THE IMPACT OF CONFLICT ON FOOD INSECURITY IN ETHIOPIA

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The Impact of Conflict on Food Insecurity in Ethiopia

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DECLARATION

I, the undersigned, Teklehaymanot Araya, declare that this thesis titled “The Impact of Conflict on Food Insecurity in Ethiopia” and the work presented herein are entirely my original work. It is submitted in partial fulfillment of the requirements for the Master of Science in Development Economics. I confirm that no part of this thesis has been submitted for the award of any other degree at any other university or institution.

Name Teklehaymanot Araya Signature _____ Date _____

APPROVAL SHEET

This is to certify that the thesis prepared by Teklehaymanot Araya, entitled: *The Impact of Conflict on Food Insecurity in Ethiopia* and submitted in partial fulfillment of the requirement for the Degree of Master of Science in Development Economics complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Signed by the Examining Committee:

Advisor	Signature	Date
Internal Examiner	Signature	Date
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ACRONYMS AND ABBREVIATIONS

ACLED	Armed Conflict Location and Event Data
ATT	Average Treatment on Treated
CSA	Central Statistical Agency
CSI	Coping Strategies Index
DID	Difference-in-Differences
FAO	Food and Agriculture Organization
FBS	Food Balance Sheets
FCS	Food Consumption Score
FIES	Food Insecurity Experience Scale
GRFC	Global Report on Food Crises
GFSI	Global Food Security Index
HHS	Household Hunger Scale
HDDI	Household Dietary Diversity Index
HFPS	High-Frequency Phone Survey
IDPs	Internally Displaced Persons
IPC	Integrated Food Security Phase Classification
IFPRI	International Food Policy Research Institute
NGO	Non-Governmental Organizations
PSNP	Productive Safety Net Programme
RCT	Randomized Control Trial

RSF	Rapid Support Forces
SAF	Sudanese Armed Forces
TLU	Tropical Livestock Unit
TWFE	Two-Way Fixed Effect
WFP	World Food Program

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ABSTRACT

Armed conflicts are a key driver of food insecurity. Exposure to battle and political instability are a major challenge to the sustainable development goal of Africa. This study aims to examines the impacts of conflict on food insecurity in Ethiopia. And, this study examines the trends in exposure to conflict and the corresponding levels of food insecurity in Ethiopia. Two-wave panel data were collected through household surveys conducted in 2019 (baseline) and 2023 (end-line) across all regions of Ethiopia. Using Difference-in-Differences (DID) and Two-Way Fixed Effects (TWFE) estimations to compare the trends in food security before and after the conflict. key food security indicators assessed including the Food Consumption Score (FCS), Household Dietary Diversity Index (HDDI), and Food Insecurity Experience Scale (FIES). Key findings in the study show that exposure to conflict is negatively associated with food security. The results indicate that exposure to conflict leads to 9.5 points or 30% decline in FCS. Similarly, exposure to conflict is associated with 0.817 points or 19% decline in HDDI. Finally, exposure to battle leads to 19% points increase in moderate food insecurity, and exposure to conflict leads to 17% points increase in moderate severe food insecurity. The adverse effect of exposure to conflict on food security is similar across gender and location. The results are also consistent even when including several control variables and using different measures of exposure to conflict. This study finds that exposure to conflict is significantly and negatively associated with food security. I recommended the government and Non-Government Organization (NGOs) to focus on project that can help the conflict affected household to improve their livelihood.

Keywords: Conflict; Food Insecurity; Difference-in-Differences (DID); Ethiopia

JEL: O17; N4

CHAPTER 1: INTRODUCTION

1.1. Background of the Study

Globally, Armed conflict are the key driver to food insecurity, driving millions into hunger and food insecurity. Exposure to conflict are the one primary driver to poverty and food insecurity (Collier, 2003a; Corral et al., 2020; Shemyakina, 2022). Based on the World Bank, reported a rise in moderate to severe food insecurity in the region from 51.5% to 59.5%, with some countries exceeding 80% (World Health Organization, 2021).

Globally context, exposure to conflict consistently increases from a complex mix of economic, environmental, political, cultural issue, and religious factors. According to more recent research, an estimated 41.3 million individuals were internally displaced due to increase of exposure to battle in 2018, and also which 29.4 million of global population were refugees, while 600 million young people reside in areas plagued by the violence (Vos et al., 2020). In 2022, 2.4 billion people, or 29.6% of the global population, experienced moderate or severe food insecurity, and also almost 900 million people experienced extreme food insecurity. However, food security is very essential for economic development, especially in developing countries that lack sufficient food security due to various factors such as climate change, increase food prices, increased global population, and exposure to conflict (Cafiero et al., 2018)

Armed conflicts are a key driver to food insecurity and starvation by disrupting and destroying food systems, decline farming populations, destroying infrastructure, reducing resilience and increasing vulnerabilities, disrupting access to markets, raising food prices, and being unavailable entirely the goods and services (Bora et al., 2010).

In Africa context, exposure to conflicts are major contributors to poverty and food insecurity. Exposure to conflict and political instability are a major challenge to the sustainable development goal of Africa. Exposure to conflicts are on the increases, particularly across Africa, and they have serious consequences for both individuals and communities. More recent studies have shown that in 2023, there were 59 Armed conflicts, more than any other year since the conclusion of World War II, with over half of them occurring in Africa (Obermeier & Rustad, 2023). In 2022, over 204,000 people were killed as a result of state-based warfare in Ethiopia and the Russian-Ukraine war (Davies et al., 2023a).

In Ethiopia context, over the last two decades, Ethiopia achieved strong economic growth. However, this situation changed drastically on November 4, 2020.The exposure to conflict between Ethiopia's federal government and the Tigray regional administration outbreak the war on November 4, 2020 (Abay et al., 2023). The exposure to battle has caused extensive civilian casualties, widespread infrastructure destruction, and massive displacement across Ethiopia. Reports have consistently highlighted gender-based sexual violence as a pervasive issue throughout the exposure to conflict (Abay et al., 2022; Devi, 2021; Gesesew et al., 2021).

The exposure to conflict in Ethiopia affected food security throughout agricultural production, market access, income (Abay et al., 2023).The exposure to conflict in Ethiopia has also significantly reduced access to health services, food, and water, disproportionately affecting poor, in rural populations (Abay et al., 2022).According to data from the Tigray Regional Health Bureau, 70 percent of hospitals and more than 80 percent of health centers have restricted or uncertain functionality as a result of exposure to conflict (Assefa et al., 2022).

This exposure to conflict in Ethiopia is argued to be one of the deadliest conflicts in the 21st century, killing over 600,000 people (Pilling & Schipani, 2023). In Ethiopia, it was estimated that 22.25% of the population experienced food insecure in 2023, largely due to conflict-related factors. Recent exposure to conflict in Ethiopia has created a greatly significant humanitarian crisis (Peters et al., 2022).

Based on the World Food Program (WFP) in 2023 reported that an estimated 15.8 million people are experiencing severe food insecurity including approximately 4.5 million internally displaced people who were forced to leave their homes due to the increase of exposure to conflict (Cullis & Bogale, 2024). The exposure to conflict in Ethiopia concluded with a "permanent ceasefire" in November 2022 under the Pretoria Agreement. In 2024, According to the World Food Program (WFP) recent reports show that about 21.4 million people in Ethiopia need humanitarian assistance (HARAKE, 2024).

This study to examine the impact of conflict on food insecurity in Ethiopia using panel data collected by the International Food Policy Research Institute (IFPRI).

1.2. Statement of the Problem

Food security and exposure to conflict are volatile interconnected through socioeconomic factors, political dynamics, cultural issues, economic challenges, and other influences. This research investigate how exposure to battle affects food security outcomes in Malawi and Ethiopia. Exposure to conflict is the one of key drivers of food insecurity. The results show that exposure to conflict in Ethiopia greatly disrupt food production and market access, leading to increased food insecurity (Muriuki et al., 2023). Also, the result of this paper is the exposure to conflict disrupts wealth, income, infrastructure, and agricultural production (Muriuki et al., 2023). Similarity ,in Malawi exposure to conflict damage the market access ,limited market, disruption agricultural production ,loss of income and loss of asset (Muriuki et al., 2023)

The weakness of in this paper is it does not capture the direct impact of exposure to conflict. However, battle leads to immediate food insecurity the people. This research presents evidence for the immediate effect of exposure to battle on food security in Ethiopia. Another, weakness of this paper does not address heterogeneity impact by gender and location. Many research focused on the overall the effect of exposure to battle on food security without specifically examining which gender (female or male) is more affected, and which location (urban or rural) is more impacted.

This study contributes to addressing heterogeneity impact by gender (female and male) and location (urban and rural variation). A limitation of this paper also is the knowledge gap in terms of methodology which is based on the assumption of homogeneity, which indicates that the effect of exposure to conflict on food security is consistent across all households. I examined how the impact of exposure to conflict varies across households, highlighting that the impact on food security is not uniform throughout Ethiopia. I utilize panel data to show the changes in household food security before and after the conflict. While useful, the research lacks depth in this study and has gaps in terms of missing variables.

This study focuses only on environmental factors. I was addressing all relevant control variables, including household size, access to land, Tropical Livestock Unit (TLU), off-farm income, asset index, and household size. The final contribution of this paper explores the impact of exposure conflict on food insecurity in Ethiopia.

Previous studies have shown that the connection between exposure to conflict and food security is bi-directional manner. In Ethiopia, a political disagreement between the Tigray regional government and the federal government escalated into a full-scale war on November 4, 2020. Millions of people were affected by the recent of exposure to conflict in Ethiopia. This paper's evidence from Ethiopia shows the exposure to conflict destruction of infrastructure, large-scale displacement of people, limited access to food markets, and disrupted livelihood activities (Abay et al., 2023). It is common that exposure to conflict continues lead to food insecurity. The result shows that exposure to conflict in Ethiopia affected food security throughout by collapse the market and limited of access of market, loss of livelihoods, loss of income, disruption health outcome, loss of their productive asset and damaging public services (Abay et al., 2023).

This study shows of direct impact of exposure to conflict on food security and contributes to understanding the causal relationship between exposure to conflict and food insecurity. Additionally, the limitation of this paper is data collected at the Midway of the conflict, which does not capture the before conflict and after the conflict. This study addresses that gap by using panel data that covers both the before the conflict and after the conflict periods. I have the data before-conflict and after-conflict. The limitation of this paper is also based on data collected through the High-Frequency Phone Survey (HFPS). The phone survey means the respondents are not willing to provide accurate data. Some of the research overstate the phone survey based on food consumption. In this study, the data collected is in a personal survey or face-to-face survey. The Another, weakness of this paper does not capture the heterogeneity by gender and location. The final contribution of this paper identifies the heterogeneity of impacts by location (urban versus rural areas) and gender (Female versus male).

Due to the recent conflict in Ethiopia, research on these topics is still limited. It is really not exploring this topic is limited because due to data availability before the conflict and after conflict settings.

1.3. Objective of the study

1.3.1. General objective

The general objective of the study is to examine the impact of conflict on food insecurity in Ethiopia.

1.3.2. Specific objectives

The specific aims of the study are:

- To examine the trends in exposure to conflict and the corresponding levels of food insecurity in Ethiopia
- To investigate the impact of conflict on food insecurity in Ethiopia
- To analyze the differential impact of conflict on food insecurity across gender (female vs. male) and location (urban vs. rural).

1.4. Research Questions

The study aims to respond to the following fundamental research questions by the conclusion of the study:

(1). What is the impact of conflict exposure on food insecurity in Ethiopia?

(2). How does conflict impact food insecurity in urban and rural areas of Ethiopia, as well as among female-headed and male-headed households?

1.5. Scope of the Study

This research investigates the impact of exposure to conflict on food security in Ethiopia, with a focus on how conflict exacerbates poverty and undermines access to adequate food. The study is nationally representative, covering diverse regions across Ethiopia to capture variations in exposure to conflict the intensity, socioeconomic conditions, and food security outcomes.

Methodologically, the study applies a robust quantitative approach using Difference-in-Differences (DID) and Two-Way Fixed Effects (TWFE) models. The DID framework compares food security outcomes between conflict-affected and non-conflict-affected areas before and after conflict events, isolating the causal relationship is of exposure to conflict.

Two-Way Fixed Effect (TWFE) that show changes over time in two differences shows before conflict and after conflict. These methodologies leverage panel data from nationally representative household surveys and conflict event records, enabling a rigorous analysis of the relationship between exposure to conflict and food insecurity. The study focuses on key food security indicators, such as the Food Consumption Score (FCS), Household Dietary Diversity Index (HDDI), and Food Insecurity Experience Scale (FIES).

1.6. Significance of the Study

Exposure to conflict affects food security through psychological trauma, mental and well-being, agricultural production, trade, and income. This study is very crucial and holds significant importance for understanding the impact of conflict food insecurity in Ethiopia. This study can add to the literature on the effect of exposure to battle on food insecurity in Ethiopia.

The results of the study will assist policymakers in advancing sustainable development and peace in areas impacted by violence. This paper may also inspire other researchers to perform better in this field. Overall, my research aims to improve our understanding of food security in conflict-affected areas.

1.7. Limitation of the Study

The study's limitations include data availability before and after the conflict, as well as challenges in data collection due to conflict exposure in the regions. Additionally, while the study focuses on location (urban vs. rural) and gender (female vs male) disparities, limited disaggregated data may affect the depth of the analysis.

This study has two main limitations: first, the occurrence of exposure to battle is not randomized, which may introduce selection bias, and second is the ACLED data base may have limitations related to accuracy, and based on the reporting bias.

1.8. Research Hypothesis

This research determined that conflict exposure is inversely related to food security indicators. Additionally, the effect of exposure to conflict on food insecurity is more significant in Ethiopia's rural areas than in its urban areas. The effect of battle exposure on food insecurity in Ethiopia impacts females more than males, as women typically encounter greater food security challenges.

In Ethiopia, female play a crucial role in farming and caring for their families, but conflict disrupts their access to land, resources, education, health services, and market. Rural households more experience higher levels of food insecurity during conflict with compared to urban households.

