflict. However, informal social support networks among families and neighbors strengthened, reflecting adaptive community resilience. Natural capital degradation, particularly deforestation, accelerated due to the absence of law enforcement and growing dependence on firewood and charcoal. Financial capital declined sharply, with rural and urban household incomes dropping by over 50% during the conflict, although partial recovery was observed post-conflict ($F = 127.17$, $p < 0.001$). Significant differences were noted between rural and urban households, as well as across different livelihood zones. The study underscores the need for conflict-sensitive recovery policies that integrate asset-based livelihood planning. Key policy recommendations include infrastructure rehabilitation, social institution revitalization, income diversification, and gender-responsive programming.

Key words – Conflicts; Households; Livelihood assets; Livelihood zones; Ethiopia

2.1. Introduction

Livelihood assets form the foundational pillars through which households engage in productive activities, participate in labor markets, and interact with other households through communal exchange (Ellis, 2003). The literature consistently highlights the crucial role of household assets in promoting resilience and ensuring food security. These assets enhance a household's capacity to withstand shocks and stresses, thereby supporting sustained food security (Chambers & Conway, 1992; Maxwell & Smith, 1992; Carney, 1998; Gunderson & Gruber, 2001; Keil et al., 2008; Yusuf, 2008; Lampis, 2009; Kalaba et al., 2013; Green & Haines, 2015; d'Errico et al., 2018; Manlosa et al., 2019).

Acquiring livelihood assets is a gradual process, often taking years of investment and effort. However, these assets can be lost rapidly - within hours or even minutes - due to various factors, both natural and manmade. Among manmade factors, conflict stands out as a major contributor to asset destruction.

Today, conflicts occur in multiple forms, ranging from strikes and demonstrations to riots, guerrilla warfare, terrorism, and civil war. These manifestations impose diverse economic, social, and psychological burdens on households. Armed civil conflict, in particular, generates both direct and indirect costs that severely disrupt household living conditions during and long after the conflict. Civil wars result in loss of life and injury, destruction of infrastructure and livelihoods, population displacement, breakdown of social cohesion and institutions, and the erosion of trust (Justino, 2011). Most households affected by armed conflict reside in impoverished regions across Africa, Asia, and Latin America, often under conditions of extreme poverty and deprivation (Fearon & Laitin, 2003; Stewart, 2002).

In Ethiopia, political tensions intensified following the postponement of the 2020 parliamentary elections due to the COVID-19 pandemic. The Tigray region held its own regional elections in defiance of the federal government, culminating in the outbreak of civil war in November 2020 following a federal military offensive in response to an alleged attack on army camps. This marked the beginning of an ongoing conflict that has had profound negative consequences for northeastern Ethiopia (GEOGLAM, 2022).

As one of the least developed countries, Ethiopia faces substantial socioeconomic challenges even in the absence of conflict. However, the situation is exacerbated when conflict occurs,

particularly in rural areas where the majority of the population depends on agriculture. In northeastern Ethiopia, around 80 % of the population relies on farming for both food and income (Carter & Kelly, 2021). Households in this region typically hold a diverse range of livelihood assets - including human, natural, physical, social, and financial capital.

The outbreak of conflict significantly increases household vulnerability by amplifying economic and social insecurity. Conflicts are closely associated with the destruction of critical infrastructure and social services, the erosion of household assets and livelihoods, the breakdown of law and order, and sharp declines in both public and private investment (Justino, 2011). These consequences severely constrain the ability of households to maintain or adapt their livelihood strategies. In poor and conflict-exposed communities, such impacts further intensify pre-existing hardships.

The conflict in Ethiopia, particularly in the northeastern region, is thus believed to be deteriorating the socioeconomic conditions of households. It undermines livelihood assets, which are intrinsically linked to household food security. This chapter investigates the status of household livelihood assets in conflict-affected areas of northeastern Ethiopia, specifically examining asset ownership before, during, and after the conflict.

Given the scarcity of empirical studies on asset ownership in this region, this research makes a valuable contribution to the literature on livelihoods in conflict contexts. Furthermore, by exploring the interplay between conflict and livelihood strategies, the study offers practical insights for designing targeted development interventions aimed at improving food security and resilience among affected populations.

2.2. Data Analysis Methods

To evaluate the asset holding status of households in conflict-affected areas, the following methods were employed:

1. Descriptive statistics

Household survey data on assets were summarized using measures of central tendency (mean and median) and dispersion (standard deviation), alongside frequency distributions and percentages. Asset categories considered included natural, physical, financial, human, and social assets. This descriptive analysis allowed for the identification of general trends and patterns in

asset ownership across the sampled households and highlighted variations between rural and urban contexts.

2. Severity Index (SI)

The severity of conflict impacts on livelihood assets was assessed using the Sustainable Livelihood Framework's five capital categories: human, natural, physical, financial, and social capital. Relevant indicators were identified for each asset category and measured through household surveys. Relevant indicators were identified for each asset category and measured through household surveys. Respondents were asked to indicate the extent to which each asset was affected by the conflict using a five-point Likert scale ranging from 1 = not affected to 5 = severely affected.

For each livelihood asset category, a Severity Index (SI) was computed as follows:

$$SI_j = \frac{\sum_{i=1}^N X_{ij}}{N}$$

Where:

(SI_j) = Severity Index for livelihood asset category (j)

(X_{ij}) = Score assigned by household (i) for asset category (j)

(N) = Total number of respondents

The severity ranking was established based on the mean severity index values. Asset categories with higher mean scores were considered more severely affected by the conflict. The severity levels were interpreted as follows:

Table 2.1. Asset damage severity index

Severity Index	Interpretation
1.00 – 1.80	Not affected
1.81 – 2.60	Slightly affected
2.61 – 3.40	Moderately affected
3.41 – 4.20	Highly affected
4.21 – 5.00	Severely affected

3. Qualitative assessment of access and control over assets

To complement the survey data, qualitative information was collected through focus group discussions (FGDs), key informant interviews (KIIs) with community leaders and government officials, and direct field observations. This qualitative component provided insights into how

households accessed, controlled, and used livelihood assets under different circumstances. For example, even when households nominally possessed land or livestock, conflict and displacement sometimes limited their actual access or ability to use those assets. These qualitative findings enriched the quantitative results by capturing dynamics that were not measurable through survey data alone, such as gendered differences in asset control, or changes in social capital due to disrupted networks during conflict.

3. Repeated measures statistical analysis

To rigorously test whether household access to livelihood assets changed significantly across the three time periods (pre-conflict, conflict, and post-conflict), a one-way repeated measures ANOVA was employed. This statistical test was appropriate because the same households were observed at multiple time points, enabling comparisons within groups over time. The repeated measures design also helped control for individual household differences that might otherwise confound the results.

The analysis tested the null hypothesis that there were no significant differences in the mean level of access to household assets across the three periods. Rejection of the null hypothesis provided evidence of statistically significant changes attributable to the conflict. Post-hoc comparisons (e.g., Bonferroni test) were further conducted to identify which specific periods (pre- vs. conflict, conflict vs. post-conflict, etc.) differed significantly. By combining descriptive statistics, qualitative insights, and inferential statistical techniques, this objective provided a comprehensive and nuanced understanding of household asset dynamics in the conflict-affected study area. Such triangulation strengthened the reliability of the findings and allowed for a more holistic analysis of how conflict undermined, reshaped, or restored household assets.

2.3. Results and Discussion

2.3.1. Socio-demographic characteristics of the respondents

The demographic profile of surveyed households reveals that most household heads (66.2%) fall within the 35 to 55 age range, which is considered the prime working age. A smaller proportion (15.2%) were in their twenties, while 18.6% were aged 56 or older (Table 2.2.). In Ethiopia, male-headed households are predominant, with national data indicating that over 76% of

households are led by men (CSA, 2012). This study aligns with that trend, showing that 78.1% of the surveyed households were headed by males (Table 2.2).

Table 2.2. Socio - Demographic characteristics of households

Household survey (N = 388)					FGD Participants (N=72)	
No	Variables	Group	Number	Percentage	Number	Percent
1	Age	25 – 35	59	15.2	8	11
		36 – 45	142	36	30	42
		46 – 55	117	30.2	28	39
		56– 65	42	10.8	-	-
		>65	28	7.8	6	8
					-	-
2	Sex	Male	303	78.1	47	65
		Female	85	21.9	25	35
3	Marital status	Married	222	57.2	54	74.6
		Unmarried	37	9.5	2	3.4
		Divorced	45	11.6	-	-
		Widowed	84	21.6	16	22
4	Educational status	Literate	162	41.8	35	48.6
		Illiterate	226	58.2	37	51.4
		Male literate	156	40.2	25	34.7
		Male illiterate	147	37.9	22	30.6
		Female literate	6	1.5	10	13.9
		Female illiterate	79	20.4	15	20.8
		Rural literate	30	7.7	16	22.2
		Rural illiterate	211	54.7	32	44.4
		Urban literate	132	34	19	26.4
		Urban illiterate	15	3.9	5	6.9
5	Residence	Rural	241	62.1	48	66.7
		Urban	147	37.9	24	33.3

The demographic profile of respondents also revealed that 11.6% and 21.6% of household heads were divorced and widowed, respectively. The relatively high proportion of widowed households may partly reflect the broader impacts of the armed conflict in northern Ethiopia, which resulted in loss of life, displacement, and family disruption across many communities in North Wollo.

Similarly, prolonged economic hardship, displacement, and social stress associated with the conflict may have contributed to marital instability and family separation. However, because the study did not specifically investigate the causes of widowhood and divorce, these associations

should be interpreted with caution. The findings nevertheless suggest that conflict-related demographic changes may have important implications for household livelihood security and resilience. Educational attainment was notably low, with 58.2% of respondents identified as illiterate (Table 2.2.)

The focus group discussion included 72 participants, with a greater share (66.7%) coming from rural areas (48 individuals) and the rest (33.3%) from urban settings (24 individuals). Men accounted for 65% (47 participants), while women made up 35% (25 participants). In terms of literacy, 48.6% (35 participants) had some level of education, whereas 51.4% (37 participants) were illiterate. Age distribution showed that a significant majority (81%) were between 35 and 55 years old. Additionally, 11% (8 participants) were between 25 and 35, while 8% (6 participants) were over 55 years old. Marital status among focus group participants reflected a similar pattern, with 74.6% (54 individuals) being married, 22% (16 individuals) widowed, and 3.4% (2 individuals) unmarried (See table 2.2).

2.3.2. Household livelihood asset holding status in three time periods

Livelihood systems, particularly in conflict-affected settings, are shaped by the dynamic interplay of multiple assets or capitals that households rely upon to sustain their well-being. The Sustainable Livelihood Framework (SLF) identifies five key types of capital assets- (human, physical, social, natural, financial), as essential for people to pursue and maintain viable livelihoods. In contexts of armed conflict, these capitals are not only unevenly distributed but also variably disrupted. Understanding how each of these assets is affected during different phases of conflict (before, during, and after) offers critical insights into household resilience, vulnerability, and recovery capacity. This section explores the ways in which the five types of livelihood capitals were impacted by the recent conflict in northeastern Ethiopia, drawing on both quantitative data and qualitative insights from community members.

2.3.2.1. Human capital

Human capital, encompassing the age of the household head, household size, education, health status, and accumulated experience is a critical asset shaping household livelihoods. Among these, education is particularly significant, as a skilled and educated workforce is a key driver of change and economic opportunity.

Prior to the conflict, approximately 58.2% of the sampled household heads were illiterate. Illiteracy was markedly higher among rural households, with 87.6% unable to read and write,

compared to just 10.2% among their urban counterparts. Education enhances the likelihood of employment and income generation, making it a crucial resource for poverty alleviation. Studies consistently underscore the importance of access to education, particularly for impoverished communities. Gender disparities in literacy were also notable: only 7.2% of female-headed households were literate. Notably, the educational status of households remained unchanged during and after the conflict.

Despite the absence of a significant shift in educational attainment, the education sector itself was severely disrupted. Schools and educational facilities were extensively damaged, with many left unrepaired. According to UNICEF (2022), more than 2,000 schools across Africa were closed over a four-year period due to security and conflict-related issues. Similarly, the conflict in northeastern Ethiopia profoundly impacted the education system. Focus Group Discussion (FGD) participants reported that nearly all children in the study area had fallen one to two years behind in their grade level compared to peers in conflict-free regions. The disruption to schools (see figure 2.1.), coupled with the psychological trauma of conflict, significantly affected children's ability to focus and engage in learning.

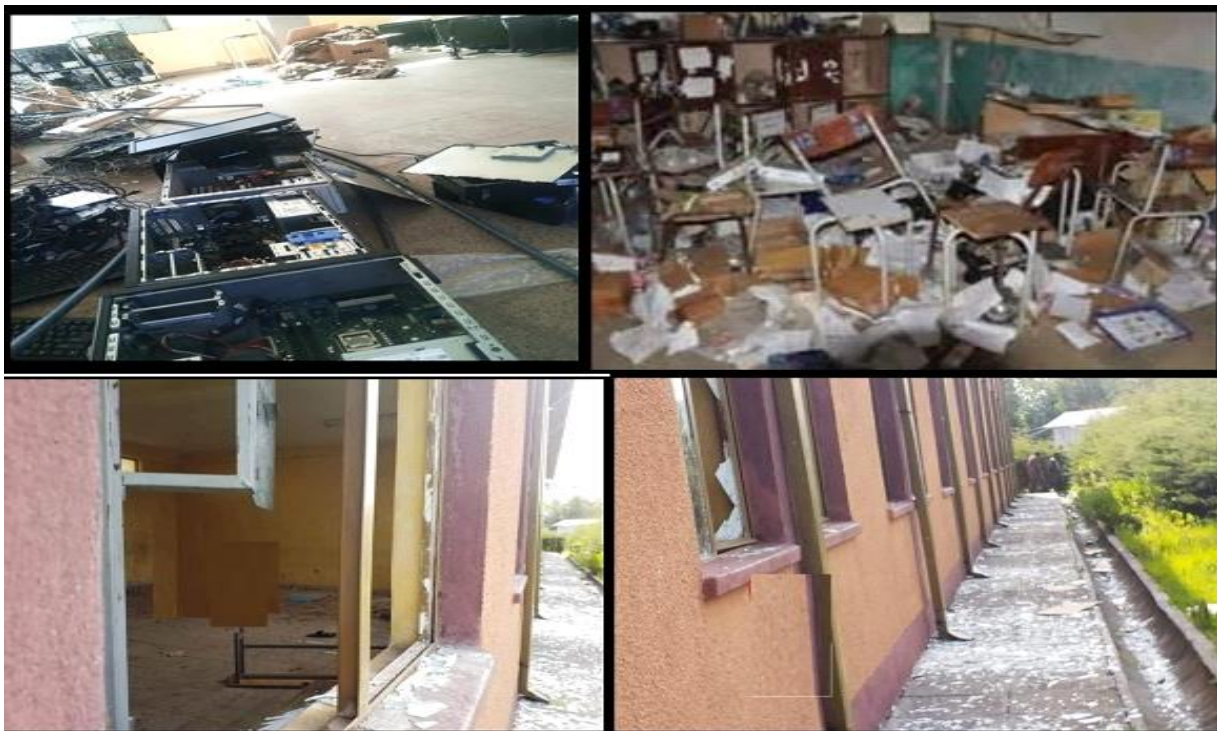


Figure 2.1. War damaged schools in kobo district (Kobo town communication office, 2023)

Health is another fundamental dimension of human capital, directly influencing the capacity of individuals to participate in income-generating activities. Illness within a household can significantly undermine its livelihood and food security. For instance, Rudolph et al. (2012), in their statistical analysis of data from Johannesburg, demonstrated a correlation between illness and food insecurity, with causality potentially operating in both directions. Batters by (2011) further emphasized that the inability of household members to contribute to income due to illness had detrimental effects on food security.

Before the conflict, 93.3% of respondents reported good health status, with no serious physical or psychological health issues among household members. Only 6.7% reported poor health, characterized by prolonged illness (over two months) and psychological challenges such as stress and anxiety. However, health conditions deteriorated significantly during and after the conflict. During the conflict period, only 60.5% of respondents reported that their household members could perform tasks efficiently and were free of serious health or psychological issues - a decline of 32.8% from the pre-conflict period. In the post-conflict period, the figure improved slightly to 79.6%, but still represented a 13.7% decrease compared to the pre-conflict baseline.

Table 2.3. Health status of household members before, during, and after Conflict

Health status of household members	Pre-Conflict (2020)	During Conflict (2021–2022)	Post-Conflict
Good health (able to perform normal activities	93.3%	60.5%	79.6%
Poor health (illness/ psychological constraints	6.7%	39.5%	20.4%

Note - Health status was measured based on respondents' self-assessment of whether household members were able to perform normal livelihood activities without major physical or psychological constraints.

FGD responses further revealed that limited access to healthcare facilities, medical personnel, and essential medicines posed major challenges during the conflict. Outbreaks of diseases such as typhoid and giardia were common, largely due to the lack of access to clean water and food. Some individuals reportedly died due to the unavailability of basic medications. Maternal and infant mortality also increased as pregnant women and newborns lacked access to adequate medical care during childbirth. Many public health facilities were looted or destroyed both deliberately and inadvertently by armed actors (see Figure 2.2).

In response, traditional medicine became widely used, and religious institutions played a significant role in supporting the mental well-being of the affected communities. Clergy and faith-based organizations provided spiritual and emotional support, which, according to FGD participants, was especially vital in helping people cope with stress and trauma during the conflict.



Figure 2.2. War damaged health facilities in kobo district. (Kobo town communication, 2023)

2.3.2.2. Physical capital

Physical capital refers to infrastructure and tangible assets that support livelihoods, including housing, durable goods (e.g., phones, televisions, refrigerators, and cookers), access to transportation, markets, and water facilities (González et al., 2010; Vincent & Cull, 2010). In the study area, market access remained universal across all three periods - before, during, and after the conflict with all respondents (100%) reporting market access. However, both the distance traveled to reach the market and household safety varied considerably over time.

Before the conflict, households traveled an average of 2.03 kilometers to reach the market. During the conflict, this increased significantly to an average of 4.8 kilometers due to road inaccessibility and safety concerns. Following the cessation of hostilities, the average distance declined to 2 kilometers. These variations were statistically significant, as confirmed by a one-way repeated measures ANOVA ($F = 369.8$, $p < .000$). FGD participants corroborated these findings, reporting that they had to travel two to three times further than usual to access markets during the conflict. The cost and risk of transporting goods also increased significantly during this period (Concern Worldwide, 2018). Participants emphasized that beyond the distance,

market trips involved substantial risk, and some households returned empty-handed due to inflated prices and unaffordability.

Shelter is one of the most vulnerable forms of physical capital in conflict zones and is often intentionally or unintentionally destroyed (Justino, 2011). For instance, during the 1994 Rwandan genocide, 12% of households lost their homes (Verpoorten, 2005), and 7% were similarly affected during the Tajikistani civil war (Shemyakina, 2011). The 2023 conflict between Israel and Hamas resulted in the destruction of approximately 45% of homes in Gaza (Al Jazeera, 2023). The conflict in northeastern Ethiopia resulted in substantial damage to housing infrastructure, significantly affecting households' physical capital (see Figure 2.3). Data from the household survey indicate that approximately 9.8% of households experienced either partial or complete destruction of their homes during the conflict period. In absolute terms, this corresponds to about 38 households within the sample, highlighting the scale of direct asset loss at the household level. Before the conflict, 80.4% of households reported owning their homes. This proportion declined sharply to 70.6% during the conflict, before recovering slightly to 77.6% in the post-conflict period. These differences were also statistically significant, as demonstrated by a one-way repeated measures ANOVA ($F = 23.49, p < .00$).

The observed decline in home ownership during the conflict can be attributed to, direct destruction of houses due to military operations, including shelling, airstrikes, and ground fighting, led to the loss of residential structures. Field observations and evidence from focus group discussions confirm widespread physical damage to housing in affected districts, including Kobo.

Although a partial recovery in home ownership is observed in the post-conflict period, the level remains below the pre-conflict baseline. This incomplete recovery reflects ongoing challenges, including limited financial capacity for reconstruction, continued insecurity in some areas, and inadequate institutional support for housing rehabilitation. Key informants also noted that reconstruction efforts have been uneven and largely dependent on household resources rather than systematic government support.



Figure 2.3. An example of a damaged house in NWE livelihood zone (Kobo town Communication Office, 2023)

Access to water, another vital physical asset was also severely disrupted. During the conflict, water sources were frequently targeted or damaged by armed actors, either as a military tactic or as collateral damage (Concern Worldwide, 2021). Prior to the conflict, households in the study area traveled an average distance of 1.1 kilometers to access clean water, indicating relatively adequate availability of nearby water sources. However, this situation deteriorated significantly during the conflict period, with the average distance increasing sharply to 5.6 kilometers. This substantial increase reflects the severe disruption of water infrastructure and services caused by the conflict. The increase in distance can be attributed to several interrelated factors. First, many water supply systems, including boreholes, hand pumps, and piped water schemes, were either physically damaged or became non-functional due to the destruction of infrastructure during military operations. Field observations conducted in affected districts, such as Gubalafto, confirmed that several water points were either destroyed or left in disrepair. Second, insecurity and restricted mobility limited households' ability to access previously available water sources. Some water points were located in areas considered unsafe due to the presence of armed actors, forcing households to avoid them and instead travel longer distances to relatively safer locations. Third, the breakdown of institutional and maintenance systems contributed to the problem. Local water management committees and government service providers were unable to operate effectively during the conflict, resulting in a lack of repair and maintenance of damaged facilities. As a result, even water points that were not directly destroyed became non-functional over time.

In the post-conflict period, the average distance to water sources declined to 1.8 kilometers, reflecting partial restoration of water infrastructure and improved access. However, this distance remains higher than the pre-conflict level, suggesting that recovery has been incomplete. Key informants indicated that while some rehabilitation efforts have been undertaken by government and non-governmental organizations, many water systems are still not fully operational. This change was statistically significant, as evidenced by a one-way repeated measures ANOVA ($F = 1322.5$, $df = 2$, $p < .000$).

Disaggregated by residence, rural households traveled longer distances for water than urban households prior to the conflict - 1.8 km versus 0.2 km, respectively. However, during the conflict, even urban residents were compelled to travel an average of 5.9 kilometers to fetch water. Key informant interviews highlighted water access as a major challenge during the conflict and an ongoing concern thereafter. This perspective was also supported by FGD participants, who noted that piped water was often available only once every 15 days even after the conflict. Field observations further confirmed the issue, with households in the NHB livelihood zone still collecting water from unsafe sources such as streams.



Figure 2.4. Households from NHB livelihood zone fetching unsafe water from river after the conflict.

Overall, the findings indicate that the increase in distance to water access during the conflict was driven by infrastructure destruction, insecurity, institutional disruption, and increased pressure on limited resources, all of which significantly constrained household access to essential services.

2.3.2.3. Social Capital

Social capital plays a critical role in fostering social cohesion, promoting economic stability, and creating the enabling environment necessary for sustainable development (Justino, 2011). Armed conflict, however, often undermines these social structures. It affects interpersonal relationships among family members, neighbors, and friends, disrupts intra- and inter-community interactions, and weakens the functioning of local institutions as well as their linkages with broader governance structures (Justino, 2011).

In the study area, various indigenous informal institutions such as religious organizations, self-help groups, small-scale credit schemes, and cooperatives serve as key sources of social capital. Locally, these institutions are known by specific names: *idir* (mutual aid associations for times of death), *mahiber* (religious and social associations centered on celebration and labor-sharing), and *equib* (community savings groups). These institutions play a critical role in providing social safety nets, resolving interpersonal disputes, and reducing vulnerability, particularly during periods of crisis. They help foster resilience by offering both emotional and material support, thereby mitigating feelings of isolation and powerlessness.

Data gathered from FGDs indicated that all these indigenous institutions, except for religious organizations became largely inactive during the conflict. Before the conflict, participation rates among sampled households in *idir*, *mahiber*, and *equib* stood at approximately 96%, 62%, and 34%, respectively. This reflects a strong tradition of community engagement and mutual assistance prior to the disruption caused by armed conflict. The findings are consistent with Twigg's (2001) observation that well-organized and socially cohesive communities are more resilient in the face of disasters than those fragmented by divisions such as race, religion, class, or caste. Communities with strong ideological bonds and a history of cooperation are more likely to support each other during crises than those with weaker social ties.

Interestingly, despite the disruption to formal and semi-formal social institutions, evidence from focus group discussions across all three livelihood zones revealed an increase in both bonding and bridging social capital during the conflict period. Participants consistently emphasized that

interpersonal relationships had strengthened considerably; family ties became closer, and mutual support among neighbors intensified. Community members reported sharing food, labor, and information, particularly in support of the most vulnerable households, even in the absence of functioning formal institutions. This finding is consistent with existing literature on social capital in crisis and conflict settings. Studies suggest that in the face of institutional breakdown and external shocks, informal social networks often become more prominent as survival mechanisms. For instance, bonding social capital, which refers to close ties among family members and homogeneous groups, tends to intensify during periods of stress and provides immediate emotional and material support (Putnam, 2000). Similarly, both bonding and bridging social capital are critical for resilience, particularly in contexts where formal institutions are weak or disrupted (Woolcock, 1998).

Empirical evidence from developing and conflict-affected settings further supports this pattern. Krishna (2002) demonstrates that informal networks play a key role in risk-sharing and mutual assistance when formal safety nets collapse. Likewise, social capital has been widely recognized as a crucial coping mechanism during crises, enabling households to mobilize resources, share risks, and adapt to adverse conditions (Twigg, 2001). In the Ethiopian context, traditional systems of mutual support such as *idir* and *equib* have long functioned as informal social protection mechanisms. Although many of these institutions were weakened during the conflict, the persistence and strengthening of interpersonal support networks observed in this study suggest that social capital is dynamic and capable of reconfiguring itself to sustain livelihoods under stress.

2.3.2.4. Natural capital

Among the various forms of natural capital, land remains a fundamental asset for rural households. According to the FAO (2011), access to land is essential for farming, often serving as a proxy for wealth, social status, and power in many regions. Dereje (2019) further emphasizes the critical role of land and natural resources in supporting rural livelihoods, arguing that while all forms of livelihood capital are important, the contributions of natural resources particularly land, water, and vegetation are especially vital for rural farming households.

In the northeastern region of Ethiopia, land continues to serve as the primary productive asset for most households. The survey revealed that 96.7% of rural households owned agricultural land. The average landholding size across the entire study area was 0.61 hectares per household.

However, this figure varied across different livelihood zones. Specifically, the average farmland size per household was 0.84 ha in the North Wollo East Plain Livelihood Zone (NWE), 0.46 ha in the North Wollo Highland Belg Livelihood Zone (NHB), and 0.4 ha in the Northeast Midland Mixed Cereal Livelihood Zone (NMC) (See Table 2.4).

Table 2.4. Land Ownership and Average Farm Size by Livelihood Zone

Variable	Category	Value
Rural household Land ownership	Own agricultural land	96.7 %
	Do not own agricultural land	3.3%
Overall average landholding size in ha	All households	0.61ha
Average landholding size in ha by livelihood zone	NWE livelihood zone	0.84 ha
	NHB livelihood zone	0.46 ha
	NMC livelihood zone	0.40 ha

One-way ANOVA results indicated that these variations were statistically significant ($df = 2$, $F = 12.8$, $p < 0.00$). Notably, the size of farmland owned by households remained largely consistent across the three reference periods (before, during, and after the conflict).

In addition to farmland, vegetation including trees and pasture represents another vital component of natural capital for rural households. These resources serve multiple purposes, including the provision of fuelwood, timber for construction, livestock shelters, fencing, furniture, and farming tools. Qualitative data obtained from FGDs, key informant interviews, and reports from the North Wollo Zone Planning and Economic Development Office highlight that forest degradation has become a serious concern, particularly in the NWE livelihood zone. The extent of deforestation was reported to have increased significantly during and after the conflict compared to the pre-conflict period. The conflict disrupted access to electricity, and fuel sources became either unavailable or prohibitively expensive. In the absence of government enforcement during the conflict, regulations on forest use were largely ignored. As a result, nearly all households resorted to using firewood and charcoal for cooking and heating, placing immense pressure on local forest resources. The widespread reliance on vegetation for fuel, combined with the breakdown of institutional controls, has had a detrimental impact on the region's natural resource base. This underscores the vulnerability of natural capital in conflict-affected settings

and highlights the need for post-conflict environmental restoration and improved resource governance mechanisms.

2.3.2.5. Financial capital

Financial capital comprises the resources that enable individuals and households to pursue various livelihood strategies. According to Kollmair and St. Gamper (2002), financial capital includes both available stocks such as cash, bank deposits, livestock, and jewelry and regular income flows from wages, pensions, remittances, or state transfers.

In the study area, primary income sources included agricultural activities (such as crop and livestock production, beekeeping, and cash crop cultivation), government and non-government employment, remittances, and both non-farm and off-farm activities. As shown in Table 2.5, the average annual income per household prior to the conflict was 47,196.5 ETB. During the conflict, however, the average household income dropped by more than half, declining to 24,002.3 ETB. Following the conflict, income levels showed some recovery, with the average annual income reaching 41,298.3 ETB per household. The one-way repeated measures ANOVA confirmed that these differences in mean annual income across the three time periods were statistically significant ($df = 2$, $F = 127.17$, $p < 0.00$).

Table.2.5. Average annual income households earned in the three time periods in Ethiopian Birr

Rural households livelihoods	Mean annual income		
	Before	During	After
Crop production	28441.2	12797.8	21523.7
Livestock rearing	4257.6	1969.5	3259.8
Remittance	1970.1	962.6	2836.9
On/off farm	2379	310.6	1806.8
Total annual mean income	37047.9	16040.5	29427.2
Urban households livelihoods			
Gov't job	47699.5	27292.7	47040.6
Daily labor	2541	2646	2124
Small business	1535.3	391.3	1060
Remittances	2395.9	795.9	3823.4
Total annual mean income	54171.7	31125.9	54048

Differences in income levels and livelihood strategies were observed between rural and urban households. Prior to the conflict, rural households had an average annual income of 37,047.9 ETB, while urban households earned significantly more - an average of 54,171.7 ETB. During the conflict, incomes declined sharply for both groups, with rural households earning an average of 16,040.5 ETB and urban households' 31,125.9.7 ETB. Post-conflict figures show improvement: rural households' incomes rose to 29,427.2 ETB and urban households to 54048 ETB.

The differences in income levels across the three periods were statistically significant for both rural and urban households. Repeated measures ANOVA results for rural households confirmed a significant difference in mean income across the three timeframes ($df = 2$, $F = 290.48$, $p < 0.00$). Similarly, the results were significant for urban households ($df = 2$, $F = 85.27$, $p < 0.00$). For rural households, agricultural activities accounted for the majority of income in all three time periods, although the absolute amounts varied greatly due to the conflict's impact. In contrast, for urban households, the largest share of annual income in each time period came from salaried government employment.

2.4. Severity Ranking of Livelihood Assets

The analysis revealed that conflict affected all livelihood asset categories, although the magnitude of impact varied considerably. Physical capital recorded the highest severity index (4.52), indicating severe damage to houses, farm equipment, roads, market infrastructure, schools, health facilities, and water systems. Financial capital was the second most affected asset category, with a severity index of 4.18, reflecting substantial losses of livestock, savings, income sources, and access to financial services. Human capital ranked third, primarily due to displacement, loss of labor, disruption of education, and reduced access to healthcare services.

Table 2.6. Composite Severity Index and Ranking of Livelihood Assets

Livelihood Asset Category	Number of Indicators	Composite Severity Index (CSI)	Severity Level	Rank
Physical Capital	8	4.48	Severely Affected	1
Financial Capital	7	4.15	Highly Affected	2
Human Capital	6	3.89	Highly Affected	3
Social Capital	5	3.54	Highly Affected	4
Natural Capital	5	3.21	Moderately Affected	5

The findings demonstrate that physical and financial capitals were the most severely affected livelihood assets. The destruction of productive infrastructure and economic resources substantially reduced households' ability to pursue livelihood activities, generate income, and access food. Human capital was also significantly affected through displacement, injury, and disruption of education and health services. The relatively lower severity observed for natural and social capitals suggests that although these assets were adversely affected, they experienced less direct destruction than physical and financial assets. Overall, the findings indicate that conflict undermined household food security primarily through the degradation of physical, financial, and human capital assets.

2.4. Conclusion and Policy Implications

2.4.1. Conclusion

The conflict had far-reaching and multi-dimensional effects on household livelihood assets in the northeastern region of Ethiopia. The most critical disruptions occurred in physical and financial capital, directly affecting daily survival, economic activity, and long-term development prospects. Natural capital degradation emerged as a pressing issue due to increased dependence on forest resources, while social capital proved to be both fragile and resilient, formal networks weakened, but interpersonal relations intensified. Although land ownership remained largely stable, the quality and accessibility of surrounding resources were heavily impacted.

Overall, the findings highlight the importance of conflict-sensitive recovery and development strategies that strengthen all five capital types in a complementary manner. Rebuilding infrastructure, revitalizing local institutions, restoring natural resources, diversifying income sources, and investing in human capital are essential to enhancing household resilience and achieving sustainable livelihoods in post-conflict settings.

2.4.2. Policy implication

The findings of this study offer several key policy insights for designing targeted interventions in conflict-affected regions, particularly in northeastern Ethiopia:

1. **Integrated asset-based recovery:** given the multidimensional impact of conflict on the five core livelihood capitals, post-conflict recovery strategies must adopt a holistic, asset-based approach. Infrastructure rehabilitation (physical capital), revitalization of education and health services (human capital), and ecosystem restoration (natural capital) should be implemented in tandem.

2. **Rural - urban policy differentiation:** The study underscores significant disparities in asset damage and recovery trajectories between rural and urban households. Tailored support is needed such as agricultural subsidies and input access for rural households, and small enterprise recovery support for urban dwellers.
3. **Revitalizing indigenous institutions:** The breakdown of informal institutions (e.g., *idir*, *equib*, and *mahiber*) during conflict suggests a need for policy frameworks that integrate and support these community-based systems within formal governance and social protection mechanisms.
4. **Social capital as a resilience lever:** Strengthened interpersonal ties during the conflict period highlight the potential of bonding and bridging social capital as a coping and resilience strategy. Policymakers should recognize and enhance these networks through community-driven development and psychosocial support programs.
5. **Environmental resource governance:** The unsustainable use of forest resources due to weakened enforcement during the conflict calls for urgent reforestation programs, fuel alternatives (e.g., solar or biogas), and renewed local environmental governance structures to curb natural capital depletion.
6. **Conflict-sensitive livelihood planning:** Humanitarian and development actors should incorporate conflict-sensitive planning tools to prevent the aggravation of existing vulnerabilities. Early recovery programming should be localized, inclusive, and gender-responsive, addressing disparities in literacy, income, and health.

