The Immediate and Medium-term Impact of Armed Conflict on Food Security in Ethiopia[1]

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Abstract

Food insecurity remains a major development challenge in low- and middle-income countries (LMICs), particularly in Sub-Saharan Africa. Building on the recent armed conflict in Ethiopia, this study investigates the impact of armed conflict on food security using a two-wave panel dataset, collected before and after the conflict. Beyond quantifying the overall effect, we also explore the trajectory of recovery after exposure to armed conflict. Most importantly, we quantify the immediate and medium-term impacts of armed conflict. To identify the causal effect, we apply a difference-in-differences (DiD) estimation strategy. The results indicate that exposure to armed conflict significantly reduces food security. Specifically, exposure to armed conflict (one or more battles) leads to a 28% reduction in Food Consumption Score (FCS) and a 13% reduction in Household Dietary Diversity Index (HDDI). Interestingly, the adverse impact of armed conflict on food security lessens with increasing rehabilitation period: the adverse effects of armed conflict decline and households recover after about two years. The findings are robust to alternative measures of both conflict exposure and food (in)security. We also identify potential channels through which armed conflict undermines food security, including through impacts on access to and ownership of productive assets. These findings underscore the importance of both conflict prevention and post-conflict rehabilitation efforts that go beyond immediate humanitarian relief.

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

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1. Introduction

Food insecurity remains globally high, despite the Sustainable Development Goal (SDG) of ending hunger and achieving food security by 2030. According to UNICEF (2024), one out of eleven people in the world have faced hunger in 2023, while the ratio picks up to one out of five in Africa and is increasing over time. Similarly, over 295 million people (22.6%) in 53 countries included in the Global Report on Food Crises (GRFC) faced high levels of acute food insecurity in 2024 (GRFC, 2025). Four African countries – Nigeria, Sudan, the Democratic Republic of Congo, and Ethiopia – are among the top five countries with the largest number of people facing high levels of acute food insecurity, in descending order.

Our results show that exposure to armed conflict has large and statistically significant adverse effects on food security. More specifically, exposure to armed conflict leads to 9.9- and 0.65-point lower Food Consumption Score (FCS) and Household Dietary Diversity Index (HDDI), respectively. The trajectory of recovery in food security reveals that households with six months or less of rehabilitation experience the largest decline in food security, with the effect moderating during the 6–18-month period and becoming statistically insignificant after 18 months. This pattern, consistent across both FCS and HDDI measures, suggests a gradual recovery over time. Heterogeneity analysis reveals that male-headed households are relatively more food insecure than female-headed households, with 5 and 4.3 percentage point differences in the mean deviations of FCS and HDDI, respectively. On the other hand, exposure to armed conflict is statistically significant in affecting the food security of rural residents. The key mechanisms that link armed conflict and food security are found to include loss of productive assets and underuse of agricultural land. Therefore, our findings highlight the persistent adverse impact of armed conflict on food security that requires extended post-conflict support and rehabilitation.

This study contributes to the broader development literature on food security and poverty. This paper also contributes to the literature on shocks and their consequences on the livelihoods of people. Manmade and natural adverse events such as conflicts and weather shocks contribute to the socio-economic well-being of individuals. Rainfall shock is found to adversely affect the health, education, and other socio-economic outcomes of victims (Abiona, 2017; Adhvaryu et al., 2024; Maccini and Yang, 2009).

Studying the link between armed conflict and food insecurity in the context of Africa, where both are escalating, is worthwhile. As indicated above, the largest number of people facing high levels of acute food insecurity are present in Africa, and the trend is not declining. In 2023, of the total armed conflicts that occurred globally, more than half of them were in Africa (Obermeier & Rustad, 2023). Ethiopia is among the countries with the highest prevalence of armed conflict and its adverse effects on the livelihoods of people. For instance, in 2022, over 204,000 people were killed due to state-based violence, with the largest numbers resulting from the wars in Ethiopia and Ukraine (Davies et al., 2023).

In recent decades, Ethiopia was hailed as one of Africa's fastest-growing economies, with marked progress in poverty reduction and infrastructure expansion. However, this trajectory was severely disrupted by the outbreak of armed conflict between Ethiopia's federal government and the Tigray regional administration on November 4, 2020 (Abay et al., 2023). The war quickly escalated and spread to other regions, including Amhara and Afar, affecting millions and triggering a large-scale humanitarian crisis (Pilling & Schipani, 2023; Abay et al., 2023; Marivoet et al., 2024; Cullis & Bogale, 2024).