1.9. Organization of the Study

This thesis is structured into five interconnected chapters. Chapter One introduces the study by outlining its background, problem statement, research questions, objectives, significance, scope, limitations, hypothesis, and overall structure. Chapter Two reviews relevant theoretical and empirical literature review on exposure to conflict and food insecurity, presents the conceptual framework, and identifies key knowledge gaps the study seeks to address. Chapter Three describes the research methodology, including the design, data sources, sampling techniques, and variables, as well as the empirical strategies specifically the Difference-in-Differences (DID) and Two-Way Fixed Effects (TWFE) models, used to assess the impact of conflict on food security. Chapter Four presents and interprets the empirical results, relating them to the research objectives and existing literature. Finally, Chapter Five summarizes the main findings, draws conclusions, and offers policy recommendations for governmental and non-governmental actors to better support conflict-affected households and improve food security outcomes.

CHAPTER 2: LITERATURE REVIEW

2.1. Theoretical Literature

2.1.1. Definition of Food Security

Food security is achieved when everyone, at all times, has reliable physical and economic access to enough safe and nutritious food that fulfills their dietary needs and food preferences, enabling them to live an active and healthy life (Canton, 2021).

Numerous and diverse factors contribute to food insecurity at global, national, municipal, and regional levels, including food production and availability, volatile food prices, poverty, income levels, social protection, access to public services, and other elements. Based on this definition, four key components of the food security determinant are: food availability, food accessibility, food utilization, and food stability.

(i) Food availability: refers to the exists of food at global, national, household, and individual levels, sourced from domestic production, commercial imports, humanitarian assistant, or food reserves. It is influenced by macroeconomic conditions and encompasses agricultural output, trade, and market distribution (Anderson & Elisabeth, 2015). This represents the supply side of food, which includes agricultural output, trading, and market distribution.

Food availability, as outlined in a food balance sheet, refers to the quantity of food accessible for human consumption at the retail level for a country's population, accounting for losses or waste at the retail or consumer stage (FAO). It needs a consistent supply of sufficient food, with per capita dietary energy supply indicating whether the national food supply fulfills the population's nutritional requirements (Mohamed, 2017).

(ii). **Food accessibility:** refers to the resource's households have to obtain food through self-productive or sale, closely tied to household income and self-production capacity (Anderson & Elisabeth, 2015). It is influenced by household income, income distribution, market food prices, market access, and social and institutional rights (Kuwornu et al., 2011).

The key factors include personal income, food availability, and global and local food price trends. Accessibility encompasses the ability to obtain sufficient, high-quality food and involves physical, economic, and sociocultural dimensions. food is abundant and affordability, socio-cultural and economic (Mahmoud, 2021)

(iii) Food utilization: refers to the nutritional benefits derived from food consumption, linked to proper food processing, storage, nutrition knowledge, and access to health and sanitation services(Anderson & Elisabeth, 2015). It involves the biological use of food, requiring a diet rich in energy and essential nutrients, along with knowledge of food storage, processing, nutrition, childcare, and disease management (Jrad et al., 2010). Utilization is measured by cooking, storage, hygiene practices, individual health, water, sanitation, and intra-household feeding and sharing practices.

(iv) Food stability: refers to the persistence the availability, accessibility, and utilization of food resource outcome. Individuals are considered food insecure if access to food is periodically limited, risking nutritional decline. Factors such as adverse weather, political instability, unemployment, and rising food prices can affect food security (Al et al., 2008b). Food stability ensures consistent food security at global, regional, national, household, and individual levels.

2.1.2. Concepts and Definitions

This section presented the key concepts of exposure to conflict/Armed conflict, heterogeneity, and impact as employed in this study. Each term is defined using established literature and supplemented with operational definitions to clarify their application within the research context.

(i) Armed Conflict or Exposure to Conflict:

In the literature, conflict denotes a state of disagreement between or opposition between individuals, groups, or entities due to incompatible goals, based on interests, or based on the values (Deutsch, 1973). Armed conflict, a specific form of conflict, involves organized groups state or non-state actors engaging in sustained, deliberate violence, resulting with greatly significant casualties (Kivimäki, 2024). According to the (Galtung, 1969) categorizes exposure to conflict as structural, cultural, or direct, with armed conflict typically representing direct violence.

The United Nations (1998) defines armed conflict as a political or territorial dispute involving armed forces, causing at least 25 battle-related deaths annually. In this study, Armed conflict refers to organized violent interactions between state or non-state actors within during meeting the Uppsala Conflict Data Program's threshold of at least 25 battle-related deaths per year. The broader term conflict encompasses non-violent disputes, such as political or social tensions, that may precede or accompany armed conflict and are relevant to the study's objectives.

(ii) Heterogeneity:

Heterogeneity refers to diversity in character, composition, or attributes within a population or group (Babbie, 2016). In social science research, it often describes variations in ethnicity, religion, culture, socioeconomic status, or political affiliations, which can influence social cohesion or conflict dynamics (Alesina & La Ferrara, 2005). High heterogeneity may lead to competing interests, potentially exacerbating tensions (Collier & Hoeffler, 2004). In this study, heterogeneity denotes diversity in among gender and location. This study examines heterogeneity as a factor influencing the dynamics or outcomes of exposure to conflict.

(iii) Impact:

Impact refers to the effect or influence of one phenomenon on another, often encompassing social, economic, political, or environmental consequences (Creswell & Creswell, 2017). In conflict studies, impacts may include displacement, economic decline, or institutional changes, with effects varying in scope and duration (Babbie, 2020; Bank, 2011).

In this study, impact denotes the measurable effects of armed conflict on food security in Ethiopia. It is operationalized through quantitative of data the source comes in different data set .in this study drawn from two source one is from household survey data and also from Armed Conflict Location and Events data (ACLED).

This study assesses immediate impact or short-term impacts like casualties, displacement, disruption income, loss of wealth, damage infrastructure, limited of market due to increase of exposure to conflict.

2.2. Measurement of Food Security

There are several ways to assess food security at the household level. I evaluated food security using alternative indices.

Food Consumption Score (FCS): In this study, to assess food security in a household survey, I used the Food Consumption Score (FCS). The Food Consumption Score (FCS) measures a household's dietary diversity, frequency of consumption, and the nutritional value of several group food in the one seven days.

According to a Kenyan survey, households with low FCS experienced poor health results, which were strongly related to a lack of food during drought seasons (Wfp, 2008a). It analyzes a population's food security and nutritional condition by aggregating household-level data on eight essential food types consumed in the previous seven days.

Food groups are given weights based on their nutritional value, and the weighted food group scores are added to get the final FCS score (Wfp, 2008b). When the FCS generates based on the questioners: Using data from the survey's food consumption questionnaire module, I classify all food products consumed by the household into eight categories. lower FCS score indicates that increasing levels of food insecurity. Also, a higher FCS score increases food security. According, to the World Food Program (WFP), Households are classified as having poor, borderline, or acceptable food security based on their FCS scores.

The main advantage this measurement of food security is standard. If the FCS is more than 35 it is acceptance this means this food secure and the FCS is less than 21.5 means poor this imply food insecure and at the middle 21.5-35 means broader line.

Household Dietary Diversity Index (HDDI): the core purpose of HDDI the indicate food access at the household level and also to reflect the nutritional quality of dietary. It is a measure of the variety of foods consumed by a household within a certain time period (usually in the past 24 hours). The HDDS is determined using the following twelve food groups. When calculating the household dietary diversity index (HDDI), the extended set should be integrated back into the original 12 food groups, ensuring that the overall HDDS is based on the same 12 food groups.

The Food Insecurity Experience Scale (FIES): refers to which is the most widely used method for evaluating food insecurity the prevalence (Kadir et al., 2023).The FIES is a statistical measurement scale similar to other widely accepted statistical scales designed to measure unobservable traits such as intelligence, personality, and a broad range of social, psychological, and health-related conditions. The rate of moderate food insecurity and the rate of moderate or severe food insecurity are the two FIES metrics. It uses a series of 8 yes/no questions to assess food-related behaviors and experiences.

To Provide actionable information that policymakers can use to identify vulnerable population groups and guide policy interventions. The information obtained from the FIES is useful to a wide

range of audiences, including government officials and program managers at all levels, as well as advocates, community leaders, and scholars (Saint Ville et al., 2019).

FIES can be used in conjunction with other indicators to identify risk factors and outcomes of food insecurity. The phenomenon of food insecurity encompasses much more than what the FIES captures; it includes aspects such as international and national social, economic, and agricultural policies, as well as livelihood strategies, access to public services, basic sanitation, food habits, and household nutritional status (Helmi et al., 2020).

FIES does not provide particular information on actual food consumption, dietary quality, or nutritional status, it provides a significant tool for the nutrition and food security community to expand the knowledge regarding the experiences of food insecurity (Cafiero et al., 2018).

Household Hunger Scale (HHS): this Focuses on the most severe forms of food insecurity, such as going hungry owing to food shortages in the previous month. In Sudan, displaced populations had significantly higher HHS scores, emphasizing the acute impact of conflict on food security (Ballard et al., 2011).

Integrated Food Security Phase Classification (IPC): A systematic framework for categorizing food security from minimal to famine levels using a combination of food intake, livelihood shifts, and nutritional outcomes. The IPC framework found famine conditions in portions of Somalia in 2011, caused by drought and violence(IPC & Pilot, n.d.).

Coping Strategies Index (CSI): Captures the frequency and severity of tactics used by households to deal with food shortages, such as lowering meal sizes or selling assets. A study in South Sudan (Maxwell et al., 2014) discovered that households in conflict-affected regions depended heavily on negative coping techniques, resulting in long-term economic fragility.

Global Food Security Index (GFSI): A worldwide metric for analyzing cost, availability, quality, and natural resource risks to food security. The GFSI 2023 put Afghanistan among the lowest globally due to ongoing violence and economic insecurity (Maxwell et al., 2008).

Food Balance Sheets (FBS): Monitors food supply at the national level, including production, imports, exports, and losses. FAO's analysis of food balance sheets in (Daszkiewicz, 2022),the continuous fighting has resulted in a 40% reduction in wheat exports, hurting global food markets.

2.3. Empirical Literature Review

This section presented empirical reviews studies that examine the impact of armed conflict on food security, focusing on outcomes relevant to the study's objective of assessing how conflict affects household food security in Ethiopia. The review also considers the role of heterogeneity in the location (urban and rural) and gender (female and male).

Empirical studies persistency demonstrates that exposure to conflict significantly undermines food security by disrupting agricultural production, market access, and household livelihoods. Based on (Muriuki et al., 2023) used a Difference-in-Differences (DID) approach to analyze the impact conflict on food security in Ethiopia and Malawi , finding that conflict exposure reduced by food consumption scores 16.3% due to disrupted supply chains and income losses. These studies highlight direct impacts, such as reduced access to food, and market collapse and limited the access of market (Muriuki et al., 2023).

The role of heterogeneity in exacerbating conflict's impact on food security is also well-documented. (Alesina & La Ferrara, 2005) found that ethnically diverse communities in conflict zones, such as South Sudan, experienced greater food insecurity due to unequal resource distribution, with fractionalization indices correlating with a 10% higher likelihood of food shortages. In a study of the Boko Haram insurgency in Nigeria, (Penne & Goedemé, 2021) used survey data and regression models to show that heterogeneous communities (e.g., mixed ethnic or religious groups) faced a 30% higher rate of acute food insecurity. These findings suggest that diversity can intensify the negative effects of exposure to conflict, a dynamic this study explores in Ethiopia.

Empirical studies often employ rigorous quantitative methods to assess conflict's impact. The DID approach, used by (Brück et al., 2019) compares food security outcomes before and after conflict in affected versus unaffected areas, controlling for time-invariant factors. Similarly, TWFE models, as applied by (Abay et al., 2023), account for both time and regional fixed effects, isolating conflict's causal impact on food consumption. These methodologies inform this study's analytical strategy, which adopts DID and TWFE models to estimate conflict's effect on food security indicators.

Impact refers to the effect or influence of one phenomenon on another, often encompassing social, economic, political, or environmental consequences (Creswell & Creswell, 2017).In conflict studies, impacts may include displacement, economic decline, or institutional changes, with effects varying in scope and duration (Babbie, 2020; Bank, 2011).

I also provide more evidence on the Macro and Micro factors that determine poverty and food security. The macro factors determine poverty and food security. poor governance is a major macroeconomic element affected food security. The poor governance also one of driven to poverty and food security. The outcome of this paper is inefficient policy making and resource allocation, worsening poverty and food insecurity (Khan et al., 2024; Okpala et al., 2023).

Effective governance systems are critical in formulating strategies to solve problems and to good policy making (Okpala et al., 2023). Furthermore, governance and policy frameworks are critical to economic growth levels, and infrastructure has a significant effect on food security. countries with higher economic development led to have better food security due to enhanced agricultural output and resource allocation (Soóki et al., 2024). Environmental variables such as agriculture productivity are also important macroeconomic indicators. Environmental degradation can threaten food security and productivity (Soóki et al., 2024). Furthermore, economic crisis, such as increase in food price, can have a major significant impact on food security and poverty levels. These shocks can disproportionately affect poorer countries, leading to increased food insecurity (Boccanfuso & Savard, 2011).

Micro factors determine poverty and food security. Household income and employment status are directly affected by food security. Higher per capita income and numerous earners in a home can decrease poverty and also increase food security (Khatun et al., 2022). In addition to income, food security is influenced by education levels, especially among family heads. Higher education levels are related with better food security outcomes because they boost employment options and income (Khatun et al., 2022). Health issues, such as disease prevalence, also have an impact on food security since they affect household production and income (Khatun et al., 2022).

Food security is important for economic development, especially in developing countries that lack sufficient food security due to various factors such as climate change, volatile food prices, increased global population, and exposure to conflict (HUNGER & INSECURITY, 2024). Furthermore, larger household sizes may contribute to increased food insecurity. The composition

of the household, such as the head's age and gender, has an impact on food security. Women play an important role in farming and caring for their families. Female-headed households are sometimes more food secure since exposure to conflict disturbs their access to land, resources, education, health services, and markets (Oduniyi & Tekana, 2020).

The problem of food security keeps evading millions of Africans are due to persistent of conflict and political instability in the continent in many Sub-Sahara African countries food are available and too much but not distribute to every one because of the exposure to battle that affect the farmers not to bring their food production to market and conflict also collapse market and development policies ,and conflict make food production to decrease and food price to increase consequently poor families and children cannot access to healthier and balanced dietary diversity (Mahmoud, 2021). At end of 2014, exposure to conflict and human rights violations had displaced 59.5 million people globally, out of which 38.2 million people were Internally Displaced Persons (IDPs) (Loescher, 2014).