CHAPTER THREE

3. Household Livelihood Strategies and Outcomes in Conflict Affected Areas of Northeastern Ethiopia

Abstract

This study examines household livelihood strategies and outcomes in conflict areas of northeastern Ethiopia. One way Analysis of Variance and linear regression models were used to analyze data. The findings revealed that crop incomes of rural households found decreasing by 47% during the conflict compared to peace times. Income from small-scale employment of households had also decreased by >74% from the pre-conflict period. The regression result found that sensitivity to conflict significantly and negatively affected households' livelihood incomes. Governments and battling factions are advised to avoid armed clashes, minimize human sufferings and losses of livelihood assets, strategies and outcomes.

KEYWORDS: Conflict; Ethiopia; Household income; Livelihood outcome; Livelihood strategy; Livelihood zone

3.1. Introduction

Conflicts are clashes arising among people, between community groups, countries, political parties, governments, and/or between regions over the control of political power and livelihood resources (Brown & Keating, 2015). They emanate when the needs and interests of people or communities/groups are not met and when the priorities and demands of people are mistreated by governments (Matiru & Castro, 2000).

Nowadays, conflict remains a major driver of poverty and it is on the rise in the developing countries in general, and in Africa in particular (Shemyakina, 2022; Kibrom.et.al 2023). It is predicted that by 2030, 68% of all extremely poor people will live in the conflict affected regions. The predicted figure shows a 20% increment from the 2018 level (Corral et al., 2020).

Recently, Ethiopia, as part of this rising trend in political instability and war, experienced a massive scale destructive conflict. Because of the onset of the coronavirus pandemic, the parliamentary election in Ethiopia which was scheduled to be held in 2020 was delayed and the term of the prime minister was extended. In response, the Tigray region defied the federal government by holding its own regional elections. In November 2020, military assault against Tigray was ordered in response to an alleged attack on federal army camps, marking the start of the civil war in Ethiopia. Conflict has played out and stayed long in most parts of Amhara region; mainly in North Wollo Zone where this study focused on.

Expanded and volatile conflicts in northeastern Ethiopia significantly killed and injured people, disrupted livelihood assets and activities, driving displacement and limited humanitarian access. Armed conflicts incur economic, social, psychological, and other types of costs on a household (Guidolin & La Ferrara, 2010). Conflicts carry various direct and indirect, as well as intended and unintended impacts that strongly affect the living conditions of households at the time of the conflict and for many years thereafter. Civil wars and violent revolutions kill and injure millions of people every year (Justino, 2011a); mainly in less developed countries. Similarly, FAO and WFP (2021) noted that conflict can impose an overwhelming influence on communities' livelihoods through disturbing markets and supply chains, killing livestock and burning of fields, or when the chief producers of food are killed or involved in battle, destroying infrastructure.

Most of the countries affected by armed conflicts are the least developed with some 60% of the population living in rural areas (FAO, 2017). Ethiopia, as part of sub-Saharan Africa (SSA),

appears to equally facing a serious of economic risks and downturns due to incessant armed conflicts. The continuous conflict in the country is currently worsening the livelihood of both rural and urban poor.

The occurrence of armed conflict in the northeastern districts of the country is also expected to further upsurge both the economic and social insecurity of the households further. The conflict in the area, in general, is deteriorating the socioeconomic situation of the households. This has a significant effect on the livelihood assets, strategies, and outcomes of households, and can further impact the food security status of the households in Ethiopia overall.

Although the conflict imposed a negative impact on the livelihood asset, strategies and outcomes on households in the area, only few studies (e.g. Nyssen et al., 2021; GEOGLAM, 2022; Tedla et al., 2023; Kibrom et.al 2023) attempted to address the issues. However, none of the aforementioned studies addressed the impact of conflict on households' livelihoods both at the rural and urban areas. They only tried to address the impact on rural households. Hence, studies on the status of livelihood strategies and livelihood strategy outcomes in the conflict areas of northeastern Ethiopia both in the rural and urban areas are scarce and missing in the reviewed studies. Therefore, this study makes an important addition to the literature regarding livelihood strategies and its outcomes in the conflict context. Additionally, studies on the issue of livelihood strategies and their outcomes in the context of conflict facilitate the identification of important strategies to be implemented by the government and communities for the improvement of livelihood outcomes in conflicting areas. Thus, the study has practical significance for designing more targeted and effective food security-related development interventions in the study area.

The study investigated livelihood strategies and livelihood strategy outcomes of households in the conflict areas of northeastern Ethiopia. Specifically it: (i) examine the livelihood strategies employed by households before, during, and after the conflict in the conflict areas; (ii) evaluate the livelihood strategy outcomes as measured by annual total incomes in the three time periods; and (iii) explore determinants of livelihood outcomes of households in the conflict areas as measured by annual total incomes.

3.2. Materials and Methods

Data collected through the structured questionnaire were analyzed using descriptive statistics, analysis of variance (one-way and repeated measures of ANOVA), and a linear regression model. A one-way repeated measure of ANOVA was used to determine the mean annual income difference of households (the variation of the income earned by households from the different livelihood strategies during the three time periods). One-way ANOVA was employed to examine whether there is a significant difference in the mean of the households' annual income among the three livelihood zones. A multiple linear regression model was also used to identify significant factors influencing household annual incomes in the study areas. Total household annual income was taken as a proxy for livelihood outcome, and hence, the dependent variable for the regression modelling. Various studies on the determinants of households' livelihood outcomes (Tasie et al. 2012; Arega et al. 2013; Obike et al. 2016) considered only biophysical, socioeconomic, and institutional factors. However, this study included the political factor as an additional determinant.

Most of the explanatory variables (see Table 3.1) used in the regression model were obtained from the empirical study literature (Obike et al. 2011; Ahmed 2012; Tasie et al. 2012; Arega et al. 2013; Swesi 2019). In the regression model, the results of unstandardized coefficients indicate how much the dependent variable varies with an independent variable when all other independent variables are held constant. The regression coefficient indicates the expected change in the target variable (here: household mean annual income) for a unit increase in the independent variable. On the other hand, standardized coefficients measure how much the criterion variable increases when the predictor variable is increased by one standard deviation, assuming that other variables in the model are held constant.

The information gathered through the key informant interviews and FGDs was concurrently analyzed contextually to authenticate and complement the quantitative results from the structured questionnaire.

Table 3.1. Household livelihood outcome determinant variables

Variables	Type	Definition	Direction of influence
Age	Continuous	Age of household (hh) head	-
Education	Dummy	Literate = 1 and illiterate = 0	+
Family size	Number	Number of household members	+
Farmland size	Continuous	Farm size in hectare (ha)	+
Credit	Dummy	Accessed credit = 1 otherwise 0	+
Social organizations	Dummy	Membership in <i>Equib</i> (1), otherwise (0)	+
Loss of asset by conflict/death, injury	Dummy	If asset loss = 1 otherwise, 0	—
Having own house	Dummy	Having house = 1 otherwise 0	+
Livestock ownership	Continuous	Number of livestock in TLU	+
Agricultural subsidy	Dummy	Access to subsidy = 1 otherwise 0	+
Off/non-farm engagement	Dummy	Engaged = 1 otherwise 0	+

Note: TLU refers to Tropical Livestock Unit

3.3. Results and Discussion

3.3.1. Livelihood strategies of the sampled households

The livelihood strategies of the studied households are not similar in urban and rural contexts. Therefore, the study results are thus separately presented through the ongoing paragraphs.

3.3.1.1. Rural households' livelihood strategies

Crop production, rising livestock, off-farm/non-farm employment and remittance are the main strategies used by rural households to satisfy livelihood needs of their families. Each of these strategies is discussed in the following paragraphs.

3.3.1.1.1. Crop production

In the Ethiopian highlands, including the Amhara region, mixed crop-livestock farming is the dominant livelihood strategy, with crops as the primary source of livelihood, followed by livestock. Crop production is the main source of livelihood for the majority (96.3%) of the rural households sampled in the study area. Although various types of crops are grown in Ethiopia, five major cereal crops: *teff*, maize, wheat, sorghum, and barley, accounted for three-quarters of the total cultivated area and 68% of the total production (Chamberlin & Schmidt, 2012). *Teff*,

maize, wheat, sorghum, barley, beans (*Phaseolus vulgaris*), pea (*Pisum sativum*), and chickpeas (*Cicer arietinum*) likewise accounted for the largest share in the study livelihood zones.

The type of climate each district experiences determines the major crops grown in the region. Hence, in the study districts, the amount and type of crops grown appear to vary within the livelihood zones. For example, *teff*, maize, and sorghum are the most dominant crops grown in the NWE livelihood zone. Wheat, barley, and beans are the common crops grown in the NMC livelihood zone. On the other hand, maize, wheat, and *teff* crops grow largely in the NHB livelihood zone (Table 3.2).

Although agriculture in general and crop production in particular is influenced by various environmental factors, the influence of conflict on agriculture is also immense. For instance, the level of crop production in the study area was lower at the time of conflict and even after the conflict (624.2 and 1035.5 quintals, respectively) as compared to the pre-conflict period production amount (which was ≈ 1374 quintals) (Table 3.2). The study districts were also impacted by both direct and indirect effects of the conflict beginning from the onset of the conflict in November 2020. The direct effects included attacks on crop production (restricted access to crop fields & yield reductions); transportation blockages, destruction of agricultural tools, killing of human power, burning and pillaging of crops by armed groups. The indirect consequences were also displacement, field abandonment, market disruption, economic downturn, and input shortage. The estimated yearly crop produced at the time of the conflict in the study areas was generally lower than the peace period production amount by over 54% (Table 3.2).

Table 3.2.Average annual crop production (in quintals) during the three time periods by Livelihood Zone

Crop type	Before conflict				% of	During conflict				% of	After conflict				% of
	NWE	NHB	NMC	Total	total	NWE	NHB	NMC	Total	total	NWE	NHB	NMC	Total	total
Teff	78.4	45	6.7	130.1	9.8	33.9	22.7	3.3	59.9	9.6	49.8	36.4	5.1	91.3	8.8
Sorghum	150.3	36.9	7.8	195	14.2	55.1	16.9	4.7	76.7	12.3	89	28.6	6.6	124.2	12
wheat	30.8	42	77.7	150.5	11	8.7	18.8	38.5	66	10.6	26.7	34.3	57	118	11.3
Barley	2.5	35.8	62.6	100.9	7.2	.7	17.6	30.8	49.2	7.9	1.7	28.6	47.1	77.4	7.5
Maize	109.6	39.8	7.4	156.8	11.4	46	19.3	3.7	69.2	11	70.8	30.4	6.2	107.4	10.4
Beans	16	37	59	112	8.2	7.4	16.1	26	49.5	7.9	13.4	29.1	44.6	87.1	8.4
Pea	16.6	35.5	32.4	84.5	6	6.4	14.6	15.7	36.8	5.9	17.2	27.4	27.1	71.7	7
Chickpea	37.8	30	33.4	101.2	7.4	23.2	13	16.3	52.9	8.5	30.15	24	27.3	81.5	7.9
Sugarcane	15	85	-	100	7.3	5	40	-	45	7.2	12	76	-	88	8.5
Water melon	100	-	-	100	7.2	50	-	-	50	8	78	-	-	78	7.5
Onion	90	-	15	105	7.6	38	-	11	49	7.9	70	-	11	81	7.8
Mango	15	23	-	38	2.7	10	10	-	20	3.2	12	18	-	30	2.9
Total	662	410	302	1374	100	284.4	189	150	624.2	100	470.7	332.8	232	1035.5	100
% of total	48.1	29.9	22	100		45.6	30.3	24.1	100		45.5	32.1	22.4	100	

Note: NWE - North Wollo East Plain Livelihood Zone; NHB - North Wollo Highland Belg Livelihood Zone; NMC - Northeast Midland Mixed Cereal Livelihood zone

FGD participants also described how the conflict affected the production amount in the study area. About these scenarios, one FGD participant in the NWE livelihood zone, for instance, narrated his experience as follows:

At a time when we were ready to harvest our production, there was active fighting in the area. The conditions highly restricted us from harvesting our products and left our products to be looted and burned. I produced perishable products such as onions, tomatoes, potatoes, and watermelons which require to be harvested and get into the market timely. However, active fighting completely restricted me not to harvest the product and blocked the market access. As a result, almost all of the tomato and onion products were decayed, and I was not able to get even a fraction of cents from it.

The conflict has affected agricultural production not only at the time of the conflict but also thereafter. As noted by key informants, households were not able to access agricultural inputs like artificial fertilizers, best seeds, and insecticides in the aftermath of the conflict. This is mainly because the federal and regional governments had other priorities, such as keeping the peace, and they had few funds to invest. They pay due attention on political issues rather than providing agricultural inputs to farmers. As a result, crop production after the conflict was lower than that before the conflict period. The amount of production after the conflict was 24.6% lower than the production amounts before the conflict (Table 3.2) Indicating the ongoing impact of the conflict on crop production. A one-way repeated measures ANOVA was tested to see the differences in the mean annual crop production within the three time periods. Accordingly, the result from the repeated measure one-way ANOVA proved that there was a statistically significant difference in the mean of annual crop production within the three time periods ($df = 2$, $F = 169.032$, $P < 0.00$). This is perhaps expected when the conflict is held in agricultural economy-led countries because it always swallows substantial costs during the conflict, and improves when peace returns.

On the other hand, the decline in crop production led to a decline in income households earned from it. As indicated in Figure 3.1, household income from crop production found to vary within the three time periods assessed. Before the conflict, the average estimated annual income from crop production was ETB 28441.2 per household (hh^{-1}). However, due to the conflict in the area and various interconnected factors, this income has reduced to ETB12797.8 and 21523.7 hh^{-1} , respectively (Figure 3.1) during and after the conflict. This indicates a 47% income variation between peace and conflict times.

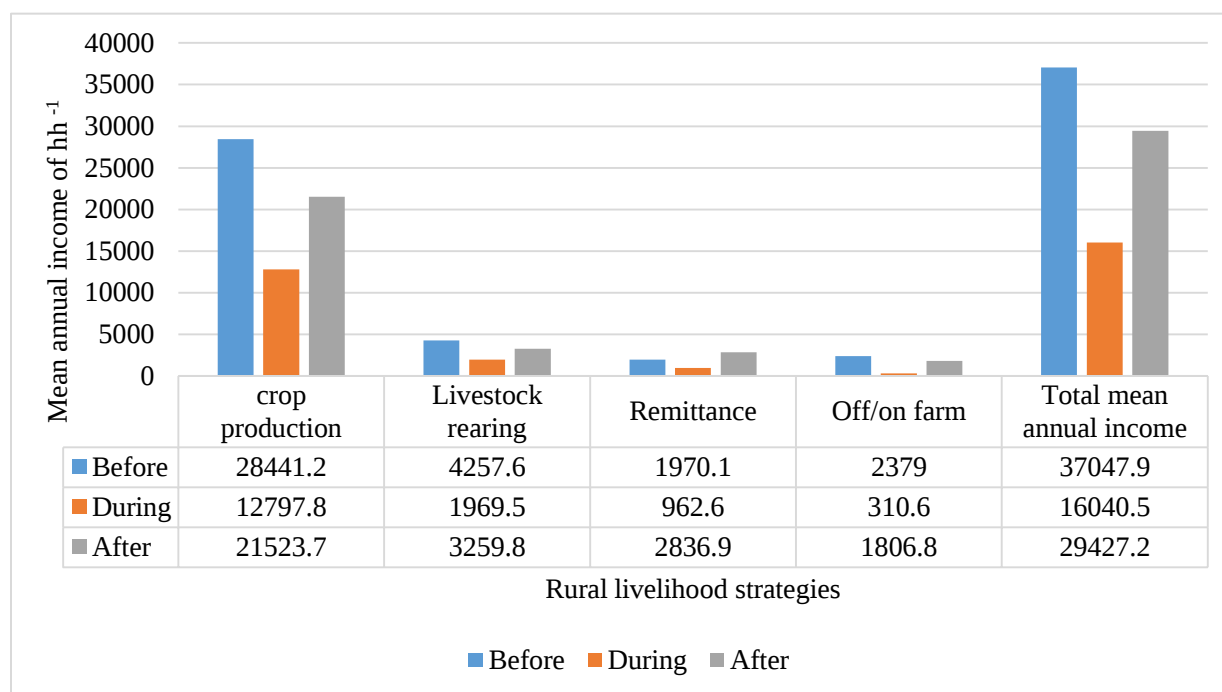


Figure 3.1. Average annual income of rural households from different livelihood sources in three time periods (ETB hh⁻¹)

Note: One United States Dollar (1USD was ETB55 during the survey time)

Repeated measures of one-way ANOVA confirmed a significant difference ($df = 2$, $F = 268.043$, $P < 0.00$) in income generated from crop production within the three-time periods. The statistical result shows that households' income from crop production varied during the three time periods. The conflict in the area smashed the production amount and household income from it and created a clear variation in income of households in the three time periods. This directly affected production amount in the area. It affected agricultural activities and exposed the product to be looted. The active fighting restricted farmers from harvesting and prevented them from accessing agricultural inputs. In addition, the conflict limited the access to markets. It has hindered rural households not to sell their products freely. Hence, the reduction in production affected households' income.

The mean income from crop production has also shown variation within the three livelihood zones. Before the onset of the conflict, households in the NHB livelihood zone earned the highest mean annual income from crop production (ETB33470.7 hh⁻¹) followed by NWE (ETB29173.5 hh⁻¹) and NMC (ETB22505.5 hh⁻¹) livelihood zones (Table 3.3). One-way ANOVA result also confirmed that, before the onset of the conflict, there was a statistically significant

difference in mean income from crop production among the three livelihood zones ($df = 2$, $F = 3.381$, $P < 0.036$). The statistically significant difference in the mean annual income of households is probably due to the chance of access to irrigation in two of the studied livelihood zones. Households in the NWE and NHB livelihood zones have good access to irrigation, which helps them grow cash crops and earn an income from it. This was a reason for the difference in income earned among the households in the three livelihood zones before the conflict. Cash crops like sugarcane (*Saccharum officinarum*), watermelon (*Citrullus lanatus*), papaya (*Carica papaya*), avocado (*Persea americana*), and mango (*Mangifera indica*) are grown and are good sources of income for households in the NHB and NWE livelihood zones.

Table 3.3. Summary of rural and urban households' livelihood strategies and livelihood strategy outcomes by time periods and livelihood zones

Time period	LLZ	Rural households Livelihood strategies and mean annual income from them in Birr							
			Mean annual income		Mean annual income		Mean annual income		Mean annual income
Before conflict	NWE	Crop production	29173.5	Livestock	2481	Off/ non-farm	3710.6	Remittanc e	2504.7
	NHB		33470.7		3228.7		863.3		2328.7
	NMC		22505.5		7971		805.7		1778
During conflict	NWE	Crop production	12457.3	Livestock	863.3	Off/ non-farm	432	Remittanc e	566
	NHB		14954.9		1226.5		310.7		2090.9
	NMC		11257.6		4379.4		123.9		492.8
After conflict	NWE	Crop production	20906.4	Livestock	1701.6	Off/ non-farm	2756.5	Remittanc e	3694.3
	NHB		26450.5		2300.4		589.2		2886.3
	NMC		17759.4		6571.3		1512.6		1472.5
Urban households Livelihood strategies and mean annual income from them in Birr									
Before conflict	NWE	Daily wage labor	1503	Small business	1781.9	Governme nt employee	66132	Remittanc e	2908
	NHB		1654		1458		28976		2821.6
	NMC		4502.6		1286		38890.7		1436.7
During conflict	NWE	Daily wage labor	1391	Small business	431.6	Governme nt employee	48786.6	Remittanc e	245.9
	NHB		232.9		391.8		12697		405
	NMC		6030.6		340		11556		1775.5
After conflict	NWE	Daily wage labor	1353.7	Small business	1210.4	Governme nt employee	66132	Remittanc e	5663.9
	NHB		1137.8		993		26358.8		4494.5
	NMC		3827.7		923		38890.7		1025.5

Note: LLZ – Livelihood zone; NWE - North Wollo East Plain Livelihood Zone; NHB - North Wollo Highland Belg Livelihood Zone; NMC - Northeast Midland Mixed Cereal Livelihood zone.

During the conflict, the total annual income from crop production was drastically declining in all of the three livelihood zones. Accordingly, households in the NHB, NWE, and NMC livelihood zones earned an average yearly income of ETB14955, 12457.3 and 11257.6 hh⁻¹, respectively (Table 3.3). Although there was a difference in income within the livelihood zones during this period, the one-way ANOVA statistical result found not significant.

After the conflict, as compared with the conflict period, in all the three livelihood zones, a yearly estimated average income from crop production showed improvements. The average yearly estimated income of households in the NWE livelihood zone was ETB20906.4 hh⁻¹, whereas households from NHB and NMC livelihood zones earned an estimated income of ETB 26450.6 and ETB 17759.4 hh⁻¹, respectively (Table 3.3). One-way ANOVA result also confirmed a statistically significant difference (df =2, F= 23.17 at p < 0.00) in the mean of income from crop production among the three livelihood zones.

The foregoing empirical findings show that one of the principal livelihood assets (crop income) of the rural households was declining both during and after conflict in the study areas, compared to the peace times. This implies that the crop production agricultural sector was affected by the conflict both directly and indirectly. Comparative results were similarly reported by previous studies for comparable parts of the world. Analogous production declines due to disruption and demolition of farm production and agricultural land abandonment were, for instance, reported by Verpoorten (2009), Blattman & Miguel (2010), Rockmore (2020), Nillesen (2016), Yin et al. (2019), and Dago (2021). FAO (2003) similarly studied per capita food production for 14 countries from different parts of the world, comparing years with and without violent conflict. The study found that in 13 countries, food production was lower during war times with declines ranging from 3.4% in Kenya to over 44% in Angola. FAO (2017) moreover highlighted that several conflicts are fought in rural areas and target fruitful agricultural assets such as infrastructure, land, and livestock. The same source (FAO, 2017) further remarked that the economic impact of conflict on the agricultural sector is extremely substantial.

In general, crop production, a major source of income for rural households declined both at the time and after the time of conflict. Income from it also declined after the conflict, from the peace period income indicating that the conflict affected the crop production not only at the time of the conflict but also then after. It affected the sector both directly and indirectly. Hence, specific

mitigation measures focusing on the improvements of crop production in the conflict affected situation is required in the study areas.

3.3.1.1.2. Livestock production

Almost all the sampled households in the study area practice mixed farming. Livestock keeping is the secondary crucial complement activity to cropping. It is considered the most vibrant physical asset that plays a vital role in protecting households from any crisis during crop failure. Although it plays a protecting role from crises during crop failures, the human-driven conflict in the area has brutally affected households' livestock assets. Before the conflict, the mean TLU was 5.06 hh⁻¹. However, during the conflict and post conflict time, it decreased to 3.75 and 3.55 hh⁻¹, respectively (Figure 4.3). FGD participants confirmed that sheep, goats, and chickens were deliberately slaughtered and consumed by the combatants.

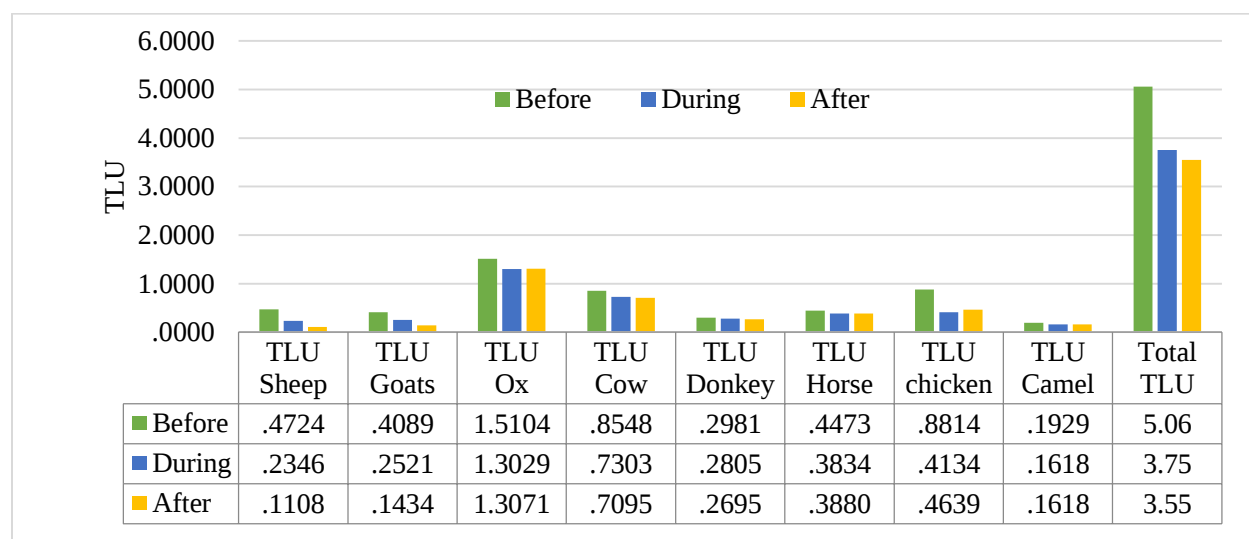


Figure 3.2. Tropical livestock units (TLU) held by the rural households in time periods

The survey data also demonstrated the prevalence of great variation in the mean TLU of sheep, goats and chicken owned by households before and during the conflict periods. The mean TLUs of the sheep, goats, and chicken were 0.47, 0.4, and 0.88 respectively before the conflict. However, the mean TLU of the sheep, goats, and chickens decreased by a mean of 0.24, 0.15, and 0.467 TLU, respectively from the peacetime (Figure 3.2). A study conducted by Swesi (2019) noted that households' ownership of sheep, goats, and poultry had decreased by a mean of 0.29, 0.21, and 0.13 TLU, respectively, from the peacetime during the conflict in Libya. FAO (2003) in its report stated that the armed conflict in Bosnia and Herzegovina highly affected the livestock sector. The report further noted that the total number of farm animals was reduced by

half at the time of the war. Due to the conflict between 1991 and 1995, the number of cattle, sheep, pigs, horses, and poultry dropped by 60, 75, 90, 65, and 68%, respectively. Similar conditions have been reported in Burundi by Verwimp (2012). This author noted that the average number of TLU hh^{-1} dropped from 2.37 before the war to 0.42 in 2001. Looting, forced displacement, disease, and distress sales contributed to this unprecedented loss in Burundi's physical asset holdings, according to this author. A report from Tedla et al. (2023) also disclosed the loss of 2,487,047 cattle, 1,690,096 sheep, 3,803,860 goats, 610,976 donkeys, 4,280,815 poultry, and 231,985 beehives in Tigray, Ethiopia during the 2020-2022 conflict. Similar to the aforementioned studies, looting, forced displacement, distress sales, and illegal slaughter are the major reasons for the decline of TLU in the study area during and after the conflict.

Referring to Figures 3.1 and Table 3.3, it is possible to note that the annual mean incomes of the sample households from the livestock sector tend to vary within the three time periods and livelihood zones of the study areas. The annual mean livestock income households earned before, during, and after the conflict were ETB4257.6, 1969.5, and 3259.8 hh^{-1} , respectively (Figure 3.1). Repeated one-way ANOVA was also made to see the statistical difference in the mean of TLU within the three time periods. Accordingly, a statistically significant difference was observed in the total mean TLU within the three time periods ($df = 1$, $F = 35.751$, $P < 0.00$). Such a statistically significant difference in mean annual income within the three time period is probably because of distress sell of animals due to fear of looting by the combatants, illegal slaughtering by warring groups; death of animals due to blockage of veterinary services; and blockage of markets to sell them freely. One of the FGD participants from the NWE livelihood zone confirmed this statement:

At the time of the conflict, income I earned from selling animals and their products was very low. At the time, animals, particularly sheep, goats, poultry, and animal products like eggs, milk, butter, and others were deliberately taken by the combatants. Seven of my sheep and goats were taken by the combatants. Additionally, I and my family were in serious need of food and other facilities. But I didn't have enough cash to meet the immediate needs of my family. Hence, I was forced to sell the remaining sheep and goats at a very cheap price.

Income from the livestock sector also varied within the livelihood zones. Before the conflict, households in the NMC livelihood zone earned the highest annual mean income (ETB7971) from selling of animals and their products. This was followed by the NHB (ETB3228.7) and NWE (ETB2481.1) livelihood zones (Table 3.3). The variation in income within the three

livelihood zones before the conflict was probably because most households in the NMC livelihood zone were rearing livestock for market purposes. In contrast, households in the other two livelihood zones were keeping livestock for drought power and other household consumption purposes.

During the conflict, households in the NMC, NHB, and NWE livelihood zones earned mean annual incomes of ETB4379.4, 1226.5, and 863.3, respectively (Table 3.3). The conflict has seriously restricted market flow. The cost of selling animals and their products was low. The distress sales of animals were high. These conflict-related factors were responsible for the decline of income from the sector in the three livelihood zones during the conflict.



Figure 3.3. Overview of livelihood assets destroyed during the war A) Damaged bridge at Alwuha near Kobo town, a bridge connecting Kobo town with Woldia (Kobo town Communication Office, 2023); B) Households from Gedober KA fetching unsafe water from a nearby stream due to destruction of pipe water during the conflict; C) Cattle killed during the conflict in the Enjafat KA (NMC livelihood zone) (Lasta District Communication Office, 2023).

After the conflict, household income from livestock was better than the conflict period income due to accessibility to a free market. However, things are worse than before. An FGD participant narrated the experience as follows:

After the conflict, in our district, the cost of everything increased significantly. Food and food products have become very expensive. I and my family were unable to get cash money to fulfill our needs. Additionally, my wife was eight months pregnant. I was really in need of cash. As a result, I was forced to sell the remaining goats and sheep to manage the conflict induced economic problems.

Similar to crop production, household livestock holdings, and income from it show great variations during the three time periods. Killing of livestock, illegal slaughtering, looting, or starved on an immense scale across all livelihood zones (see Figure 3.3 (C)) were the main reason for the decline in TLU. Targeted killing and unauthorized slaughter of animals by the combatants were common incidents. There were forced displacements and migration of people with their live animals. Shortages of veterinary medicine and other professionals were among the bottle-necks as confirmed by the key informants. In some areas, animals were left unattended (suffered from lack of food, and water, and even were eaten by predators) following the runaway of farmers to escape the fighting. All the aforementioned conflict-related factors together led the decline of TLU and the income that households earned from it in the study area. Almost all households in the study area now own low average herd sizes of livestock.

3.3.1.1.3. Remittance

Remittance remains an imperative and stable source of private inflows to developing countries (Wolde, 2018). It plays a vital role in supporting households in addressing their immediate needs and also invest in the future. In the study livelihood zones, a substantial number of people ($\approx 22\%$ of the rural households) virtually depend on remittance flows. These households receive an average annual estimated income of ETB1970.1 (Figure 3.1) from family members living abroad. This implies that the sources of remittances for these households were mainly originated from foreign countries. Most of them also have one or more family members living abroad. This is expected because the study area (North Wollo Zone) is one of the most migrant-sending areas in the Amhara National Regional State (Wolde, 2018).

However, remittance flows were not similar across the three time periods and livelihood zones of the study area (See Figure 3.1 and Table 3.3). The flows differed significantly within the three time periods ($F = 29.45$, $p < 0.00$) as to the results of the repeated measure of one-way ANOVA. Such differences in mean annual income from remittance were mainly due to the impact of the conflict in the area. Because of the conflict almost all financial systems like banking, micro finance services and electronic financial services were completely ceased working. All communication services are blocked. Households from abroad failed to communicate and send some cash to their families. Hence, remittances from abroad during the conflict period were very low. On the other hand, after the cease-of-fire, remittance flows were high and were even much higher than that earned before the conflict (Figure 3.1). This is because households in conflict

zones face disruptions in local economies, lost their livelihoods and increased living costs due to instability. This pushed those abroad to send more money to support their loved ones during these difficult times. One of the FGD participants in the NMC livelihood zone confirmed this statement:

Immediately after the restoration of peace, communication channels, banks, and other financial services were gradually improved. Subsequently, my son from America called me to collect money. He was highly stressed and said; my son and family did not meet for about six months. He asked me everything about the situation and the entire family. He did not even believe that I was talking to him. He advised me not to be worried about our destroyed and looted materials. He finally told me that, he has sent me ETB25, 000 for now; which is five times higher than the previous monthly sent amount.

As indicated by focus group participant, everything in the area was blocked during the conflict time. No communication channels, banks or other financial service facilities to access the remittance. As a result, the annual estimated mean income from remittance was somewhat low during the conflict period ($\approx$ ETB566 hh^{-1} in the NWE, ETB2091 hh^{-1} in the NHB and ETB493 hh^{-1} in the NMC livelihood zones) (Table 3.3). These financial flows appear to be lower than those received by households before and after the conflict. This indicates that conflict, as a quick-onset disaster greatly affected the remittance flow in the study livelihood zones. Prior to the conflict, remittance flows were about ETB2505, 2329 and 806 in the NWE, NHB and NMC livelihood zones, respectively. Such differences in income from remittance before the conflict were mainly due to the NWE and NHB livelihood zones constituted the most migrant - sending districts. Surprisingly, these remittance flows increased after the conflict ($>$ ETB3694, 2886 and 1472 in the NWE, NHB and NMC livelihood zones, respectively) (Table 3.3). The average income households earned after the conflict has been improved ($\approx$ ETB2836.9) (Figure 3.1). However, the estimated annual income from remittance in the three livelihood zones was not statistically significant.

Overall, the average yearly estimated income from remittance during the conflict period was ETB962.5 (Figure 3.1) which is lower by more than half than the pre-conflict time. Savage and Harvey (2007) noted that remittances are likely to be initially disrupted by disasters. These authors argued that many provincial banks in Sudan (in 2003) were closed including in Khartoum due to conflict. Similar occasions were vividly existed in the studied districts of northeastern Ethiopia.