Numerous studies provide empirical evidence of exposure to conflict impact on food insecurity. Macro-level research examines the connection between exposure to battle, economic growth, and broader development indicators (Collier, 2003b). At the micro level, research has explored how battle exposure affects household welfare and food security. For instance, the (1998–2000) Ethio-Eritrea battle conflict negatively associated with child health, education, and food security (Akresh et al., 2012). Similarly, exposure to the (2002–2007) exposure to battle in Côte d'Ivoire led to deteriorated health outcomes and raised in food insecurity (Minoiu & Shemyakina, 2012).

Next, I come to Ethiopia, where millions of people have been affected by the exposure to battle (Muriuki et al., 2023). The exposure to conflict greatly significant impacted food security and exposure to battle reduction in the Food Consumption Score (FCS) by 4.32 units, this result indicates an 11.67% decline in food security for Ethiopian households (Muriuki et al., 2023).A devastating exposure to conflict in Ethiopia severely affected to food security, according to High-Frequency Phone Survey (HFPS) results. The exposure to conflict is significant disruptions in supply chain and limited access to food markets and disruption farm equipment and loss of livestock and livelihood (Abay et al., 2023).

2.4. Conceptual Framework of the Study

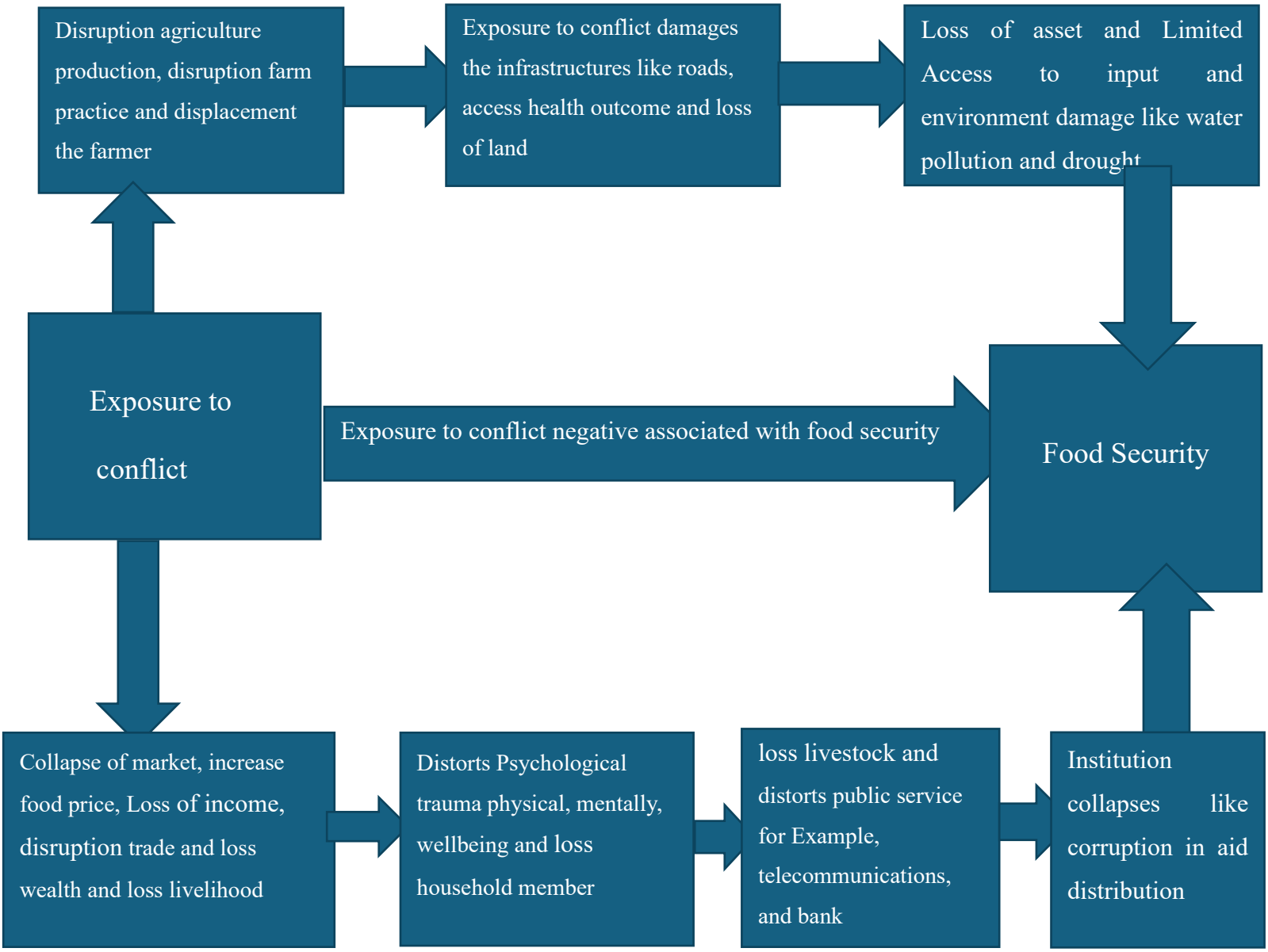


Figure 1. Conceptual Framework of the Study

Conceptual framework of the study

I detailed the description to elaborate on the conceptual framework of the study. Exposure to conflict affected food security throughout production, trade, and income. Armed conflict the key driver to food insecurity. The armed conflict leads to reduced agricultural productivity and increased food insecurity, which negatively affects human capital development and increased food prices (Muriuki et al., 2023). Additionally, conflicts disrupt child education and health outcomes, forced displacement, damage essential infrastructure, limit access to food markets, and disrupt livelihood activities, and also the damage of local economies (Weldegiargis et al., 2023).

Armed conflict disrupts access to basic services, the infrastructures like roads, access to health service, and increase price of food. The exposure conflict in Ethiopia has also significantly reduced access to health services, food, and water (Abay et al., 2022b). The distorts psychological stress can lead to long-term mental health impact and also disruption physically, and mentally affects income and other aspects of activities. The previous research about the distorts physical, mental, and wellbeing (Miller, 2016) demonstrate that exposure to battle trauma can result in decreased agriculture productivity and decreased income and trade. In conflict zones, market accessibility challenges and market are limited. Limited market access can lead to shortages of essential goods, increasing the prices of food and limiting food availability.

Exposure to conflict loss of income and wealth. In Africa, conflict continues drives to poverty and food insecurity. Exposure to conflict of loss of income, loss of wealth assets, and also increasing food insecurity (Crost et al., 2023). Armed conflict disruption agricultural output, mostly because they destroy farmland, displace farmers, and change farming systems. Exposure to conflict interrupts supply networks, limiting the availability of inputs like seeds, fertilizers, and cattle. In Syria, the crisis was significantly impacted by disruptions livestock supply chain, then resulting in increased food insecurity (Li et al., 2022). Finally, According to (Lima, 2021) institutional collapse, failed food policies, corruption, and bias in the aid distribution system have affected food-insecure people.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Research Design

I used quantitative data analysis to examine the impact of conflict on food insecurity in Ethiopia. I used longitudinal data to examine the impacts of conflict on food insecurity in Ethiopia.

For this study, I used secondary data from the International Food Policy Research Institute (IFPRI). The data for this paper come from two sources: one is Household survey data and Armed Conflict Location and Event Data (ACLED).

3.2. Description of the Study Area

This study is conducted in Ethiopia, a landlocked country in the Horn of Africa with a population of approximately 130 million, making it the second-most populous nation in Africa. Covering an area of about 1.1 million square kilometers, Ethiopia is characterized by diverse topography, ranging from highland plateaus to lowland plains, and varied agroecological zones that influence agricultural production and food security. The Ethiopia country is administratively divided into 12 regional states and two chartered cities (Addis Ababa and Dire Dawa), each with distinct ethnic, cultural, and economic.

Ethiopia's nationally representative scope ensures that the study captures the heterogeneity of exposure to conflict and food security outcomes across its regions. The study leverages Ethiopia's complex socio-political context, marked by recent armed conflicts and ongoing localized violence, to examine their impacts on household food security. Including urban and rural areas, the research reflects the interplay of exposure to conflict, and food insecurity.

3.3. Data types and sources

The data for this study are comes from two sources:

(i) Household Surveys data:

In this study, I use secondary data from the International Food Policy Research Institute (IFPRI). Two-wave panel data were collected through household surveys conducted in 2016-2019 (Baseline) and 2020-2023 (End-line) across all regions of Ethiopia. In this study about 3000 households were interviewed before the conflict and after the conflict.

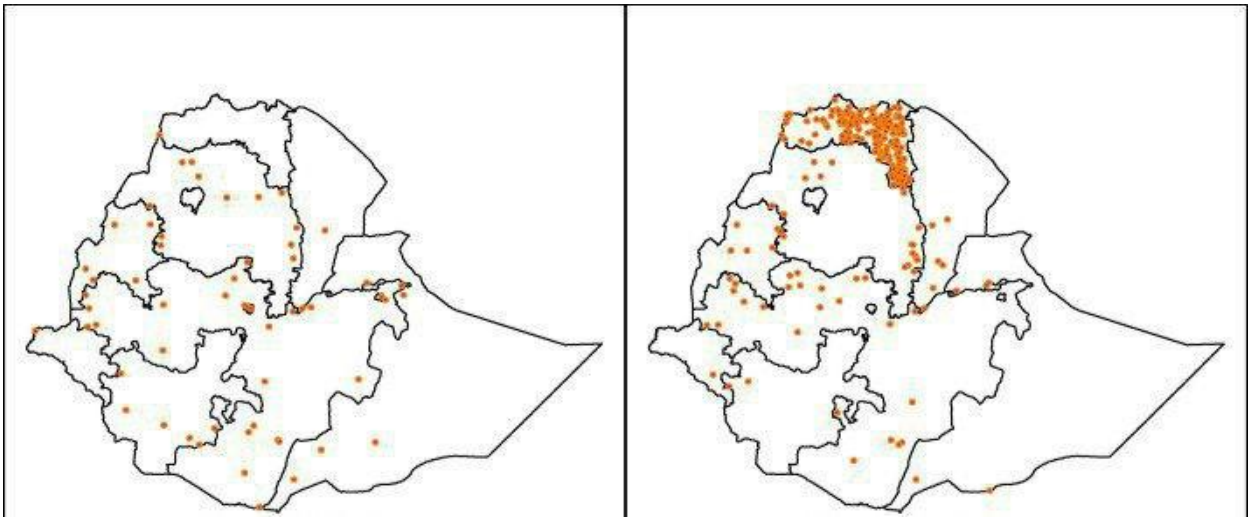
The variable includes Food security (dependent variable) Exposure to conflict (Treatment variable) and control variable (Age, Sex, Education Level, Drought, Access to Agricultural Land, Household Size, Asset Index, Off-Farm Income, Tropical Livestock Unit, Farm equipment index, and Housing condition).

The Household surveys collected detailed information on household demographics, food consumption, and economic conditions. I checked the population in the areas covered by the household survey data and This study analyzes the exposure of battles occurring within 10-kilometer, 15 kilometers, and 20-kilometer radius of household locations. Using GPS data, was identify the exact locations of these households to study the relationship between conflict on food insecurity in Ethiopia.

(ii) Armed Conflict Location and Event Data (ACLED):

This thesis investigated conflict exposure across all regions of Ethiopia. The analysis utilized two waves of survey data conducted in 2016-2019 (baseline) and 2020-2023 (end-line) across all regions of Ethiopia. Armed Conflict Location and Event Data (ACLED) monitors a variety of violent and nonviolent actions by political agents, including governments, rebels, militias, communal organizations, political parties, external players, rioters, protestors, and civilians (Location, 2019). The Armed Conflict Location and Event Data (ACLED) database offers comprehensive data on various types of conflict events, including both violent and non-violent incidents. These events are categorized into six types, such as remote violence (e.g., drone and airstrikes), demonstrations, riots, armed clashes, violence against civilians, and strategic developments (Raleigh et al., 2010).This study, I focused on the battles because exposure to battles are the dominant two survey data.

In this study, the data collection was conducted by expert enumerators. The survey was translated into Three (3) languages. The one was in Amharic the second was in Afaan Oromo and also the third was in Tigrigna. Additionally, I considered Ethiopia as a whole and I utilized conflict data to identify the food security status of individuals living near conflict areas compared to those who were far away. I did heterogeneity impact by gender and location to show regional variations.



ACLED conflict events between 2016-2019 **ACLED conflict events between 2020-2023**

Source - (Abay et al., 2023)

Figure 2- Conflict events and regional variations

This data links the household information to the GPS location. The dataset merges ACLED and the Household survey data. Using these GPS identifiers, I identified the occurrence of the exposure to battle. If battles are reported immediately to ACLED.

For occurrence, I used a dummy variable Exposure to battles coded 1 if a household is exposed to one or more battles within a 15-kilometer radius (buffer), and 0 otherwise.

3.4. Econometrics Model Specification

I apply Difference in Difference (DID) and Two-Way Fixed Effect (TWFE) models are both used to determine causal linkages, but they differ depending on the data requirements and assumptions.

3.4.1 Difference-in-Differences (DID)

Difference-In-Differences (DID) one of the most popular research designs used to evaluate causal effects of policy intervention. The data requirement of DID is requires two time period data means needs before conflict and After conflict and also two groups mean treatment group(exposed) and control group (not exposed). The ideal of DID in the first period no one is treated which means before conflict all are not affected and also in the second period some units are treated (the treated group), and some units are not (the control group).

DID follow parallel trend assumption. Parallel Trends needs to be discussed and its plausibility assessed. DID it rely works on pre-conflict and post-conflict. In Difference-in-differences (DID) uses baseline and end-line data, where households are equal.

The Methodology extensions of DID approaches frequently focus on the typical two periods (before conflict and after conflict) and two groups which means treatment group and control group (Abadie, 2005; Athey & Imbens, 2006; Bonhomme & Sauder, 2011; Botosaru & Gutierrez, 2018; Callaway et al., 2024; Heckman et al., 1997; Sant'Anna & Zhao, 2020).

3.4.2 Empirical Strategy: Difference-in-Differences (DID) Approach

This method compares changes in food security indicators between households affected by exposure conflict and those not affected, before and after the conflict setting.

Average Treatment Effect on Treated (ATT) is estimated using the following approach:

$$\text{ATT} = \left(Y_{\text{treated},1} - Y_{\text{treated},0}\right) - \left(Y_{\text{control},1} - Y_{\text{control},0}\right)$$

Where:

- $Y_{\text{treated},1}$: The average outcome for the treated group after receiving the treatment
- $Y_{\text{treated},0}$: The average outcome for the treated group before receiving the treatment
- $Y_{\text{control},1}$: The average outcome for the control group after the treatment period
- $Y_{\text{control},0}$: The average outcome for the control group before the treatment period

The specification of Difference-in-Differences (DID) is:

$$Y_{it} = \beta_0 + \beta_1 \cdot \text{Year}_t + \beta_2 \cdot \text{Battle}_i + \beta_3 \cdot (\text{Battle}_i \times \text{Year}_t) + \beta_4 X_{it} + \alpha_i + \epsilon_{it}$$

- Y_{it}**:** Food security for unit i at time t
- Year_t**:** dummy variable before conflict equal to 2019 and after conflict equal to 2023
- Battle_i **:** dummy variable equal to 1 for treatment units (exposed to conflict) and 0 for control units (not exposed to conflict)
- $\text{Battle}_i \times \text{Year}_t$: Interaction term, capturing the DID estimate of the causal effect of conflict exposure (β3)

• β_0 (baseline): the average food security level for control units (not exposed to conflict) in the before-conflict period

• β_1 (post -conflict effect): captures the change in food security for control units in the post-conflict period

• β_2 (treatment effect): measures the difference in food security between treated (exposed to conflict) and control units in the pre-conflict period

• β_3 (DID effect): the causal effect of conflict exposure on food security. It shows how food security changes for treated units in the post-conflict period relative to the control units

• β_4 (control effect): captures the effect of other time-varying factors

• X_{it}**:** controls variable

• α_i **:** dummy region

• ϵ_{it}**:** Error term

3.4.3 Two-Way Fixed Effects (TWFE)

I use TWFE that show changes over time in two differences shows before conflict and after conflict. I use two-way fixed effects because they address changes before conflict and after conflict. Fixed effects show only one-way change over time differences. Fixed effect only shows before conflict or after conflict change over time. Extends DID by controlling for time-invariant differences across units and time-specific shocks. The key assumption of TWFE treatment effect is constant over time and across groups and also there no omitted variable. the requirement of TWFE requires panel data with multiple time periods. TWFE can handle circumstances in which the treatment is given at different times to different groups and accounts for unobserved characteristics that vary across groups. TWFE is an extension of DID that's develop for more complex patterns.

3.4.4. Empirical Strategy: Two-Way Fixed Effect (TWFE) Approach

The specification of Two-Way Fixed Effect (TWFE):

$$Y_{it} = \beta_0 + \beta_1 \cdot \text{Conflict}_{it} + \beta_2 X_{it} + \alpha_i + \lambda_t + \epsilon_{it}$$

Explanation:

• Y_{it}: Food security for unit i at time t (dependent variable).

• Conflict_{it}: exposure to conflict for unit i at time t (key independent variable).

• X_{it}: Other time-variant controls for unit i at time t

• β_0 **(**intercept term): baseline food security level when there's no conflict and all other variables are at their reference values

• β_1 **(**effect of exposure to conflict): measures how exposure to conflict impacts food security

• β_2 **(**controls effect): shows how other factors (e.g., income, household size and asset) influence food security

• α_i: dummy region effect

• λ_t: time-specific fixed effects (or year fixed effect)

• ϵ_{it}**:** Error term

3.5. Method of Data Analysis

I use panel data with a two-way fixed effects model to analyze the impact of conflict on food insecurity in Ethiopia. Panel data is hybrids of time-series and cross-sectional data, tracking multiple subjects over time.

This study utilizes both pre-conflict and post-conflict data to assess the impact of conflict on food insecurity in Ethiopia, providing a valuable opportunity to observe changes over time. Panel data shows in change household food security before the conflict and the conflict. Using panel data with a two-way fixed effect model provides multiple advantages for this analysis.

Firstly, controlling unobservable and reducing estimation biases which means makes the result more accurate. Second, it captures complex patterns, shows long-term effects, and also better causation to see cause and effect. Finally, TWFE (Two-way fixed effect) accounts over time more than fixed effect. TWFE is more powerful than fixed effect.

For data analysis, descriptive statistics I use for balance test and mean difference test and also econometric analysis were applied. I regress the model to illustrate the relationships between the dependent variable and key explanatory variables.

Finally, I conducted Robustness approach checks to ensure the reliability of the results. I assessed the robustness approach within 10km and 20km, change over time, and also food security is consistent or not.

3.6. Definition of variables and measurements of food security

Variables

The aim of this study is to investigate how exposure to conflict impacts food security in Ethiopia. I assessed food security using several alternative indicators. The first indicator is the Food Consumption Score (FCS). Food Consumption Score (FCS) measures a household dietary diversity and food consumption, nutritional content of different food types consumed over a specified time period in the past week or seven days.

A lower FCS score suggests increased food insecurity. Also, a higher FCS score increases food security. The Food Consumption Score (FCS) is a standardized indicator developed by the World Food Programme (WFP). According to WFP thresholds, a score below 21.5 indicates poor food consumption, a score between 21.5 and 35 is considered borderline, and a score above 35 is deemed acceptable.

The second indicator is Household Dietary Diversity Index (HDDI). HDDI is a measure of food access at the household level as well as the nutritional quality of the diet. It is a measure of a household's dietary diversity over a specific time for one day. A higher HDDI score suggests increased food security and nutrition, while a lower HDDI score indicates increased malnutrition or food insecurity.

The third indicator is Food Insecurity Experience Scale (FIES), created by the FAO, is a metric used to assess the rate of food insecurity over the past one month or 30 days. It uses a series of 8 yes/no questions to assess food-related behaviors and experiences. The two measurements of FIES are one, the prevalence of moderate food insecurity and two, the prevalence of moderate severe food insecurity.

The key explanatory variable this study is exposure to conflict. I was more focused only the battles because battle was the most dominant conflict events between the two surveys which means in the base-line survey and end-line survey. I was examining the locations of individuals in the household survey data and the count of battles within 10km, 15km, and 20kilometer radius of their household locations.

Control variable: I focused only on the time-variant variables. I was control for those factors because they contribute uniquely affected to the analysis.

Table 3.1 Description of variables, measurements of food security

Variable Name	**Variable Type**	**Variable Description**	**Level Measurement**	**Expected Sign**
Head age	Continuous	Age of the household members	Ratio	±
Household head sex	Dummy	Gender of household head (Male = 0, Female = 1)	Nominal	±
Head highest education level	Categorical	Highest level of education attained (e.g., primary, secondary)	Ordinal	+
Drought	Continuous	SPI values. -1 represents below drought and 1 represents above the drought	Interval	-
Access Agricultural Land	Continuous	Size of land owned or accessed by the household (in hectares)	Ratio	+
Household Size	Continuous	Total number of household members	Ratio	-
Asset Index	Continuous	Composite index of household assets	Ratio	+
Off-Farm Income	Continuous	Income earned from non-agricultural activities	Ratio	+
Tropical Livestock Unit	Continuous	Livestock ownership measured in Tropical Livestock Units	Ratio	+
Housing condition	Continuous	Assesses the quality and adequacy of a household's living environment	Ordinal	+
Farm equipment index	Continuous	Measures the availability and utilization level of agricultural tools	Ratio	+

CHAPTER 4: RESULTS AND DISCUSSIONS

This section first presents the descriptive statistics of baseline characteristics and mean difference Test based on the baseline characteristics. Next, the implications of armed conflict (battle) on different indicators of food security are analyzed. After, it discusses the heterogeneous impact of exposure to battle on food security based on gender and location. Finally, the robustness of the main findings is assessed.

4.1. Descriptive Statistics of Baseline Characteristics (Before Conflict characteristics)

4.1.1. Summary statistics at the base-line characteristics

Table 4.0 Summary statistics at the base-line information (before conflict characteristics)

	Mean	SD	Variance	Min	Max	N
head sex	.246	.431	0.186	0	1	3022
head age	46.242	15.937	253.988	18	100	3022
head highest grade	3.065	4.859	23.614	0	23	3022
asset index	-.005	1.183	1.400	-.334	7.32	2987
Tlu	3.662	4.906	24.071	0	99.523	3022
housing condition ~x	-.072	1.22	1.488	-1.037	3.501	2987
farm equiments index	.025	1.542	2.379	-1.742	2.608	2987
off farm income	.185	.388	0.151	0	1	3022
hh size	4.871	2.274	5.172	1	19	3022
HH AgricArea ha	1.813	3.338	11.141	0	54	3022
annual drought shck	.292	.455	0.207	0	1	2858

Source: Author's computation

At baseline, in this section presented of table 4.1, the sample size is 3000 households. The summary statistics at the before conflict characteristics indicate that the average age of household heads is 46.24 years, ranging from 18 to 100 years. Approximately 24.6% of household heads are female, while about 75.38% are male. The average household head educational level is approximately 3.07 years of schooling, The education level of the household head, measured as years of formal education ranging from 0 years for no education to a maximum of 23 years for advanced tertiary education

In terms of economic condition, the average asset index is approximately -0.005 and the asset index with values ranging from -0.334 to 7.32. Tropical Livestock Units (TLU) households own on average 3.66, with some owning none and others as many as 99.52 TLUs. In addition, the housing condition index averages -0.072, with a range from -1.037 to 3.501, while the farm equipment index has an average of 0.025, ranging from -1.742 to 2.608. The average household

size is 4.87 members, with household's size ranging from 1 to 19 people. Regarding income sources, 18.5% of households report having off-farm income. And, the average access to agricultural land is 1.81 hectares, with a maximum of 54 hectares access agriculture of land and also some households are no access of agriculture land. Finally, in these results, the summary statistics 29.2% of households report experiencing an annual drought shock in the past year.

4.1.2. Descriptive Statistics of End-line Characteristics (After Conflict characteristics)

Table 4.1 Summary statistics at the end-line information (after conflict characteristics)

	N	Mean	Min	Max	SD	Variance
head sex	3022	.437	0.000	1	.496	.246
head age	2807	47.833	18.000	100	16.208	262.711
head highest grade	2805	2.843	0.000	23	4.588	21.046
asset index	2800	.008	-0.334	7.32	1.177	1.386
Tlu	2870	3.006	0.000	94.382	4.839	23.418
housing condition ~x	2799	.081	-1.037	3.501	1.206	1.454
farm equiments index	2800	-.012	-1.742	3.391	1.534	2.354
off farm income	3022	.189	0.000	1	.392	.153
hh size	2888	4.991	1.000	14	2.209	4.881
HH AgricArea ha	2413	1.329	0.001	52	2.586	6.688
annual drought shck	2840	.464	0.000	1	.499	.249

Source: Author's computation

At end line of conflict in this section presented, the sample size is 3,022 households. Among them, approximately 43.7% of household heads are male. The average age of household heads is 47.8 years, ranging from 18 to 100 years. In terms of education, household heads completed an average of 2.84 years of schooling, with the highest reported grade being 23. The asset index has a mean value close to zero (0.008), with a minimum of -0.334 and a maximum of 7.32. Households own an average of 3.01 Tropical Livestock Units (TLU), although this ranges widely, from 0 to 94.38. The mean value of the housing condition index is 0.081, while the farm equipment index has a mean of -0.012 both indices range from negative to positive values, indicating variability in asset ownership and living conditions. Off-farm income is reported by 18.9% of households. The average household size is approximately 5 members, with the smallest household consisting of 1 member and the largest having 14 members. On average, households cultivate 1.33 hectares of agricultural land, with land sizes ranging from as little as 0.001 hectares to as much as 52 hectares. Additionally, 46.4% of households reported experiencing a drought shock in the past year, highlighting the prevalence of climate-related challenges across the sample.

4.1.3. Mean difference tests for baseline characteristics

Table 4.2 Balanced test (Mean difference test)

		(1) control group		(2) Treatment group	Full sample	(1)-(2) Pairwise t-test
Variable	N/Clusters	Mean/(SE)	N/Clusters	Mean/(SE)	N/Clusters	P-value
FCS	1406	31.54	1001	34.83	2407	0.75
	94	(1.31)	64	(1.31)	150	
HDDI	1406	4.60	1001	4.50	2407	0.81
	94	(0.14)	64	(0.16)	150	
Moderate insecurity	1406	0.21	1001	0.13	2407	0.04**
	94	(0.02)	64	(0.02)	150	
Moderate sever insecurity	1406	0.33	1001	0.19	2407	0.05*
	94	(0.02)	64	(0.02)	150	
Head Sex	1406	0.23	1001	0.26	2407	0.01**
	94	(0.01)	64	(0.01)	150	
Head Age	1406	46.27	1001	47.56	2407	0.57
	94	(0.61)	64	(0.76)	150	
Education Level	1406	3.28	1001	2.83	2407	0.42
	94	(0.21)	64	(0.30)	150	
Asset Index	1405	-0.10	1001	0.04	2406	0.60
	93	(0.06)	64	(0.10)	149	
Tropical Livestock Unit	1406	3.94	1001	3.62	2407	0.29
	94	(0.29)	64	(0.30)	150	
Housing condition	1405	-0.35	1001	0.25	2406	0.28
	93	(0.08)	64	(0.12)	149	
Farm equipment index	1405	0.00	1001	0.47	2406	0.41
	93	(0.09)	64	(0.12)	149	
Off-Farm Income	1406	0.19	1001	0.18	2407	0.26
	94	(0.02)	64	(0.03)	150	
Household Size	1406	4.97	1001	4.53	2407	0.22
	94	(0.08)	64	(0.09)	150	
Access Agricultural Land	1406	1.83	1001	1.96	2407	0.17
	94	(0.19)	64	(0.18)	150	
Drought	1336	0.07	948	0.61	2284	0.19
	91	(0.03)	61	(0.06)	144	

Note: This regression model accounts zone fixed effect analysis. The table presents descriptive statistics and balance tests for key baseline variables using data from Round-1 or year 2019. The analysis is conditional, controlling for zone fixed effects and relevant covariates. FCS means Food Consumption Score and HDDI means Household Dietary Diversity Index. The standard errors are displayed in parenthesis and are grouped at the village (kebele) level. The following are the significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

This analysis accounting zone fixed effects. At baseline, the two groups are comparable; the only difference is their exposure to conflict. The p-value represents whether the result is statistically significant or not. In this case, most of the p-values are statistically insignificant, which means the groups are already balanced. If the p-values are statistically significant, it indicates that the two groups the treatment group and the control group are imbalanced. in this case, the two group are comparable.