By nature, remittances are direct sources of household income, and thus directly contributing to the livelihoods of the rural households that receive them. They are unlikely to be a panacea for poverty reduction or development. They may help mitigate some of the worst effects of conflict induced poverty. They play direct role in people's livelihoods and daily consumptions. Rural households can use them to replace lost agricultural assets, seeds, farming tools and livestock. It can also help them survive until the next harvest season. This helps them to revive from conflict based destruction, looting and damage of assets and resources and helps to restart their known livelihood. Because of their significance to many social and economic institutions, remittance flows after a conflict become increasingly serious to all aspects of human security and peace-building for the longer term.

3.3.1.1.4. Non-farm/off-farm income

In the study area, non-farm/off-farm activities include casual labor, carpentry or masonry, handicrafts, selling fuel wood and charcoal, and selling of local drinks (alcohol). According to the survey data, 38.2% of the total sampled rural households were engaged in off-farm/non-farm activities in the study livelihood zones before the conflict. However, this figure is much lower than the 42% average of SSA reported in Arega et al. (2013). Davis et al. (2014) also reported that 44% of households in rural Africa partake in the non-farm economy, where self-employment contributes on average 15% to household income. In the study's livelihood zones, the 38.2% proportion of households engaged in the activity decreased to only 6.6% during the conflict. This is consistent with the reports of Weldegiargis et al. (2023) which stated that exposure to war is associated with a decline in livelihood activities. Participation in overall economic activity, non-farm business, and wage employment on farms declined immediately following the experience of battles nearby; according to these authors.

Income from non-farm/off-farm employment shows great variation with in the three time periods. The average annual income households earned from non-farm/off-farm employment was 3300.56 hh^{-1} before the conflict. However, due to the conflict in the area, the estimated average yearly income from the sector has drastically declined by more than six times (520.49 hh^{-1}). On the other hand, although some improvements recorded after the conflict, the income households earned from the sector was low as compared to the income earned before the conflict (2586.6. hh^{-1}) (Figure 3.1).

Similarly, household income from non-farm/off-farm employment was roughly ETB3711, 868 and 1778 hh⁻¹ in the NWE, NHB and NMC livelihood zones, respectively. However, this total off-farm/non-farm annual household income declined to ETB432, 311 and 124 hh⁻¹ in the aforesaid respective livelihood zones during the conflict time (Table 3.3). This indicates that the conflict has restricted households from freely conducting their day-to-day tasks. In nature, off-farm/nonfarm tasks require peace and stable situation to do them freely and quickly. Income from the sector has thus improved with the restoration of peace. The mean income households earned from it has increased and was nearly ETB2757, 589 and 1513 hh⁻¹ in the respective livelihood zones after the conflict. The repeated measure one-way ANOVA and one way ANOVA indicated a statistical significance difference of off-farm/nonfarm income within the three-time periods ($df = 2$, $F = 22.009$, $p < 0.00$) and within the three livelihood zones ($p < 0.010$) respectively. As key informants noted, the loss of assets (working capital & materials) due to the conflict, lack of employment opportunities, limited skills, and weak marketing systems were the major reasons for the poor performance of non-farm activities in the study areas. In particular, the conflict in the area led the situation to the worst conditions.

Generally, armed conflicts pose a danger to farmers and herders. People were killed and injured; some people escaped the fight and did not return to their villages. All types of assets were often destroyed: crops, livestock, barns on farms, government buildings and telecoms in the public realm. Other assets fell into disrepair: roads, irrigation systems. Hence, restoring damaged assets as fast as possible is necessary in the area to help the rural households to recover from the impact. Additionally, the provision of credit service to the households also help them to restore their farming tools, purchase best seeds, livestock and restart their agricultural activity effectively. Rebuilding veterinary clinics and services is also essential in improving the livestock ownership of the households in the conflict affected rural areas in general and in the study area in particular.

3.3.1.2. Livelihood strategies of urban households

In their attempts to manage the challenges of their economic environment and political circumstances, urban households implement several livelihood strategies. They implement various activities including formal and informal employments (Schütte, 2006). Households in the study districts similarly implement a number of livelihood strategies including wage labor, small-scale business (self-employment), government employment, and remittance.

3.3.1.2.1. Wage labor.

Working on a daily based wage labour is among the various livelihood strategies practiced by households in many urban areas. Households living in urban areas likewise contract daily labour occupations to generate income for their livelihoods. However, wage laborers receive very low wages that enable them to survive in a state of disproportionate poverty and indecorous daily existence according to Ephrem (2015). In the study area, 16.3% of the total urban sample households are involving in daily wage labor activities for their main source of income. Yet income generated from a daily labour found to vary through time, livelihood zone and from that received in other occupations. For instance, before the onset of the conflict, the average estimated annual income from a daily wage labour in the studied urban areas was ETB2541 hh^{-1} . Contrary to incomes earned from other urban livelihood strategies, during the time of the conflict, the income earned from a daily wage labour (ETB2646 hh^{-1}) was higher than the income earned before the conflict period (see Figure 3.4). This was probably because at the time there was no transport access in the area and everything was transported through pack animals and human powers. Hence, the cost of transporting materials through humans was very high.

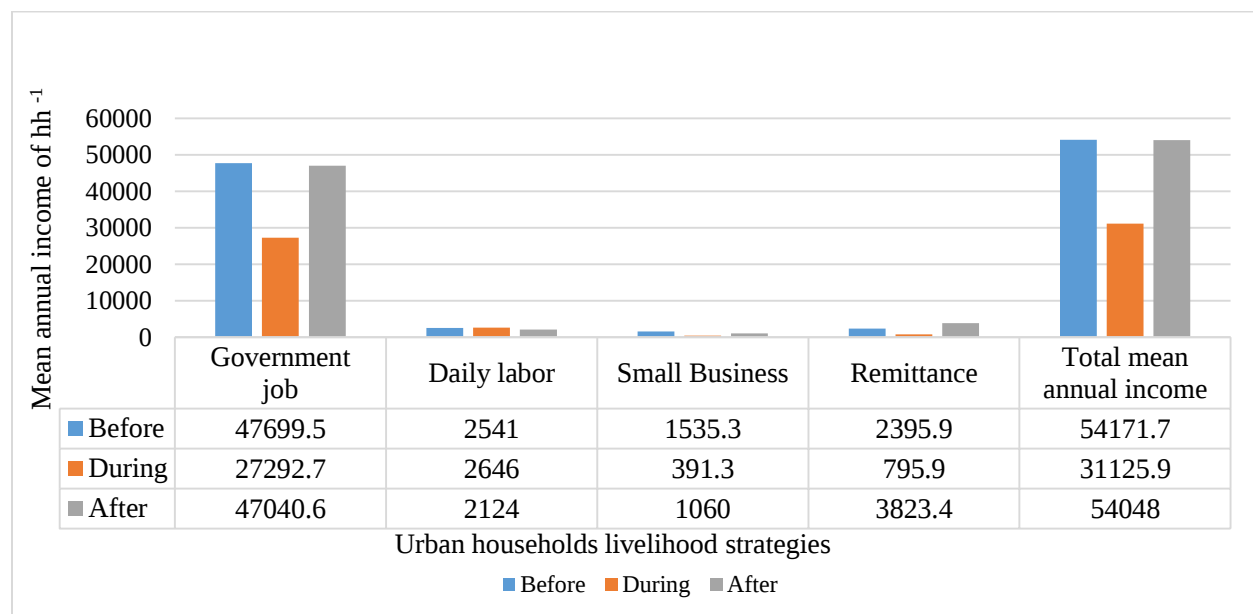


Figure 3.4. Mean annual income of urban households in ETB from different sources by time periods

In conformity with this, Lewis et al. (2020) stated that in fragile and conflict-affected situations, the informal economy delivers a dynamic and systemic response to the problems and opportunities of conflict and urban violence. For some informal workers (laborers), work

remained the same before the crisis, and in some cases even was better than before the crisis, similar to what is indicated in Lewis et al. (2020).

Although the annual income collected by urban households from a daily labour was higher than that of the other income sources mentioned above, this income was found differing among the three livelihood zones. For example, in the NMC livelihood zone, the income households earned from wage labor at the time of the conflict was ETB6030.6 hh^{-1} (Table 3.3). This was higher than the money they earned before and after the conflict; which was about ETB4503 and 3828 hh^{-1} , respectively. Conversely, households from NWE and NHB livelihood zones earn less income (ETB1391 & 233 hh^{-1} , respectively) during the time of conflict than they earned before the conflict; which was about ETB1503 and 1654 hh^{-1} . The average annual incomes of households collected after the conflict in these zones was roughly ETB1354 and 1138 hh^{-1} . In the foregoing discussion, income collected in the NHB livelihood zone during the conflict period seems very low compared to the two other livelihood zones; may be due to the worse condition prevailed in the area due to the intense fighting. This implies that the conflict has more affected the daily wage labour in the conflict prone areas by limiting the free movement of people and denying them the opportunity to work. Nevertheless, the effect was similar in all conflict-affected livelihood zones as can be observed from the annual income secured by the urban households. The one-way ANOVA statistical result also confirmed the prevalence of a significant income difference between the livelihood zones in all three time periods ($F= 4.182$, $P< 0.017$, $F= 10.551$, $P< 0.00$ and $F= 4.504$, $P< 0.013$, respectively). The difference in income from daily wage labor in the three livelihood zones are mainly because of the variation in the level of intensity of fighting and hence resulting instability.

In general, the conflict in the study area pushed daily wage workers to deeper poverty, insecurity and vulnerability with long term repercussion on their livelihoods and wellbeing. Conflicts in the study's urban areas also affected those who engaged in informal business like selling of alcohol, charcoal, and petty trades.

3.3.1.2.2. Small-scale business

Self-employment in small businesses is another livelihood strategy practiced by many urban residents. This very diverse category comprises activities such as selling homemade drinks like 'tella' and 'arekie', petty trading, and selling of homemade 'injera' or bread (*shilto*). However, all the various forms of self-employment observed in this study derive low and irregular income

due to the irregularity of the job opportunity. Conflict transfers these characteristics to worse conditions. For example, Mackie et al. (2017), in their informal economies, conflict recovery, and absent aid study in Hargeisa (Somaliland) stated that nearly all employees who had been working in a self-employment informal economy lost all their businesses at the time of the conflict and the income earned from it was extremely low.

Consistent with the foregoing text, the mean monthly income of households from self-employment during the conflict time was very low ($\approx$ ETB391.3) compared to that received before the onset of the conflict ($\approx$ ETB1535.3) (Figure 3.4). This is probably because of many conflict-led factors. First, during the conflict, people left the towns, which resulted in the neglect of businesses and the loss of client bases. Second, an absence of security was leading to pillaging of goods and the foray of business spaces. Third, infrastructure was strictly smashed, which made goods difficult to acquire (see Figure 3.3 (A) & (B)). With the restoration of peace, households in the study area could do tasks freely, and the income from the sector rose again. Consequently, estimated average income generated from self-employment has improved ($\approx$ ETB1060) after the conflict. Hence, there is variation in income from the above-mentioned self-employment activities in the three livelihood zones. The repeated measure one-way ANOVA also shows a significant difference in the mean of income earned from small-scale businesses in the three time periods ($df = 2$ $F = 36.87$, $P < 0.00$).

On the other hand, income from small businesses exhibits variation in the three livelihood zones during the three time periods. For instance, in all three time periods, households from the NWE livelihood zone earned the highest annual income from the sector, than those from the NHB and NMC livelihood zones (see Table 3.3). However, the difference in income from the sector within the three livelihood zones was not statistically significant. As the survey data indicate, income earned from small-scale business activities in all three livelihood zones was very low at the time of the conflict. One of the FGD participants in the NHB livelihood zone explained the influence of the conflict on small business activities as: “At the onset of the conflict, I lost all my clients because all the people fled...It caused me to go bankrupt and I lost all my business.” On the other hand, an FGD participant from the NWE livelihood zone explained the small business situation at the time of conflict as follows:

Everything was destroyed.... During the conflict, combatants looted everything. Transport was a problem, as bridges were damaged, and there were no vehicles except military trucks. The customers were afraid of the situation. Because banks and other financial services were blocked, customers didn't have enough cash to buy. As a result, my income from the sector collapsed and left me in danger.

The livelihood of poor people like small business and daily wage labor is highly influenced by the armed conflict in the past. However, the post conflict phase is characterized by increasing mobility, expanding knowledge and opportunities. Hence, income variations from those sectors in the three time periods is expected.

3.3.1.2.3. Government employment

In all three periods, activities related to public employment were major sources of income in the study areas. Before the conflict, the average estimated annual income from public employment was ETB47699.5 hh⁻¹. However, income from public employment during the time of the conflict was low (ETB27292.7 hh⁻¹) (Figure 3.4) compared to the pre-conflict period due to the disruption of public infrastructure and closure of government offices. One of the key informants explained why government employees' income declined:

A week before the area fell under the control of government opponent armed groups; everything was closed including government offices, banks, and other financial services. In particular, private banks completely stopped their service delivery a couple of weeks ago. Hence, most public employees could not earn their monthly salary until government forces control of the area again.

When the conflict dies down, the yearly estimated income from public employment rose again, reaching ETB47040.6 hh⁻¹ (Figure 3.4). On the other hand, there was a difference in the mean yearly income from public employment within the three livelihood zones. The one-way ANOVA result shows that there was a statistically significant difference in the mean income of households earned from public employment within the three livelihood zones in all of the three time periods [(F = 3.099, p < 0.048); (F = 5.289, p < 0.006); and (F = 3.430, p < 0.035)]. The difference in income in the three livelihood zones is probably because of the difference in salary they received. The comparative incomes were ETB66132, 28976 and 38890.7 hh⁻¹ in the NWE, NHB and NMC livelihood zones, respectively before the conflict; ETB48786.6, 12697 and 11556 hh⁻¹ in the NWE, NHB and NMC livelihood zones, correspondingly during the conflict; and ETB66132, 26358.8 and 38890.7 hh⁻¹, respectively after the conflict (Table 3.3). Such a difference in income within the three time periods is due to the effect of the conflict. During the conflict, all the study areas were under the control of the government opposing groups and none of the government

sectors were functional at that time. Hence, government employees were unable to receive their monthly salary. Even after the conflict, some of the employees were not able to return back to work either because they are killed by combatants or left their place of residence permanently.

3.3.1.2.4. Remittance

As in rural households, remittances are among the income sources of urban households. Contrary to other financial flows, remittances go directly into family incomes and thus have immediate and direct influence on the livelihoods of receiving households (Savage & Harvey, 2007). Of the total sampled urban households in the area, 18.4% earned income from remittances. Before the conflict, the average estimated annual income from remittance was ETB23985 hh^{-1} . However, during the conflict, it was reduced to ETB797.55 hh^{-1} (Figure 3.4). The average estimated annual income from remittances after the conflict has increased to ETB3822.55 hh^{-1} . Normally, remittances are likely to be disrupted by disasters like conflict. Displacements, lack of communication and infrastructure damage were among the disruptions restricting the flow of remittances in the area as reported by key informants. Savage and Harvey (2007) reported that the closure of mobile phone networks and banking services has hindered half of the receipt of household income from remittances during the conflict in Somaliland. Repeated one-way ANOVA has indicated that there is a statistically significant difference in the mean income from remittance in the three time periods ($F = 22.433$, $p < 0.00$). The estimated annual income from remittance within the three livelihood zones was also different. The comparative incomes were ETB2908, 2821.6, and 1436.7 hh^{-1} in the NWE, NHB and NMC livelihood zones, respectively before the conflict; ETB245.9, 405 and 1775.5 hh^{-1} in the NWE, NHB and NMC livelihood zones, correspondingly during the conflict; and ETB5663.9, 4494.5 and 1025.5 hh^{-1} , respectively after the conflict (Table 3.3). However, the result was not statistically significant. The difference in income from remittance in the three livelihood zones before the conflict was mainly because the NWE and NHB livelihood zones constituted the most migrant sending districts.

3.3.2. Livelihood outcome comparison between urban and rural households

Though, conflict affects both rural and urban areas indiscriminately, the rural households face the effect a lot. A comparative analysis of the impact of conflict in rural and urban household income of the study area reveals significant difference due to various factors. The duration of the conflict stayed in the area greatly determined the degree of impact of the conflict. Because several conflicts are fought in rural areas and target fruitful agricultural assets such as

infrastructure, land, and livestock, the economic impacts often smashed rural households excessively. The Conflict in the rural study districts take an enormous toll on the economic health of the families and households and undermine the local economic progresses. Ethiopians in general and the study households in particular are highly engaged in agricultural activities for their livelihoods. Hence, the longtime war in the rural part of the study area reduced households' access to farmland, disrupted planting and harvesting cycle and increase insecurity and making farming risky. As a result, the conflict highly affected the rural households in the study districts.

Similarly, the result from the survey indicated the mean annual income rural households earned from the different livelihood strategies during the conflict period declined by 56.7% from the pre conflict period (Figure 3.1). On the other hand, urban households mean annual income from different livelihood sources also declined during conflict period when it compared to the peace period income. However, the income urban households earned declined by 42.5% (Figure 3.4) which is lower when compared to rural households. Even after the conflict, the total annual income rural households earned from the four livelihood strategies was declined by 20.6 % from the pre conflict period. On the other hand, the mean annual income urban households earned from the four urban livelihood strategies after the conflict was better than the rural households. An independent sample t – test result (Table 3.4) also confirmed that during the conflict period, the annual mean income of rural households were statistically significantly lower (16124.09 ± 15782.3) compared to urban households (1.60 ± 7097.3) $F = 116.76$, $P < 0.000$.

Table 3.4. T-test comparison of income of rural and urban households during the conflict

Household category	N	Mean income (ETB)	F	Sig
Rural	241	16124	116.76	0.000
Urban	147	36919.7		

Hence, the conflict in the study area greatly affected rural households' livelihood strategies and income from it both at the time and even after the time of the conflict. While urban households were also affected, the diversified economic opportunities and stronger institutional support from both governmental and non-governmental organization helped them to mitigate income losses.

3.3.3. Determinants of households' livelihood annual incomes

3.3.3.1. *Determinants of rural households' livelihood annual incomes*

This study considered a wide range of explanatory variables including biophysical, socioeconomic, and political factors to predict the determinants of rural households' livelihood outcomes. All the variables together explained about 57.8% of the variance in the annual income of the sample rural households (the outcome variable). Therefore, the model fits the data fairly. The multicollinearity problem does not exist in the model as VIF for all variables is < 10 (or Tolerance > 0.1). Maximum likelihood estimates showed that household farmlands, agricultural subsidies, engagement in off- and nonfarm activities, access to credit services, family size, total TLU, membership in *equib*, and sensitivity to conflict were, respectively significant and highest contributing predictors (Table 3.5).

As shown in Table 3.5, the size of farmland was positively and significantly correlated with annual income for rural households. It is the highest contributor of the factors. Holding other variables constant, the model predicts that households' annual income increases by about ETB21520.2 for every 1ha of farmland increment. This result was also statistically significant ($p < 0.001$). The likely explanation is that those farmers who had access to relatively large farms were more likely to get high income level than those households who had no or little land. The results are similar to the study conducted by Noack and Larsen (2019) in Uganda. These authors predicted that an increase in farmland size would increase households' annual incomes. The second-most contributing factor is agricultural subsidy (t: 5.75; Table 3.5). This factor is significantly and positively correlated with the rural household income. The model predicted that a unit increase in agricultural subsidies increases the households' annual income by about ETB3.16. This variable is also strongly significant ($p < 0.001$). Other studies (Hemming et al., 2018; and Yang et al., 2023) have confirmed a positive correlation between agricultural subsidies and annual incomes. The more households receive agricultural subsidies, the more they produce and earn money.

Table 3.5. Regression results of determinants of annual income for rural households in the study districts

Explanatory Variables	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error			
(Constant)	-18300.429	13229.381		-1.383	0.168
Age of the head in years	1015.181	1272.021	0.038	0.798	0.426
Education level of the head	282.011	1794.670	0.009	0.157	0.875
Family size (number)	4767.400	1860.810	0.117	2.562	0.011**
Farmland size (ha)	21520.247	3653.682	0.305	5.890	0.000***
TLU	839.287	317.419	0.151	2.644	0.009**
Access to Credit	0.473	0.139	0.155	3.411	0.001***
Off/nonfarm employment	8800.168	2619.055	0.155	3.360	0.001***
<i>Equib</i> membership	7105.190	2695.809	0.123	2.636	0.009**
Agricultural subsidy	3.166	0.551	0.355	5.750	0.000***
Sensitivity to conflict	-8803.346	4017.026	-0.098	-2.192	0.029**

Significant at 0.05; * significant at 0.1; *Significant at 0.01; F = 31.37; df (10, 229); p < 0.000; R = 0.760; R² = 0.578.

Livestock is one of the most important physical assets in the study area. Consequently, the TLU variable is found to be the other important determinant of household income in the studied rural areas. It is significantly and positively correlated with the household income (significant at p<0.001; Table 3.5); implying that household income increases by ETB839.28 with a unit increase of TLU. This is because livestock in remote areas are liquid assets that can be sold to meet household financial needs or to start a new business. Thus, large livestock holdings place households in better economic positions than those with no or small livestock holdings. Many studies in different parts of Ethiopia have reported similar results (see e.g. Devereux & Amare, 2003; Tefera, 2009; Deressa, 2010; Tadesse, 2010; Arega et al., 2013). These studies indicate

that livestock possession has positively and significantly influenced household income in different parts of Ethiopia.

Off-farm/non-farm income also showed a positive and significant correlation with the annual income of rural households (significant at $p=0.001$ level; Table 3.5). Other variables remain constant, engagement in non-farm/off-farm activities increases households' annual incomes by about ETB8800.16. A similar finding was reported in an earlier study (Arega et al., 2013) which noted that engagement in non-farm/off-farm activities increases households' annual incomes. This means that as the off-farm/non-farm income level of sampled households' increases, the farm income increases. This indicates that as gross farm income increases; there is tendency towards increasing in non-farm income by the sample households.

Membership in a local institution (*Equib*) and access to credit services were also other variables significantly and positively influencing rural households' incomes in the studied districts (significant at $p=0.009$ & 0.001 , respectively; Table 3.5). As credit availability increases by one unit, the annual income of rural households also increases by ETB 0.473. Credit access helps households recover looted, burned, and distracted products and materials in the conflict areas and helps them to acquire income. A similar, positive, and significant credit-household income relationship was reported by Arega et al. (2013). *Equib* is also the other socioeconomic institution that helps people in rural areas to recover from shocks during times of local danger, war and natural disasters. Although having weak influence compared to others, family size was another important variable in the prediction of the rural household incomes. It has positively and significantly correlated with the rural household annual incomes (significant at $p < 0.05$ level; Table 3.5). This result was also similar to the findings of Arega et al. (2013) and Tasie et al. (2012); but it contradicts with those of Obike et al. (2011) and Ahmed (2012) who both reported significant but negative correlation between family size and annual household incomes. In this study, an increase in the size of the family appears increasing the annual household income by ETB4767.4; with keeping other things normal. In other words, as the number of family members increases, so does the likelihood of the household earning income from a variety of sources. More family means more labour in a rural area, allowing households to engage in a variety of livelihood activities and earn more income from them.

Contrary to the other factors, sensitivity to conflict (death or injury to the household head, asset damage by the conflict) showed a significant but negative correlation with the rural households' annual incomes (significant at $p < 0.05$; Table 3.5). By running a series of regressions on income and sensitivity to conflict, various studies found that the relationship between sensitivity to conflict and household annual income was generally negative, and significant, for various econometric models. Similarly, in our study area, the regression model estimate basically represents an increment of income that a household would experience if there were no conflict. Holding other variables constant, a unit increase in sensitivity to conflict decreases the households' annual incomes by ETB8803.3. The empirical evidence surveyed in this study also indicated that sensitivity to conflict is significant and negatively correlated with annual income. Findings of other similar studies (e.g Arunatilake et al., 2001; Davis et al., 2006; Guidolin & La Ferrara, 2010; Justino, 2011a, 2011b; Swesi, 2019) reported the negative influence of sensitivity to conflict on households' annual incomes.

3.3.3.2. Determinants of urban households' livelihood outcomes

On the analysis of appreciating the determinant factors of urban households' annual incomes, a total of ten explanatory variables were considered in the linear regression model. During running the model, all variables together explained 52.2% of the variance in the annual income of the sample households (the outcome variable). Hence, the model relatively fits the data fairly. VIF for all variables is < 10 (or Tolerance > 0.1). Therefore, the model does not face a problem of multicollinearity. The release from the multiple linear regression modelling showed that having houses for residence and renting, income from other family members, sensitivity to conflict and financial supports discovered significantly influencing the annual incomes of urban households and thus their livelihood outcomes.

Table 3.6. Regression model result for the determinants of annual income of rural households in the study districts

Explanatory variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	24601.631	27647.046		0.890	0.375
Age of the head	-8173.154	4584.896	-0.129	-1.783	0.077
Education	3130.032	16405.213	0.013	0.191	0.849
Family size	9242.022	7298.586	0.089	1.266	0.208
Inactive family members	-9010.735	11509.120	0-.053	-0.783	0.435
Own house for residence	23378.496	11551.627	0.160	2.024	0.045**
Houses owned for rent	34049.165	12829.135	0.206	2.654	0.009**
Income from other family members	10.285	1.333	0.532	7.714	0.000** *
Credit access	6461.354	10155.044	0.038	0.636	0.526
Sensitivity to conflict	-0.317	0.108	-0.211	-2.931	0.004**
Financial support	-2.301	1.212	-0.118	-1.899	0.060

Significant at 0.05; * significant at 0.1; *Significant at 0.01; F = 15.237; df (9, 231); p < 0.000; R = 0.727; R² = 0.528.

As can be observed from the model release (Table 3.6), sensitivity to conflict has significantly ($p < 0.005$) and negatively affected urban households' annual income as was expected. The model predicted that a unit increase in sensitivity to conflict decreases the annual income of households by a factor of ETB0.317. A study conducted by Swesi (2019) in Libya reported a similar outcome indicating that sensitivity to conflict has negatively and significantly affected the urban households' annual incomes. Sensitivity to conflict is a determinant variable which is significant and negatively correlated with both rural and urban households' income. However, the impact highly smashed the rural households (see Tables 3.5 & 3.6). The age of the household head is also negatively correlated with urban household income. Regarding the regression result, a one year increase in the age of the head likely decreases the annual income of households by ETB8173.4 with considering other factors remaining constant. This indicates that household income decreases as the age of the household head increases. However, the influence appears very weak ($p < 0.1$; Table 3.6). A study by Ephrem (2015) on urban livelihoods in three towns in

Ethiopia reported a similar negative and significant correlation between the age of the head and the average annual income of households.

Owning a house for both residency and renting was positively and significantly correlating with the urban households annual income (both significant at $p < 0.05$; Table 3.6). Housing in urban areas is unquestionably the most imperative physical asset that a household can hold because it can be used productively and stabilizes financial pressures. Having a house for residence and renting enhances annual household incomes by about ETB34513 and 21171, respectively. Many urban livelihood writers paralleled the role of shelter in the livelihoods of the urban poor to that of land for the rural poor (Schütte, 2006). This physical asset becomes a seriously significant asset at times of shock and stress when a house can be rented or utilized as a place for home-based enterprise or other activities. An income generated only by the head of the household sometimes might not be sufficient to support the family and save for further economic improvement. The other member of the household who earns an income from the various jobs can support the family. In the same way, the model predicted that other household incomes derived from different sources (income occasionally collected by family members and obtained from support) found significantly influencing the annual incomes of urban households. Occasional income generated by the family members appears to strongly increase the annual income of the household by a factor of ETB10, 285. This variable has a statistically significant effect ($p < 0.001$; Table 3.6). Unfortunately, income received through donation significantly reduces the total annual income of urban households. This may probably be because of an increasing of dependency on donation which limits households not to see other income generation alternatives.

3.4. Conclusion and Policy Implication

3.4.1. Conclusion

This study explored the livelihood strategies and outcomes of households in conflict- affected areas of northeastern Ethiopia. Data were generated from a questionnaire survey of 388 households, 15 key informant interviews, and 9 FGDs in April and May 2023. ANOVA and multiple linear regression models were used for data analysis with the support of textual narrations. A major finding is that almost all households' livelihoods both in rural and urban areas were negatively affected by the conflict. For rural households, crop production is found to be the major ($\approx 96.3\%$) livelihood strategy, followed by livestock rearing. The conflict in the area

greatly affected crop production. As compared to the pre conflict period, crop output declined by 54% and 24% during and after the conflict, respectively. Although variation occurs within the livelihood zones, in the entire three livelihood zones, production amounts were low at the time of the conflict. The income households earned from crop production has thus declined by 55% from the pre conflict period.

Livestock rearing, the second most important livelihood of the study households, was also greatly influenced by the conflict. Like crop production, households' ownership of TLU was having great variation between the conflict and before conflict periods. TLU decreased by a mean of 1.31 and 1.51 during and after the conflict, respectively. Looting, burning, theft, inability to do tasks freely, loss of manpower, scarcity of agricultural inputs, distress sales, and inaccessibility of roads and markets were the main conflict based reasons associated with the decline of both crop and TLU products. The impact of the conflict on urban households was also immense in the study areas. Particularly, those households that engaged in informal business activities (51.7%) including small private businesses and wage laborers were highly affected by the conflict. As a result, the income households earned from those small business activities declined by 74.5%. Farm and family sizes, TLU, access to credit, engagement in non/off- farm activities, and sensitivity significantly influenced the annual incomes of rural households. House ownership for both residence and rent, income by other household members, and sensitivity to conflict have significantly determined the annual incomes of urban households. Sensitivity to conflict has significantly decreased the annual incomes of both the rural and urban households. The conflict overall affected the livelihood strategies and outcomes of the studied households.

3.4.2. Location-Specific and Livelihood-Specific Policy Implications

The findings of this study demonstrate that the impacts of conflict-induced food insecurity were not uniform across livelihood groups and geographic locations. Significant differences were observed between rural and urban households as well as among the North Wollo East Plain (NWE), Northeast Highland Barley and Wheat (NHB), and Northeast Midland Mixed Cereal (NMC) livelihood zones. Consequently, resilience-building interventions and policy responses should be tailored to the specific livelihood systems, vulnerabilities, and recovery needs of each group rather than applying a uniform approach.

Policy Implications for Rural Households

Rural households experienced the greatest livelihood deterioration during the conflict due to their heavy dependence on agriculture and livestock production. The disruption of farming activities, destruction of productive assets, livestock losses, and restricted access to agricultural inputs significantly reduced household income and food availability. Therefore, policy interventions should prioritize agricultural recovery through the provision of improved seeds, fertilizers, farm tools, and irrigation support. Livestock restocking programs, veterinary services, and animal health interventions should also be strengthened to restore livestock-based livelihoods. In addition, expanding access to rural credit, agricultural extension services, and climate-smart agricultural practices can enhance households' adaptive capacity and resilience to future shocks.

Policy Implications for Urban Households

Urban households were primarily affected through disruptions to employment opportunities, petty trade, small businesses, and market systems. Therefore, interventions targeting urban communities should focus on employment creation, enterprise recovery, access to finance, and market stabilization. Support for micro and small enterprises, vocational training programs, youth employment initiatives, and urban social protection schemes can contribute to restoring livelihoods and strengthening resilience among urban households. Improving access to affordable credit and facilitating the recovery of local markets are also essential for rebuilding urban economic activities.

Policy Implications for the North Wollo East Plain (NWE) Livelihood Zone

The North Wollo East Plain livelihood zone experienced the most severe livelihood disruptions due to its direct exposure to armed conflict and prolonged insecurity. Crop production losses, displacement, destruction of productive assets, and market interruptions were particularly pronounced in this zone. Consequently, priority should be given to comprehensive livelihood rehabilitation programs, including agricultural recovery, livestock restocking, rehabilitation of rural infrastructure, restoration of market systems, and targeted support for conflict-affected households. Humanitarian assistance should gradually transition toward long-term recovery and resilience-building initiatives that strengthen household asset bases and livelihood diversification.

Policy Implications for the Northeast Highland Barley and Wheat (NHB) Livelihood Zone

Households in the NHB livelihood zone experienced significant livelihood challenges arising from agricultural disruptions, market constraints, and reduced access to services. Policy interventions should therefore focus on restoring agricultural productivity through improved access to agricultural inputs, strengthening market linkages, and improving transportation and rural infrastructure. Investments in agricultural value chains, farmer cooperatives, and extension services can contribute to improved livelihood outcomes and reduced vulnerability.

Policy Implications for the Northeast Midland Mixed Cereal (NMC) Livelihood Zone

Although households in the NMC livelihood zone demonstrated relatively better livelihood performance in some indicators, they remained vulnerable to conflict-related shocks and economic disruptions. Policy interventions should emphasize livelihood diversification, income-generating opportunities, and improved access to financial services. Promoting non-farm employment opportunities, small-scale enterprises, and skills development programs can reduce dependence on a limited number of livelihood activities and enhance resilience to future shocks.

Cross-Cutting Policy Implications

Across all livelihood groups and zones, strengthening social protection systems, improving access to health and education services, enhancing rural and urban infrastructure, and promoting conflict-sensitive development interventions remain essential. Community-based organizations, cooperatives, and local institutions should be strengthened to support social cohesion, collective action, and recovery efforts. Furthermore, integrating resilience-building strategies into local development planning can help households better absorb, adapt to, and recover from future shocks, thereby reducing vulnerability to conflict-induced food insecurity.

CHAPTER FOUR

4. Conflict Induced Household Level Food Insecurity in Conflict Affected Areas of Northeastern Ethiopia

Abstract

Conflict-induced food insecurity has been currently emerging to be a widespread challenge to the decent livelihood of the human population. This study examined conflict-induced food insecurity in conflict-affected areas of the northeastern part of Ethiopia. This study assessed three time periods (pre-conflict, conflict, and post-conflict times) to analyze the impact of conflict on the studied households. Food consumption score and household food insecurity access scale tools were used to measure the food security status of households. Descriptive statistics and independent t-test were used to analyze the data. The major finding confirmed that the food security status of both urban and rural households in the study areas was negatively affected by the conflict. Compared to the pre-conflict period (22.2%), the number of food-insecure households at the time of the conflict was three times higher. Though the food security status of both rural and urban households was affected by the conflict in the area, the effect was much severe for the rural households. The number of food-insecure rural households during the conflict was three times higher than the pre-conflict period. During the conflict, female-headed households (78.3%) were more vulnerable to food insecurity than male-headed households. The independent t-test result confirmed the presence of a difference in food security status between rural and urban households ($P > 0.01$) and between female- and male-headed households ($P > 0.021$). Food security status variations were also seen among the study livelihood zones. Households from the north Wollo east plain livelihood zone suffered a lot (71.3%). The result suggested that any project aiming at improving households' food security in conflict-affected areas should give attention to the provision of food aid, agricultural inputs, credit services, and financial support to the affected community. Restoring peace would rather be the long-lasting solution to minimize the conflict-induced food insecurity in the area.

Keywords: Conflict; Food consumption score; Food insecurity; household food insecurity access scale; Livelihood zones; Ethiopia

4.1. Introduction

Food insecurity remains a major development challenge globally, with armed conflict increasingly recognized as one of its key drivers (FAO, 2021; WHO, 2024). Conflict affects all dimensions of food security by disrupting agricultural production, displacing populations, and constraining access to markets and essential services (Brinkman & Hendrix, 2011; Martin-Shields et al., 2018).

Recently, the impact of conflict on food security has been steadily rising throughout the world. Conflict induced food insecurity has been now emerging to be a widespread challenge to the decent livelihood of human population at the global and local levels. Because of the frequent rise of armed clashes, wars, disputes, and terrorism; here and there, the number of food insecure people has been rising over the different corners of the world (FAO, 2021). The recently recorded food insecurity problems everywhere are likewise believed to be the direct results of conflicts.

Armed conflicts directly cause food insecurity and starvation by disturbing markets and supply chains, killing livestock and burning of fields, or when the chief producers of food are killed or involved in battle, destroying infrastructure, increasing food price or making goods and services unavailable altogether. Destruction to water and sanitation infrastructure due to warfare can make it more challenging to safely prepare food and highly impacts nutrition outcomes. It can be even more challenging to endure proper nutrition and resilience to food insecurity when households' security is compromised.

In Ethiopia, although food insecurity has traditionally been associated with climatic shocks such as drought, recent conflicts have emerged as a significant and compounding factor. The armed conflict that began in northern Ethiopia in November 2020 has had far-reaching impacts on livelihoods, particularly in the northeastern part of the country. The conflict has resulted in the destruction of assets, displacement of households, disruption of agricultural activities, and breakdown of market and service systems, all of which have contributed to worsening food insecurity conditions.

Despite these developments, much of the existing research in Ethiopia ((Ramakrishna, & Demeke, 2002; Agidew & Singh, 2018; Debessa, 2018) has primarily focused on natural causes of food insecurity, with limited attention given to conflict-induced dynamics at the household level. This

creates a gap in understanding how conflict affects food security outcomes among affected populations.

Hence, studies on the level of the armed conflict linked to household food insecurity and its outcomes in the conflict areas of northeastern Ethiopia are scarce and missing in the reviewed studies. Therefore, this study provides an important addition to the literature regarding the level of food insecurity in the conflict context. Additionally, studies on the level of food insecurity and its outcomes in the context of conflict can facilitate the identification of important strategies to be implemented by the government and communities for the improvement of food security in the area. Thus, the study has practical significance for designing more targeted and effective food security-related development interventions in the study area. The aim of this study is therefore to analyze household level conflict induced food insecurity in the conflict areas of northeastern Ethiopia, particularly in Amhara regional state (focusing on the Northern Ethiopian conflict of 2020-2023).

4.2. Data Analysis

To analyze the impact of the conflict on food security, the study used three time periods (2020, as a pre-conflict period; 2021–2022, as a conflict period; and the data collection time (2023) as a post-conflict period). Hence, data were gathered for three time periods through a questionnaire survey of 388 households; 72 FGD participants and 15 key informants. The questionnaire was based on validated food security assessment tools, namely the Food Consumption Score (FCS) and the Household Food Insecurity Access Scale (HFIAS). These tools are widely recognized and have been extensively used in food security research globally. The utilization of both the Food Consumption Score (FCS) and the Household Food Insecurity Access Scale (HFIAS) is a deliberate, complementary methodological approach designed to capture different dimensions of food insecurity. Combining these two validated metrics provides a robust, multi-dimensional assessment of household vulnerability during conflict for several reasons:

✓ **Dietary Diversity vs. Access Anxiety:** The FCS is a proxy measurement of *dietary quality and caloric availability*, calculated based on food frequency and diversity over a 7-day recall period. In contrast, the HFIAS captures the *behavioral and psychological dimensions* of food insecurity, specifically focusing on household anxiety, perceptions of insufficiency, and coping strategies over a 30-day period.

✓ **Objective Intake vs. Subjective Severity:** A household might maintain an acceptable FCS score by eating monotonous, low-cost staple foods, yet still experience 'severe food insecurity' under the HFIAS due to intense anxiety about future food supplies or a complete lack of financial access to markets. Conversely, during acute conflict, physical market disruptions might cause an immediate drop in dietary diversity (FCS), while behavioral coping mechanisms (HFIAS) reveal the structural severity of the deprivation.

✓ **Cross-Validation in Conflict Zones:** In highly volatile, conflict-affected environments, relying on a single metric can lead to under- or over-reporting. Triangulating FCS (which heavily reflects short-term food consumption) with HFIAS (which reflects broader economic access and stability) allows for the cross-validation of data, ensuring that the identified spikes in post-conflict food insecurity are both nutritionally and behaviorally verified.

To ensure reliability, enumerators were trained to administer the tools consistently, and pre-testing was conducted to adapt the tools to the cultural and contextual specifics of the study area. This included modifications for local food items and terminology while maintaining the core constructs of the tools. The themes of the questionnaire align with the objectives of assessing food security, with FCS capturing dietary diversity and food frequency, and HFIAS addressing the experiential aspects of food insecurity.

Food Consumption Score (FCS)

The FCS is one of the most commonly used methods of measuring household food security (WFP, 2008). It mainly measures the “access” dimension of food security (Headey et.al, 2012; Lovon, M., & Mathiassen, 2014; Leroy et.al, 2015). In many ways conflict highly affects the access dimension of food security. As a result, in order to assess the access dimension of food security, applying FCS is better (Leroy et.al, 2015). In this study, the original FCS tool of the WFP was slightly adapted to cover the three-time periods. FCS is a composite score used to capture the dietary diversity and food frequency of different kinds of food or food groups consumed during seven days. FCS involves: the weighing of these groups given a score that represents the diversity of intake of each household (Coates et.al, 2007). Households were asked about the number of days each of the food items was consumed in their homes within a week. After identifying the number of days each food was consumed, the consumption frequency of the food items is then multiplied by the corresponding food group weights (Table 4.1).

Table 4.1. Food groups and their weights

Food items	Food groups	Weights
Maize, maize porridge, rice, sorghum, millet, pasta, bread and other cereals	Cereal and tubers	2
Cassava, potatoes and sweet potatoes		
Beans, peas, groundnuts and cashew nuts	Pulses	3
Vegetables and leaves	Vegetables	1
Fruits	Fruits	1
Beef, goat, poultry, pork, eggs and fish	Meat and fish	4
Milk, yoghurt and other diaries	Milk	4
Sugar and sugar products	Sugar	0.5
Oils, fats and butter	Oil	0.5

Source: WFP (2008, p. 8).

The resultant values were then added to obtain the FCS for each household:

$FCS = 2 * Y \text{ staple} + 3 * Y \text{ pulse} + 1 * Y \text{ vege} + 1 * Y \text{ fruit} + 4 * Y \text{ animal} + 4 * Y \text{ diary} + 0.5 * Y \text{ sugar} + 0.5 * Y \text{ oil};$

Where Y represents the number of days, each food item was consumed within a week. After estimating the FCS of the sampled households, their food consumption (access) was classified into three categories according to the guidelines provided by the WFP (Table, 4.2).

Table 4.2. Food consumption score and household groups

FCSs	Categories
Score 0-28	Poor
Score 28.5-42.5	Border line
Score > 42.5	Acceptable

Source: WFP (2008, p. 8).

HFIAS score

The HFIAS is a popular tool used by the United States Agency for International Development (USAID) Food and Nutrition Technical Assistance III Project (FANTA). The tool is designed to collect information on: feelings of anxiety over food (e.g. access, resources); concern that food is insufficient in quantity and quality for children and adults (includes preference, dietary diversity, & nutritional adequacy); informing the reductions in food intake for the households (including adults & children); and feelings of embarrassment to turn to socially unacceptable means to

obtain food resources. About to the guideline, Coates et al. (2003) noted that the sampled households were asked 13 questions regarding their food insecurity over three-time periods. Often is coded as 4, sometimes as 3, rarely as 2 and never as 1. The scores on all the questions were then added in order to get the HFIAS score for each household. The total of HFIAS scores were then categorized as: severe food insecure (27 – 39), Moderate (14 – 26), and mild/no (1 – 13). Since there is no guideline in the literature about the categorization of HFIAS scores, this study used an equal interval method in this categorization. Finally, descriptive statistics and independent t-test were used to analyze the data. Independent sample t-test was computed to see whether there is a difference in mean of level of food security status among the rural and urban households. In this case, household's food security status are dependent variables and households location (rural & urban), and gender of head of the household (Male & female) are the independent variables.

4.3. Result and Discussion

4.3.1. Food security status of the households in the three time periods

The food security status of households was evaluated using FCS and HFIAS scores across three time periods: before the conflict, during the conflict, and at the time of data collection. As illustrated in Table 4.3, household FCSs showed a noticeable decline both during and after the conflict when compared to the pre-conflict period. An analysis of food security categories reveals that prior to the conflict, more than half of the households (52.1%) fell within the borderline category. Meanwhile, 25.8% had an acceptable food consumption level, while 22.2% were categorized as having poor food consumption.

Table 4.3. Household FCS and HFIAS) computations over the three time periods

% of FCS score				% of HFIAS Score			
FCS level	Before	During	After	HFIAS level	Before	During	After
Poor	22.2	66.5	49	Severe/food insecure/	30.7	79.1	63.7
Border line	52.1	28.1	38.1	Moderate	44.6	19.3	28.4
Acceptable	25.8	5.4	12.9	No/mild /secured/	24.7	1.5	8.0
Total	100.0	100.0	100.0	Total	100.0	100.0	100.0

However, during the conflict, there was a significant shift, with the proportion of households in the poor category rising sharply to 66.5% (Table 4.3). This represents more than a threefold

increase compared to the pre-conflict period, likely due to the direct impact of the conflict on food access and availability. In support of this, Weldegiargis *et al.* (2023) stated that armed conflict leads to loss of income and disruption of agricultural activities and production (Weldegiargis et.al, 2023). Disruption of agricultural production, off – farm income generating activities, and loss of income, as a result of armed conflict have primarily affected the food systems through their negative effects on people’s access to food, including the unaffordability of foods. The unaffordability of foods might be a consequence of the effects of other factors on people’s income and the cost of foods throughout the food system. The unaffordability of food together with low incomes, elucidates why the households were not able to access even the cheapest food in conflict-affected districts. Key informants noted that at the time of the conflict, nothing intruded on the area. Everything was banned. Households were not able to get food items. Even, access to safe water and electricity was a major challenge at the time (see Fig. 4.1).



Figure 4.1. Overview of damaged infrastructure during the northeastern Ethiopian conflict (2021 – 2023). **Note:** a) Electricity technicians maintaining the war destroyed electric lines in NWE livelihood zone. b) Households from Gedober Kebelle fetching unsafe water from a nearby stream due to destruction of pipe water during the conflict.

As shown in Table 4.3, the proportion of households within the borderline and acceptable category was low. During the time of the conflict, only 28.1 and 5.4% of the households fell under the borderline and acceptable category, respectively. Similarly, WFP’s food security assessment report on the Tigray war noted that 83% of the households were food insecure during

the time of the conflict (WFP, 2022). After the conflict, as compared to the conflict period, there was a slight increase in the proportion of households within the acceptable category (12.9%). However, the proportion was lower when it was compared to the pre-conflict period. After the conflict, almost half (49%) of the households were under the poor category (Table 4.4).

Table 4.4. Percentage of FCS and HFIAS categories by nature of kebeles and gender

Percentage of rural households FCS score					Percentage of rural households HFIAS score		
	Before	During	After		Before	During	After
Poor	22.8	78.8	48.5	Severe	33.6	83	65.1
Border line	53.9	16.2	39	Moderate	42.3	15.4	26.1
Acceptable	23.2	5	12.4	No/mild	24.1	1.7	8.7
Percentage of urban households FCS score					Percentage of urban households HFIAS score		
level	Before	During	After	level	Before	During	After
Poor	21.1	46.3	49.7	Severe	25.9	72.8	61.2
Border line	49	47.6	36.7	Moderate	48.3	25.9	32
Acceptable	29.9	6.1	13.6	No/mild	25.9	1.4	6.8
Percentage of FCS of Male headed household					Percentage of HFIAS of Male headed household		
level	Before	During	After	level	Before	During	After
Poor	20.1	63	46.2	Severe	28.7	77.8	62.7
Border line	52.1	31.3	40.6	Moderate	43.5	21.1	29.7
Acceptable	27.7	5.6	13.2	No/mild	27.7	0.99	7.6
Percentage of FCS of Female headed household					Percentage of HFIAS of Female headed household		
level	Before	During	After	level	Before	During	After
Poor	29.4	78.8	58.8	Severe	37.6	83.5	67
Border line	51.7	16.4	29.4	Moderate	48.2	12.9	23.5
Acceptable	18.8	4.7	11.7	No/mild	14.1	3.5	9.4

A FAO and WFP joint report on monitoring food security in countries with conflict situation also revealed that though ongoing progresses in the food security situation was expected after the conflict, many prone groups continued to depend on humanitarian assistance (FAO WFP, 2019). Households in the borderline category rose to 38.1% after the conflict compared to the 28.1% of the conflict period.

Key informants noted that the slight improvement in FCS score after the conflict was due to free market access, aid from government and non-government organizations, and support from families from non-conflict affected areas. The key informants further noted that households in the study districts are highly in need of support to the restoration of their livelihood strategies. Hence, the supply of agricultural inputs, credit services and financial supports are essential and will help both rural and urban households to reinstate lost materials and restart ceased business activities. Similarly, a FGD participant from NHB livelihood zone explained that:

..... the conflict completely destroyed my agricultural materials including livestock. Currently I have nothing in my hand to proceed farming. I am really in need of cash or credit to resume the agricultural activity. Just inform the government to facilitate access to credit and provide us fertilizers and other essential materials.

The distribution of the HFIAS score presented in Table 4.4 reveals a similar finding to that from the FCS score. The percentage of households with no/mild, moderate, and severe food insecurity at the pre-conflict time was 24.7, 44.6, and 30.7%, respectively. However, at the time of the conflict, the proportion of households in the no/mild, moderate, and severe food insecurity was correspondingly changed to 1.5, 19.3, and 79.1%, reflecting the serious impact of conflict on households' access, quality, quantity, and affordability of food. After the conflict, there was a slight increase in the proportion of households within the mild/no (8%) and moderate (28.4%) categories, compared to that conflict period; a slight decrease within the severe category (63.7%). Lin *et al* (2022) in their study of food insecurity in the context of Palestinian conflict revealed that conflict reduces the availability of production input and income, increases the number of days households have to rely on less preferred foods, and limits the variety of foods eaten and the portion size of meals consumed (Lin *et al*. 2022).

When the data is analyzed by Kebele type (rural vs. urban), the proportion of food-insecure households before the conflict showed only a slight difference, with 22.8% of rural households and 21.1% of urban households falling into the poor category (Table 4.4).

An independent t-test (Table 4.5) indicated that this difference in food security status between rural and urban households was not statistically significant at that time. However, during the conflict, the gap widened considerably. The proportion of food-insecure rural households surged to 78.8%, while urban households in the poor category increased to 46.3%. Justino (2017) noted that since most conflicts are held in rural parts of a country, rural households bear the brunt of the conflict a lot. Verwimp likewise revealed that a large part of the production of crops occurs for own consumption for many of the African households. Hence, the disturbance of the production process and incapability to cultivate through conflict directly affects the command over food of the household members (Verwimp, 2012). A study conducted by Weldegiargis *et al.* (2023) also stated that most households residing in the rural part of Tigray faced a serious food security problem at the time of the conflict.

As to information from key informants, the major reason for the rise of food insecurity in the studied districts was the reduction of production as a result of the conflict in the area. The conflict in the area led crops and animals to be plundered, burned, or destroyed. As a result, most of the rural households left without any food and agricultural inputs. When food production, storage, and distribution processes are endangered, the supply to local markets decreases while the demand for food increases. This push prices to increase: more people need to depend on the market, while the market obtains low food to be sold. If the local markets can receive supplies from markets further away, the rising burden on prices may be hard. The higher the price the more unaffordability of the households and leads them to be food insecure. An independent sample t – test result (Table 4.5) confirmed that during the time of the conflict rural households were statistically significantly food insecure ($1.26 \pm .542$) compared to urban households ($1.60 \pm .60$) $F = 18.7$, $P < 0.001$

Table 4.5. T – test comparison of FCSs during the conflict by category of households

Household category	N	Mean	Std.dev	Std. Error	F	Sig
Rural	241	1.26	0.542	0.035	18.70	0.000
Urban	147	1.60	0.604	0.050		
Male-headed	303	1.43	0.598	0.034	13.72	0.021
Female-headed	85	1.26	0.538	0.058		

The foregoing text indicates that there was significant food insecurity difference between the rural and urban; as well as, between male-headed and female-headed households during the time of the conflict. But, the FCS of urban households under the poor category was so high at the time of the conflict. Referring to Table 4.4, it is possible to note that only 6.1% of the households were food secure, 46.3% were food insecure and the remaining 47.6% were at the borderline during the time of the conflict. Lack of physical and economic access to sufficient food because of the intense fighting and siege were among the reasons for the high levels of food insecurity in the urban study communities during the conflict time. High cost of food and persistently high levels of war-induced poverty continued to keep foods out of the reach of people in the urban areas of the study districts. The conflicting parties' cut-off the local communities from the supply of food and non-food items from other non-conflict areas. These conditions have aggravated the local food insecurity in the area and may potentially lead the population to famine as like reported in (De Soysa,et.al, 1999). Hence, during the conflict, urban households faced serious food supply problems.

Most of the conflicts in northeastern Ethiopia happened in rural areas. This has barred the rural households to sell their products which in turn affected the food supply in the urban markets. Even after the conflict the percentage of households who fall under the poor category was slightly higher than it was during the conflict ($\approx 49.7\%$) (Table 4.4). As noted by key informants the destruction of assets and livelihood resources by the armed conflict, in addition to the wobbly economic, social, and political environments, has meaningfully influenced the ability of affected households to recover their economic and social positions in post-conflict settings. In conformity to this, a joint report from FAO and WFP revealed that despite progresses in security, the food insecurity situation in most conflict affected area continued its downhill spiral with millions of people in need of urgent food, nutrition and livelihood assistance in 2020. Conflict-related destruction of livelihoods and disruption of agriculture, markets and trade flows drove this deterioration for example in South Sudan (FAO & WFP, 2021)

The distribution of the HFIAS score (Table 4.4) shows a similar finding to that from the FCS score. According to the HFIAS score, before the onset of the conflict, 33.6 and 25.9% of the rural and urban households were severely/food insecure, respectively. However, at the time of the conflict, the number of food-insecure rural and urban households rose by 247 and 281%, respectively. A similar finding was reported by (Weldegiargis *et al.*2023). In their study of food

security and armed conflict in Tigray, they noted that 84.6% (by HFIAS) of households in Tigray were food insecure during the Tigray war. The augmented occurrence of household food insecurity and increment of food insecurity conditions were mainly due to the disturbed production and economic activities of the households accredited to the armed conflict. As reported by the Key informants, livestock was slaughtered and/or plundered, production highly dropped, poultry out-growers were interrupted, and milk processes were disturbed implying that the armed conflict worsened household food insecurity by affecting the quantity, quality, and affordability of food in the study communities. After the conflict, the food security status in the study area improved. The proportion of rural and urban households that fell under the severe category was 65.1 and 61.2%, respectively (Table 4.4).

The analysis of household FCS and HFIAS by gender reveals significant differences across different time periods. Before the conflict, the proportion of male-headed households classified as food insecure was 20.1%, while female-headed households were higher at 29.4%. However, these figures changed drastically during the conflict. The percentage of food-insecure female-headed households rose to 78.8%, nearly three times the pre-conflict level. Similarly, male-headed food-insecure households increased to 63% during the conflict (Table 4.4).

An independent sample t-test (Table 4.5) further confirmed that female-headed households experienced significantly higher food insecurity during the conflict (1.26 ± 0.538) compared to male-headed households (1.43 ± 0.598), with $F = 13.72$ and $P < 0.0021$. Although some improvement was observed after the conflict, food insecurity remained high for both groups, with 58.8% of female-headed and 46.2% of male-headed households still classified as food insecure. Food security analysis studies also confirmed that females are highly exposed to food insecurity. For example, FAO in its report revealed that women and girls are more food insecure and more susceptible to food insecurity than men in every province of the world (FAO, 2023). Similarly, a report from IPCC (2023) noted that due to gender rules and roles and growing male migration in starvation hotspot countries, food insecurity upsurges burden and duty of obtaining food on women and girls. Drivers of this gender gap are multifaceted and aggravated by factors including conflict, climate change, poverty and financial crises (Carter & Kelly, 2021, UN & World Bank, 2018, Bahgat et.al, 2017).

When the effect of the conflict is evaluated by livelihood zones, the worst food insecurity situation was observed in households from the NWE livelihood zone during the conflict time. According to FCS score results, during the time of the conflict most of the households (71.3%) from the NWE livelihood zone were food insecure (Figure. 4.2).

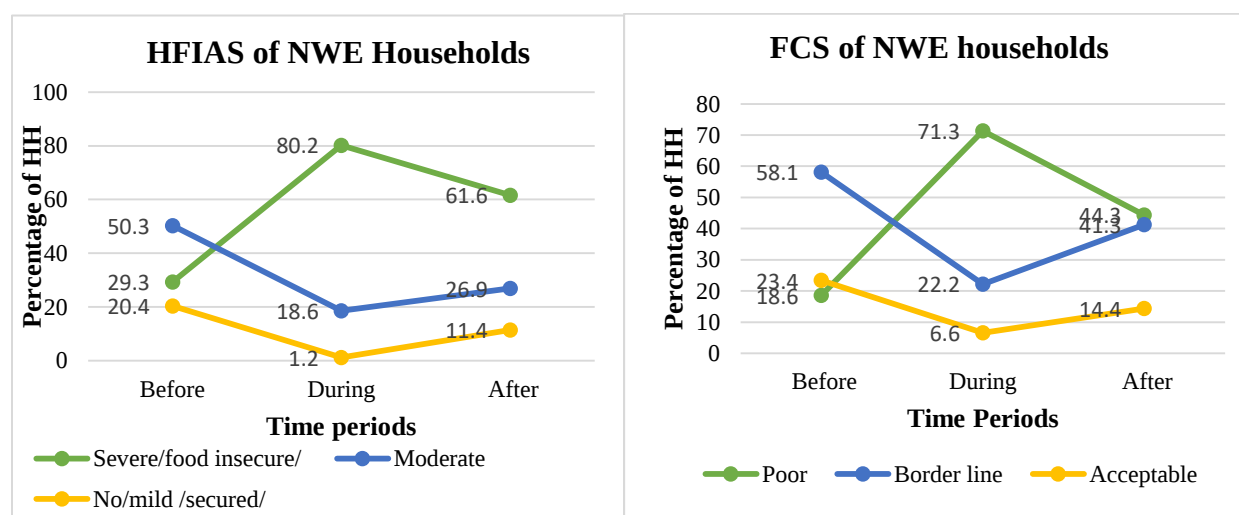


Figure 4.2. Household FCS and HFIAS computation results in the NWE livelihood zone over the three time periods

With similar pattern, a large proportion of the sampled households (80.2%) were severe/food insecure with consideration of the HFIAS score results (Figure.4.2). This was probably mainly because a very destructive fighting was held in the NWE livelihood zone compared to the other livelihood zones. Households in the area of under destructive conflict are severely food insecure than those households in the normal conditions. This is because the devastating nature of the conflict, the time the conflict stayed in the area, and the nature of the weapon employed in the conflict area have determined the households' economic situation of the area.

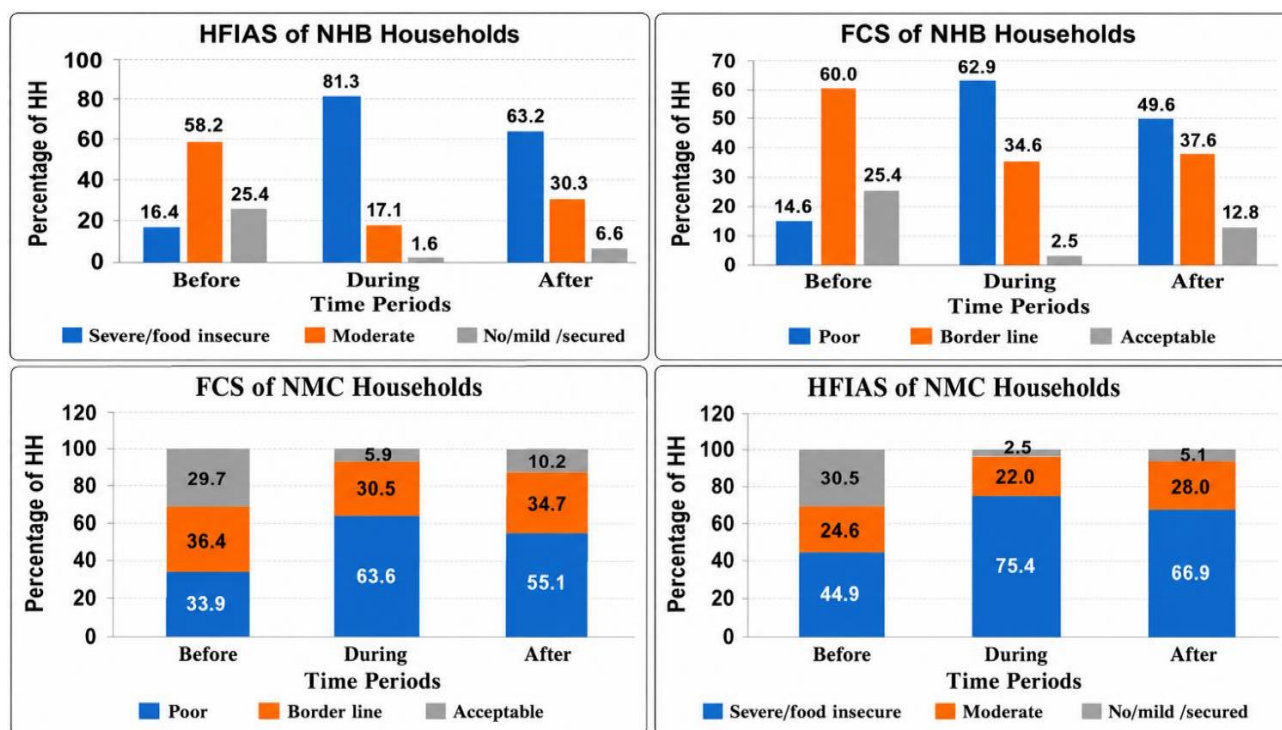


Figure 4.3. Household FCS and HFIAS computation results in the NHB and NMC livelihood zone over the three time periods.

Households from the NHB and NMC livelihood zones equally suffered from food insecurity at the time of the conflict. As can be seen in Figures 5.4 81.6 and 75.4% of the households from the NHB and NMC livelihood zones were correspondingly food insecure (with respect to HFIAS) during the conflict period. The FCS result also confirmed that 62.6 and 63.1% of the households in the foregoing respective livelihood zones experienced food insecurity during the period of the conflict (Figure. 4.3). After the conflict, there was a slight difference in the households' food security status over the three livelihood zones. Nearly 62, 63, and 67% of the households from the NWE, NHB, and NMC livelihood zones respectively were food insecure (Figure. 4.2 & 4.3).

4.3.2. Comparison of food insecurity between the peace and conflict times

Household access and concern to variety, affordability, quantity, and quality of foods are furthermore analyzed for the peace and conflict times. Accordingly, households have witnessed a lessening in food quality, variety, or quantity because of laughable capitals or resources. During the time of the conflict, 82.4% of the households reported that they were concerned that enough food may not be available in the household. On the other hand, 79.7% of the households were not able to eat preferred foods. However, before the conflict, only 20.3 and 14.9% of the households

were worried about the availability of enough food and were not able to eat preferred foods, respectively (Table 4.6). Moreover, households were obliged to consume a few kinds of foods, smaller meals, and skip meals at the time of the conflict. A substantial proportion of households had no food of any kind to eat (63.3%) and went a whole day and night (58.5%) without eating any food suggesting the severity of the armed conflict-induced household food insecurity. A similar finding was reported by Azad & Kaila, (2018) . In their study of food insecurity in conflict affected regions in Nigeria, Azad and Kaila found that 79, 71 and 74 % of the households in the northern and southern parts of the country were, respectively not able to access enough food of any kind to eat during the conflict(Azad & Kaila, 2018) .

Table 4.6. Percentage comparison of food insecurity access-related conditions between the peace and conflict times

HFIAS questions	Before the conflict (%)				During the conflict (%)			
	1	2	3	4	1	2	3	4
Have no enough food to eat	26	28.7	15.7	4.6	8	9.5	49.7	32.7
Not able to eat nutritious food	43.8	17	10	4.9	5	12.6	30	49.7
Eat only few kinds of food	32.5	17	19.8	5.9	11	26.6	24.5	41.7
Skip meals	32.7	27	12	2.8	18	2	31	47
Eat less than you thought you should	40	18	13.6	3.4	2.3	15	36	43.8
Household ran out of food	35	18.8	17.5	3	2.8	23	24.5	147
No food to eat of any kind	37.6	16.5	17.5	3	5.6	22.4	28.6	34.7
Hungry but did not eat	37	20.8	14.6	2.6	4.8	23.7	35.8	34.7
Go a whole day and night without eating	41.5	23	9	1.8	33.5	4	33.5	25
Food price market was unaffordable	45	33.5	17	3.4	5.4	13.9	31.9	48
Not to find the food that you needed in the market?	87.6	11	1	0	19.8	1.3	50	27.8
Worried about the bad quality of the food	34	25	10	5.4	12.8	4.9	64.6	16.7
Unable to get food in the market due to transport	88	10.8	1	0	5	14	17.8	62

Note: 1: Never; 2: Rarely; 3: Sometimes; 4: Often

As learned from FGDs, households faced a serious deficiency of physical and financial access to adequate food due to the fighting and siege. The unaffordability of food and insistently high levels of poverty sustained keeping the people not to reach to the foods in the study districts. Food prices were unaffordable for 79.9% of the households at the time of the conflict (Table 4.6). Azad

and Kaila revealed that food prices were foremost causes of food insecurity during conflict times in the aforementioned regions of Nigeria (Azad & Kaila, 2018) . One urban NHB FGD participant narrated his experience for the study area as:

Before the conflict, the price of a kilogram of *teff* was ETB 45. However, in 2020–2021, it rose sharply to ETB 100, and following the conflict, it further increased to ETB 135. The cost of food items has escalated significantly, with some prices doubling or even tripling. For instance, while a 5 kg sack of rice previously cost ETB 150, the current price for just one kilogram has reached ETB 110.

This practical evidence on price effects of armed conflict reported an upsurge in prices of staple food. Justino , in his study of impact of armed conflict on household welfare stated that the demolition of roads, bridges and other infrastructure rise the transaction costs for households involved in market exchanges and, in extreme cases, result in a return to subsistence activities (Justino, 2011).

4.4. Conclusion

This study explored the conflict-induced household-level food insecurity in the conflict areas of northeastern Ethiopia. Questionnaire surveys, FGDs and KIIs, were used to collect data. FCS and HFIAS tools were employed to measure the food security status of the households in the conflict and peace times. The result confirmed that food insecurity was the major problem for both rural and urban households in all the three time periods. However, the degree of food insecurity was severe at the time of the conflict. This study also demonstrates that while food insecurity is a persistent, systemic challenge in northeastern Ethiopia, violent conflict acts as an acute catalyst that drastically escalates and prolongs the crisis. The dramatic tripling of food-insecure households during the active conflict phase highlights how rapidly warfare dismantles local food systems. More importantly, the fact that nearly half of the surveyed households remained food insecure well after the active fighting ceased underscores a critical truth: the destabilizing effects of conflict on food security are not transient. They leave a deep, lingering scar on household resilience that persists long into the post-conflict period.

The findings further reveal that conflict does not affect all populations equally; it exacerbates pre-existing spatial and livelihood vulnerabilities. Rural households bear the brunt of the shock due to their direct dependence on climate-sensitive agriculture and localized supply chains, with the North Wollo East plain (NWE) livelihood zone emerging as a critical pocket of extreme

vulnerability. Ultimately, this research concludes that conflict fundamentally alters household economic behavior, forcing families into a destructive cycle of asset depletion and unsafe survival strategies that severely hinders their long-term recovery.

To break this cycle, interventions by governmental and non-governmental organizations must be multi-phased and context-specific. In the immediate aftermath of conflict, prioritizing direct food aid is paramount. Providing reliable safety nets ensures that affected communities can meet their basic caloric needs without being forced to sell off productive assets (such as livestock or tools) or engage in high-risk coping mechanisms.

Parallel to immediate relief, long-term recovery efforts must focus on systemic restoration. This includes rehabilitating rural livelihoods by providing essential agricultural inputs, accessible credit services, and targeted financial support to help households reinstate lost materials and restart disrupted business activities. Finally, physical reconnection is vital; rehabilitating key infrastructure, such as roads and market centers, is essential to link rural producers with urban consumers, thereby restoring local economies and ensuring sustained access to essential services.