At the baseline both treatment and control groups are mostly comparable. Before treatment this group were similar on average. Most of the reported differences are statistically insignificant which means it is balanced already. Some variables are statistically significant due to noise. The two groups after treatment, ensuring that the households are similar based on household characteristics, income, and wealth, with the change only by the intervention or conflict.

4.2. Econometric Analysis

4.2.1. Exposure to conflict and food insecurity (Main results)

This section, as presented in Table 4.3, shows the estimated coefficient of exposure to conflict on food security. Specifically, the outcome variable both in column (1) and column (2) of table 4.3 is the Food Consumption Score (FCS). In column (1) of Table 4.3 shows the year dummy shows an increase in the Food Consumption Score (FCS) by 9.12 points or 29%, for those not affected by exposure to conflict. The results are resilient to the inclusion of several controls, as seen in column (2) of Table 4.3. Specifically, the year dummy indicates an increase Food Consumption Score (FCS) 10.06 points or 31.2%, for those not exposed to conflict.

The main interaction term in column (1) of Table 4.3 shows that experiencing one or more battle events occurred within a 15km radius of the household leads 8.4 points or 26% decrease in the Food Consumption Score (FCS). This result indicates that exposure to conflict deteriorates food security status. The results are robust to inclusion of several controls as shown in column (2) of Table 4.3, indicates that experiencing one or more battle events occurred within a 15km radius of the household leads 9.5 points or 30% reduction in Food Consumption Score (FCS).

According to (Muriuki et al., 2023) used a Difference-in-Differences (DID) approach to analyze the impact conflict on food security in Ethiopia and Malawi , the estimation shows that exposure to conflict leads 16.3% reduction in Food Consumption Score (FCS) due to increase of exposure to

battle. This estimation result indicates that exposure to conflict is negatively associated with food security. The exposure to conflict negative consequences on food consumption quality and reduces dietary diversity. This result with expectations that exposure to conflict disrupts food access, market availability, and dietary diversity.

This section, as presented in Table 4.3, shows the estimated coefficient of exposure to conflict on food security. Specifically, the outcome variable both in column (3) and column (4) of Table 4.3 is Household Dietary Diversity (HDDI). In column (3) of Table 4.3, shows the year dummy shows an increase in Household Dietary Diversity (HDDI) by 1.218 points or 27.2 %, for those not affected by exposure to conflict. The results are robust to the inclusion of a various control variables as shown in column (4) of Table 4.3. Specifically, the year dummy is a positive and statically significant 1.383 point or 31% increase in HDDI, for those not affected by exposure to battle.

The main interaction term in column (3) of Table 4.3 indicates that experiencing one or more battle events occurred within a 15km radius of the household leads to 0.540 points or 12% decline in Household Dietary Diversity Index (HDDI). This result indicates that exposure to battle worsens food security status. The results are robust to the inclusion of a various control variables as shown in column (4) of table 4.3. Specifically, the households located within 15 km of one or more battle events occurred experienced a significant by 0.817 points or 19% reduction in the Household Dietary Diversity Index (HDDI). This finding indicates that exposure to conflict has a negative impact on food security.

This part, presented in Table 4.3, provides the estimated coefficient exposure to the battle for food security. Specifically, the dependent variable in column (5) and column (6) of table 4.3 is the moderate food insecurity. In column (5) of table 4.3, shows the year dummy shows an increase in moderate food insecurity by 0.143 points, for those not affected by exposure to battle. The results remain robust with the inclusion of several control variables, as shown in column (6) of Table 4.3. Specifically, the year dummy shows an increase moderate food insecurity 0.117 points, for those not exposed to conflict.

Table 4.3 The effect of exposure to conflict on food security indicators

	Food Consumption Score		**Household Dietary Diversity Index**		**Moderate food insecurity**		**Moderate severe food insecurity**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	9.118***	10.060***	1.218***	1.383***	0.143***	0.117***	0.395***	0.363***
	(1.762)	(1.815)	(0.175)	(0.186)	(0.035)	(0.035)	(0.027)	(0.028)
Exposure to battle dummy 15km	3.295*	2.114	-0.102	-0.171	-0.085***	-0.094***	-0.130***	-0.103***
	(1.842)	(1.743)	(0.206)	(0.196)	(0.025)	(0.027)	(0.032)	(0.036)
Year#Exposure to battle dummy 15km	-8.361***	-9.469***	-0.540**	-0.817***	0.118***	0.182***	0.096**	0.163***
	(2.359)	(2.356)	(0.245)	(0.254)	(0.045)	(0.044)	(0.041)	(0.043)
Constant	31.536***	26.048***	4.597***	4.074***	0.213***	0.157***	0.325***	0.228***
	(1.308)	(2.240)	(0.136)	(0.244)	(0.020)	(0.041)	(0.024)	(0.045)
R-squared	0.0615	0.0993	0.1235	0.1703	0.0936	0.1145	0.3590	0.057
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,814	4,202	4,814	4,202	4,814	4,202	4,814	4,202

Note: This table reports coefficients of DID estimates. The outcome variable in columns (1) and (2) is the Food Consumption Score (FCS), while the dependent variable in columns (3) and (4) is the Household Dietary Diversity Index (HDDI). Additionally, the outcome variable in columns (5) and (6) is moderate food insecurity, and in columns (7) and (8), it is moderate or severe food insecurity. Moderate food insecurity is measured using a binary variable, coded 1 if the household reports at least one instance under the FIES criteria, and 0 otherwise. Likewise, moderate or severe food insecurity is coded 1 if the household is classified in either category based on the FIES severity score. For this DID estimation, the battle variable is time-invariant. Which means the battle exposure variable does not vary over time. Battle dummy 15km refers to dummy variable for Exposure to battle occurred within 15km radius of the household's residence. Controls include: Age, Sex, Education Level, Household Size, Asset Index, Off-Farm Income, Tropical Livestock Unit (TLU), Housing Condition, Farm equipment index, Access to land and drought. The regression model accounts year fixed effect and year×Exposure to battle interaction term. The standard errors are displayed in parenthesis and are grouped at the village (kebele) level. The following are the significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

The main interaction term in column (3) of Table 4.3 shows that households within 15 km of one or more battle occurred events experienced a significant 12 percentage points increase in the prevalence of moderate food insecurity. This result indicates that exposure to battle deteriorates food security status. The results are resilient to inclusion of several control variables as shown in column (6) of Table 4.3, this indicates that households exposed to one or more battles occurred within a 15 km radius experienced 19% points increase in the prevalence of moderate severe food insecurity. This result indicates that exposure to conflict is negatively associated with food security.

Table 4.3 displays the estimated effect of exposure to battle on food security outcomes. Specifically, the outcome variable in column (7) and (8) is moderate food insecurity. Column (7) of Table 4.3, shows the year dummy shows an increase in the moderate sever food insecurity by 0.395 points, for those not affected by exposure to conflict. The results are resilient to inclusion of several controls variables as shown in column (8) of Table 4.3. Specifically, the year dummy shows an increase in moderate food insecurity by 0.363 points, for those not exposed to conflict.

The main interaction term in column (7) of Table 4.3, shows that experiencing to one or more battle events occurred within 15km radius of the household leads to 10% points increase in the probability of moderate sever food insecurity. This result indicates that exposure to conflict worsens food security status. The findings remain consistent with the inclusion of various control variables, as shown in column (8) of Table 4.3. Specifically, this result indicates the households experiencing to one or more battle events within a 15km radius is associated with 17% points increase in the prevalence of moderate to severe food insecurity. This estimation results indicates a negative association between conflict exposure and food security. This finding indicates that experiencing one or more battle events within a 15km radius of the household significantly affected both moderate and severe food insecurity.

4.2.2. Heterogeneity Analysis

This section presents the heterogeneous effect of exposure to conflict by gender. Table 4.4 shows the estimated coefficient of exposure to battle on food security. Specifically, the dependent variable both in column (1) and column (2) of Table 4.4 is Food Consumption Score (FCS).

In the year dummy shows both females and males significant increase over time, with increases in the Food Consumption Score (FCS) by 10.39 or 32% and 9.836 points or 30.5% for those not affected by exposure to battle. This finding shows positive and significant, indicating that, on average, households in non-conflict areas experienced an increase in FCS over time.

Table 4.4, column (1) (female), the main interaction term shows that households experiencing one or more battle occurred events within a 15 km radius leads to 7.342 points, or 23% reduction in Food Consumption Score (FCS). The findings remain robust even after including various control variables, as evidenced in column (2) (male) of Table 4.4. Specifically, this estimation shows that experiencing one or more exposure to battle events occurred within a 15km radius leads to 10.380 points or 32.1% reduction in the Food Consumption Score (FCS).

To compare with previous studies used a Difference-in-Differences (DID) approach to analyze the impact conflict on food security in Ethiopia and Malawi. The result indicates that exposure to conflict leads to 16.3% decline in Food Consumption Score (FCS) due to increase exposure to battle (Muriuki et al., 2023) .

Overall, these findings show that exposure to conflict is negatively associated with food security. This estimation indicates experiencing to battle within a 15km radius both female and male are greatly significant decrease in the food consumption score.

Table 4.4 presents the estimated effect of exposure to battle on food security. Specifically, the outcome variable both in column (3) and column (4) of table 4.4 is Household Dietary Diversity (HDDI). In column (3) and column (4), the year dummy both genders show an increase in Household Dietary Diversity (HDDI) by 1.259 or 28% this result is for females and also 1.421 or 32% this result indicates for male which those not affected by exposure to conflict.

In Table 4.4, column (3) (female), the main interaction term indicates that experiencing one or more exposure to battle events occurred within a 15km radius leads to 0.648 points or 14.5% decline in Household Dietary Diversity (HDDI). This result indicates that exposure to conflict worsens food security status.

Table 4.4 Heterogeneous effect to battle on food security indicators by gender

	Food Consumption Score		**Household Dietary Diversity Index**		**Moderate food insecurity**		**Moderate severe food insecu**	
Variables	Female	Male	Female	Male	Female	Male	Female	Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	10.390***	9.836***	1.259***	1.421***	0.045	0.154***	0.268***	0.402***
	(2.226)	(1.891)	(0.226)	(0.192)	(0.049)	(0.036)	(0.040)	(0.031)
Exposure to battle dummy 15km	0.894	2.467	-0.303	-0.121	-0.111***	-0.093***	-0.106**	-0.110***
	(2.275)	(1.820)	(0.256)	(0.202)	(0.042)	(0.030)	(0.053)	(0.037)
Year#Exposure to battle dummy 15km	-7.342***	-10.387***	-0.648**	-0.881***	0.210***	0.170***	0.189***	0.156***
	(2.744)	(2.583)	(0.301)	(0.274)	(0.064)	(0.047)	(0.060)	(0.045)
Constant	26.581***	26.717***	3.931***	4.124***	0.221***	0.155***	0.206***	0.255***
	(3.561)	(2.267)	(0.358)	(0.254)	(0.066)	(0.044)	(0.072)	(0.048)
R-squared	0.122	0.108	0.211	0.178	0.047	0.092	0.223	0.281
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1,329	2,873	1,329	2,873	1,329	2,873	1,329	2,873

Note: This table reports coefficients of DID estimates. The outcome variable in columns (1) and (2) is the Food Consumption Score (FCS), while the dependent variable in columns (3) and (4) is the Household Dietary Diversity Index (HDDI). Additionally, the outcome variable in columns (5) and (6) is moderate food insecurity, and in columns (7) and (8), it is moderate or severe food insecurity. Moderate food insecurity is measured using a dummy variable, coded 1 if the household reports at least one instance under the FIES criteria, and 0 otherwise. Likewise, moderate or severe food insecurity is coded 1 if the household is classified in either category based on the FIES severity score. Battle dummy 15km refers to dummy variable for Exposure to battle occurred within 15km radius of the household's residence. Controls include: Age, Sex, Education Level, Household Size, Asset Index, Off-Farm Income, Tropical Livestock Unit (TLU), Housing Condition, Farm equipment index, Access to land and drought. The regression model accounts year fixed effect and year×Exposure to battle interaction term. Standard errors, clustered at the village (kebele) level, are reported in parentheses. The following are the significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

The results are robust to inclusion of various control variables as shown in column (4) (male) of Table 4.4. Specifically, the main interaction term shows that households experiencing one or more battle occurred events within a 15 km radius decline in Household Dietary Diversity (HDDI) by 0.881 points or 20%. Overall, this finding showing that both genders are impacted by the Exposure conflict. This result indicates that exposure to conflict is negatively associated with food security.

Table 4.4 displays the estimated impact of battle exposure on food security. The dependent variable in columns (5) and (6) of Table 4.4 is moderate food insecurity. In column (5), the year dummy for females indicates 0.045 points or 25.4% rise in moderate food insecurity for those unaffected by conflict. In column (6), the year dummy for males shows 0.154 points increase in moderate food insecurity for those not exposed to conflict.

The key interaction term in column (5) (female) of Table 4.4 reveals that experiencing one or more battle events occurred within a 15km radius of the household increases the likelihood of moderate food insecurity by 21 percentage points. This finding suggests that conflict exposure worsens food security status. The results remain robust after incorporating several controls, as shown in column (6) (male) of Table 4.4. Specifically, exposure to one or more battle events occurred within a 15km radius raises the probability of moderate to severe food insecurity by 17 percentage points.

This part, presented in Table 4.4, provides the estimated coefficient exposure to the battle for food security. Specifically, the outcome variable in column (7) and (8) is the moderate severe food insecurity. In Column (7) (female), the year dummy showing increase in moderate food insecurity by 0.268 points for those not affected by exposure to battle and in Column (8) (male), the year dummy showing increase in moderate food insecurity by 0.402 points for those not affected by conflict.

In Table 4.4, the main interaction term in column (7) (female) indicates that experiencing one or more battle events occurred within a 15km radius of the household increases the prevalence of moderate to severe food insecurity by 19 percentage points. This finding suggests that exposure to battle significantly worsens food security. The results remain consistent even after including several control variables, as shown in column (8) (male) of Table 4.4, where exposure to one or more battle events occurred within a 15km radius increase of the probability of moderate to severe food insecurity by 16 percentage points.