CHAPTER FIVE

5. Food insecurity coping strategies in conflict affected areas of Northeastern Ethiopia

Abstract

Albeit various factors are responsible for the rise of food insecurity and hunger at the global level, conflict has been identified as a key driver. The recurrent conflict in most developing countries leaves food insecurity a serious concern. Though little is known, the fact that many households in the conflict-affected areas are considered to be food insecure raises the question of how these households survive conflict-induced food insecurity. This study therefore, assessed the coping strategies employed by households in conflict affected areas of north eastern Ethiopia. Data were collected using questionnaire survey on 388 households, nine Focus Group Discussion, and 15 key informant interviews. Mixed research design was employed. The major finding of the study revealed that food insecurity were high (66.5%) during the conflict time. Compared to urban households, rural households are more vulnerable to food insecurity in the conflict affected areas. Similarly, female headed households were more food insecure than male headed households in the conflict context. Additionally, eight major categories of coping strategies were identified. Some of the strategies implemented in the conflict affected study areas for example fasting, and eating traditional foods usually were unique to the conflict contexts. Relying on the economic conditions of the nations, coping strategies practiced by households in the conflict affected area differ from country to country.

Keywords: Conflict affected areas; Coping strategy; Food consumption score; Food insecurity; Ethiopia

5.1. Introduction

Despite significant global efforts to eradicate hunger and poverty, global food insecurity levels have remained alarmingly high. In 2023, approximately 733 million people worldwide faced hunger, equating to one in eleven individuals; in Africa, this vulnerability is even more acute, affecting one in five people (WHO, 2024). While multiple structural factors drive this global crisis, armed conflict has been identified as the primary catalyst (FAO, 2017; WFP, 2017). Empirically, the world's most catastrophic food crises are systematically concentrated in zones of active warfare. For instance, Muriuki et al. (2023) reported that all nations experiencing famine conditions in 2020 were plagued by conflict. Similarly, FAO et al. (2017) observed that over 50% of the world's 815 million undernourished people, and 122.45 million of the 155 million stunted children, resided in conflict-impacted countries.

When violent conflict dismantles local food systems, vulnerable populations are forced to actively negotiate these shocks to safeguard their survival. Micro-level scholarship emphasizes that households are not passive victims during crises; rather, they act as active negotiators who implement deliberate, dynamic coping mechanisms to mitigate risk and reduce systemic susceptibility to adverse events (Christiaensen and Boisvert, 2000; Béné et al., 2012; Levine et al., 2011). In food security literature, these behavioral responses are categorized into two distinct operational frameworks: Livelihood-Based Coping Strategies: Long-standing structural adjustments involving household income generation, expenditure modifications, and asset management (WFP and REACH, 2016). Food Consumption Coping Strategies: Immediate, short-term dietary compromises used to endure acute, daily food shortages.

Despite the critical nature of these survival mechanisms, empirical understanding of how households behave within active warfare zones remains remarkably limited. As Justino (2012) uncovered, there is minimal understanding of what specific measures individuals take in reaction to conflict-induced food shortages, and how their ultimate well-being is influenced by these real-time survival decisions.

This knowledge gap is highly visible in Ethiopia. Following the political tensions and delayed parliamentary elections of 2020, a devastating civil war erupted in November 2020, with prolonged hostilities heavily impacting the Amhara region most notably the North Wollo Zone. While food insecurity coping strategies have been widely studied across various Ethiopian

contexts, existing literature focuses almost exclusively on non-conflict shocks. These include climate-induced food insecurity in the drought-affected Lasta District (Gebremariam et al., 2019), drought coping mechanisms in Tigray (Weldemariam et al., 2023), and urban economic strains among pensioners in Jimma Town (Misgana et al., 2018). Crucially, none of these studies isolate or address conflict as the primary driver of food deprivation.

This chapter directly addresses this empirical omission by analyzing the behavioral responses of households in the conflict-affected districts of northeastern Ethiopia. To provide a rigorous, non-redundant assessment, this chapter is designed to: Investigate and catalog the specific consumption and livelihood-based coping strategies unique to the conflict situation and compare and contrast these locally observed strategies with empirical evidence implemented in other conflict-affected countries globally.

By structuring the analysis around these explicit aims, this chapter eliminates the conceptual repetition common to the study of food shocks. Ultimately, this knowledge provides essential micro-level insights to enhance early warning systems, humanitarian targeting, and post-conflict policy interventions aimed at restoring resilient food systems in volatile regions.

5.2. Data and Methods of Analysis

The various food insecurity coping mechanisms pursued by households to ensure the food security of their families and their feasibility were explored using qualitative method. Qualitative data generated through Focus Group Discussions (FGDs), and Key Informant Interviews (KIIs) were analyzed using thematic analysis. Thematic analysis is a systematic qualitative analytical technique used to identify, organize, analyze, and interpret recurring patterns or themes within textual data (Braun & Clarke, 2006). The method was selected because it provides a flexible and rigorous approach for exploring participants' experiences, perceptions, and responses to conflict-induced food insecurity.

The analysis process involved several stages. First, all interview and discussion notes were reviewed repeatedly to achieve familiarity with the data. Responses obtained from FGDs, and KIIs, were carefully transcribed, organized, and categorized according to the study objectives. Second, initial codes were generated by identifying important statements, concepts, and experiences related to livelihood disruption, food insecurity, coping mechanisms, resilience

strategies, and post-conflict recovery. Third, similar codes were grouped together to form broader categories and themes.

Particular attention was given to identifying themes associated with household coping mechanisms adopted during periods of conflict-induced food insecurity. These included food consumption adjustment strategies (such as reducing meal frequency and portion sizes), food-access strategies (borrowing food or money, relying on social support networks, and receiving remittances), asset-based coping strategies (selling livestock, productive assets, and household belongings), and livelihood adaptation strategies (engaging in casual labor, petty trade, migration, and livelihood diversification). The analysis also explored participants' perceptions of the effectiveness, sustainability, and long-term consequences of these coping responses.

The identified themes were subsequently compared and triangulated with quantitative findings obtained from household survey data. This integration enabled the study to examine not only the prevalence of coping mechanisms but also the underlying reasons for their adoption and their implications for household livelihood resilience. The qualitative findings therefore complemented the quantitative results by providing contextual explanations of how households experienced conflict-induced shocks, managed food shortages, and attempted to restore their livelihoods during the recovery period.

The final themes were organized around the major dimensions of the study, including conflict impacts on livelihood assets, livelihood strategies, food security outcomes, coping mechanisms, and household resilience capacities. Representative quotations and narratives from participants were used where appropriate to illustrate and support the interpretation of findings.

5.3. Result

5.3.1. Coping strategies adopted by households in the study districts

As mentioned earlier, due to food insecurity in the study districts, households adopted several coping strategies, which can be classified into eight categories: food compromising, asset compromising, budgeting, borrowing and renting, changing employment and income generation, relying on food aid, utilizing local cooperation, and migration.

5.3.1.1. Food compromising

In response to food insecurity, households adopted various strategies that compromised their food quality. During both the initial phase of food scarcity and extended times of food

deprivation, food coping strategies were displayed in various forms, such as decreasing the number and size of meals consumed by the entire family; consistently reducing meal portions; and opting for less desirable foods. Adults were seen consuming limited amounts of food and missing some meals in order to provide for their children. Nearly all FGD participants, from both rural and urban regions, agreed that the initial month of the war did not see a food shortage. Nevertheless, after a month, everything changed completely. One FGD member from the NMC livelihood zone described his experience as follows:

Before armed groups opposed to the government took control of our district, I had provided enough food for a month. I anticipated that the war would not endure for a long time in the region. My family and I did not encounter any issues until we finished the stored meals. Nevertheless, after a month, we had consumed all our stock, and we found ourselves in serious trouble (May 2023). Many households did not anticipate that the conflict would endure for an extended period in the region. As a result, they did not keep additional food items for extended durations. As the war persisted and the region came under control of rival armed factions, they started to employ different tactics to compromise food supplies. FGD participants indicated that the primary and most frequently employed strategy was to decrease the number of meals and lessen the portions for all members of the household. During the FGD sessions, the households illustrated their situation by showing that nearly all households in the study districts reduced the number of meals.

I didn't anticipate a lengthy war, yet it turned out to be one. The amount of food our family had decreased over time. Initially, we started cutting the number of meals we had in one dish by 50%. As the war persisted, we found ourselves consuming only one type of food, and as the war dragged on, we began to decrease the quantity of food we consumed (FGD participant in NWE livelihood zone. May, 2023)

Oh God, there is nothing that compares to peace. I consistently give thanks to God when I recall what my family and I endured during the conflict. Every night after we put our children to bed, my wife and I always discuss and try to find a solution to the problem. One evening, she informed me that starting the next day, we must cut our food intake in half. I had no option but to voice my discontent as I lacked sufficient cash to cover the meal (FGD participant from urban NHB livelihood zone, May 2023).

When the war continued further, households began to use other food-compromising strategies. In some households, the adults ate less than normal to feed children, and in others, the children

were given priority over adults. A FGD participant from the NHB livelihood zone narrated her experience as:

Five years ago, my husband passed away. I have three kids; one of them is somewhat older, so he comprehends my circumstances while the younger ones do not. In certain situations where there isn't enough food at home, the older individuals and I wake up in the morning, pray, drink a glass of water, and forgo breakfast to provide for the younger ones. Uffffff There is nothing worse than witnessing children suffer from hunger (May 2023).

Another food-compromising strategy adopted by households in the conflict-affected area was eating traditional and lower-quality foods more often than usual. Among these traditional foods are 'Kollo' and 'nifro', which are made using chickpea, beans, barley, and wheat grains. In the pre-conflict period, it was typically consumed during the coffee ceremony or once a month. Eating it for breakfast, lunch, or dinner was unusual, but during the conflict period, most households consumed it daily, serving it as lunch, breakfast, or dinner.

My neighbor was financially struggling. Prior to the conflict, she was sustaining her life through small-scale trading. Nevertheless, throughout the duration of the conflict, she entirely ceased her work. She was under a lot of stress and facing difficulties. In the morning, I would always see her eating 'Kollo'. Occasionally, when my husband allows, I offer her what we prepared. However, it was challenging to provide her with support at all times. I promise you, she was physically declining month after month, but after the ceasefire, thank God, she is well (FGD participant from rural NMC livelihood zone, May 2023).

The other most important food-compromising strategy was encouraging young people to fast and pray. Before the conflict, youngsters were reluctant to fast and pray. A FGD participant from the NWE livelihood zone narrated her experience as follows:

Prior to the conflict, my two sons (aged 15 & 18) did not observe fasting. Nevertheless, during the conflict, I informed them about the significance of fasting. To put it bluntly, the recommendation was solely to preserve our food. Nonetheless, even after the war, they maintained their fasting and grew very devout.

In several households, technical reduction of food portion size (altering the consistency of food, i.e., making portions thinner) and mother buffering were also utilized. I had never encountered such a thin *injera* as the one my neighbor baked before. One FGD participant stated that it was indeed very thin, but she lacked other options to provide *injera* for all her family members. The quality of food became a problem as the opponent armed group took control of all the districts, preventing them from importing high-quality food from other markets. In addition, markets were supplied with extremely low-quality and even expired food products. Regarding the key

informants, the conflict led to a significant food supply shortage in the market. Even those affluent city homes struggled to locate quality food in the market. Participants of the FGD observed that these food-compromising strategies affect food consumption in both qualitative and quantitative ways and pointed out that these strategies were the final option for households to ensure their survival. According to FGDs, food-compromising strategies were the first steps they had adopted in order to overcome crisis situations, and those were easier to adopt compared to the other strategies, as described below.

5.3.1.2. Asset compromising

The other most common coping strategy households used during the conflict period was selling assets to reduce the effect of food insecurity. This included selling livestock, jewelry, and other necessary materials and devoting the saved finances in order to meet household costs (including food) or to escape to safer areas. One household described this situation in the following way:

Prior to the war, I owned eight goats. At the onset of the war, it was challenging to obtain cash; cash for groceries and other essentials. During the period of conflict, I had to sell five of my goats for cash, albeit at a low price. It was quite beneficial for me back then, however, the amount I sold them for was very low (FGD participant from rural NWE livelihood zone).

Throughout the conflict, in our district, the prices of everything became unaffordable and soared significantly. Food and food items have become quite costly. My family and I could not obtain cash to meet our requirements. Furthermore, my wife had a baby, and the newborn was at home. I was desperately in need of money. Consequently, I had to sell the ox to manage the economic issues caused by the conflict (FGD participant in NMC livelihood zone, May, 20203).

The gold that I received as a gift from my mother was 24 karat and weighed 4.8 grams. During the conflict, there was no money at home to buy food for my three daughters. Consequently, I had to part with my cherished gift from my mother (crying). I take an oath by the name of Allah. I believe I replaced my mother with money, and I often weep when I recall it (FGD participant from urban NHB livelihood zone, May 2023).

However, the sale of assets was not entirely motivated by the expenditure needs of households. For instance, certain urban families sold their high-end possessions due to concerns following robberies of affluent household members. Conversely, certain rural families sold their livestock in desperation to prevent others from taking their animals (key informant interviewee).

Conversely, certain households reported that they had allocated their financial savings (cash kept at home) to purchasing food during the conflict.

I have saved cash at home for emergency situations. While the conflict was ongoing, I discovered 5000 ETB when I opened the savings box. I used nearly all my savings to buy food for my family, leaving nothing behind, but now, thank God, I am back in my old teaching position, my salary has returned, and the situation is not too bad (FGD participant from urban NWE livelihood zone, May 2023).

In general, asset-compromising strategies deteriorated households' economic situation in the future and were implemented only in life-threatening situations.

5.3.1.3. Budgeting

Many budgeting strategies have been identified. Almost all FGD members said that they had cut down on non-food items in order to provide for household food and medical treatments, with one household stating: "The household's budget goes almost all on food and medical treatment; there is not enough left. Buying clothes and other materials was completely unexpected in our home".

A further effective approach involved decreasing the quantity of food bought for home use. In the pre-conflict period, the majority of households would purchase more food than they needed. In many instances, this surplus food was either wasted or distributed to those in need. In the post-conflict period, most households, however, made an effort to minimize food waste.

Prior to the conflict, the meals our family cooked for a month always took the guests into account as well. The lunch prepared for our home can assist other households. My wife was not happy unless the food was lavishly displayed on the table. Nevertheless, throughout the conflict, everything shifted in line with the plan and the count of household members. Due to the rationing of food consumption, the pressure on household budgets is forcing us to reduce food waste as well (FGD participant from urban NWE livelihood zone, May 2023)

Other households saved money for food by cutting expenses on luxury goods. For instance, some households sold their smartphones and purchased cheaper ones.

I sold my A32 smartphone, a present from my daughter sent from Saudi Arabia, and bought a less expensive button phone at a lower cost. I was aware that the price of selling the smart phone was low, but I managed to save around ETB10, 000, which I utilized for family costs related to food and medicine (FGD participant from urban NWE livelihood zone, May 2023)

As previously noted, this coping strategy was not solely influenced by household spending and consumption needs. Some households were motivated by the fear of robbery or being kidnapped for ransom.

5.3.1.4. Borrowing and renting

Certain households took steps like borrowing funds from friends or family and purchasing groceries on credit. These strategies were primarily adopted by households with larger family sizes. As all banks and financial services shutdown and a significant cash shortage occurred, the majority of households in the region had to take out loans and purchase items on credit.

Unexpectedly, this conflict also allows us to identify who is good and who isn't. I was anticipated to guide all seven members of the family. Throughout the conflict, I was in dire need of cash to stay alive. My home was empty, and I felt much stressed. I had no other options. I requested some money from my wealthiest neighbor, but he declined to lend me any. Nonetheless, the person I had only known for a few days lent me money.

Rural FGD participants from the NWE livelihood zone mentioned that they had rented agricultural tools instead of buying them due to the high prices of agricultural equipment.

Prior to the conflict, I owned my own tractor. A month prior to our district coming under the control of the armed opposition, my wife and other family members urged me to sell the tractor. I have sold it. As a result, I had no choice but to rent a tractor when necessary due to the rising costs of tractors and harvesters following the conflict.

5.3.1.5. Changes in employment and income generation

This category encompassed both lawful and unlawful activities. Among the legal coping strategies was taking on additional technical jobs, as some of the FGD participants did.

Prior to becoming a teacher, I worked as a tailor. When I obtained a teaching job, I had set up my sewing machine at home. Throughout the conflict, every school in our district was shutdown. There was absolutely no source of income. Consequently, I have recently started my old job again and am earning a modest income, which assists me in meeting some of my family's needs. I am currently working as a part-time tailoring job.

Another positive strategy was that some household members started working in various jobs, which were considered the least expensive before.

Prior to the conflict, my son was extremely addicted and quite lethargic. He was not interested in doing any jobs. He just sat and chewed chats. He didn't help me at all. However, during the conflict, I was unaware of the reason, yet he began taking on different income-generating jobs, such as daily labor.

Regarding illegal or negative strategies, in some households, the youths stopped their university or school studies and joined military groups for income. However, this strategy had damaging consequences, such as losing some young family members.

I have lost two of my sons in the conflict. The younger was a grade 12 student, and the elder was a second-year university student. When the war started and approached our districts in 2021, they both joined the local

army to struggle. Actually, I don't really know whether they died or not because I didn't get any information about them either from the government or from the opposing armed groups. I am still hoping that at least one of them will return to see me, but none of them have yet returned home.

Women play a very significant but complex role in conflict and recovery. Similarly, in the study area, most men migrated to safer areas since most combatants killed the men in the area. According to key informants, a significant number of women engaged in unsafe and informal economies during the war just to survive themselves and their families. A FGD member from the NHB livelihood zone also stated that

Almost a month after our district fell under the control of the opponent armed group, my neighbor, who worked in a factory as a daily laborer, was highly stressed. She didn't have anything in her home. She was searching for jobs. She asked me to inform her if any jobs were available. Almost a week after our contact, I didn't know what she did, but she always dressed well, went out at night, and returned home early in the morning. She survived the situation.

Such negative coping strategies were mainly practiced by the most susceptible and severely food-insecure households, which did not have savings or assets. This strategy was their last option, as it was extremely dangerous.

5.3.1.6. Relying on food aid

Key informant interviews with the food officials revealed that, at the beginning of the conflict, there was some minor food relief for those in the refugee camps, coming mostly from UN organizations such as the WFP and the FAO. Those organizations provided some basic foodstuffs like wheat, oil, peas, and notorious foods for children. The provision continued until the ceasefire. However, the aid was provided only for those who were in the refugee camp and not for those who were in the surrendered areas. Some FGD members said that they had relied on food aid from the FAO and the WFP. A FGD member from the NMC livelihood zone noted that:

Almost all the people who left their place of residence as a result of the conflict settled in Debre Birhan (120 km away from the capital Addis Ababa). I swear to God, it seems like we were living in the market. There, the humanitarian organizations provided all the necessary materials, including foodstuffs, solar lights, mats, and others. I received food aid, including a bottle of oil, rice, wheat, peas, milk, and some biscuits.

However, there were also local charities and NGOs, which played significant roles in helping the conflict-affected households. These associations provided some basic foodstuffs, such as oil, sugar, tomatoes, rice, and flour, at reasonable prices as of key informants.

5.3.1.7. Using local cooperation

Various types of local cooperation are found in the study area. Cooperation like '*Edir*', '*Mahiber*', and others. They played many positive roles in household food security during the conflicts. For example, Mahiber and Edir leaders supervised the collection of donations and provided financial and food aid to households in need. Some households also mentioned the role of *edir* and *mahiber* leadership in resolving disputes, e.g., concerning the inheritance of lands and other lost assets after the conflict. An interview with religious leaders revealed that during the conflict, various religious-based organizations played a vital role in resolving the food shortage problem among the households in the area. The religious leaders also mentioned that the solidarity and cooperation between households and their friends, relatives, and neighbors had become stronger since the conflict had begun.

Social relationships here in Kobbo are very good. I realized that my neighbors quickly arrived than those of my relatives, who reside far away. We support each other. Particularly at the time of the crisis, we were together. We celebrated the holidays together. However, it is difficult to say that all the households did this at the time of the conflict (FGD participant from NMC livelihood zone).

Thanks to my neighbors, I and my three children overcame the situation in a good way. Sometimes, when I felt that we were putting them in trouble, I ordered my children to stay home and not go to the neighbors. At this time, very surprisingly, they sent their children to call us to go home and share everything they had at home. I have no words to express their benignancy. Let God pay them (FGD participant from NHB livelihood zone).

This local cooperation provision included food, medicine, gifts, and cash. However, this help did not fully cover all the food needs of the households. Some rural households use their social networks based on kinship and neighborhoods. For example, when faced with a labor shortage, they call it '*Jiggi*', doing someone's farm work together.

5.3.1.8. Migration

A commonly used coping strategy was temporary migration to areas less affected by conflict or to areas considered safer. Many households from the study livelihood zones moved to Dessie city. However, after a few months, Dessie itself was on the way to falling under the control of the armed opposition groups. As a result, households again fled to Debre Birhan city. The households mentioned that migration was their last choice, and this choice was made only under extremely compelling conditions.

In fact, the war was brutal, and the combatant forces bombed many towns and areas with huge weapons. People were afraid, and many of them fled to the adjacent non-conflict-affected regions and areas to protect women and children (FGD participant from NHB livelihood zone).

The information we gathered from different sources, including the government media, pushed us to consider them barbaric. We taught them that they would kill everyone they faced and rape women and kids. Hence, we were forced to leave our place and flee to other areas (FGD participant from NMC livelihood zone).

The households that fled to other non-conflict-affected areas found shelter under the auspices of both governmental and non-governmental organizations. Some households that had financial savings had rented houses with their own money, while other households had lived with their friends and relatives in Debre Birhan and Bahir Dar city. Key informants noted that almost all households had returned to their homes by the end of the conflict. They also noted that although migration had temporarily enhanced food access, the costs incurred in migration negatively affected household economic situations in the longer term, thereby affecting households' ability to buy quality foods.

The drivers of migration were, however, quite diverse and complex and were not always related to consumption problems (although this strategy did affect household food access). In addition to military violence, many households, in particular the wealthy ones, migrated to safer areas out of fear of kidnapping. Others, because of a lack of availability of medicines in their home towns. For example, a FGD participant from the NMC livelihood zone narrated his experience as follows:

A total of nine people were members of the household. Of them, my father and my wife's mother were sick of diabetes and hypertension. They regularly take medicines and need doctor follow-ups. Hence, before the war reached our district, I was forced to move to other safer areas with my father and my wife's dad just for their medical safety.

Table 5.0.1. Key words from the FGD session

Keywords/ phrases	Theme	Notes
Food compromising	Copping strategy	Reducing portion size, adults ate less than normal to feed children, skipping meals to stretch food supplies
Borrow money	Social coping strategy	Borrowing money or food stuffs from friends, family, or neighbors to meet needs.
Selling productive assets	Economic coping strategy	Selling or pawning assets to afford food.
Change in employment	Economic adjustment	Taking on new or additional work to cope with financial difficulties
Migration	Relocation strategy	Moving to areas with better opportunities or access to resource
Local cooperation	Community support	Relying on community network or informal support system to access resource
Food aid	External support strategy	Receiving assistances from food bank, NGOs or government programs
Budgeting	Financial management	Adjusting household budgets to prioritize food purchases over other expenses.

5.4. Discussion and Conclusions

The research sought to investigate the actions taken by households in conflict zones when confronted with food insecurity due to conflict and whether there are insights to be gained for measuring food security and interventions. In the conflict-affected northeastern region of Ethiopia, we discovered that the food-compromising strategies employed by households were remarkably similar to those observed in non-conflict situations and can be seen in coping-based food security assessment tools such as the Coping Strategy Index (CSI) and the Household Food Insecurity Access Scale (HFIAS). Similarities can also be observed in asset compromise, alterations in income-generating activities, budgeting and borrowing, dependence on food assistance, the utilization of local institutions (social capital), and migration. Households in conflict-affected areas also show similarities in adopted coping strategies. For instance, conflict-affected households in South Sudan, Libya, and Afghanistan implemented measures such as selling household assets, borrowing money or buying food on credit, selling productive assets, and cutting back on essential non-food expenses (Swesis, 2019; Sassi, 2021). Conversely, certain strategies were utilized in other conflict-affected regions that were not applied in our study districts. In South Sudan, coping strategies such as pulling children out of school and depending

on fishing, hunting, and foraging for wild foods were employed (Sassi, 2021), but these were not observed in our districts. While not every one of these measures was directly linked to consumption issues, they still affected household food security.

Presently, instruments such as the CSI and HFIAS solely encompass food-related coping strategies, thereby restricting their capability to deliver a thorough description of the behavioral reactions that could indicate food insecurity. Consequently, this research highlights the necessity of recognizing suitable local coping strategies in food security evaluations, as recommended by advocates of coping-based instruments such as the CSI (Maxwell et al., 2008). Certain coping strategies in the study districts, including systematic meal portion reduction, promoting fasting among the young and children, and the use of traditional foods (*Kollo* and *Nifro*), were not previously recognized in the literature on conflict-related coping strategies. Conversely, several strategies detailed in the literature, including fasting for whole days, having certain household members eat outside, begging, and migration, were likewise carried out in our study districts. In the same way, those strategies were put into action in South Sudan (Sassi, 2021), but they were not adopted in Libya (Swesis, 2020), suggesting that the coping strategies employed will differ based on the economic conditions of the nations. It is well understood that South Sudan and Ethiopia are both poorer countries in comparison to Libya. As a result, households in Ethiopia and South Sudan employed the most severe food insecurity coping strategies when compared to those in Libya.

Our research indicates that coping mechanisms in regions affected by conflict can have both detrimental and beneficial long-term effects on household welfare. For example, actions such as selling productive assets could be detrimental to a household. However, initiatives such as urging family members to fast, decreasing or eradicating workplace discrimination, and minimizing food waste are expected to positively impact household income and food security. Before the conflict, the awareness and practice of engaging in any income-generating work were minimal. Nevertheless, amid the conflict, the young individuals who were heavily reliant on chat found motivation from their families and began engaging in jobs that generated income. Previous research overlooked these constructive elements of coping strategies. Consequently, the finding highlights the necessity of integrating the distinctive and cross-cultural coping strategies observed in conflict-affected regions into the current coping strategy assessment.

In most quantitative metric measures such as CSI and HFIAS, the primary motive for food-related coping is simply 'lack of money or resources'. For instance, in both instruments, the participants are questioned about their actions when they lack sufficient funds or resources to purchase food. Nevertheless, this study discovered that the adoption of coping strategies might not always stem from a 'lack of funds', particularly in the context of conflict situations. For instance, certain affluent households in urban regions had to rely on inferior food items solely because of a market supply shortage caused by the conflict, rather than a lack of resources. Consequently, focusing solely on monetary-related stresses neglects other aspects of how conflict affects food accessibility and may present an incomplete view of food insecurity during conflicts. Therefore, this kind of emphasis might not be adequate, especially in conflict situations.

CHAPTER SIX

6. Household Livelihood Resilience to Food Insecurity in the Conflict Areas of Northeastern Ethiopia

Abstract

The recently recorded food insecurity problems everywhere are believed to be the direct results of conflicts. This study examined household livelihood resilience to food insecurity in the conflict areas of northeastern Ethiopia. The study assessed before and after conflict time periods to analyze the impact of conflict on households resilience to food insecurity. SHINY RIMA (Resilience Index Measurement and Analysis) tool, developed by the Food and Agriculture Organization were used to measure households' resilience to food insecurity. Descriptive statistics and Analysis of Variance were used to analyze the data. The major finding confirmed that, the resilience index exhibits a substantial decline after the onset of conflict. Prior to the conflict, the overall average resilience capacity index (RCI) was 61.37. However, post-conflict, the RCI dropped sharply to 36.51. Assets, adaptive capacity and social safety-nates are the most important factors affecting households' resilience to food insecurity. The results also revealed that both rural and urban households resilience capacity were significantly affected by conflict, with female-headed households experiencing the most severe decline (30.5) in resilience. Resilience capacity variations were also seen among the study livelihood zones. Households from Northeast Midland Mixed Cereal Livelihood Zone are more resilient (38) than the other two livelihood zone households. One- way ANOVA result also confirmed the mean difference in RCI among the three livelihood zones ($df = 2$, $F = 296.5$, $p < 0.00$). The result suggested that any project aiming at improving households' resilience to food insecurity in conflict affected area should give attention in promoting livelihood diversification and encouraging households to engage in multiple income-generating activities, both agricultural and non-agricultural, which can reduce their vulnerability to shocks. Improving access to productive resources is another essential step. Targeted interventions that address gender-specific needs should also be prioritized.

Keywords: Conflict; Food insecurity; Households; Livelihood resilience; Shiny RIMA; Northeast Ethiopia

6.1. Introduction

Conflict remains one of the most significant drivers of food insecurity worldwide. Violent confrontations not only disrupt agricultural production and market systems but also undermine years of developmental progress by destabilizing livelihoods and pushing communities deeper into poverty. According to projections, by 2030, nearly two-thirds of the world's poorest populations will live in conflict-affected regions (Mercy Corps, 2021). Conflict-induced disruptions such as the destruction of farmland and livestock, displacement of populations, and damage to water sanitation infrastructure disproportionately impact vulnerable groups, especially women and children, exacerbating malnutrition and limiting access to food (FAO & WFP, 2021).

Ethiopia has not been immune to these challenges. The armed conflict that erupted in November 2020 between the Tigray People's Liberation Front (TPLF) and the Federal Government has severely affected the northern regions, particularly Tigray and the adjacent Amhara Region. The violence has disrupted the agricultural season, displaced hundreds of thousands of people, and caused a breakdown of both rural and urban livelihood systems (USAID, 2021; Human Rights Watch, 2021). These disruptions have significantly weakened local economies and food systems, threatening food security across both farming communities and urban centers.

In this context, household livelihood resilience - the capacity of households to absorb, adapt to, and recover from conflict-related shocks - has become a critical area of concern. In northeastern Ethiopia, rural households traditionally rely on subsistence farming, livestock, and informal networks, while urban households depend on small businesses, daily wage labor, and public services. The ongoing conflict has eroded these coping mechanisms by damaging infrastructure, limiting mobility, fragmenting social support systems, and reducing income opportunities. Many households in both settings have become increasingly dependent on humanitarian assistance, with limited means for self-recovery (USAID, 2021). Understanding and strengthening household livelihood resilience in both rural and urban conflict-affected settings is therefore essential for informing interventions that support not just immediate survival but long-term food security and recovery.

Globally, few studies have directly addressed households' resilience to conflict-induced food insecurity. For example, Swesi (2019) conducted a study on household resilience in a conflict-affected area of Libya. However, this study lacked a clear methodology for identifying resilient

households within the conflict setting. Similarly, Alinovi et al. (2008) examined household resilience to food insecurity in the Palestinian context, but the study did not incorporate livelihood assets as a core pillar of resilience measurement. Brück et al. (2019) also explored the effect of violent conflict on household resilience and food security during the 2014 Gaza conflict. Yet, the study covered only a small population and suffered from sampling limitations due to security concerns during data collection.

Other studies have primarily focused on the relationship between conflict and food insecurity without a specific focus on resilience. For instance, Teodosijević (2003) analyzed the two-way relationship between armed conflict and food security - examining how conflict leads to food insecurity and vice versa. Similarly, Brück (2020) explored the links between food security and violent conflict in Somalia, emphasizing the cyclical nature of conflict and hunger.

As highlighted by these and other studies, a range of factors influence household resilience to food insecurity, and understanding these factors is crucial for informing policy interventions in conflict-affected settings. However, despite growing recognition of resilience as a key strategy for addressing food insecurity in Ethiopia, limited empirical research has focused on conflict-induced food insecurity specifically. Existing studies within Ethiopia (e.g., Demeke & Tefera, 2013; Mulugeta, 2014; Daie & Woldtsadik, 2015; Debessa, 2018; Getachew, 2021) have mainly examined resilience from the perspective of natural hazards such as drought and climate shocks.

These studies, while valuable, do not address the unique dynamics of food insecurity resulting from armed conflict. As such, there remains a significant gap in the literature regarding the status of conflict-induced food insecurity and the resilience capacities of affected households in Ethiopia. This study aims to fill that gap by examining household livelihood resilience to conflict-induced food insecurity in both rural and urban areas of northeastern Ethiopia. In doing so, the research contributes to a deeper understanding of the factors that shape household resilience in conflict contexts and offers practical insights for policymakers, development practitioners, and humanitarian actors working to support recovery and long-term food security in fragile regions.

6.2. Data Analysis Method

In order to assess resilience to food insecurity and understand the key determinant factors affecting households' resilience to food insecurity, this study employed the Shiny RIMA

(Resilience Index Measurement and Analysis) methodology, developed by the Food and Agriculture Organization (FAO). This approach was chosen for its multidimensional nature, which captures various socio-economic and structural factors influencing resilience. Given the focus of this study on the impact of conflict on food security, Shiny RIMA provides a robust framework to compare resilience levels in conflict and non - conflict situations. The resilience capacity of a given household at a given point in time is assumed to depend primarily on the options available to that household to make a living. Accordingly, the options are households' access to assets, adaptive capacity, Access to basic services and social safety-nets. These options represent a precondition for the household response mechanisms to a given risk, that is, its ability to handle it. Hence, Shiny RIMA applies a quantitative approach to measure resilience based on the four key pillars

In this study, resilience is considered as a latent variable defined indirectly, using resilience blocks or pillars. Therefore, these pillars are combined into a Resilience Index (RI) using a latent variable model, which estimates the contribution of each pillar to overall resilience. Therefore, to assess the resilience to food insecurity for the J^{th} household as a latent variable defined according to the following pillars of resilience: Assets (Asst), Access to Basic Services (ABS), Social Safety-Nets (SSN), and Adaptive Capacity (AC).

Algebraically it is stated as: $RJ = f(\text{Asst}_J, \text{ABS}_J, \text{SSN}_J, \text{and } \text{AC}_J)$

Where, RJ, is Resilience Index for J^{th} household

Asst_J = Asset of J^{th} household

SSN_J = Social safety net of J^{th} household

ABS_J = access to basic services of J^{th} household

AC_J = Adaptive capacity of J^{th} household

Since resilience cannot be measured directly, it is considered as a latent variable. In order to estimate resilience, it is therefore necessary to estimate separately all the pillars of resilience which are themselves latent variables because they cannot be directly observed in a given survey. Therefore, the indicators of each pillar was used to measure the pillars. Table 6.1 indicates the pillars and their corresponding indicators and measurement scales.