Overall, Exposure to conflict is linked to a statistically significant increase in moderate and severe food insecurity for both females and males, indicating that exposure to battle adversely affects food security for both genders.

Heterogeneity by location

This section presents the heterogeneous impact of conflict by location. Table 4.5 shows the estimated coefficient of exposure to battle on food security. Specifically, the dependent variable in column (1) and column (2) of Table 4.5 is Food Consumption Score (FCS). the year dummy shows urban households experienced a significant increase over time, with an increase of 1.203 point. While the year dummy rural shows a positive and significant, indicating that, on average, households in non-conflict areas experienced an increase 10.085 points or 31.2% in FCS.

In Table 4.5, the key interaction term in column (1) (urban) reveals that experiencing one or more battle events occurred within a 15km radius leads to 7.619 points or 24% decrease in the Food Consumption Score (FCS). The results remain robust after incorporating several control variables, as demonstrated in column (2) (rural) of Table 4.5, where exposure to one or more battle occurred events within a 15km radius leads to 8.190 points or 25.3% reduction in FCS.

Previous studies used a Difference-in-Differences (DID) approach to analyze the impact conflict on food security in Ethiopia and Malawi. The result indicates that exposure to conflict leads to 16.3% decline in Food Consumption Score (FCS) (Muriuki et al., 2023) .

Overall, this estimation result shows that exposure conflict is negatively associated with food security. This result indicates exposure to battle within a 15km radius both urban and rural are greatly significant decline in the food consumption score.

Table 4.5 displays the estimated impact of battle exposure on food security. Specifically, the outcome variable both in column (3) and column (4) of Table 4.5 is Household Dietary Diversity Index (HDDI). In column (3) and column (4), the year dummy in urban shows an increase in household dietary diversity (HDDI) by 0.909 or 21% and also in rural areas increase 1.440 or 32.1% for those not affected by exposure to conflict. In addition, the year dummy shows a positive and statistically significant but the increase was significant only in rural areas (1.449 points).

Table 4.5 Heterogeneous effect of battle on food security indicators by location

	Food Consumption Score		**Household Dietary Diversity Index**		**Moderate food insecurity**		**Moderate severe food insecurity**	
Variables	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	1.203	10.085***	0.909	1.449***	0.095	0.121***	0.269***	0.369***
	(4.325)	(1.883)	(0.855)	(0.191)	(0.056)	(0.038)	(0.083)	(0.030)
Exposure to battle dummy 15km	1.666	3.143*	-0.608	-0.116	-0.083	-0.099***	-0.029	-0.115***
	(4.595)	(1.865)	(0.461)	(0.218)	(0.068)	(0.029)	(0.079)	(0.039)
Year#Exposure to battle dummy 15km	-7.619	-8.190***	-0.152	-0.877***	0.133	0.187***	0.034	0.180***
	(6.039)	(2.503)	(0.969)	(0.264)	(0.100)	(0.048)	(0.112)	(0.045)
Constant	42.797***	30.160***	4.172***	4.063***	0.204*	0.158***	0.238*	0.230***
	(3.394)	(1.330)	(0.630)	(0.260)	(0.110)	(0.044)	(0.124)	(0.048)
R-squared	0.014	0.039	0.216	0.164	0.116	0.072	0.212	0.270
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	580	4,234	384	3,818	384	3,818	384	3,818

Note: This table reports coefficients of DID estimates. The outcome variable in columns (1) and (2) is the Food Consumption Score (FCS), while the dependent variable in columns (3) and (4) is the Household Dietary Diversity Index (HDDI). Additionally, the outcome variable in columns (5) and (6) is moderate food insecurity, and in columns (7) and (8), it is moderate or severe food insecurity. Moderate food insecurity is measured using a dummy variable, coded 1 if the household reports at least one instance under the FIES criteria, and 0 otherwise. Likewise, moderate or severe food insecurity is coded 1 if the household is classified in either category based on the FIES severity score. Battle dummy 15km refers to dummy variable for Exposure to battle occurred within 15km radius of the household's residence. Controls include: Age, Sex, Education Level, Household Size, Asset Index, Off-Farm Income, Tropical Livestock Unit (TLU), Housing Condition, Farm equipment index, Access to land and drought. The regression model accounts year fixed effect and year×Exposure to battle interaction term. Standard errors, clustered at the village (kebele) level, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

In Table 4.5, the main interaction term in column (3) (urban) indicates that household experiencing one or more battle events occurred within a 15km radius leads to 0.152 points or 4% reduction in Household Dietary Diversity Index (HDDI). This estimation result reveals that exposure to battle negatively associated with food security. The results remain consistent after including several control variables, as shown in column (4) (rural) of Table 4.5, where exposure to battle events within a 15km radius reduction in HDDI by 0.877 points or 20%.

Table 4.5 also provides the estimated coefficients for the exposure to war on food security. The dependent variable in columns (5) and (6) of Table 4.5 is moderate food insecurity. In column (5), the year dummy for urban households shows 0.095 points increase in moderate food insecurity for those unaffected by conflict, and 0.121 points increase for those not exposed to battle events.

The main interaction term in column (5) (urban) of Table 4.5 reveals that household experiencing to one or more battle occurred events within a 15km radius associated with increases the prevalence of moderate food insecurity by 14 percentage points. This result indicates that battle exposure worsens food security status. The findings remain robust after incorporating several control variables, as shown in column (6) (rural) of Table 4.5, where exposure to one or more battle events within a 15km radius raises the probability of moderate to severe food insecurity by 19 percentage points.

Additionally, Table 4.5 examines the estimated effect of battle exposure on food security, with the outcome variable in columns (7) and (8) is moderate food insecurity and moderate severe food insecurity. The main interaction term in column (7) (urban) of Table 4.5 indicates that exposure to one or more battle occurred events within a 15km radius of the household increases the probability of moderate to severe food insecurity by 4 percentage points. This finding highlights that exposure to battle deteriorates food security status. These results remain consistent after including several control variables, as shown in column (8) of Table 4.5, where household experiencing to one or more battle occurred events within a 15km radius leads to 18% points increase in the likelihood of moderate to severe food insecurity. This outcome further confirms that conflict exposure is negatively associated with food security. Overall, these findings demonstrate that conflict significantly affects both urban and rural households, with a consistently strong effect on both moderate and moderate to severe food insecurity across these groups.

4.2.3. Robustness check

To evaluate the robustness check of the findings, I investigate whether exposure to battle within 10 km and 20 km radius impact on food security. Initially, I analyze the effects of exposure to battle on food security indictors within a 10 km radius. Next, I examine the effects of exposure to battle on food security outcomes within a 20 km radius.

Table 4.5 displays the estimated impact of battle exposure on food security outcome. Specifically, the outcome variable in column (1) and column (2) of table 4.6 is the Food Consumption Score (FCS).In column (1) (without controls), the year dummy shows an increase in the Food Consumption Score (FCS) by 8.340 points, or 26%, for those not affected by exposure to conflict. This estimation result is positive and significant, indicating that, on average, households in non-conflict areas experienced an increase in FCS over time and also in column (2) (with controls), the year dummy shows an increase Food Consumption Score (FCS) 8.794 point or 27.2%, for those not exposed to conflict.

In Table 4.6, the main interaction term in column (1) indicates that household experiencing one or more battle events occurred within a 10km radius leads to 7.952 points or 25% reduction in Food Consumption Score (FCS). This finding suggests that exposure to conflict negatively associated with food security. The results remain consistent after including various control variables, as shown in column (2) of Table 4.6, proximity to one or more battle occurred events within a 10km radius leads to 8.366 points or 26% reduction in Food Consumption Score (FCS). This result indicates exposure to battle within a 10km radius led to a greatly significant decreases in food consumption score. The estimation results are consistent with main result in Table 4.5. This estimation result exposure to battle affected on food security. This result indicates that exposure to conflict is negatively associated with food security.

This part, presented in Table 4.6, provides the estimated coefficient exposure to the battle for food security. Specifically, the outcome variable in column (3) and column (4) of table 4.6 is the Household Dietary Diversity Index (HDDI). In Column (3) (without controls), the year dummy shows an increase in Household Dietary Diversity (HDDI) by 1.205 points, or 27%, for those not affected by Exposure conflict. In addition, in column (4) the year dummy shows a positive and statistically significant increase of 1.294 points in household dietary diversity.

Table 4.6 Robustness checks using 10km Exposure to battle dummy

	Food Consumption Score		Household Dietary Diversity Index		Moderate food insecurity		Moderate severe food insecurity	
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	8.340***	8.794***	1.205***	1.294***	0.149***	0.140***	0.409***	0.403***
	(1.557)	(1.522)	(0.155)	(0.156)	(0.030)	(0.031)	(0.024)	(0.025)
Exposure to battle dummy 10km	3.203*	0.898	-0.006	-0.208	-0.067***	-0.062**	-0.096***	-0.041
	(1.891)	(1.691)	(0.221)	(0.203)	(0.025)	(0.029)	(0.034)	(0.037)
Year#Exposure to battle dummy 10km	-7.952***	-8.366***	-0.571**	- 0.702***	0.079*	0.115***	0.061	0.086**
	(2.401)	(2.338)	(0.250)	(0.265)	(0.043)	(0.044)	(0.040)	(0.043)
Constant	31.508***	27.741***	4.488***	4.087***	0.205***	0.138***	0.312***	0.194***
	(1.143)	(2.046)	(0.125)	(0.234)	(0.017)	(0.036)	(0.022)	(0.041)
R-squared	0.0572	0.1030	0.1258	0.1796	0.0767	0.0904	0.3516	0.3866
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	5,380	4,669	5,380	4,669	5,380	4,669	5,380	4,669

Note: This table reports coefficients of DID estimates. The outcome variable in the column (1) and (2) is FCS (Food Consumption Score). And the dependent variable is Columns (3) and (4) focus on the Household Dietary Diversity Index (HDDI). And also, the outcome variable in the column (5) and (6) is moderate food insecurity, and also Columns (7) and (8) moderate or severe food insecurity. Moderate food insecurity is measured using a dummy variable, coded 1 if the household reports at least one instance under the FIES criteria, and 0 otherwise. Likewise, moderate or severe food insecurity is coded 1 if the household is classified in either category based on the FIES severity score. Battle dummy 15km refers to dummy variable for Exposure to battle occurred within 15km radius of the household's residence. Controls include: Age, Sex, Education Level, Household Size, Asset Index, Off-Farm Income, Tropical Livestock Unit (TLU), Housing Condition, Farm equipment index, Access to land and drought. The regression model accounts year fixed effect and year×Exposure to battle interaction term. The following standard errors are provided in parenthesis, clustered at the village (kebele) level. The following are the significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

In Table 4.6, the main interaction term in column (3) indicates that households experiencing one or more battle occurred events within a 10km radius leads to 0.571 points or 12.7% decrease in the Household Dietary Diversity Index (HDDI). This result indicates that exposure to conflict worsens food security status. The results are robust to inclusion of several control variables as shown in column (4) of Table 4.6. Specifically, exposure to one or more battle events occurred within 15km radius reduction in Household Dietary Diversity Index (HDDI) by 0.701 point or 15.6%. The estimation results are consistent with main result in table 4.5. This estimation result exposure to battle effects on food security. Table 4.6 illustrates the estimated coefficient of exposure to the war for food security. Specifically, the dependent variable in column (5) and column (6) Table 4.6 is moderate food insecurity. In Column (5) (without controls), the year dummy showing increase in moderate food insecurity by 0.149 points for those not affected by exposure to conflict and in column (6) (with controls), the year dummy showing increase in moderate food insecurity by 0.140 points for those not affected by conflict.

In Table 4.6, the main interaction term in column (5) reveals that households experiencing one or more battle events occurred within a 10km radius of the household increases the prevalence of moderate food insecurity by 8 percentage points. This finding suggests that battle exposure adversely affects food security status. The results remain consistent after incorporating various control variables, as demonstrated in column (6) of Table 4.6, where exposure to one or more battle events within a 15km radius raises the probability of moderate to severe food insecurity by 12 percentage points. The estimation results are consistent with main result in table 4.5. This estimation result exposure to battle effect on food security. This result indicates that exposure to conflict is negatively associated with food security.

This part, presented in Table 4.6, provides the estimated coefficient exposure to the battle for food security. Specifically, the outcome variable in column (7) and (8) is the moderate severe food insecurity. In column (7) (without controls), the year dummy showing increase in moderate food insecurity by 0.409 points for those not affected by conflict and In column (7) (without controls), the year dummy showing increase in moderate food insecurity by 0.403 points for those not affected by exposure to battle.

Table 4.6, the main interaction term in column (7) indicates that experiencing one or more battle events occurred within a 15km radius of the household increases the prevalence of moderate severe

food insecurity by 6 percentage points. This finding suggests that conflict exposure negatively impacts food security status. The results remain robust after including various control variables, as shown in column (6) of Table 4.6, where exposure to one or more battle events occurred within a 15km radius leads to a 9 percentage points increase in the probability of moderate to severe food insecurity. This outcome confirms a negative association between conflict exposure and food security. Overall, these findings reveal the exposure to battle within 10km radius significantly elevates both moderate and moderate to severe food insecurity among affected households. These results align with the primary findings in Table 4.5, reinforcing the conclusion that battle exposure adversely affects food security.

Robustness check by 20km

Table 4.7 in this section displays the estimated coefficient of exposure to battle on food security. Specifically, the outcome variable both in column (1) and column (2) of table 4.7 is the Food Consumption Score (FCS). In Column (1) (without controls), the year dummy shows an increase in the Food Consumption Score (FCS) by 10.180 points, or 31.5% and in column (2) (with controls), the year dummy shows an increase Food Consumption Score (FCS) 10.857 points or 33.6%, for those not affected by exposure to conflict.

The main interaction term in column (1) of Table 4.7 shows that households located within 20 km of one or more battle events occurred experienced 8.275 points or 25.6%, decline in Food Consumption Score (FCS). This finding indicates that exposure to battle negatively associated with food security status. The results remain consistent after incorporating various control variables, as shown in column (2) of Table 4.7, where exposure to one or more battle events within a 15km radius leads to 9.47 points or 29.3% reduction in FCS. This results consistent with the main results presented in Table 4.5. This estimation indicates that exposure to conflict is negatively associated with food security.