Table 6.0.1. Livelihood resilience determinant factors (latent and observed variables)

Pillars (latent variables)		Indicators (observed variables)	Measurement scale
Access to Asset (Asst)	Land size	-Land size in hectare	Continuous
	Livestock	- Number of livestock /TLU/	
	Television/Radio	- Access to TV/Radio households owned	
	House	- Number of house for rent and residence households owned	
Adaptive Capacity (AC)	Job diversification	- number of jobs HH heads engaged in	Continuous
	Loans	- Amount of loans HH received	
	Educational status	- Number of years HH heads attend for school	
	Income from other HH members	- Amount of income other HH members contributed to that HH	
Access to basic services (ABS)	Health service	- Distance to health service in K.m	Continuous
	School	- Distance to school in K.m	
	Clean water	- Distance to clean water in K.m	
	Market	- Distance to market in K.m	
Access to social safety nets (SSN)	Agricultural subsidy	- Amount received subsidies for agricultural input in Birr	Continuous
	Food subsidies	- Amount received subsidies for Food input in ETB	
	Government financial support	- Amount in ETB HH received from the Government	
	Cash transferred	- Amount of cash HH received from both formal and informal transfers	

*HH: Household; **km: Kilometer; ***ETB: Ethiopian Birr

Therefore, in measuring household resilience, Shiny RIMA processed survey data through factor analysis and structural equation modeling, and produced a composite index that allows for comparative analysis. Thus, the resilience index is estimated using a two-stage factor analysis strategy.

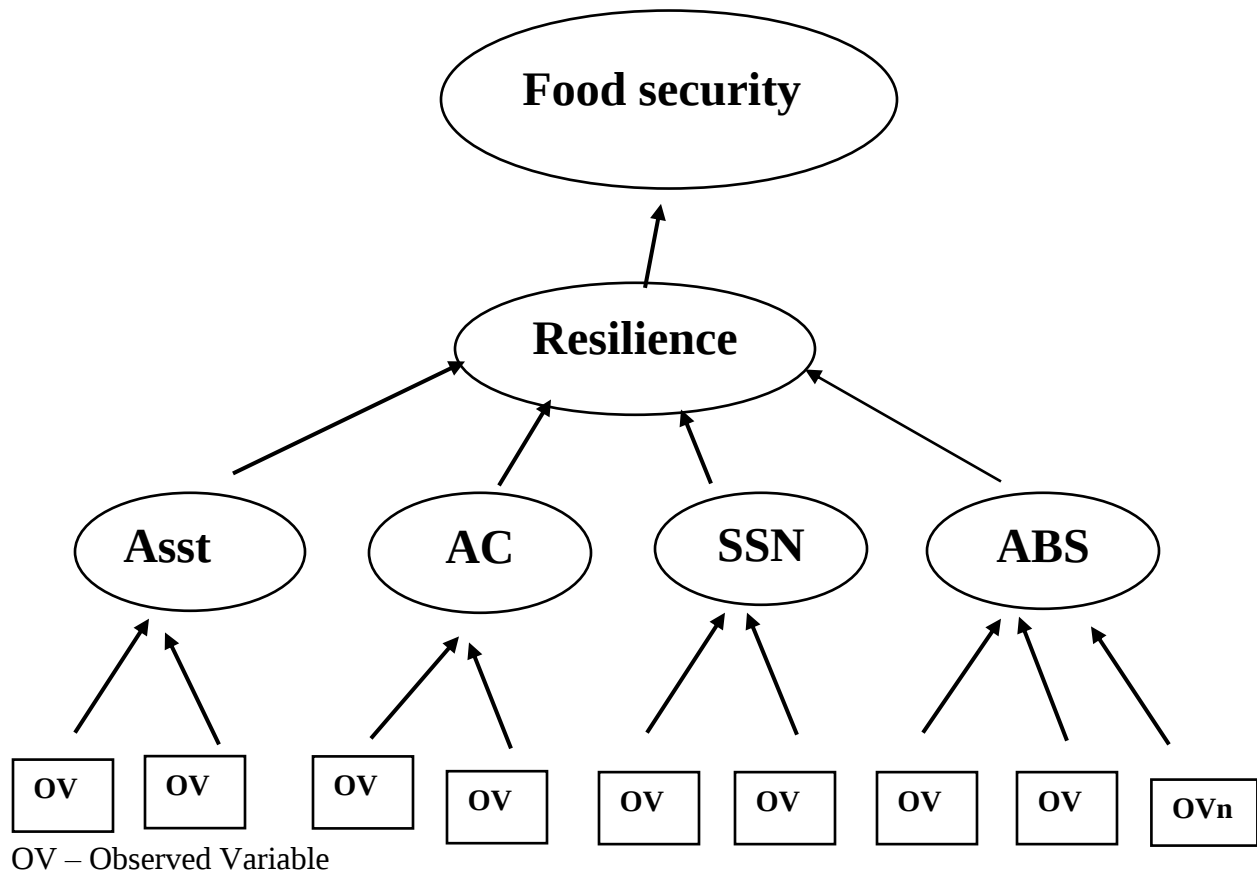


Figure 6.0.1. Path diagram of the household resilience model

Hence, resilience index is the weighted sum of the factors generated and specified as:

$$R_j = \sum_{j=1} W_j F_j$$

Where R_j is resilient of J household, W_j is the weight of variable j and F_j is the factor under consideration of the variable j . The weights are the proportions of variance explained by each factor. Finally, ANOVA was computed to see the mean differences in household's resilience level among the three livelihood zones.

6.3. Results and Discussions

6.3.1. Measuring household resilience to food insecurity using the Shiny RIMA approach

In Shiny RIMA dimensions, the first step was estimating the four determinant variables of resilience capacity through factor analysis model from observed variables. Secondly, the second stage of factor analysis is employed to predict a latent outcome, namely household resilience

capacity index (RCI) based on the four determinant variables. To calculate an index for the latent variable, factor analysis finds one or more common factors that linearly reconstruct the observed variables by predicting their correlation matrix. It then calculates factor loadings for possibly multiple common factors. These loadings are used to identify which common factor appears to be the one representing the concept being measured. Such identification takes place by examining the signs and magnitudes of the loadings. After identifying a common factor, the loadings are used to calculate the desired index, as a weighted average. Therefore, the first stage factor analysis is applied to estimate each resilience pillar distinctly. Thus, each pillar of resilience, namely adaptive capacity, asset, Social safety net and access to basic services are estimated distinctly as follows.

1. Access to basic services

Access to Basic Services (ABS) is one of the four latent variables in the RIMA (Resilience Index Measurement and Analysis) model framework, which contributes to enhancing households' resilience by enabling access to essential public services and infrastructure that support their ability to withstand and recover from shocks (d'Errico, 2017; Alinovi et al., 2010). To estimate this latent variable, indicators such as household access to health services, markets, schools, and clean water were used. In addition, the distance (in kilometers) travelled to reach the nearest basic services was considered as a key proxy in measuring access to basic services. Based on the results obtained from the Shiny RIMA tool, all selected indicators were retained in both time periods (before and after the conflict), indicating their relevance in explaining the Access to Basic Services latent variable (see Figure 6.2).

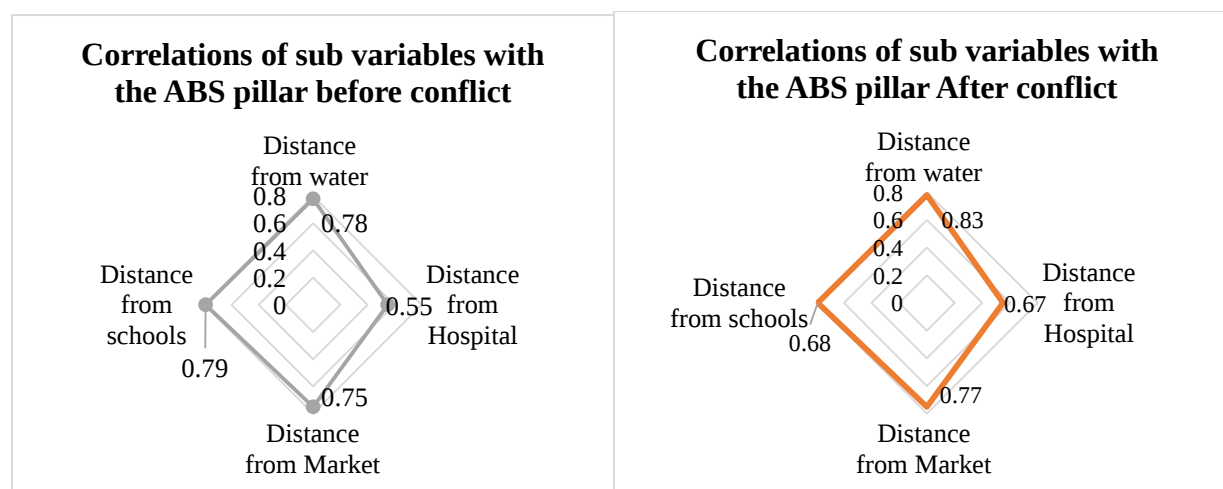


Figure 6.0.2. Correlation of observed variables with ABS pillar before and after the conflict

As shown in Figure 6.2, all observed variables exhibit meaningful associations with the latent ABS variable. The magnitude and direction of the relationships suggest that these variables are important contributors to the estimation of the ABS construct. Similarly, d'Errico et al. (2018) identified market access and infrastructure such as schools, health facilities, and roads as key components in explaining access to basic services. In the same vein, Ado et al. (2019) reported that variables including access to health centers, education services, markets, and distance to the nearest services are positively associated with the ABS latent variable. Overall, the findings indicate that access to basic services is closely linked to households' physical proximity to essential facilities. Shorter distances to key services such as water sources, schools, markets, and health institutions are associated with better access to basic services, both before and after the conflict.

2. Adaptive capacity

Adaptive capacity is a crucial determinant of household resilience, referring to the ability of households to adjust to and respond effectively to changing environmental, economic, and social conditions. Within the RIMA (Resilience Index Measurement and Analysis) model framework, this latent variable is represented by four observed indicators: income from other household members, job diversification, amount of loan received, and the literacy status of the household head.

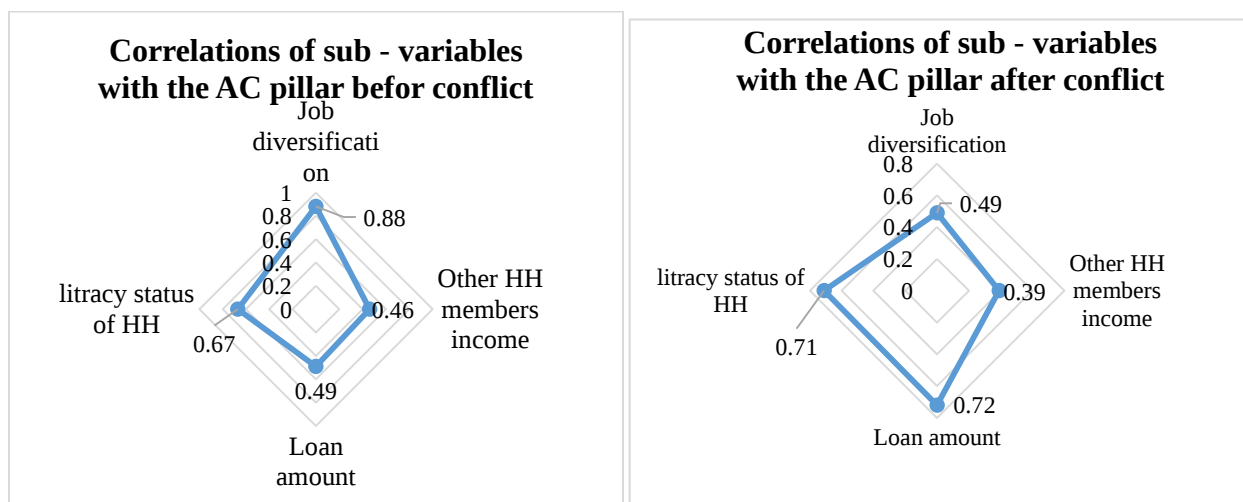


Figure 6.0.3. Correlation of observed variables with AC pillar before and after the conflict

As presented in Figure 6.3, all four observed variables show meaningful contributions to the Adaptive Capacity (AC) latent variable. The magnitude and direction of the loadings indicate

that income from household members, access to loans, literacy status of the household head, and job diversification are important components in explaining adaptive capacity. Consequently, all four indicators were retained for the estimation of the AC latent variable.

These findings are consistent with previous studies. For instance, d'Errico et al. (2018) and Habtamu et al. (2024) identify education and income diversification as key elements of adaptive capacity at the household level. Similarly, Beyene et al. (2023) report that diversification of income sources plays a significant role in enhancing household resilience to food insecurity among farming households. Overall, the results suggest that households with diversified income sources, better educational status, and access to financial resources (such as credit) are more capable of adapting to shocks and stresses. Therefore, the combined loadings of these four variables were used to estimate the Adaptive Capacity latent variable.

3. Asset

Asset is an unobservable (latent) component of the resilience capacity index within the RIMA (Resilience Index Measurement and Analysis) model framework. It captures both financial and non-financial resources, including durable and non-durable assets, which enable households to sustain their livelihoods and cope with shocks. In this study, the Asset latent variable is represented by four observed indicators: per capita agricultural land size (in hectares), livestock holdings measured in Tropical Livestock Units (TLU), number of houses owned, and ownership of consumer durables such as televisions and radios.

The results indicate that all four indicators contribute meaningfully to the Asset latent variable and were therefore retained in the model. Before the conflict, the asset index was strongly associated with key household wealth indicators, including ownership of televisions/radios (0.72), number of houses (0.62), land size (0.63), and total livestock units (0.55).

After the conflict, some shifts in the relative importance of these indicators are observed. Notably, the correlation with livestock holdings increased (0.67), suggesting a relatively greater role of livestock in explaining household asset capacity during the post-conflict period. In contrast, the associations with housing (0.50) and ownership of televisions/radios (0.51) weakened, likely reflecting the erosion or loss of physical and durable assets due to conflict-related shocks (see Figure 6.4).

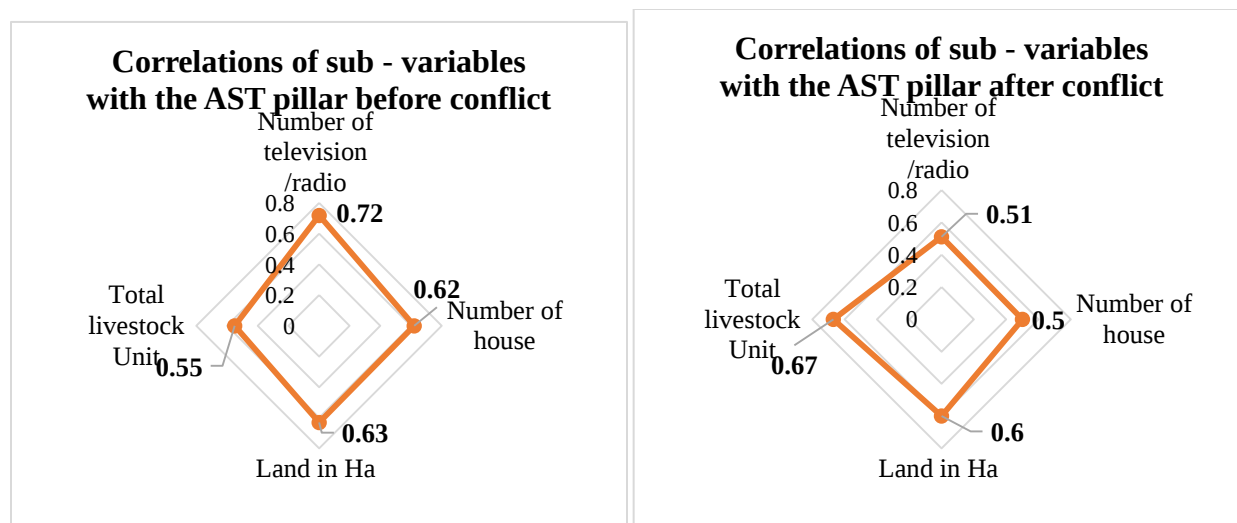


Figure 6.0.4. Correlation of observed variables with Asset pillar before and after the conflict

These findings are consistent with previous empirical studies. For example, Guyu and Muluneh (2015) reported that asset-related variables make substantial contributions to overall household resilience to food insecurity. Similarly, d’Errico et al. (2018) identified land and livestock (TLU) as key components of the asset dimension. In the same vein, Ado et al. (2019) found that livestock holdings, farm size, and non-agricultural assets are important contributors to the asset latent variable. Overall, the results suggest that while a broad set of assets underpins household resilience, the relative importance of specific asset types may shift in response to conflict, with more resilient or less destructible assets (such as livestock) playing an increasingly central role.

4. Social safety net

Social Safety Net (SSN) is an important component of household resilience within the RIMA model framework. It reflects the extent to which households rely on support from both formal and informal sources particularly during periods of shock through cash or in-kind assistance (Alinovi et al., 2010). Similar to the other pillars, the SSN latent variable in this study is constructed from four observed indicators: agricultural subsidies, government financial support, food subsidies, and support from family members. The results show that all four variables are positively associated with the SSN latent variable, indicating that both formal assistance (e.g., government and agricultural support) and informal transfers (e.g., family support) contribute to households’ social protection capacity. Consequently, all indicators were retained in the estimation of the SSN pillar.

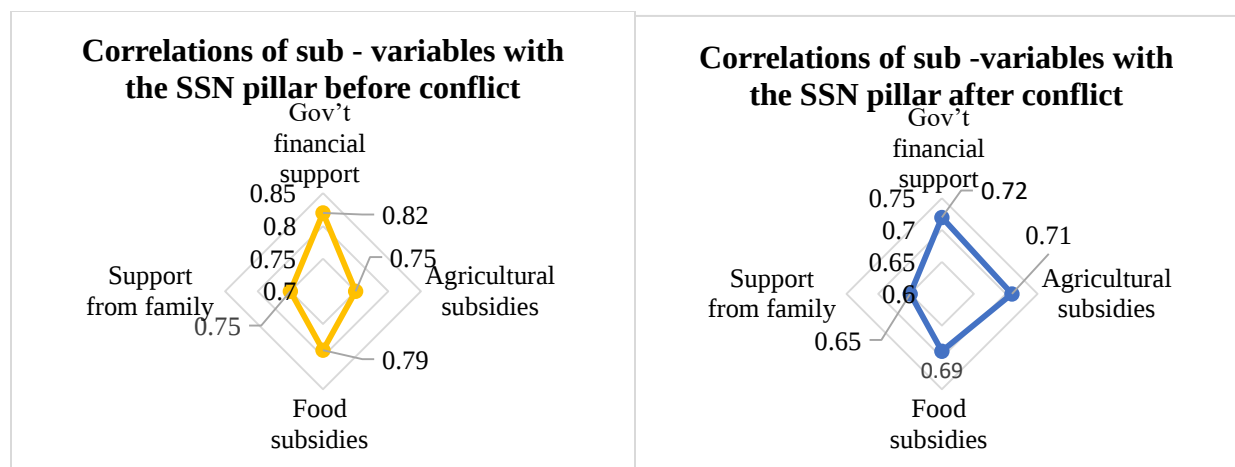


Figure 6.0.5. Correlation of observed variables with SSN pillar before and after the conflict

These findings are consistent with previous studies. For instance, d'Errico et al. (2018) and Mercy Corps (2021b) highlight that social safety nets comprising both formal and informal transfers play an important role in strengthening household resilience to food insecurity. Similarly, Ciani and Romano (2013) demonstrate that transfers received by households, whether from institutional or social networks, are key contributors to their ability to cope with adverse conditions. Overall, the results suggest that access to social support systems enhances households' capacity to withstand shocks, with both institutional assistance and family-based support serving as critical components of resilience.

6.4. Comparative Analysis of Overall Resilience Capacity across the Two Periods

The study employs a three level, low, moderate, and high level classification of resilience capacity based on the normalized RCI scale (0 - 100) to provide a more nuanced understanding of household resilience. This approach allows for better differentiation of households across varying levels of vulnerability and adaptive capacity, rather than relying on a simple binary classification. Such categorization is consistent with resilience measurement practices under the Food and Agriculture Organization of the United Nations RIMA framework, where resilience is treated as a continuous construct but often grouped into meaningful categories for interpretation and policy relevance (FAO, 2016; FAO, 2022). Studies such as d'Errico et al. (2018) also emphasize that multi-level classification enhances the identification of vulnerable groups and supports targeted intervention strategies.

Accordingly, as can be seen in table 6.2 the distribution of households across resilience categories reveals a substantial shift following the conflict. Prior to the conflict, 47.4% of the

households were classified as highly resilient, while only 22.2% fell into the low resilience category. This indicates that, before the conflict, a relatively large proportion of households possessed strong livelihood capacities and were better able to absorb and adapt to shocks.

Table 6.0.2. Distribution of households by resilience category before and after conflict

Resilience Category	RCI Range	% of Household Before Conflict	% of Household After Conflict
Low Resilience	0 - 33	22.2	36.1
Moderate Resilience	34 - 66	30.4	50.8
High Resilience	67 - 100	47.4	13.1

However, in the post-conflict period, the situation changed markedly. The proportion of highly resilient households declined sharply from 47.4% to 13.1%, indicating a significant erosion of resilience capacity. At the same time, the share of households in the low resilience category increased from 22.2% to 36.1%, while the majority of households (50.8%) shifted into the moderate resilience group. This shift suggests that the conflict had a profound negative impact on household resilience, pushing many previously highly resilient households into moderate and low resilience categories. The results indicate not only a decline in overall resilience capacity but also a redistribution of households toward more vulnerable conditions. This reflects the wide spread disruption of livelihood assets, reduced access to services, and weakened adaptive capacity experienced during the conflict.

The analysis of the overall Resilience Capacity Index (RCI) reveals a substantial decline from 61.37 in the pre-conflict period to 36.51 after the conflict period (Figure 6.6). This decline of 24.86 index points represents approximately a 40.5 percent reduction in resilience capacity. Such a magnitude of change indicates a pronounced contraction in households' ability to absorb, adapt to, and recover from shocks.

In the pre-conflict period, an RCI score of 61.37 suggests that households possessed a relatively stable resilience base. While not necessarily indicative of high resilience, this level reflects a system with moderate buffering capacity, functioning livelihood strategies, and an operational institutional environment. Households were likely able to manage routine shocks through a combination of asset utilization, diversification strategies, and access to services. The system, therefore, exhibited structural balance and operational flexibility.

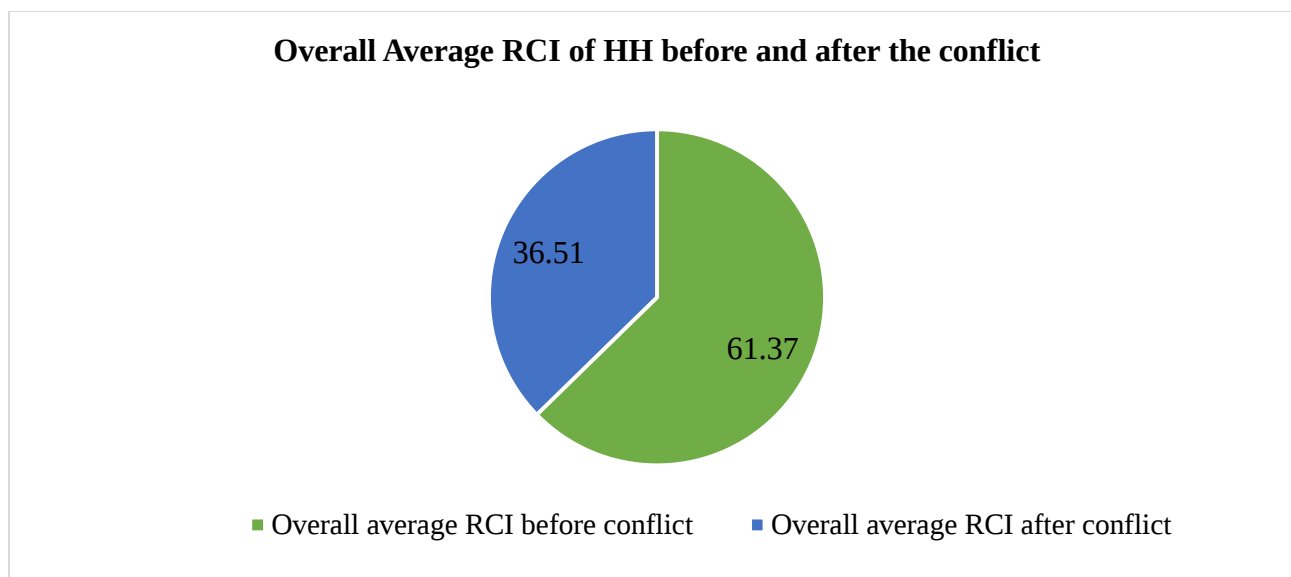


Figure 6.0.6. Overall average RCI of households before and after the conflict period

In contrast, the decline to 36.51 during the conflict period signals a transition toward heightened vulnerability. A score at this level reflects a system under stress, characterized by weakened coping margins and reduced capacity to withstand additional disturbances. The scale of the decline suggests that the conflict did not merely introduce temporary disruption but fundamentally undermined the structural foundations of resilience.

The difference between the two periods illustrates that resilience capacity is highly sensitive to systemic shocks. Conflict operates not only through direct economic losses but also through disruption of markets, erosion of trust, insecurity, institutional breakdown, and uncertainty. These interacting pressures compress livelihood flexibility and reduce households' strategic options. As resilience is inherently multidimensional, weakening across several domains simultaneously can result in accelerated system contraction.

Importantly, the overall RCI decline should be interpreted as a cumulative effect rather than the result of a single dimension. Resilience functions as an integrated system. Therefore, deterioration in interconnected components can produce a disproportionate aggregate impact. The approximately 40 percent reductions suggest that households are operating closer to vulnerability thresholds, where additional stressors such as climatic shocks or economic fluctuations could lead to severe welfare deterioration.

The comparative results also imply that the post-conflict resilience structure is more fragile and less robust than the pre-conflict system. Even if some coping mechanisms remain active, the overall reduction in resilience capacity indicates a diminished safety margin. In practical terms, households in the conflict period are likely more dependent on immediate coping strategies and external support, with limited scope for long-term recovery without structural rebuilding.

Thus, the decline from 61.37 to 36.51 reflects a systemic erosion of resilience capacity in the study area. The magnitude of this reduction underscores the profound impact of conflict on livelihood stability and highlights the urgency of interventions aimed at restoring resilience foundations.

6.5. Structural Reconfiguration of Resilience Capacity in the Study Area

The comparative analysis of resilience pillars before and after the conflict in northeastern Ethiopia reveals a profound restructuring of the resilience system. While household asset status declined during the conflict period, the relative contribution of assets and social safety nets to resilience increased substantially, whereas adaptive capacity and access to basic services weakened. This pattern does not indicate inconsistency but rather reflects a systemic reconfiguration of resilience under conditions of violent disruption.

The armed conflict that affected northeastern Ethiopia severely disrupted both urban and rural livelihoods. The destruction of productive assets, looting of livestock, market interruption, displacement, and interruption of public services fundamentally altered the socio-economic environment.

Prior to the conflict, resilience in the study area was shaped by a relatively balanced combination of adaptive capacity (31.6%), assets (32.7%), social safety nets (18.9%), and access to basic services (16.8%) (Figure 6.7). This configuration aligns with livelihood systems operating under relatively stable institutional environments, where households rely on diversification, market integration, and incremental asset accumulation to manage risk (Ian Scoones, 1998; FAO, 2016).

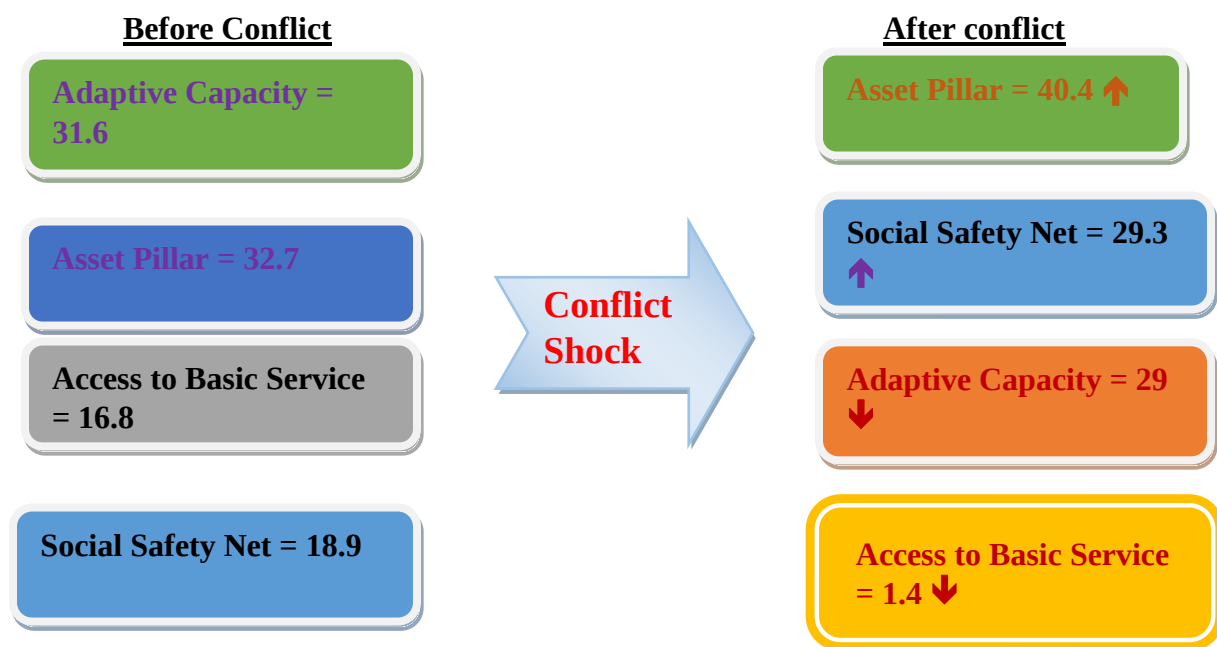


Figure 6.0.7. Resilience capacity shifts before and after conflict

However, after the conflict period, the resilience structure shifted dramatically. Asset contribution increased to 40.4%, social safety nets rose to 29.3%, adaptive capacity declined to 29%, and access to basic services collapsed to 1.4% (see Figure 6.7). These shifts reflect the transformation of resilience from a dynamic, adaptation-driven system into a materially buffered and externally supported survival system.

6.5.1. The paradox of declining asset status and increasing asset contribution

Although asset status declined during and after the conflict, its contribution to resilience increased significantly. This apparent paradox reflects the changing functional role of assets under stress. The sustainable livelihoods framework conceptualizes assets as the foundation of coping and adaptation (Department for International Development, 1999). In stable contexts, asset endowments are more evenly distributed, and resilience may depend on strategic utilization rather than mere possession. However, conflict often produces asset erosion, livestock loss, savings depletion, and infrastructure destruction (Christopher Cramer, 2006).

As assets become scarcer and more unevenly distributed, they gain differentiating power. Households that retain physical infrastructure or financial liquidity acquire a disproportionate survival advantage. This increases the explanatory weight of assets in resilience models even when overall asset levels decline. Similar patterns have been observed in conflict-affected and

shock-prone region, where asset retention becomes the primary determinant of absorptive capacity (World Bank, 2017).

In northeastern Ethiopia, livestock ownership, land productivity, irrigation access, and financial liquidity historically function as critical livelihood buffers. During the conflict, households that retained livestock, secured stored grain, or maintained some financial resources gained a disproportionate advantage. As assets became scarcer and more unevenly distributed, their differentiating power increased.

Thus, the rise in asset contribution reflects growing asset-based stratification. Resilience became more dependent on what households physically and financially retained. This suggests that post-conflict resilience is more materially concentrated and potentially more unequal. In this context, resilience increasingly reflects absorptive capacity which is defined as the ability to withstand shocks using existing resources rather than adaptive expansion.

6.5.2. Declining adaptive capacity under insecurity

Adaptive capacity declined from 31.6% to 29% (Figure 6.7), indicating reduced effectiveness of livelihood diversification and innovation during the conflict. In the study area, adaptive strategies such as petty trade, migration, off-farm employment, and participation in local markets depend heavily on mobility, security, and functioning institutions.

Conflict restricted movement, disrupted transportation routes, and weakened market linkages between rural communities and urban centers. Agricultural extension services were interrupted, and information flows were constrained. Under such conditions, households had limited room to adjust livelihood strategies.

This finding suggests that the conflict compressed opportunity space. Even households with skills and experience could not fully utilize adaptive mechanisms. As a result, resilience shifted away from proactive adjustment and toward defensive coping.

6.5.3. Rising role of social safety nets

The contribution of social safety nets increased markedly from 18.9% to 29.3% (figure 6.7). In northeastern Ethiopia, safety nets include formal mechanisms such as the Productive Safety Net Program (PSNP), humanitarian food assistance, and emergency relief interventions, as well as informal community-based support systems. The sharp increase in the contribution of social safety nets indicates growing reliance on transfers and external support mechanisms. In fragile

and conflict-affected settings, social protection plays a critical stabilizing role in preventing collapse of household welfare (World Food Program, 2020).

After the conflict, humanitarian assistance played a crucial role in preventing severe food insecurity. As agricultural production declined and income-generating opportunities shrank, external transfers became essential for survival. This explains the rising explanatory weight of social safety nets in the resilience model.

As livelihood systems deteriorate, resilience shifts from endogenous coping to externally supported buffering. This transition from autonomous resilience to assisted resilience reflects a reduction in livelihood self-sufficiency. While safety nets enhance short-term absorptive capacity, overdependence may limit long-term adaptive and transformative potential if not coupled with asset rebuilding and livelihood restoration (Organisation for Economic Co-operation and Development, 2018).

However, this shift also indicates reduced livelihood autonomy. Resilience became more dependent on exogenous support rather than endogenous capacity. While safety nets enhance short-term stability, sustainable recovery requires rebuilding adaptive and productive systems.

6.5.4. Collapse of institutional support - decline in access to basic services

The most dramatic structural change is the decline in the contribution of access to basic services from 16.8% to 1.4%. Public goods such as health services, education, extension systems, and market infrastructure are critical enablers of long-term adaptive capacity (Mark Pelling, 2011).

In the pre-conflict period, access to health facilities, schools, water systems, markets, and extension services supported livelihood stability and adaptive potential. During the conflict, many services were disrupted or destroyed. Health facilities and schools closed, road infrastructure deteriorated, and agricultural extension services were suspended. As service access declined across the board, variation among households narrowed, reducing its statistical explanatory power.

The erosion of institutional resilience shifts coping mechanisms from public systems to private assets and informal or humanitarian support. Such privatization of resilience may preserve short-term survival but weakens the foundations of sustainable recovery.

6.5.5. Integrated interpretation

Taken together, the findings indicate that conflict in northeastern Ethiopia transformed the resilience system in three major ways:

- ▣ From adaptation based to asset based resilience
- ▣ From autonomous to assisted resilience
- ▣ From institutionally supported to privately buffered resilience

Pre-conflict resilience was characterized by functional institutions, livelihood diversification, and moderate reliance on transfers. Post-conflict resilience, in contrast, became concentrated in households with retained assets and access to safety nets, while adaptive pathways and institutional supports weakened.

This structural reconfiguration suggests that resilience after conflict was maintained primarily through absorptive mechanisms rather than adaptive or transformative capacities. While such survival resilience may prevent immediate collapse, it may also deepen inequality and constrain long-term recovery if not accompanied by asset reconstruction, service restoration, and livelihood revitalization.

6.6. Disaggregated Analysis of Resilience by Livelihood Zone, Kebele Type, and Gender

Breaking down the resilience index into its key components by livelihood zone, nature of kebeles and gender provides further insights into the dynamics of food insecurity.

6.6.1. Disaggregated analysis of resilience structure by livelihood zone

The disaggregated resilience structure matrix by livelihood zone (LLZ) reveals substantial spatial heterogeneity in both resilience levels and structural composition before and after the conflict. The three zones - NWE, NHB, and NMC exhibited distinct resilience architectures prior to the conflict and experienced differentiated structural transformations after the conflict period. This section examines these patterns in detail and discusses their implications for post-conflict recovery and policy design in northeastern Ethiopia.

6.6.1.1. Pre-conflict resilience structure across livelihood zones

Before the onset of conflict, resilience capacity (RCI) exhibited notable variation across livelihood systems in the study area. The North Wollo East Plain (NWE) recorded the highest average RCI (64.3), followed by the Northeast Midland Mixed Cereal (NMC) zone (61), while the North Wollo Highland Belg (NHB) zone registered the lowest (57) (Table 6.3). However,

beyond these aggregate differences, the internal composition of resilience varied significantly across zones, reflecting distinct livelihood structures and coping mechanisms.

In NWE, resilience was largely driven by adaptive capacity (36.3%) and social safety nets (28.4%), whereas assets (21.7%) and absorptive capacity/basic services (13.6%) played comparatively smaller roles. This configuration suggests a relatively dynamic and flexible livelihood system in which households relied heavily on diversification strategies, mobility, and participation in social and institutional networks. Such a structure indicates that resilience in this zone was more forward-looking and opportunity-oriented, with households better positioned to adjust to changing conditions under pre-conflict circumstances.

Table 6.0.3. Analysis of resilience capacity index and its pillar by livelihood zone and time

Resilience capacity index by LLZ before the conflict					Average RCI
LLZ	Asset	ABS	AC	SSN	
NWE	21.7	13.6	36.3	28.4	64.3
NHB	37.9	9	28.9	24.2	57
NMC	39.8	41.7	16.9	1.6	61
Resilience capacity index by LLZ after the conflict					Average RCI
LLZ	Asset	ABS	AC	SSN	
NWE	40.3	1.6	26	32.2	36.6
NHB	40.7	8.3	25.5	25.5	34.6
NMC	33.2	12	29.9	24.9	38

By contrast, resilience in NHB was more strongly anchored in assets, which accounted for 37.9% of the total resilience capacity, followed by adaptive capacity (28.9%) and social safety nets (24.2%), while absorptive capacity contributed only 9%. This pattern indicates that households in NHB depended more on material resources and accumulated physical capital as the foundation of their resilience. Although such an asset-based structure may provide stability under moderate shocks, it can increase vulnerability in situations of violent conflict where productive assets are directly targeted or destroyed.

A different pattern is observed in NMC, where resilience was predominantly shaped by absorptive capacity/basic services (41.7%) and assets (39.8%), with minimal contribution from social safety nets (1.6%) and relatively low adaptive capacity (16.9%). This suggests that resilience in this zone was heavily reliant on the functioning of public services, infrastructure, and existing resource buffers. The limited role of social safety nets and adaptive capacity implies

a weaker emphasis on informal support systems and livelihood diversification, making resilience more dependent on institutional stability prior to the conflict.

Overall, these findings demonstrate that pre-conflict resilience was not uniform across livelihood systems but was structurally embedded in zone-specific socio-economic configurations. The variation in the relative importance of resilience pillars indicates that households relied on different combinations of resources, capacities, and institutional support, which has important implications for how each zone responds to and recovers from conflict-induced shocks.

6.6.1.2. Post- conflict resilience structure across livelihood zones

Following the conflict, all three livelihood zones experienced substantial declines in aggregate resilience capacity (RCI), although the magnitude and structural pathways of change differed considerably across zones.

In the NWE, resilience declined sharply from 64.3 to 36.6, representing the most pronounced reduction among the three zones. This decline was accompanied by a significant restructuring of resilience components. The contribution of assets increased markedly from 21.7% to 40.3%, while social safety nets rose from 28.4% to 32.2%. In contrast, adaptive capacity declined from 36.3% to 26%, and absorptive capacity/basic services collapsed dramatically from 13.6% to 1.6% (Table 6.3). This shift reflects a breakdown of institutional and service-based resilience mechanisms. The near collapse of absorptive capacity indicates severe disruption of public infrastructure, including health services, markets, and extension systems. At the same time, the decline in adaptive capacity suggests constraints on mobility, market participation, and livelihood diversification. As a result, resilience in NWE became increasingly dependent on retained assets and external support, marking a transition from a dynamic, adaptive system to one characterized by defensive, survival-oriented buffering.

A similar decline in overall resilience was observed in the NHB, where RCI fell from 57 to 34.6. However, the structural changes in this zone were less transformative and more reflective of an intensification of pre-existing patterns. Asset contribution increased slightly to 40.7%, while both adaptive capacity and social safety nets converged at 25.5% (Table 6.3). Absorptive capacity showed only a modest decline to 8.3%. Given that NHB was already characterized by asset-dominant resilience prior to the conflict, the crisis reinforced rather than fundamentally altered this structure. Households became even more reliant on material resources as a buffering

mechanism. At the same time, the increase in social safety nets indicates a growing dependence on external assistance, including humanitarian aid and formal support mechanisms, as households attempted to cope with the effects of the conflict.

In contrast, the NMC zone exhibited a distinct pattern of structural reconfiguration. Although resilience declined from 61 to 38, the internal composition of resilience shifted in a more balanced manner compared to the other zones. The contribution of assets decreased from 39.8% to 33.2%, while absorptive capacity experienced a sharp decline from 41.7% to 12%, indicating a severe breakdown of institutional and service-based support systems. However, this decline was partially offset by notable increases in adaptive capacity, which rose from 16.9% to 29.9%, and social safety nets, which increased significantly from 1.6% to 24.9%. This pattern suggests that, despite the collapse of formal systems, households in NMC were able to adjust by strengthening adaptive strategies and increasing reliance on social support mechanisms. Compared to the other zones, this reflects relatively greater flexibility and capacity for strategic adjustment in the post-conflict period.

In general, the cross zonal comparison insights emergence of several common patterns. First, the conflict led to a substantial decline in overall resilience capacity in all areas. Second, institutional and absorptive components of resilience weakened sharply, reflecting widespread disruption of public services and infrastructure. Third, assets and social safety nets became increasingly prominent as key determinants of resilience. Despite these shared trends, the direction and nature of structural change varied across zones. NWE shifted from an adaptive and institutionally supported system toward dependence on assets and transfers; NHB reinforced its pre-existing reliance on asset-based buffering; and NMC demonstrated a more balanced restructuring, with increased emphasis on adaptive capacity and social support.

Overall, the disaggregated analysis highlights that all livelihood zones experienced a significant decline in resilience, but the underlying drivers varied. One- way ANOVA result also confirmed that, after the conflict, there was a statistically significant difference in mean of RCI among the three livelihood zones ($df = 2$, $F = 296.5$, $p < 0.00$).

6.6.1.3. Policy implications by livelihood zone

The heterogeneity observed across livelihood zones indicates that uniform recovery strategies are unlikely to be effective. Instead, context-specific and targeted interventions are required to address the distinct structural weaknesses and recovery pathways identified in each zone.

In the NWE, where the conflict led to a severe collapse of adaptive capacity and institutional support systems, policy interventions should prioritize the rehabilitation of basic services, including health facilities, market infrastructure, and agricultural extension systems, in order to restore absorptive capacity. At the same time, strengthening livelihood diversification programs is essential to rebuild adaptive capacity and enable households to respond more flexibly to future shocks. While social safety nets played an important buffering role during the crisis, there is a need to gradually transition from emergency relief towards more productive and resilience-enhancing safety net mechanisms. In addition, targeted support for asset reconstruction, such as livestock restocking and replacement of farming tools, is crucial to prevent further widening of inequality. Overall, rebuilding adaptive pathways and institutional functionality is central to restoring the pre-conflict resilience structure of this zone.

In the NHB, where resilience remains largely asset-dependent, recovery strategies should focus on strengthening and protecting household assets. This includes targeted asset reconstruction programs as well as measures to safeguard productive resources from future shocks. Expanding financial inclusion through improved access to credit and savings mechanisms can further support asset accumulation and stabilization. However, given the risks associated with overreliance on material assets, it is equally important to promote livelihood diversification to enhance adaptive capacity. Social protection interventions in this zone should be designed to complement productive recovery efforts rather than substitute for them, ensuring that households are supported in rebuilding sustainable livelihoods rather than becoming dependent on transfers.

In contrast, the Northeast Midland Mixed Cereal (NMC) zone, which experienced a severe breakdown of institutional systems but demonstrated a relatively strong adaptive response, requires a balanced recovery approach. Rapid restoration of basic services and infrastructure is essential to rebuild absorptive capacity and support long-term stability. At the same time, continued support for small-scale trade and income diversification activities can reinforce the gains observed in adaptive capacity. Strengthening community-based social safety nets may also

contribute to more sustainable resilience outcomes by enhancing local support mechanisms. Importantly, institutional rebuilding efforts should be closely integrated with strategies aimed at strengthening adaptive capacity, ensuring that recovery is both structurally and functionally resilient. The observed adaptive rebound in this zone suggests that, with appropriate institutional support, there is significant potential for sustained recovery. Overall, these findings underscore that effective post-conflict recovery requires differentiated, zone-specific policy responses that align with the underlying structure of resilience in each livelihood system.

6.6.2. Disaggregated analysis of resilience by gender

Gender is a critical determinant of household resilience in conflict-affected contexts. In northeastern Ethiopia, pre-existing gender inequalities in asset ownership, access to services, labor participation, and social capital significantly influenced how households absorbed and responded to the shock of armed conflict. The gender-disaggregated Resilience Capacity Index (RCI) and its pillar composition reveal not only an overall decline in resilience but also a structural reconfiguration of resilience foundations for both male- and female-headed households. The findings indicate that, although resilience deteriorated across all households, female-headed households experienced a deeper erosion of resilience capacity alongside a more pronounced collapse of institutional and support systems.

Prior to the conflict, male-headed households exhibited a higher average RCI (62.3) compared to female-headed households (57.9), reflecting existing disparities in access to productive resources and livelihood opportunities. Following the conflict, resilience declined sharply for both groups. However, the magnitude of decline was greater among female-headed households, whose RCI dropped from 57.9 to 30.5, compared to a decline from 62.3 to 38.2 among male-headed households.

This pattern confirms that the conflict acted as a systemic shock that undermined livelihood systems across the region. At the same time, the larger absolute decline observed among female-headed households suggests that the conflict exacerbated pre-existing structural inequalities. The widening gender gap in resilience from 4.4 index points before the conflict to 7.7 points afterward further indicates that recovery trajectories are likely to be uneven and gender-differentiated unless targeted interventions are implemented. These findings highlight the need for gender-responsive recovery strategies that address underlying inequalities in access to assets, services, and institutional support.

6.6.2.1. Pre-conflict gendered resilience structure

Before the conflict, the structure of resilience differed markedly between female- and male-headed households, reflecting underlying gender inequalities in access to resources, services, and livelihood opportunities. Among female-headed households, resilience was primarily supported by social safety nets (33.6), followed by assets (24.6), adaptive capacity (22.4), and access to basic services (19.4). The relatively high contribution of social safety nets indicates a structural dependence on external or community-based support mechanisms. This pattern is consistent with conditions observed in many rural parts of Ethiopia, where female-headed households tend to have limited access to productive assets such as land and livestock, as well as lower participation in formal markets. The moderate role of access to basic services further suggests that public service infrastructure including health services, water systems, education, and agricultural extension played an important buffering role in supporting household resilience prior to the conflict.

In contrast, male-headed households exhibited a markedly different resilience structure. Their resilience was more strongly anchored in access to basic services (32.6), assets (30.1), and adaptive capacity (29.1), while social safety nets contributed only a minor share (8.3). This configuration reflects greater economic independence and stronger integration into market and institutional systems. The higher contribution of assets and adaptive capacity suggests that male-headed households were better positioned to diversify livelihoods, access information, and respond proactively to shocks. The comparatively low reliance on social safety nets further indicates that these households depended less on external support and more on internally generated resources and opportunities. Overall, this structural contrast highlights the gendered

disparities in asset ownership, institutional access, and livelihood strategies that characterize rural Ethiopia, shaping differentiated resilience capacities even before the onset of conflict.

Table 6.4. RCI comparison by gender before and after conflict.

Resilience Structure Matrix (aggregate) by gender before conflict					Average RCI
Sex	SSN	AC	Asset	ABS	
Female	33.6	22.4	24.6	19.4	57.9
Male	8.3	29.1	30.1	32.6	62.3
Resilience Structure Matrix (aggregate) by gender after conflict					
Sex	SSN	AC	Asset	ABS	
Female	30.7	32.2	35.1	2.1	30.5
Male	28.1	27.1	40.5	4.3	38.2

6.6.2.2. Post-conflict gendered resilience structure

The conflict produced profound shifts in the composition of resilience for both female- and male-headed households, fundamentally altering the relative importance of key resilience pillars. One of the most striking changes was the near-total collapse of access to basic services (ABS) for both groups. Among female-headed households, the contribution of ABS declined sharply from 19.4 to 2.1, while for male-headed households it fell from 32.6 to 4.3. This dramatic reduction reflects the widespread destruction and disruption of public infrastructure, including health services, education systems, water supply, agricultural extension, and market and transport networks. In northeastern Ethiopia, the conflict severely weakened decentralized service delivery systems, and the collapse of ABS confirms that institutional fragility was a central driver of resilience erosion. Notably, female-headed households experienced almost complete exclusion from basic services in the post-conflict period, suggesting the presence of gender-specific barriers to access, likely linked to mobility constraints, security risks, and prevailing social norms.

Alongside the collapse of institutional support, the relative contribution of assets increased for both groups, rising from 24.6 to 35.1 among female-headed households and from 30.1 to 40.5 among male-headed households. This shift, however, should not be interpreted as an improvement in asset accumulation. Rather, it reflects the mechanical effect of the sharp decline in other pillars, particularly ABS, as well as an increased reliance on remaining private

resources. In many cases, households resorted to distress-based coping strategies, including asset liquidation and reallocation. For male-headed households, the growing dominance of assets indicates that private resource endowments became the primary anchor of resilience following the collapse of institutional systems. For female-headed households, the increased share of assets likely reflects intensified engagement in informal income-generating activities such as petty trade and small livestock rearing. However, given the overall decline in RCI, this shift represents defensive adaptation rather than genuine structural strengthening.

The role of social safety nets (SSN) also evolved differently across gender groups. Among male-headed households, the contribution of SSN increased substantially from 8.3 to 28.1, indicating a growing dependence on humanitarian assistance and formal support mechanisms during the crisis. In contrast, female-headed households experienced a slight decline in the relative contribution of SSN, from 33.6 to 30.7. This divergence suggests that while male-headed households became newly reliant on external support, female-headed households were already structurally dependent on such mechanisms prior to the conflict. The slight decline in their SSN share may point to potential targeting gaps, overstretched assistance programs, or unequal access to support during the crisis period.

Adaptive capacity (AC) also exhibited contrasting dynamics. Among female-headed households, the contribution of AC increased from 22.4 to 32.2, while for male-headed households it declined slightly from 29.1 to 27.1. The increase observed among female-headed households may reflect greater reliance on informal networks, livelihood diversification into low-capital activities, and social reciprocity mechanisms. However, similar to the case of assets, this shift is more indicative of compensatory adjustment than structural improvement, as households adapted under constrained conditions rather than expanding their long-term capabilities.

Taken together, these findings reveal several important gendered dynamics in the transformation of resilience. First, although institutional collapse affected all households, its impact was more severe for female-headed households, who experienced near-total exclusion from basic services, highlighting the intersection of institutional fragility and gender inequality. Second, female-headed households entered the conflict from a structurally weaker position, as reflected in their higher dependence on social safety nets and lower access to productive assets, making them more vulnerable to systemic shocks. Third, for both gender groups, the post-conflict resilience

structure shifted away from institutional and service-based foundations toward greater dependence on assets and social safety nets. This transition represents a regression from development-oriented resilience to survival-based and humanitarian-dependent coping systems.

6.6.2.3. Policy implications for northeastern Ethiopia

The gender based resilience findings have important policy implications for post-conflict recovery in northeastern Ethiopia. The collapse of access to basic services underscores the urgent need for gender-sensitive reconstruction of public infrastructure, including the restoration of rural health services, water systems, and education, alongside mobile and inclusive service delivery mechanisms that specifically target female-headed households. At the same time, strengthening social protection systems is critical, particularly through the expansion of shock-responsive safety nets that are linked to asset rebuilding and livelihood diversification pathways. Ensuring equitable targeting of female-headed households within these programs is essential to avoid reinforcing existing inequalities. Given the increasing importance of assets as a resilience anchor, interventions aimed at asset recovery such as livestock restocking, provision of agricultural inputs, microfinance tailored to women, and cash-for-work programs focused on rebuilding community infrastructure are also necessary. Furthermore, the collapse of ABS highlights the fragility of decentralized governance structures, emphasizing the need for institutional reforms that incorporate conflict-resilient infrastructure design and contingency planning within service delivery systems.

Overall, the gender-disaggregated analysis demonstrates that the conflict in northeastern Ethiopia did not merely reduce resilience levels but fundamentally restructured the architecture of resilience. Similar patterns have been documented elsewhere. For instance, studies have shown that female-headed households often exhibit lower resilience due to restricted access to resources and mobility constraints (Béné et al., 2016). Evidence from contexts such as Yemen further indicates that conflict exacerbates pre-existing gender inequalities, limiting women's participation in livelihood activities and access to assistance (ACAPS, 2020). Conversely, experiences from non-conflict settings such as Ghana and Rwanda suggest that gender-responsive interventions, including cash transfer programs and inclusive agricultural extension services, can help narrow resilience gaps (FAO, 2021). These insights highlight the importance of implementing targeted, gender-responsive strategies such as women-focused livelihood training, improved access to microfinance, and enhanced participation in local decision-making

which have been shown to significantly strengthen resilience among female-headed households (Handa et al., 2014).

6.6.3. Disaggregated resilience structure by nature of kebele

The disaggregated analysis of the Resilience Capacity Index (RCI) by nature of kebele (rural versus urban) reveals important spatial differences in the structural composition of resilience before and after the conflict. While the aggregate RCI indicates an overall post-conflict decline, examining the internal contribution of the four pillars Social Safety Nets (SSN), Adaptive Capacity (AC), Assets, and Access to Basic Services (ABS) provides deeper insight into how resilience was constituted and restructured across rural and urban settings.

Access to Basic Services (ABS) captures structural access to infrastructure and public services such as health, education, water, electricity, markets, and financial institutions. Therefore, changes in ABS reflect institutional and infrastructural disruptions rather than household-level coping depletion.

6.6.3.1. Before conflict: resilience structure by nature of kebele

Before the conflict, the structural composition of resilience differed notably between rural and urban kebeles, reflecting underlying disparities in access to resources, services, and livelihood opportunities. In rural areas, resilience was primarily driven by assets (34.5%) and adaptive capacity (32%), followed by social safety nets (22.1%), while access to basic services contributed only 11.5%. This configuration indicates that rural resilience was largely self-reliant and grounded in productive assets and adaptive practices, with limited dependence on formal institutional support. The relatively low contribution of access to basic services reflects the structural reality of rural settings, where access to health facilities, financial services, markets, electricity, and infrastructure is often constrained even under stable conditions. Although social safety nets played a moderate role through community-based support systems and informal transfers, resilience remained fundamentally anchored in tangible livelihood resources and household-level adaptive strategies.

In contrast, urban kebeles exhibited a more diversified resilience structure prior to the conflict. Assets contributed 36.1%, adaptive capacity 27.4%, access to basic services 24.4%, and social safety nets 12.1%. The substantially higher contribution of access to basic services in urban areas underscores the importance of infrastructure and institutional systems in supporting livelihoods.

Urban households benefited from proximity to health and education facilities, improved market access, financial services, and relatively better water and electricity infrastructure. As a result, urban resilience was not only asset-based but also strongly supported by institutional and service environments, providing a more balanced and system-supported resilience structure

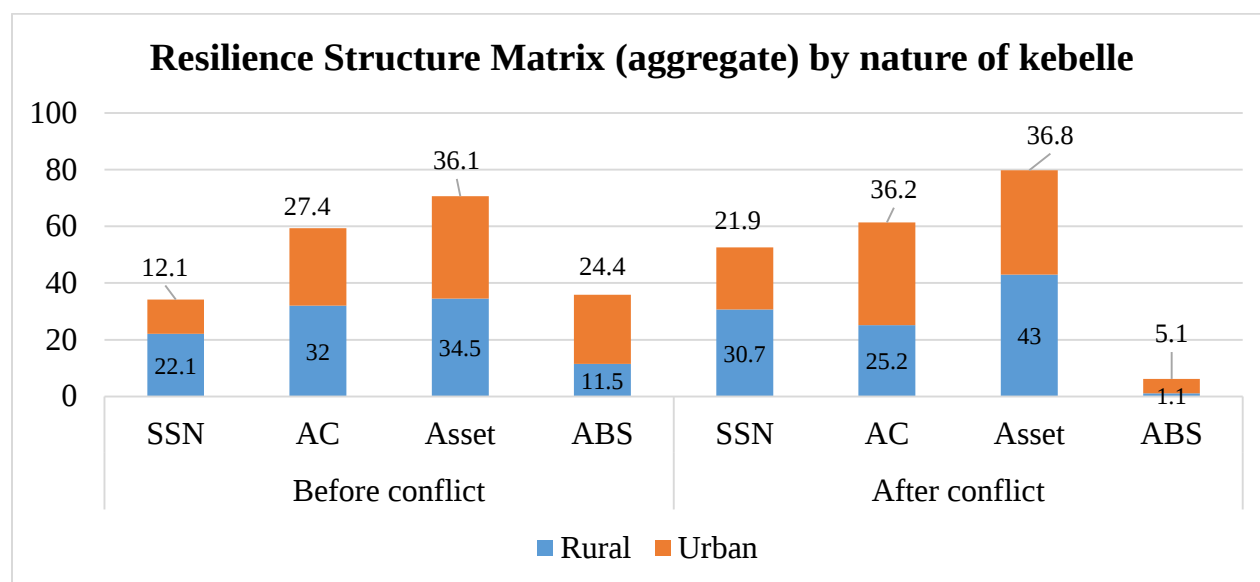


Figure 6.8. RCI comparison by kebele type before and after conflict.

6.6.3.2. After conflict: resilience structure by nature of kebele

Following the conflict, both rural and urban kebelles experienced profound structural reconfiguration of resilience. In rural areas, the most striking change was the near-total collapse of access to basic services, which declined sharply from 11.5% to 1.1%. This dramatic reduction reflects severe disruption of infrastructure and service delivery systems, including the destruction of health posts and schools, breakdown of transport and market access, closure of financial institutions, and interruption of water and electricity services. Consequently, rural resilience became almost entirely detached from formal institutional support. At the same time, the contribution of assets increased from 34.5% to 43%, indicating a growing dependence on ownership of productive resources such as land and livestock. This shift suggests that households with stronger asset bases were better able to sustain livelihoods, while asset-poor households likely experienced deeper resilience erosion, potentially exacerbating inequality. Social safety nets also became more prominent, increasing from 22.1% to 30.7%, which reflects greater reliance on humanitarian assistance, remittances, and informal transfers. In contrast, adaptive

capacity declined from 32% to 25.2%, indicating that conflict constrained livelihood flexibility, mobility, and opportunities for diversification.

Urban kebelles also experienced significant structural changes, although the pattern differed from rural areas. Access to basic services declined sharply from 24.4% to 5.1%, indicating major disruptions to infrastructure, public services, and institutional systems. However, the decline was less severe than in rural areas, suggesting some residual service capacity or relatively faster recovery in urban settings. A notable feature of the urban response was the substantial increase in adaptive capacity, which rose from 27.4% to 36.2%. This indicates that urban households responded to service disruptions through livelihood restructuring, including shifts in occupation, increased engagement in informal economic activities, and diversification of income sources. Unlike rural areas, asset contribution in urban settings remained relatively stable, suggesting that asset-based differentiation did not intensify to the same extent.

A comparative perspective reveals several important structural contrasts. First, institutional collapse was more severe in rural areas, where access to basic services nearly disappeared, compared to urban areas where some level of functionality persisted. Second, rural resilience became increasingly dominated by assets and social safety nets, reflecting a shift toward resource-based and transfer-dependent coping mechanisms, with potential implications for inequality and vulnerability. Third, urban resilience became more strongly driven by adaptive capacity, indicating greater flexibility and economic maneuverability in response to disruption. Overall, the findings demonstrate that conflict not only reduced resilience levels but also fundamentally restructured its internal architecture across spatial contexts, with rural areas experiencing deeper institutional collapse and urban areas showing relatively stronger adaptive responses.

6.7. Comparative Reflections and Policy Insights

The comparative analysis between conflict-affected and non-conflict settings reveals a stark contrast in household resilience outcomes. In regions experiencing prolonged or recurrent conflict, resilience systems are systematically dismantled. Conflict not only disrupts access to markets and services, but it also directly destroys critical infrastructure, displaces populations, and weakens institutional governance. This leads to a cascading effect where absorptive, adaptive, and even transformational capacities erode over time (FAO, 2021).

In this study, the RCI dropped significantly from pre-conflict levels of 61.37 to 36.51 post-conflict. This pattern mirrors similar declines observed in conflict-affected regions such as South Sudan (Maxwell et al., 2017), Syria (Karkour & Krikorian, 2022), and Yemen (ACAPS, 2020), where civil unrest has deeply compromised food systems and local economies. In these settings, households are often forced to sell off assets, withdraw children from school, and migrate strategies that signal a breakdown in resilience and push communities closer to chronic food insecurity.

Conversely, in non-conflict settings such as Kenya, Ghana, and Vietnam, research has shown that resilience can be maintained or even improved when underpinned by stable governance, functioning markets, and targeted development interventions. In Kenya, the Hunger Safety Net Programme (HSNP) helped buffer vulnerable communities from food insecurity through regular cash transfers (Oduro et al., 2019). Ghana's Livelihood Empowerment Against Poverty (LEAP) program increased household consumption and food diversity without resorting to distress coping strategies (Handa et al., 2014). Similarly, Vietnam's climate-resilient agricultural systems and rural investment in infrastructure have helped improve long-term adaptive capacity (World Bank, 2020).

Furthermore, while climate variability and economic shocks are common stressors in both conflict and non-conflict areas, the ability to recover differs sharply. In non-conflict zones, access to financial services, remittances, infrastructure, and community-based organizations supports faster and more sustainable recovery. In contrast, conflict zones often experience compounding shocks, where the absence of safety nets and governance structures prevents recovery and leads to cyclical vulnerability (Béné et al., 2016).

These findings underscore the urgent need for conflict-sensitive, context-specific resilience strategies. In fragile contexts, rebuilding resilience requires more than humanitarian aid. It demands integrated programs that combine emergency response with long-term investments in education, healthcare, infrastructure, and local economic development. Particular attention must be paid to marginalized groups especially women and displaced populations whose resilience is often disproportionately affected (Mercy Corps, 2021).

In summary, the decline in RCI in conflict-affected areas is not merely a temporary disruption but a manifestation of deeper systemic breakdowns. The contrast with more stable environments

reinforces the need for development actors to adopt a dual strategy: mitigate the immediate effects of conflict while simultaneously laying the foundation for sustainable recovery. Only through coordinated, inclusive, and data-informed interventions can resilience be rebuilt and sustained in the face of recurring crises (Constas et al., 2019; FAO, 2021; World Bank, 2020).

6.8. Conclusion and Recommendation

6.8.1. Conclusion

This study applied the Shiny Resilience Index Measurement and Analysis (RIMA) method to assess and compare the ability of households to withstand food insecurity. The comparative analysis of resilience to food insecurity before and after conflict highlights a severe decline in household resilience, emphasizing the disruptive role of conflict in food security systems. Four latent variables were examined: access to basic services, adaptive capacities, assets, and social safety nets. The findings revealed that, before the conflict all the underlying factors of assets, adaptive capacity, social safety nets and access to basic services exhibit a positive and high relative weight value of (32.7), (31.6), (18.9), and (16.8) respectively. On the other hand, after the conflict all the pillars to resilience drastically declined. When the data disaggregated by gender and nature of kebbes, the result suggest that both rural and urban households were significantly affected by conflict, with female-headed households experiencing the most severe decline in resilience.

6.8.2. Recommendations

To enhance resilience to food insecurity, several key strategies should be pursued.

- First, promoting livelihood diversification is crucial. Encouraging households to engage in multiple income-generating activities, both agricultural and non-agricultural, can reduce their vulnerability to shocks. Providing vocational training and entrepreneurship opportunities, particularly tailored to different livelihood zones, will help individuals and communities build more sustainable sources of income.
- Strengthening social safety nets is equally important. Expanding access to social protection programs, such as cash transfers and food aid, can provide critical support during periods of crisis. Special attention should be given to female-headed households and other vulnerable groups who may lack traditional support mechanisms. Additionally, fostering community-based safety nets can enhance resilience by reinforcing informal

support systems, particularly in rural kebeles where access to formal assistance may be limited.

- Improving access to productive resources is another essential step. Smallholder farmers and women often face barriers in obtaining credit and financial services, limiting their ability to invest in sustainable agricultural practices. Expanding access to credit, coupled with efforts to secure land tenure, can encourage long-term investments in agriculture and livestock production. Ensuring that women have equal opportunities in accessing these resources is critical for strengthening resilience at the household and community levels.
- Investment in infrastructure and essential services is necessary to support economic stability and food security. Strengthening rural infrastructure, including roads, water supply, and market access, will facilitate better connectivity and enhance resilience by improving access to goods and services. Expanding educational and healthcare services will also contribute to long-term resilience by building human capital and ensuring that communities have the capacity to withstand future shocks.
- Targeted interventions that address gender-specific needs should also be prioritized. Women often face unique challenges in accessing resources, employment, and decision-making opportunities. Policies that promote gender-sensitive approaches, including affirmative action in economic programs and leadership roles, will help ensure that resilience-building efforts are inclusive and effective. Supporting women's participation in community and policy decisions related to food security is particularly important for fostering long-term stability.
- Conflict prevention and peace building strategies should be integrated into resilience-building efforts. Conflict has been a major driver of food insecurity, disrupting food production, access to markets, and social support systems. Strengthening conflict resolution mechanisms at the community level and promoting inter-community dialogues can help mitigate tensions and prevent resource-based conflicts.
- Finally, data-driven decision-making should be emphasized to ensure that interventions are timely and effective. Continuous monitoring of resilience indicators, including those disaggregated by gender and livelihood zones, will provide valuable insights for policymakers and humanitarian organizations. Strengthening collaborations between

government agencies, research institutions, and international organizations will enhance the effectiveness of resilience-building initiatives and ensure that interventions are evidence-based.

By addressing these key areas, resilience to food insecurity can be significantly strengthened, enabling households and communities to better withstand and recover from future shocks.

CHAPTER SEVEN

7. Synthesis and Way Forward

7.1 Synthesis

Rather than affecting household food security and resilience through isolated mechanisms, the findings of this study demonstrate that conflict generated a cascading effect across the entire livelihood system. The study found that conflict first disrupted household livelihood assets, particularly physical, financial, and human capital, which constituted the foundation upon which livelihood activities depended. The destruction of infrastructure, loss of livestock and savings, displacement of labor, and interruption of basic services weakened households' productive capacity and reduced their ability to maintain pre-conflict livelihood strategies. Consequently, changes in livelihood assets triggered corresponding changes in livelihood strategies, forcing households to abandon or reduce agricultural production, livestock rearing, petty trade, and other income-generating activities that previously supported household food security.

The findings further reveal that livelihood assets, livelihood strategies, food security, coping strategies, and resilience are not independent outcomes but interconnected components of a dynamic livelihood system. The deterioration of livelihood assets constrained livelihood strategies; weakened livelihood strategies reduced household income and food access; declining food security compelled households to adopt coping mechanisms; and the nature of these coping responses subsequently influenced households' resilience capacity. For example, households that relied on negative coping strategies such as selling productive assets, reducing food consumption, withdrawing children from school, and distress livestock sales were able to survive in the short term but often experienced further asset depletion and reduced recovery capacity. In contrast, households possessing relatively stronger asset bases, diversified livelihood strategies, and stronger social support networks were better able to absorb shocks, maintain food access, and recover more rapidly following the conflict.

This dissertation examined household livelihood resilience to conflict-induced food insecurity in northeastern Ethiopia by assessing livelihood assets, livelihood strategies, food insecurity conditions, coping responses, and resilience outcomes before, during, and after the conflict. The findings indicate that these dimensions are closely linked and should be understood as components of a single livelihood system rather than as separate entities. Before the conflict,

households relied on combinations of human, physical, financial, natural, and social capital to pursue agricultural and non-agricultural livelihood strategies that enabled them to secure food and maintain their wellbeing. However, the outbreak and expansion of the conflict fundamentally disrupted this system.