This part, presented in Table 4.6, provides the estimated coefficient exposure to the battle for food security. Specifically, the outcome variable in column (3) and column (4) of table 4.7 is the Household Dietary Diversity (HDDI). In Column (3) (without controls), the year dummy shows an increase in Household Dietary Diversity (HDDI) by 1.295 points, or 29 percent, for those not affected by exposure to conflict and also column (4), the year dummy shows a positive and statistically significant increase of 1.446 points in HDDI.

Table 4.7 Robustness Checks Using 20km Exposure to conflict dummy

	Food Consumption Score		Household Dietary Diversity Index		Moderate food insecurity		Moderate severe food insecurity	
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	10.180***	10.857***	1.290***	1.446***	0.148***	0.121***	0.394***	0.375***
	(2.016)	(2.119)	(0.204)	(0.227)	(0.041)	(0.041)	(0.031)	(0.032)
Exposure to battle dummy 20km	3.390*	2.096	-0.138	-0.242	-0.054*	-0.064**	-0.100***	-0.065
	(1.932)	(1.905)	(0.208)	(0.212)	(0.028)	(0.028)	(0.036)	(0.040)
Year#Exposure to battle dummy 20km	-8.275***	-9.470***	-0.471*	-0.777***	0.105**	0.161***	0.074*	0.122***
	(2.500)	(2.653)	(0.253)	(0.286)	(0.050)	(0.049)	(0.043)	(0.047)
Constant	31.036***	25.305***	4.572***	4.075***	0.203***	0.149***	0.323***	0.218***
	(1.490)	(2.497)	(0.147)	(0.266)	(0.023)	(0.043)	(0.027)	(0.045)
R-squared	0.0680	0.1009	0.1363	0.1684	0.0991	0.1130	0.3540	0.3927
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,498	3,943	4,498	3,943	4,498	3,943	4,498	3,943

Note: This table reports coefficients of DID estimates. The outcome variable in the column (1) and (2) is FCS (Food Consumption Score). And the dependent variable is Columns (3) and (4) focus on the Household Dietary Diversity Index (HDDI). And also, the outcome variable in the column (5) and (6) is moderate food insecurity, and also Columns (7) and (8) moderate or severe food insecurity. Moderate food insecurity is measured using a dummy variable, coded 1 if the household reports at least one instance under the FIES criteria, and 0 otherwise. Likewise, moderate or severe food insecurity is coded 1 if the household is classified in either category based on the FIES severity score. Battle dummy 15km refers to dummy variable for Exposure to battle occurred within 15km radius of the household's residence. Controls include: Age, Sex, Education Level, Household Size, Asset Index, Off-Farm Income, Tropical Livestock Unit (TLU), Housing Condition, Farm equipment index, Access to land and drought. The regression model accounts year fixed effect and year×Exposure to battle interaction term. The following are the significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 4.7, the main interaction term in column (3) indicates that household experiencing one or more battle occurred events within a 20km radius leads to 0.471 points or 11% reduction in the Household Dietary Diversity Index (HDDI). This finding suggests that battle exposure adversely affects food security status. The results remain robust after including several control variables, as shown in column (2) of Table 4.7, shows that experiencing one or more battle occurred events within a 15km radius leads to 0.777 points or 18% reduction in Household Dietary Diversity Index (HDDI). The estimation results are consistent with main result in table 4.5. This estimation result exposure to battle effect on food security.

Table 4.6 illustrates the estimated coefficient of exposure to the war for food security. Specifically, the dependent variable in column (5) and column (6) Table 4.7 is the moderate food insecurity. In Table 4.7, the primary interaction term in column (5) reveals that experiencing one or more battle events within a 15km radius of the household increases the prevalence of moderate food insecurity by 11 percentage points. The findings remain robust after incorporating several control variables, as shown in column (6) of Table 4.7, where exposure to one or more battle events within a 15km radius results in 16% points increase in the probability of moderate to severe food insecurity. This outcome indicates that battle exposure negatively impacts food security status. The estimation results are consistent with main result in table 4.5. This estimation result exposure to battle effect on food security.

Finally, this section presents the estimated effect of exposure to battle on food security, as shown in Table 4.7. Specifically, the outcome variable both in column (7) and (8) of Table 4.7 is the moderate severe food insecurity. In Table 4.7, the main interaction term in column (7) indicates that experiencing one or more battle events within a 15km radius of the household increases the likelihood of moderate to severe food insecurity by 8 percentage points. The findings remain consistent after including various control variables, as shown in column (8) of Table 4.7, where exposure to one or more battle events within a 15km radius results in a 13 percentage points increase in the probability of moderate to severe food insecurity. This result indicates that exposure to conflict is negatively associated with food security. And also, this result indicates that exposure to conflict deteriorates food security status. Overall, the estimation results are consistent with main result in table 4.5. This estimation result exposure to battle negative associated with in food security.

4.2.4 Plausible Mechanism

This section presents in Table 4.8, shows the mechanism of exposure to battle impact on food security. Exposure to conflict (battle) can affect food security through several interrelated pathways. The fundamental mechanism is the loss of productive household assets, loss of household income, asset and income loss, farm equipment index, and access to agricultural land.

Table 4.8 Mechanisms through which exposure to conflict affects Food Security

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Loss productive of asset	Loss household of income	Asset and income loss	Farm equipment index	Agricultural land
Exposure to battle dummy 15km	0.244***	0.073***	0.114***	-0.097***	-0.672***
	(0.047)	(0.022)	(0.030)	(0.052)	(0.235)
Constant	0.182***	0.075***	0.058***	0.195***	1.777***
	(0.009)	(0.004)	(0.006)	(0.010)	(0.042)
R-squared	0.078	0.013	0.040	0.002	0.011
Household FE	YES	YES	YES	YES	YES
Observations	4,691	4,691	4,691	4,654	4,386

Note: This table reports coefficients of fixed effect estimates. The outcome variable in the column (1) is loss productive of asset and the dependent variable is Columns (2) and focus on loss household of income and also, the outcome variable in the column (3) is Asset and income loss, and also Columns (4) is farm equipment index finally the outcome variable is agricultural land. battle dummy 15km refers to dummy variable for exposure to battle occurred within 15km radius of the household's residence. All regressions include household fixed effects and are based on 4,691 observations, except for columns (4) and (5), which have slightly fewer due to missing data. The regression model accounts fixed effect. The following standard errors are provided in parenthesis, clustered at the village (kebele) level. The following are the significance levels: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$ indicate statistical significance levels, where *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

The estimation results in columns (1) of Table 4.8, shows exposure to one or more battle events occurred within 15km radius leads to 24.4% points increase in the probability in loss of productive asset. Similarly, in column (2) of Table 4.8, indicates exposure to one or more battle events occurred within 15km radius leads to 7.3% points increase in the probability in loss household of income asset.

Moreover, column (3) of Table 4.8, indicates exposure to one or more battle events occurred within 15km radius leads to 11.4% points increase in the probability in both loss asset and loss of income. In addition to loss income and asset loss, exposure to conflict also affects access to essential agricultural production. The result indicates loss of income and loss productive assets decrease in household food security.

As shown in column (4) of Table 4.8, shows exposure to one or more battle events occurred within 15km radius leads a 0.097 standard deviation reduction in the farm equipment. This means that ownership or availability of farm tools and machinery declines by about 9.7 percent of a standard deviation when a household is exposed to conflict. they lost farm equipment due to increase of exposure to conflict. Likewise, column (5) of Table 4.8 shows that exposure to conflict decreases agricultural land access by 0.672 standard deviations. This means access to agricultural land declined by 67.2% because of increased exposure to conflict. This result also indicates that exposure to battle has a significant negative impact on agricultural production. This result shows collapse market, forced displacement of farmers, disruption of farming practices, and limited access to inputs.

Exposure to conflict significantly increases in loss of productive assets and also loss household of income. Exposure to battle disrupts economic activities, collapse markets, and limited access of market. Furthermore, the loss of income, loss of assets and loss of household income increase because of exposure to conflict. In addition to asset and income loss, conflict also reduces access to agricultural inputs. This paper to examine these mechanisms how exposure to conflict impact on food security. Overall, this estimation results shows that exposure to conflict decrease on food security through several channels. Exposure to conflict increases the loss income and asset losses, loss productive asset and also loss of household income. Finally, exposure to battle decline in farm equipment and access of agriculture land.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

This study analyzes the impact of Armed conflict on food insecurity in Ethiopia, more focused on how conflict exposure disrupts agricultural production, market access, household income, public services, asset and wealth loss, restricted market access, and displacement. The research explores both macro-level factors (such as governance, infrastructure, and environmental shocks) and micro-level determinants (including household income, education, health, and household size) that deteriorates food security outcomes.

I apply Difference-in-Differences (DID) approach combined with Two-Way Fixed Effects (TWFE), three years before the conflict was in 2019, and three years after the conflict is in 2023. Key findings show that exposure to conflict is negatively associated with food security. This result indicates exposure to battle within a 15km radius led to a greatly significant decrease the food consumption score. While, findings shows that exposure to battle within a 15km radius led to statistically significant decrease in dietary diversity, food consumption. Exposure to battle negative consequences on food consumption quality and others. These findings align with expectations that conflict exposure impairs access to food, disrupts market availability, and reduces dietary diversity. Furthermore, the effects of conflict on food security are consistent across both moderate and moderate to severe food insecurity.

Finally, the adverse effect exposure to battle on food security similar across both gender and location. The female and male are affected by the exposure to battle and also the urban and rural are affected by the exposure to conflict. The thesis also presents a conceptual framework illustrating the mechanisms through which exposure to conflict negatively associated with food security including agriculture production, income loss, supply chain disruption, psychological and well-being trauma, reduction access to health and education services, loss of wealth, loss livestock, collapse market, limited access of input, institution collapse, and environment damage like water pollution and deforestation.

In summary, it is common that exposure to conflict continues leads to food insecurity. Exposure to conflict in Ethiopia significant impacted reduced agricultural productivity and increased food insecurity, which negatively affects human capital development and raises food prices.

Additionally, conflicts disrupt child education and health outcomes, cause displacement, damage essential infrastructure, limit access to food markets, and disrupt livelihood activities (Abay et al., 2023).

To this end, this paper contributes to the understanding of how exposure to conflict shapes food security dynamics and offers insights to inform post-conflict recovery, policy interventions, and development planning in Ethiopia. It needs calls for integrated recovery strategies that address the immediate and food access, availability, and utilization in conflict-affected areas. Overall, conflict is purely an exogenous variable. By itself, it is exogenous variable and does not require creativity. The impact of conflict is a real impact. Exposure to conflict is not a causal relationship.

5.2. Conclusion

This study investigates the effect of conflict on food insecurity in Ethiopia, utilizing panel data from the International Food Policy Research Institute (IFPRI). Two-wave panel data were collected through household surveys conducted in 2019 (baseline) and 2023 (end-line) across all regions of Ethiopia. In this study about 3000 households were interviewed before the conflict and after the conflict. the total observation in this paper is 6044. This study the data collected is in a person survey or face-to-face survey. The availability of data from before and after the conflict offers a valuable chance to study the effects of conflict on food insecurity in Ethiopia. I use Difference-in-Differences (DID) and two-way fixed effects (TWFE) methods to analyze trends pre-conflict and post-conflict, exploring heterogeneity by gender and location.

In this study finds to identify the trend of conflict exposure and food insecurity in Ethiopia. Additionally, it examines the impact of conflict on food insecurity. Lastly, it explores the heterogeneity of impacts by gender (female versus male) and location (urban versus rural areas).

The key findings show that exposure to conflict is negatively associated with food security. First, the results indicate that exposure to conflict shows a decline of 9.5 points or 30% in FCS. Second, this study finds that exposure to battle leads to 0.817 points or 19% reduction in HDDI. Third, exposure to battle leads 19% points increase in moderate food insecurity, and also exposure to conflict leads to 17% points increase in moderate severe food insecurity.

The adverse effect of exposure to conflict on food security is similar across gender and location. All are affected by the exposure to conflict. The results are also robust to the inclusion of the various control variables and to different measures of exposure to conflict.

The main limitations this study has two limitations. first, the occurrence of exposure to conflict (battles) is not randomized, which may introduce selection bias, and the second, the ACLED data base may have limitations related to accuracy, and based on the reporting bias.

This conclusion clearly suggests that governments should prioritize conflict-affected communities for recovery measures that enhance agricultural productivity and the recovery of assets and income. This report offers empirical insights into how exposure to conflict affects food insecurity in Ethiopia, potentially guiding future research and shaping policy decisions. Future research should focus by looking into the long-term impacts of conflict on nutrition, livestock, and food security. Indeed, this analysis adds to the development economics literature on the impact of conflict on food insecurity in Ethiopia.

5.3. Recommendations

This study explores that exposure to conflict has negatively impacted food security across all of Ethiopia. Both male-headed and female-headed households are affected by conflict, and similarly both urban and rural areas are affected by the exposure to conflict.

I recommended the government and Non-Government Organizations (NGOs) to focus on projects that can help conflict-affected households to improve their livelihood. The government and NGOs can help through the Productive Safety Net Program (PSNP) and by providing training to the young generation on how to improve food security.

I also recommend that the government focus on increasing food security projects aimed at supporting recovery through agricultural production and household income generation. Strengthening agricultural systems, increasing market access, and increasing social protection programs like the PSNP are essential to build resilience.

REFERENCES

Abadie, A. (2005). Semiparametric difference-in-differences estimators. *The Review of Economic Studies*, *72*(1), 1–19.

Abay, K. A., Abay, M. H., Berhane, G., Chamberlin, J., Croke, K., & Tafere, K. (2022). Access to health services, food, and water during an active conflict: Evidence from Ethiopia. *PLOS Global Public Health*, *2*(11), e0001015.

Abay, K. A., Tafere, K., Berhane, G., Chamberlin, J., & Abay, M. H. (2023). Near-real-time welfare and livelihood impacts of an active war: Evidence from Ethiopia. *Food Policy*, *119*, 102526.

Akresh, R., Lucchetti, L., & Thirumurthy, H. (2012). Wars and child health: Evidence from the Eritrean–Ethiopian conflict. *Journal of Development Economics*, *99*(2), 330–340.

Alesina, A., & La Ferrara, E. (2005). Ethnic diversity and economic performance. *Journal of Economic Literature*, *43*(3), 762–800.

Anderson, S., & Elisabeth, F. (2015). USAID Office of Food for Peace food security country framework for Ethiopia FY 2016–FY 2020. *Washington, DC: Food Economy Group*, *13*.