The assessment of livelihood assets revealed that physical capital experienced the greatest level of degradation, followed by financial and human capital. The destruction of houses, farm equipment, roads, markets, schools, health facilities, and water infrastructure undermined households' productive capacity and access to essential services. Simultaneously, the loss of livestock, savings, income sources, and market opportunities weakened households' financial position, while displacement, injuries, interrupted education, and reduced access to healthcare adversely affected human capital. These losses significantly reduced the asset base upon which households depended for their livelihoods.

The erosion of livelihood assets directly influenced livelihood strategies. As productive resources became unavailable and market systems were disrupted, many households could no longer pursue their traditional agricultural and livestock-based livelihood activities. Households increasingly shifted from productive and growth-oriented livelihood strategies to survival-oriented strategies characterized by casual labor, petty trading, migration, dependence on social support, and humanitarian assistance. Thus, the study demonstrates that changes in livelihood strategies were largely a consequence of the deterioration of livelihood assets caused by conflict.

The disruption of livelihood strategies had important implications for household food security. Reduced agricultural production, declining livestock holdings, limited market participation, and shrinking income opportunities constrained households' ability to access sufficient and nutritious food. Consequently, food insecurity increased substantially during the conflict period, as reflected in declining food consumption, reduced dietary diversity, meal reduction, and increased vulnerability to hunger. The findings therefore suggest that food insecurity emerged not only as a direct consequence of conflict but also as an indirect outcome of disrupted livelihood assets and livelihood strategies.

In response to worsening food insecurity, households adopted a range of coping mechanisms. These included reducing meal frequency, consuming less preferred foods, borrowing food or money, selling productive assets, engaging in temporary migration, and relying on social

networks and humanitarian assistance. Although these strategies enabled households to survive immediate shocks, many of them contributed to further asset depletion and weakened future livelihood prospects. The study therefore found a reciprocal relationship between food insecurity and coping strategies: increasing food insecurity triggered coping responses, while repeated dependence on negative coping strategies often intensified future vulnerability.

The resilience analysis showed that households differed considerably in their capacity to absorb, adapt to, and recover from conflict-induced food insecurity. Households possessing relatively stronger livelihood assets, diversified livelihood strategies, and better access to social and institutional support demonstrated higher resilience levels. Conversely, households experiencing severe asset loss, prolonged food insecurity, and repeated reliance on erosive coping mechanisms exhibited lower resilience and slower recovery. These findings confirm that resilience is shaped by the cumulative interaction of livelihood assets, livelihood strategies, food security outcomes, and coping processes over time.

Taken together, the findings establish a conflict – livelihood - food security - resilience pathway. Conflict acted as the initial shock that degraded livelihood assets, particularly physical, financial, and human capital. Asset degradation altered livelihood strategies and reduced households' ability to generate income and food. The resulting decline in food security compelled households to adopt coping strategies, which in turn influenced the preservation or depletion of remaining assets and ultimately shaped resilience outcomes. Therefore, resilience to conflict-induced food insecurity is not determined by a single factor but emerges from the dynamic interaction among livelihood assets, livelihood strategies, food security conditions, coping responses, and recovery opportunities.

The synthesis demonstrates that all objectives of the study are intrinsically connected. The assessment of livelihood assets explains changes in livelihood strategies; changes in livelihood strategies explain variations in food security outcomes; food insecurity influences coping responses; and the combined effects of assets, strategies, food security, and coping mechanisms determine household resilience. Consequently, effective post-conflict recovery interventions must address these dimensions simultaneously. Strengthening resilience requires rebuilding physical infrastructure, restoring financial assets, improving human capital, supporting diversified livelihood opportunities, enhancing food security, and promoting institutional and

community support systems. Only through such integrated approaches can sustainable livelihood recovery and long-term food security be achieved in conflict-affected areas of northeastern Ethiopia.

7.2. Way Forward

This study provides several key recommendations to enhance the recovery, stability, and resilience of conflict-affected households in northeastern Ethiopia. The proposed way forward is organized into five strategic areas: infrastructure rehabilitation, livelihood asset restoration, institutional revitalization, livelihood diversification, and conflict-sensitive governance.

Infrastructure Rehabilitation

Restoring essential infrastructure is a top priority. Education, health services, transport, and water systems must be rebuilt and expanded to restore service delivery and rebuild human capital. Community-based approaches should be encouraged to ensure ownership, accountability, and sustainability. Special provisions should be made for displaced populations, children, and women, who often face the greatest access challenges. Investments in trauma-informed schooling and mobile clinics should complement traditional rebuilding efforts.

Livelihood Asset Restoration

Post-conflict asset recovery programs should prioritize restocking livestock, distributing agricultural inputs, and rebuilding damaged homes and businesses. Rural households in particular need support to reestablish productive activities. Environmental rehabilitation should also be integrated into recovery programs, including tree planting, erosion control, and sustainable energy promotion to reduce pressure on degraded ecosystems. Local procurement and cash-based assistance should be preferred to stimulate economic activity and agency.

Institutional Revitalization and Social Capital Enhancement

Reviving indigenous institutions such as *idir* and *equib* is essential to reestablishing social cohesion and collective action. These institutions can play a key role in mediating local disputes, supporting vulnerable households, and promoting inclusive development. Capacity-building efforts should include leadership training, conflict sensitivity, and integration with formal governance structures to foster trust and community participation. Hybrid models that bridge traditional practices and state mechanisms are especially promising.

Livelihood diversification and Youth employment

The vulnerability of mono-dependent households highlights the need for diversification. Skill development initiatives should target unemployed youth and women, equipping them with competencies in trades, services, and micro-enterprise development. Technical and vocational education and training (TVET) centers should be expanded and aligned with market demands. Small business grants, savings cooperatives, and access to credit will empower households to pursue new income streams and reduce reliance on aid.

Conflict-Sensitive Planning and Inclusive Governance

All recovery and development efforts must be grounded in a strong understanding of local conflict dynamics. Stakeholder mapping, community consultations, and risk assessments should be integrated into project design. Governance structures must be supported to improve transparency, service delivery, and local legitimacy. Early warning systems, grievance mechanisms, and participatory monitoring are vital tools for conflict mitigation and accountability.

In sum, the pathway to resilience is complex but attainable. The findings of this study demonstrate both the scale of vulnerability and the strength of informal coping mechanisms. Development partners, government agencies, and community organizations must work collaboratively to promote inclusive and context-sensitive recovery. With sustained investment, coordinated implementation, and community participation, the people of northeastern Ethiopia can rebuild stronger, more diversified, and more resilient livelihoods.

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Appendices

Appendices I: Households' Survey Questionnaire

Introduction

Greet the person you are interviewing, and introduce yourself. Explain where you are coming from.

This survey questionnaire is designed with the aim to collect and analyze data on **Household livelihood Resilience to conflict induced Food Insecurity in the conflict areas of North Eastern part of Ethiopia**. The purpose of this questionnaire is to systematically and objectively secure information to understand the sources of resilience to conflict induced food insecurity and food security situation of the households in the conflict area. So you are kindly requested to extend your cooperation for the success of this study by genuinely answering all questions in the questionnaire. I assure you that your individual answers will be kept strictly confidential.

Thus, please feel free to convey the required information honestly.

I would like to thank you in advance for your kind cooperation.

Date _____

Name of enumerator _____ Sign _____

Name of Village _____

Checked by _____ Sign _____

Note that: For all closed ended questions, please show your responses by **encircling** your answer

Section 1. General Information of the Household Head

1	Name of wereda				
2	Nature of kebele	Rural		Urban	
3	Age of HH				
4	Sex of HH				
5	Marital status of HH	Married	Unmarried	Divorced	Widowed
6	Educational status attained	Illiterate, read and write, 1 – 8, 12 completed, diploma, 1 st degree and above			
7	Number of HH members with age of 65 and above				
8	Number of HH members with age of below 15				

9	Number of permanent Household member	Male ----- female -----				
10	Occupation of HH	Farmer	merchant	gov't	skill	specify others
11						
12						
13						

Section 2: Household status and access to Assets

Conflicts can affect households disproportionately depending on resources. For example, households with limited resources may find it harder to cope. Sometimes, more resources may create more trouble for a household. Can you please give me some idea about your household's ownership of the following resources?

Asset type	Pre – conflict (Before 2021)		During conflict (2021 – 2022)		Current situation	
Natural capital						
Land ownership type	Own	Rent	Own	Rent	Own	Rent
Size of owned agricultural land in Ha						
Size of rented agricultural land in Ha						
Number of Sheep						
Number Goat						
Number Ox						
Number Cow						
Number Caf						
Number Camel						
Number Chicken						
Number Donkey						
Number Horses						
Number well						
Fire wood from forest in cubic meter (yearly)						
Physical Capital						
Number of Houses owned by household						
Number of Building or shop for renting						
Number of Car for business						
Number of Private car						
Number of Television						

Number of Mobile phone			
Distance traveled to the market in KM			
Potable water distance from home KM			
Distance from Animal veterinary KM			
Financial capital			
Household head had salary	Yes No	Yes No	Yes No
If yes monthly amount in birr			
Other members had salary	Yes No	Yes No	Yes No
If yes monthly amount in birr			
Estimated capital in the form of major field crop (yearly) in birr			
Estimated capital in the form perennial crops grown (Yearly) in birr			
Income from yearly livestock product (from selling milk, meat, eggs, hides and skins) (yearly) in birr			
Saved capital in bank account I birr			
Access to credit (amount of credit earned)	Yes No	Yes No	Yes No
If yes amount of credit earned in birr			
Remittance			
Human capital			
HH farming skill	Yes No	Yes No	Yes No
HH construction skill	Yes No	Yes No	Yes No
HH electronics maintenance skill	Yes No	Yes No	Yes No
HH waving, smith and craft work	Yes No	Yes No	Yes No
HH driving skill	Yes No	Yes No	Yes No
Capable to work	Yes No	Yes No	Yes No
Household heads education level	Literate illiterate	Literate illiterate	Literate illiterate
Social capital			
Household members eating together			
Household members discussing family matters together			
HH income earning members sharing money for investment			

or buying property			
Membership in equb			
Membership in edir			

If you lose any of the aforementioned assets please specify the reason why?-----

Section 3, Households livelihood strategies and income from it

Livelihood strategies or Activities your household engaged before, during and after the conflict period.

i. indicate on farm activities and income generate from them

Farming activities	Before	During	After	Estimated annual income in birr		
				Before	During	After
Crop production						
Livestock rearing						
Fruit production						
Bee keeping						

ii. Indicate the Off-farm Activities and income generate from them:

Off Farming activities	Before	During	After	Estimated annual income in birr		
				Before	During	After
Daily Wage laborer in Agriculture						
Sale of local drinks						
Sale of Pottery products						
Livestock herding						
Sale of fire wood or charcoal						
Sale of Construction materials						
If other specify						

iii. Indicate the Non-farm Activities and income generate from them:

Non Farming activities	Before	During	After	Estimated annual income in birr		
				Before	During	After
Government work						
Trading grains and pulses						
Trading livestock						
Drinks production and sales						
Weaving /spinning						
Carpentry						
Blacksmith						
Home construction						
Mini shops						
If other specify						

2. In general conditions, for the last 3 years the trend of your annual income in birr

A. Get better B. Get worse C. No change

3. If your annual income gets worse, what are the main reason for the decline of your income in the last 3 years? /Multiple responses are possible/

1. Production decline due to Climatic problems/drought
2. Due to the prevalence of covid 19
3. Because of Instability and conflict
4. Due to global economic instability

Section four- Food Security issues

i. food consumption score

Considering the pre-2021 as conflict period, 2021 – 2022 as conflict period, and the current situation, in general, how many days within a week the following food items have been eaten in your household?	Before	During	After
Carbohydrates (e.g., injera, potato, bread, pasta, kita, rice)			
Vegetables (tomato, potato, cucumbers, onions, pepper, cabbage etc.)			
Fruits (e.g., banana, apple, orange, grapes, lemon etc			
Livestock protein (e.g., meats including beef, sheep, camels)			
Poultry protein (e.g., poultry meat, eggs)			
Dairy protein (e.g. milk, yoghurt, cheese, butter)			
Seafood protein (e.g. fish, shellfish)			
Sugar and honey			
Oils, fats and butter			
Spices and salts			
Drinks (e.g. juice and soft drinks)			
Nuts (e.g. pistachios and almonds)			
Hot drinks(e.g. tea, coffee)			

ii. Household Food Insecurity Experience (HFIAS)

Considering the pre-2021 as conflict period, 2021 – 2022 as conflict period, and the current situation, in general, , has there been a situation when:	Before		During		After	
1. You or others in your household worried about not having enough food to eat because of a lack of money or other resources?	1	3	1	2	1	3
	2	4	3	4	2	4
2. You or others in your household were unable to eat healthy and nutritious food because of a lack of money or other resources?	1	2	1	2	1	2
	3	4	3	4	3	4
3. You or others in your household ate only a few kinds of foods because of a lack of money or other resources?	1	2	1	2	1	2
	3	4	3	4	3	4
4. You or others in your household had to skip a meal because there was not enough money or other resources to get food?	1	2	1	2	1	2
	3	4	3	4	3	4
5. You or others in your household ate less than you thought you should because of a lack of money or other resources?	1	2	1	2	1	2
	3	4	3	4	3	4
6. Your household ran out of food because of a lack of money or other resources?	1	2	1	2	1	2
	3	4	3	4	3	4
7. There was ever no food to eat of any kind in your household?	1	2	1	2	1	2
	3	4	3	4	3	4
8. You or others in your household were hungry but did not eat because there was not enough money or other resources for food?	1	2	1	2	1	2
	3	4	3	4	3	4
9. You or others in your household went without eating for a whole day because of a lack of money or other resources?	1	2	1	2	1	2
	3	4	3	4	3	4
10. The price of the food in the market was unaffordable for you?	1	2	1	2	1	2
	3	4	3	4	3	4
11. You or others in your household did not find the food that you needed in the market?	1	2	1	2	1	2
	3	4	3	4	3	4
12. You or others in your household worried that the quality of the food eaten in your household was quite bad?	1	2	1	2	1	2
	3	4	3	4	3	4
13. You or others in your household could not get the food from the market because of transportation or travelling problem?	1	2	1	2	1	2
	3	4	3	4	3	4

N.B **1, Never** **2, Rarely** **3, Sometimes** **4, Often**

Section 5, households Exposure and sensitivity to conflict

i. Exposure to Conflict

1.	Since the conflict in 2021 began in northern Ethiopia, what types of conflicts have you experienced in your area?	Year of conflict	How many times
	Armed conflicts between government forces and opposition groups (e.g., rebel groups fighting government forces)		
	Armed conflicts between local tribes or militia groups		
	Other (please specify):		
2.	What types of damages has your household incurred due to exposure to the above conflicts? (Tick and select all that apply)		
	- Household member(s) were concerned about life	Yes	No
	- Household children suffered from psychological trauma	Yes	No
	- If yes how many are they?		
	Household member(s) were injured or became ill	Yes	No

	If yes number of injured or ill		
	Household lost member(s)	Yes	No
	If yes number of lost family members		
	Household faced asset damage	Yes	No
	if yes estimated amount in birr		
	Household member(s) lost job	Yes	No
	if yes estimated amount of birr due to loss of job		

ii. Households Sensitivity to conflict

Some households may be more vulnerable to the effects of conflicts than the others. Has one or more of the following characteristics made your household sensitive or vulnerable to conflicts? (Select all that apply)

- Household had sick and disable members Yes No
If your answer is Yes please specify the number -----
- Household had an old members (above 65) Yes No
If your answer is Yes please specify the number -----
- Household members had children in education Yes No
If your answer is Yes please specify the number -----
- Others (please specify):

Section 6 - Household Physical Access to Public Services (Access to Basic service)

Indicate whether your household has access to the following public services before, during and after conflict.

Type of basic service accessed	“√” if agree			Characterization of Service	K.M		
	Before	During	After		before	during	current
Health Post				Distance travelled to nearest Health Post (km/ hours)			
Clinic				Distance travelled to nearest clinic (km/ hours)			
Hospital				Distance travelled to nearest Hospital (km/ hours)			
Veterinary clinic				Distance travelled to nearest Veterinary clinic (km/ hours)			
School (Grade1-8)				Distance travelled to the nearest school (km/hours)			
School (Grade 9-12)				Distance travelled to the nearest school (km/hours)			
Clean water				Distance traveled to fetch it (km/hours)			
Dry-weather Road				Distance traveled to the nearest DW road (km/hour)			
All-weather Road				Distance traveled to the nearest AW road (km/hour)			
Mode of transport for				1. Animal back 2. Human-power 3. Animal-dragged four-wheeled cart 4.			

humans				vehicular			
Market				Distance travelled to the nearest market area (km/hours)			
Bank				Distance travelled to the nearest bank (km/hours)			

Section 7- Access to social safety net

Please specify the type of social safety nets that your household members from any organization.

1	Has your household received government subsidies on agricultural inputs e.g. seeds, machinery etc.?	Before		During		Current	
		Yes	No	Yes	No	Yes	No
1.1	If yes, indicate the estimated value of benefits received (in Birr) in one year time						
2	Has your household received financial or non - financial support from government/NGOS other than through PSNP?	Yes	No	Yes	No	Yes	No
2.1	If yes, indicate the estimated value of benefits received (in Birr) in one year time						
3	Has your household received government loans for building constructions or business for income generation?	Yes	No	yes	No	Yes	No
3.1	If yes, indicate the estimated value of benefits received (in Birr) in one year time.						
4	Has your household received government subsidies on fuel for personal transport?	Yes	No	Yes	No	Yes	No
4.1	If yes, indicate the estimated value of benefits received (in Birr) in one year time						
5	Has your household received free foods from the government during the time of crises	Yes	No	Yes	No	Yes	No
5.1	If yes, indicate the estimated value of benefits received (in Birr) in one year time						
6.	Any cash transferred from other conflict free areas (formal or informal)						

Section 8 - Coping mechanisms related questions

i. Consumption based coping strategies

Has your household applied or used the following coping strategies when faced with food insecurity or other crises? (Select all that apply please)									
Coping strategies	Before		During		After		If yes, (number of days each is used in a week)		
	Yes	No	Yes	No	Yes	No	Before	During	After
Reducing the number of meals eaten in a day									
Rely on less preferred and less expensive foods?									
Borrow food, or rely on help from a friend or relative?									
Purchase food on credit?									
Consume seed stock held for next season?									
Adults eating less than normal to feed children									
Send household members to eat elsewhere?									
Limit portion size at mealtimes?									
Skip entire days without eating?									

ii. Other coping strategies

Were there times your household used the following coping strategies over the past three years' period as a response to problems/shocks/ facing your household such as food shortage?									
Coping strategies	Before		During		After		If yes, (number of days each is used)		
	Yes	No	Yes	No	Yes	No	Before	During	After
Sold reproductive animals (not excess ones)									
Sold Oxen used for farming									
Sold land									
Rented out land									
Remove children from school									
Borrowed money at high interest rate									
Diverting loan from microfinance institutions									

Selling physical assets (jewelry, car and others) to get money to meet household expenditure									
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Appendix-II: CHECKLIST FOR FOCUS GROUP DISCUSSION (FGD)

A. Historical of the Study Area

1) Overall history of the area: Administrative, Population size, density, migration, land resource, forest, animals, development infrastructures, etc.

B. Exposure and Sensitivity to conflict

1. Kind of conflicts have people been exposed to in this area, for how long, and the severity of those conflicts

2. Kind of natural, physical, financial, human, and social damages have occurred in this district, as a result of conflicts?

3. What is the current situation now? Has the situation worsened, has remained the same or improved? How?

C. Livelihood Strategies / discuss the following questions by comparing in the three time periods/

1. What is the dominant livelihood strategies pursued by the people in the area?

2. What are the major occupations or livelihoods in the area currently?

3. What are the types of livestock owned by different groups within the community?

4. What are the main sources of income and work available for each livelihood group?

5. What opportunities exist in the community for livelihoods?

6. What are the major agricultural crops produced locally?

7. Major problems in livestock and crop production, non-farm generating and use of common resource issues

8. Has there been a significant loss of crop production and livestock over the last 3years? What was the cause?

9. Are there are current threats to livestock? What is being done to protect livestock against these threats? 10. What types of financial institutions exist to support the economic activities of people?

11. Access to loan, sources, costs, and terms.

12. What are the major risks associated to the different livelihood strategies perused by different occupation groups.

13. What are the major risks to the livelihood in the community, and how will these risks be managed?

D. Access to food

1. Food security status of the people in the area before, during and after the conflict

2. Perception on food security

3. How do you perceive food security? (Eating three times a day, availability of food stock at household, having sufficient income to purchase food)

4. What types of food people in this region typically eat?

5. Is there enough food available for everyone in the local markets and stocks in this area? How has it changed since the conflict started? How have these changes affected people?

5, How is access to markets? What are the main market days? Have there been any changes in prices selling or buying? Why? How have these changes affected people?

6. Where does the food in this area come from (e.g. production, market, exchange, donation, solidarity)?

7. What are the main kinds of local food and beverage products produced locally? How has it changed since the conflict started? How have these changes affected people?

8. What kinds of food are imported from other areas compared with local food? How has it changed since the conflict started? How have these changes affected people?

9. In which months are people vulnerable to food insecurity? Why?

10. Access to productive assets/capitals (physical, human, natural, financial capitals)

11. Coping mechanisms to shortage of food in terms of their severity before, during and after the conflict

12, How do neighbors help each other to minimize food insecurity problems?

13, types of livelihood strategies practiced in the area before, during and after conflict in the area (farming, on farm, off farm)

14. Nature of income from the various livelihood in the three time periods

15. Role of social organizations (both formal and informal). How the informal social organizations help to overcome problems related to food security and livelihood

16. How does the basic services look like in the area? Any change in the three time periods?

17. Any support from government, non - government or family from abroad. How the conflict affected it

Appendix- III

Check list for key informant interview

Current Organization in which you are working in _____,

Responsibility _____

Line of work and Expertise _____

I. Guiding Questions to Food Officials Interview

General information about the area

1. What are the key geographic, demographic, economic, social and cultural characteristics of this area?
2. How have these characteristics changed during the last years since the conflict started?

Conflict in the area

1. What kind of conflicts have people been exposed to in this area, for how long, and what was the severity of those conflicts?
2. What kind of natural, physical, financial, human, and social damages have occurred in this area, due to conflicts?
3. What is the current situation now? Has the situation worsened, has remained the same or improved? How?
4. What actions have been taken by the government and other organizations to limit the negative impacts of conflicts in this area or the country as a whole?

Food consumption patterns, safety and preservation

1. What are healthy and nutritious foods for people in this area? How has the consumption of healthy and nutritious foods changed since the conflict started? How have these changes affected people?

2. What is the condition of food safety and preservation, including, drying, canning, preserving, refrigeration and food processing, fortification foods such as dairy, cereal, bread and other products? How has it changed since the conflict started? How have these changes affected people?

Food security projects/programs/interventions

1. Have any national organizations or global NGO organizations been in this area to provide help at different times during the conflict (pre/during/and now)? If so, who and when did they provide food aid? What kind of food aid have they provided? Are there people still receiving this support in this area?
2. At the moment, what do you think are the main problems for food security in this region? Can you describe them? Will these problems become worse or be resolved, why?
3. In your opinion, what are the best ways to improve food security and nutrition in this area?

VII: Participatory field observation (village walk or transect walk) check list

1. The topographic features of the watershed
2. The drainage patterns of the watershed
3. Farming system (the major cereal crops growing, perennial crops, root crops, fruit and vegetables, livestock and fodder) (visible)
4. Vegetation coverage and type of indigenous trees, water availability (visible)
5. Soil fertility status (visible)
6. Type of land management technologies throughout the watershed. } Evidence of physical land management technologies adopted and their visible design on cultivated lands, and communal lands } Evidence of biological land management measures on cultivated lands and other sites
7. Evidence of integrated land management technologies (physical +biological or combination of others) on cultivated lands and others land use (visible)
8. Evidence of compost preparation, animal manure and other application on farm lands
9. Evidence of area closure supported with tree planting, terrace building, stone bunds and others (visible)

Appendix III: Conversion factor for different classes of Livestock to TLU

number	Animal group	Total livestock unit /TLU/
1	Cow and Oxen	1.0
2	Heifer	0.75
3	Calf	.25
4	Goat/sheep (adult)	.13
5	Goat/sheep (young)	.06
6	Donkey (adult)	.70
7	Donkey (young)	.35
8	Poultry	.01
9	Chicken	.013
10	Horse	1.10
11	Camel	1.12

Sources: Strock et al. (1991), CSA (2007)

RESEARCH ARTICLE

Household Livelihood Strategies and Outcomes in Conflict-Affected Areas of Northeastern Ethiopia

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Keywords: conflict | Ethiopia | household income | livelihood outcome | livelihood strategy | livelihood zone

ABSTRACT

This study examines household livelihood strategies and outcomes in conflict areas of northeastern Ethiopia. One-way analysis of variance and linear regression models were used to analyze data. The findings revealed that crop incomes of rural households decreased by 47% during the conflict compared to peace times. Income from small-scale employment of households had also decreased by > 74% from the preconflict period. The regression result found that sensitivity to conflict significantly and negatively affected households' livelihood incomes. Governments and battling factions are advised to avoid armed clashes and minimize human sufferings and losses of livelihood assets, strategies, and outcomes.

1 | Introduction

Conflicts are clashes arising among people, between community groups, countries, political parties, governments, and/or between regions over the control of political power and livelihood resources (Brown and Keating 2015). They emanate when the needs and interests of people or communities/groups are not met and when the priorities and demands of people are mistreated by governments (Matiru and Castro 2000).

Nowadays, conflict remains a major driver of poverty, and it is on the rise in the developing countries in general, and in Africa in particular (Shemyakina 2022; Kibrom et al. 2023). It is predicted that by 2030, 68% of all extremely poor people will live in the conflict-affected regions. The predicted figure shows a 20% increment from the 2018 level (Corral et al. 2020).

Recently, Ethiopia, as part of this rising trend in political instability and war, experienced a massive-scale destructive conflict. Because of the onset of the coronavirus pandemic, the parliamentary election in Ethiopia, which was scheduled to be held in 2020, was delayed, and the term of the prime minister was extended. In response, the Tigray region defied the federal

government by holding its own regional elections. In November 2021, a military assault against Tigray was ordered in response to an alleged attack on federal army camps, marking the start of the civil war in Ethiopia. Conflict has played out and stayed long in most parts of the Amhara region, mainly in North Wollo Zone, where this study focused on.

Expanded and volatile conflicts in northeastern Ethiopia significantly killed and injured people, disrupted livelihood assets and activities, drove displacement, and limited humanitarian access. Armed conflicts incur economic, social, psychological, and other types of costs on a household (Guidolin and La Ferrara 2010). Conflicts carry various direct and indirect, as well as intended and unintended impacts that strongly affect the living conditions of households at the time of the conflict and for many years thereafter. Civil wars and violent revolutions kill and injure millions of people every year (Justino 2011a), mainly in less developed countries. Similarly, FAO and WFP (2021) noted that conflict can impose an overwhelming influence on communities' livelihoods through disturbing markets and supply chains, killing livestock, and burning of fields, or when the chief producers of food are killed or involved in battle, destroying infrastructure.

ORIGINAL ARTICLE

Conflict-induced household-level food insecurity in conflict-affected areas of Northeastern Ethiopia

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Popular scientific summary

- Prolonged conflict has disrupted the livelihood strategy and outcomes of the household in the area and significantly reduced access to essential food supplies.
- Both rural and female headed households were found to be disproportionately vulnerable to food insecurity in the conflict situation.
- Urgent need for conflict resolution strategies, targeted humanitarian intervention, and sustainable recovery programs are essential to address the food insecurity problem in the conflict situation.

Abstract

Conflict-induced food insecurity has been currently emerging to be a widespread challenge to the decent livelihood of the human population. This study examined conflict-induced food insecurity in conflict-affected areas of the northeastern part of Ethiopia. This study assessed three time periods (pre-conflict, conflict, and post-conflict times) to analyze the impact of conflict on the studied households. Food consumption score and household food insecurity access scale tools were used to measure the food security status of households. Descriptive statistics and independent *t*-test were used to analyze the data. The major finding confirmed that the food security status of both urban and rural households in the study areas was negatively affected by the conflict. Compared to the pre-conflict period (22.2%), the number of food-insecure households at the time of the conflict was three times higher. Though the food security status of both rural and urban households was affected by the conflict in the area, the effect was much severe for the rural households. The number of food-insecure rural households during the conflict was three times higher than the pre-conflict period. During the conflict, female-headed households (78.3%) were more vulnerable to food insecurity than male-headed households. The independent *t*-test result confirmed the presence of a difference in food security status between rural and urban households ($P > 0.01$) and between female- and male-headed households ($P > 0.021$). Food security status variations were also seen among the study livelihood zones. Households from the north wello east plain livelihood zone suffered a lot (71.3%). The result suggested that any project aiming at improving households' food security in conflict-affected areas should give attention to the provision of food aid, agricultural inputs, credit services, and financial support to the affected community. Restoring peace would rather be the long-lasting solution to minimize the conflict-induced food insecurity in the area.

Keywords: conflict; food insecurity; food consumption score; household food insecurity access scale; households; livelihood zones; Ethiopia

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Food insecurity was one of the developmental challenges of the world. Nowadays, it continues to remain the key developmental challenges (1). One of the main goals, attaining the Zero Hunger target by 2030, is vastly confronted by the growing number of food-insecure people from year to year. Approximately 733 million people worldwide faced hunger, equating to one in 11 individuals.

In Africa, the situation is even more severe, with one in five people experiencing hunger (2). The recent persistent global challenge, food insecurity, is attributed to many factors. Armed conflict, climate erraticism and extremes, and economic downturns are among the factors. These factors are identified as driving forces for the emergence and continuation of food insecurity at global levels (3).

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Food insecurity coping strategies in conflict affected areas of northeastern Ethiopia

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ARTICLE INFO

Keywords:

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Coping strategy
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Ethiopia

ABSTRACT

Albeit various factors are responsible for the rise of food insecurity and hunger at the global level, conflict has been identified as a key driver. The recurrent conflict in most developing countries leaves food insecurity a serious concern. Though little is known, the fact that many households in the conflict-affected areas are considered to be food insecure raises the question of how these households survive conflict-induced food insecurity. This study therefore, assessed the coping strategies employed by households in conflict affected areas of north eastern Ethiopia. Data were collected using questionnaire survey on 388 households, nine Focus Group Discussion, and 15 key informant interviews. Mixed research design was employed. The major finding of the study revealed that food insecurity were high (66.5%) during the conflict time. Compared to urban households, rural households are more vulnerable to food insecurity in the conflict affected areas. Similarly, female headed households were more food insecure than male headed households in the conflict context. Additionally, eight major categories of coping strategies were identified. Some of the strategies implemented in the conflict affected study areas for example fasting, and eating traditional foods usually were unique to the conflict contexts. Relying on the economic conditions of the nations, coping strategies practiced by households in the conflict affected area differ from country to country.

1. Introduction

Despite significant efforts to reduce hunger and poverty, global hunger levels have remained alarmingly high in recent years. In 2023, approximately 733 million people worldwide faced hunger, equating to one in eleven individuals. In Africa, the situation is even more severe, with one in five people experiencing hunger (World Health Organization WHO, 2024).

Albeit various factors are responsible for the rise of food insecurity and hunger at the global level, conflict has been identified as a key driver (FAO, 2017; WFP, 2017). There is a strong connection between conflict and food insecurity. Most of the worst food crises have arisen in areas of armed conflict, indicating a strong association between food security and armed conflicts. Various studies also confirmed the link between these two variables. Muriuki et al. (2023) for instance in their study reported that all countries that experienced famine in 2020 were caused by conflict. Conversely, FAO International Fund for Agricultural Development (IFAD) United Nations Children's Fund (UNICEF) World Health Organization (WHO) & World Food Programme (WFP) (2017)

observed that over fifty percent of the 815 million undernourished people and 122,450,000 of the 155 million stunted children in 2015 resided in nations impacted by violent conflict worldwide.

The ongoing conflicts in many developing nations make food insecurity a significant issue. The reality that numerous households in the conflict-affected regions are regarded as food insecure prompts an inquiry into how these households manage to cope with food insecurity caused by conflict. Nonetheless, there is limited knowledge regarding the measures individuals take in reaction to food insecurity resulting from armed conflicts. In connection with this, Justino (2012, pp. 13–14) uncovered that there is minimal understanding of what individuals do in conflict zones and how their wellbeing is influenced by their decisions and reactions to the issue of food insecurity.

Various scholars have noted that households are active when they face shocks or risks (Christiansen & Boisvert, 2000; Béné et al., 2012; Levine et al., 2011). According to these scholars, households respond to the shock they face to reduce their susceptibility to adverse events. They are not passive agents, they are active negotiators. As a result, they believed that food insecurity as a shock is a coped process. Therefore, the

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Appendix XI: Ethical Approval Letters

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ቀ/ነ/ Date: Dec/12/2022

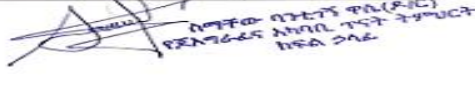
To whom it may concern

Subject: Ethics approval obtained

Dear Dawit Bezabih is currently working on his Ph.D. dissertation entitled "Household Livelihood Resilience to Conflict Induced Food Insecurity in Conflict Areas of Northeastern Ethiopia". His research includes experimentation on human subjects, which requires ethical approval by the institution's research ethical approval committee before conducting the research. Hence, we the ethical approval committee members at the department level: (1) Dr. Mesfin Anteneh (Associate professor and vice dean of social science faculty) (2) Dr. Mehrete Belay (Associate Professor and course chair of Physical Geography) and (3) Mr. Tamiru Bezabih (Associate Professor and course chair of freshman students) confirmed that all the experiments and other processes have been prepared and were made practical during the data collection, focus group discussion, key informant interviews based on the established ethical guidelines, as well as the informed consent obtained from all participants.

No	Full Name	Signature	email	Date
1	Dr. Mesfin Anteneh		Mesfinanteneh97@gmail.com	15/01/2023
2	Dr. Mehrete Belay		belaymehrete@yahoo.com	15/01/2023
3	Mr. Tamiru Bezabih		Tamirubezabih74@gmail.com	15/01/2023





CC/

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