Assefa, E., Medhin, G., & Hailemariam, D. (2022). Disparities in socioeconomic effects of COVID-19: Explo-ration of 11 rounds of panel data from high frequency phone survey of households in Ethiopia. *COVID 19 TWO YEARS ON: CONSEQUENCES AND LESSONS*, *31*, 22.

Athey, S., & Imbens, G. W. (2006). Identification and inference in nonlinear difference-in-differences models. *Econometrica*, *74*(2), 431–497.

Babbie, E. R. (2020). *The practice of social research*. Cengage Au.

Ballard, T., Coates, J., Swindale, A., & Deitchler, M. (2011). Household hunger scale: Indicator definition and measurement guide. *Washington, DC: Food and Nutrition Technical Assistance II Project, FHI*, *360*, 23.

Bank, W. (2011). World development report 2012: Gender equality and development. *The World Bank*, *15*.

Bonhomme, S., & Sauder, U. (2011). Recovering distributions in difference-in-differences models: A comparison of selective and comprehensive schooling. *Review of Economics and Statistics*, *93*(2), 479–494.

Bora, S., Ceccacci, I., Delgado, C., & Townsend, R. (2010). Food security and conflict. *World*.

Botosaru, I., & Gutierrez, F. H. (2018). Difference-in-differences when the treatment status is observed in only one period. *Journal of Applied Econometrics*, *33*(1), 73–90.

Brück, T., d'Errico, M., & Pietrelli, R. (2019). The effects of violent conflict on household resilience and food security: Evidence from the 2014 Gaza conflict. *World Development*, *119*, 203–223.

Cafiero, C., Viviani, S., & Nord, M. (2018). Food security measurement in a global context: The food insecurity experience scale. *Measurement*, *116*, 146–152.

Callaway, B., Goodman-Bacon, A., & Sant'Anna, P. H. (2024). *Difference-in-differences with a continuous treatment*. National Bureau of Economic Research.

Canton, H. (2021). Food and agriculture organization of the United Nations—FAO. In *The Europa directory of international organizations 2021* (pp. 297–305). Routledge.

Collier, P. (2003a). *Breaking the conflict trap: Civil war and development policy* (Vol. 41181, Issue 4). World Bank Publications.

Collier, P. (2003b). *Breaking the conflict trap: Civil war and development policy* (Vol. 41181, Issue 4). World Bank Publications.

Collier, P., & Hoeffler, A. (2004). Greed and grievance in civil war. *Oxford Economic Papers*, *56*(4), 563–595.

Corral, P., Irwin, A., Krishnan, N., Mahler, D. G., & Vishwanath, T. (2020). *Fragility and conflict: On the front lines of the fight against poverty*. World Bank Publications.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Cullis, A., & Bogale, S. (2024). *ALIGNED CLIMATE DRIVERS AND POTENTIAL IMPACTS ON FOOD SECURITY IN ETHIOPIA IN 2024*.

Daszkiewicz, T. (2022). Food production in the context of global developmental challenges. *Agriculture*, *12*(6), 832.

Davies, S., Pettersson, T., & Öberg, M. (2023a). Organized violence 1989–2022, and the return of conflict between states. *Journal of Peace Research*, *60*(4), 691–708.

Davies, S., Pettersson, T., & Öberg, M. (2023b). Organized violence 1989–2022, and the return of conflict between states. *Journal of Peace Research*, *60*(4), 691–708.

Deutsch, M. (1973). The resolution of conflict: Constructive and destructive processes. *American Behavioral Scientist*, *17*(2), 248–248.

Devi, S. (2021). Tigray atrocities compounded by lack of health care. *The Lancet*, *397*(10282), 1336.

Galtung, J. (1969). Violence, peace, and peace research. *Journal of Peace Research*, *6*(3), 167–191.

Gesesew, H., Berhane, K., Siraj, E. S., Siraj, D., Gebregziabher, M., Gebre, Y. G., Gebreslassie, S. A., Amdeslassie, F., Tesema, A. G., & Siraj, A. (2021). The impact of war on the health system of the Tigray region in Ethiopia: An assessment. *BMJ Global Health*, *6*(11), e007328.

HARAKE, M. (2024). *The Implementation of Humanitarian Projects: The"How to"Approach of the United Nations' OCHA*.

Heckman, J. J., Ichimura, H., & Todd, P. E. (1997). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *The Review of Economic Studies*, *64*(4), 605–654.

Helmi, N. Z., Isa, K. A. M., & Masuri, M. G. (2020). Exploratory factor analysis on Food Insecurity Experience Scale (FIES): Latest food insecurity measurement tool by FAO. *Healthscope: The Official Research Book of Faculty of Health Sciences, UiTM*, *3*(2), 31–34.

HUNGER, F. T. E., & INSECURITY, F. (2024). *Food Security and Nutrition in the World*.

IPC, C., & Pilot, R. (n.d.). *Gender, Food Insecurity & Drought*.

Jrad, S., Nahas, B., & Baghasa, H. (2010). Food security models. *Ministry of Agriculture and Agrarian Reform, National Agricultural Policy Center. Policy Brief*, *33*, 32.

Kadir, K., Prasetyo, O. R., & Rudiana, E. (2023). *Food insecurity experience scale measurement of agricultural households in Indonesia: Analysis of the agricultural integrated survey results*.

Kaluski, D. N., Ophir, E., & Amede, T. (2002). Food security and nutrition–the Ethiopian case for action. *Public Health Nutrition*, *5*(3), 373–381.

Kivimäki, T. (2024). Conflict prevention: What does it really mean? In *Research Handbook on Conflict Prevention* (pp. 8–32). Edward Elgar Publishing.

Leal Filho, W., Fedoruk, M., Paulino Pires Eustachio, J. H., Barbir, J., Lisovska, T., Lingos, A., & Baars, C. (2023). How the war in Ukraine affects food security. *Foods*, *12*(21), 3996.

Lima, T. (2021). Brazil's humanitarian food cooperation: From an innovative policy to the politics of traditional aid. *Agrarian South: Journal of Political Economy*, *10*(2), 249–274.

Location, A. C. (2019). *Armed conflict location & event data project (ACLED) codebook*.

Loescher, G. (2014). UNHCR and forced migration. *The Oxford Handbook of Refugee and Forced Migration Studies*, 215–226.

Mahmoud, B. (2021). *Food Security in Africa*. BoD–Books on Demand.

Maxwell, D., Caldwell, R., & Langworthy, M. (2008). Measuring food insecurity: Can an indicator based on localized coping behaviors be used to compare across contexts? *Food Policy*, *33*(6), 533–540.

Minoiu, C., & Shemyakina, O. (2012). Child health and conflict in Côte d'Ivoire. *American Economic Review*, *102*(3), 294–299.

Mohamed, A. A. (2017). Food security situation in Ethiopia: A review study. *International Journal of Health Economics and Policy*, *2*(3), 86–96.

Muriuki, J., Hudson, D., & Fuad, S. (2023). The impact of conflict on food security: Evidence from household data in Ethiopia and Malawi. *Agriculture & Food Security*, *12*(1), 41.

Nichola, T. (2006). The food security problem in Ethiopia–A supply side analysis. *South African Journal of Economics*, *74*(2), 315–322.

Obermeier, A. M., & Rustad, S. A. (2023). Conflict trends: A global overview, 1946–2022. *Peace Research Institute Oslo (PRIO)*.

Oduniyi, O. S., & Tekana, S. S. (2020). Status and socioeconomic determinants of farming households' food security in Ngaka Modiri Molema District, South Africa. *Social Indicators Research*, *149*(2), 719–732.

Penne, T., & Goedemé, T. (2021). Can low-income households afford a healthy diet? Insufficient income as a driver of food insecurity in Europe. *Food Policy*, *99*, 101978.

Peters, K., Silva, S., Wolter, T. S., Anjos, L., van Ettekoven, N., Combette, É., Melchiori, A., Fleuren, H., den Hertog, D., & Ergun, Ö. (2022). UN world food programme: Toward zero hunger with analytics. *Informs Journal on Applied Analytics*, *52*(1), 8–26.

Pilling, D., & Schipani, A. (2023). War in Tigray may have killed 600,000 people, peace mediator says. *Financial Times*, *15*.

Raleigh, C., Linke, R., Hegre, H., & Karlsen, J. (2010). Introducing ACLED: An armed conflict location and event dataset. *Journal of Peace Research*, *47*(5), 651–660.

Sahu, S. (2023). Food insecurity and malnutrition in South Sudan. *Keio University India-Japan Laboratory*.

Saint Ville, A., Po, J. Y. T., Sen, A., Bui, A., & Melgar-Quiñonez, H. (2019). Food security and the Food Insecurity Experience Scale (FIES): Ensuring progress by 2030. *Food Security*, *11*, 483–491.

Sant'Anna, P. H., & Zhao, J. (2020). Doubly robust difference-in-differences estimators. *Journal of Econometrics*, *219*(1), 101–122.

Selimian, H., Nassr, M., & Sen, K. (2022). Conflict, sanctions and the struggles of Syrians for food security in the shadow of the UN Food Systems Summit 2021. *BMJ Global Health*, *7*(1), e007477.

Shemyakina, O. (2022). War, conflict, and food insecurity. *Annual Review of Resource Economics*, *14*(1), 313–332.

Vos, R., Jackson, J., James, S., & Sánchez, M. V. (2020). *Refugees and conflict-affected people: Integrating displaced communities into food systems*.

Weldegiargis, A. W., Abebe, H. T., Abraha, H. E., Abrha, M. M., Tesfay, T. B., Belay, R. E., Araya, A. A., Gebregziabher, M. B., Godefay, H., & Mulugeta, A. (2023). Armed conflict and household food insecurity: Evidence from war-torn Tigray, Ethiopia. *Conflict and Health*, *17*(1), 22.

Wfp, V. (2008a). Food consumption analysis: Calculation and use of the food consumption score in food security analysis. *WFP: Rome, Italy*.

Wfp, V. (2008b). Food consumption analysis: Calculation and use of the food consumption score in food security analysis. *WFP: Rome, Italy*.

World Health Organization. (2021). *The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all* (Vol. 2021). Food & Agriculture Org.

APPENDICES

Appendix 1: Balanced Test

Linear regression

Number of obs	2,283
F(20, 142)	39.91
Prob > F	0.0000
R-squared	0.5339
Root MSE	.33798

(Std. err. adjusted for 143 clusters in village)

battle_timeinvariant15k	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
FCS	.0012391	.0009268	1.34	0.183	-.000593	.0030712
HDDI	-.0027113	.0117347	-0.23	0.818	-.0259086	.020486
moderate_insecurity	-.088928	.0472477	-1.88	0.062	-.1823279	.0044718
moder_sever_insecurity	.0219634	.0424086	0.52	0.605	-.0618705	.1057972
head_sex	.0031787	.0230974	0.14	0.891	-.0424805	.0488379
head_age	-.0003594	.00066	-0.54	0.587	-.0016641	.0009454
head_highest_grade	-.0032304	.0026459	-1.22	0.224	-.0084609	.0020001
asset_index	.0202631	.0161688	1.25	0.212	-.0116996	.0522259
tlu	-.0022539	.0022743	-0.99	0.323	-.0067498	.0022421
housing_condition_index	.0250585	.013788	1.82	0.071	-.0021977	.0523147
farm_equiments_index	-.0048588	.0105881	-0.46	0.647	-.0257894	.0160719
off_farm_income	.026311	.0347555	0.76	0.450	-.0423941	.0950161
hh_size	-.0086508	.0053698	-1.61	0.109	-.0192659	.0019643
HH_AgricArea_ha	.0024763	.0049795	0.50	0.620	-.0073673	.0123198
annual_drght_shck	.0965691	.1033512	0.93	0.352	-.1077366	.3008749
region						
Afar	-.278544	.2836564	-0.98	0.328	-.839279	.2821911
Amhara	-.2342267	.1077021	-2.17	0.031	-.4471335	-.0213199
Oromia	-.6668233	.0981972	-6.79	0.000	-.8609405	-.4727061
Somali	-.6180861	.1517606	-4.07	0.000	-.9180881	-.3180842
SNNP	-.8018693	.0874507	-9.17	0.000	-.9747428	-.6289958
_cons	.9310033	.0980258	9.50	0.000	.7372248	1.124782

Appendix 2: Model Diagnostic Tests

1. Ramsey RESET Test (`ovtest`):

```
. ovtest

Ramsey RESET test for omitted variables
Omitted: Powers of fitted values of FCS

H0: Model has no omitted variables

F(3, 5115) =   8.44
  Prob > F = 0.0000
```

2.Variance Inflation Factor (`vif`):

Variable	VIF	1/VIF
head_highe~e	1.36	0.733592
housing_co~x	1.26	0.796076
head_sex	1.25	0.800567
farm_equim~x	1.24	0.805873
hh_size	1.22	0.819773
head_age	1.20	0.830028
asset_index	1.20	0.833703
tlu	1.16	0.859961
battle_t~15k	1.14	0.880492
annual_drg~k	1.09	0.918344
off_farm_i~e	1.06	0.946305
HH_AgricAr~a	1.02	0.976487
Mean VIF	1.18	

3.Link Test (`linktest`):

```
. linktest
```

Source	SS	df	MS	Number of obs	=	5,131
				F(2, 5128)	=	251.56
Model	192018.121	2	96009.0603	Prob > F	=	0.0000
Residual	1957143.65	5,128	381.658278	R-squared	=	0.0893
				Adj R-squared	=	0.0890
Total	2149161.77	5,130	418.939916	Root MSE	=	19.536

FCS	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
_hat	1.860304	.318742	5.84	0.000	1.235433	2.485174
_hatsq	-.0115742	.0042454	-2.73	0.006	-.019897	-.0032513
_cons	-15.50842	5.908746	-2.62	0.009	-27.09208	-3.924753

4. White's Test for Heteroskedasticity (`imtest, white`):

```
. imtest, white

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

   chi2(86) = 226.84
Prob > chi2 = 0.0000

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	226.84	86	0.0000
Skewness	202.21	12	0.0000
Kurtosis	1.41	1	0.2358
Total	430.46	99	0.0000

5. Breusch-Pagan/Cook-Weisberg Test (`estat hettest`):

```
. estat hettest

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of FCS

H0: Constant variance

    chi2(1) =  36.63
Prob > chi2 = 0.0000
```