Existing studies have mostly relied on cross-sectional data collected during the exposure to conflict, making it difficult to identify causal impacts or pre/post-conflict comparisons (Muriuki et al., 2023). Recently, Abay et al. (2023) used cross-sectional data collected in the middle of the conflict in the northern part of Ethiopia to show its impact on the welfare of households. The cross-sectional nature of the data and the data collection that used the High-Frequency Phone Survey (HFPS) reduces the reliability to draw causal implications (Abate et al., 2023; Ambel et al., 2021). Therefore, this study uses pre- and post-conflict periods data collected through face-to-face interviews to explore the impact of armed conflict on food (in)security in Ethiopia.

The rest of the paper is organized as follows. The next section presents the data and descriptive statistics. Section 3 outlines the identification strategy. Section 4 presents the main results and discussion, including heterogeneous analysis, robustness checks, and mechanisms. The final section concludes with a discussion of the policy implications.

2. Data, Variables and Descriptive Statistics

2.1. Data

We analyze the impact of armed conflict on food security in Ethiopia using two waves of panel data obtained from the International Food Policy Research Institute (IFPRI) and linked with geocoded information on armed conflict obtained from the Armed Conflict Location and Event Data (ACLED) dataset. IFPRI took a baseline sample in 2019 covering six regions of the country (Afar, Amhara, Oromia, SNNP, Somali, and Tigray), which comprises more than 93% of the population. The survey aimed to assess the U.S. Agency for International Development (USAID)'s Feed the Future (FtF) program, covering 132 woredas (districts). In the baseline, the survey randomly took approximately 20 households from 264 Enumeration Areas (EAs), resulting in a total of 4376 households, all successfully interviewed during the baseline. However, due to ongoing conflict in Ethiopia, the follow-up survey in 2023 was able to collect information only from 180 of the original 264 EAs, which resulted in about 3000 households. In the first wave of the survey in 2019, information on household demographics, food consumption, income source, and other economic conditions were collected. The same household was followed, and similar information was collected in 2023. Therefore, this study relies on information available for households observed in both rounds.

2.2. Variables

The main outcome variable in this study is food security, which is measured using two widely recognized indicators: Food Consumption Score (FCS) and Household Dietary Diversity Index (HDDI). The first indicator, the Food Consumption Score (FCS), is a composite measure developed by the World Food Programme (WFP) to assess dietary diversity, food frequency, and the nutritional value of foods consumed in the seven days preceding the survey (Moulin et al., 2018). In this study, the FCS is computed using household-level data on the frequency of consumption of 15 distinct food items.[2] The second measure of food security used in this paper, Household Dietary Diversity Index (HDDI), which measures access to a variety of food groups over a 24-hour period. The key explanatory variable in this study is exposure to armed conflict, which is measured using battle events. We use this measure of exposure, as it is a clear and well-defined measure of armed conflict across time and space. In the estimations, we control for household characteristics that include age, sex, and education level of the household head; household size; and the household's asset index, off-farm income, tropical livestock unit (TLU), housing condition, and farm equipment index. we used additional variables such as loss of productive assets, uncultivated agricultural land, loss of family members that economically support the household, and displacement of the household that disrupts their usual life.

2.3. Descriptive Statistics and Balance Test

The balance test (pairwise t-tests) between the control and treatment groups on basic household characteristics before treatment, as shown in Columns 3 to 5, shows balance. That is, the two groups are not statistically different in the outcome variables before treatment, as it did for other covariates except the sex of the head of the household.

Table 1: Descriptive statistics and balance test – baseline characteristics data (2019)

	(1)	(2)	(3)	(4)	(5)
Variables	Total Sample	Sub-Sample	Control	Treatment	Mean diff. Test
FCS	32.249	32.749	31.30	34.93	-3.64
	(20.435)	(20.420)	(1.34)	(1.32)	
HDDI	4.477	4.536	4.59	4.45	0.14
	(2.158)	(2.119)	(0.14)	(0.16)	
Gender of HH head	0.246	0.243	0.23	0.26	-0.03*
	(0.431)	(0.429)	(0.01)	(0.01)	
Age of HH head	46.242	46.958	46.32	47.92	-1.60

[2] The FCS was calculated by multiplying the number of days each food group was consumed by its corresponding weight, then summing the results. FCS = (Staples × 2) + (Pulses × 3) + (Vegetables × 1) + (Fruits × 1) + (Meat/Fish × 4) + (Milk × 4) + (Sugar × 0.5) + (Oil × 0.5).

	(15.937)	(16.107)	(0.62)	(0.82)	
Education of HH head	3.065	3.030	3.26	2.69	0.57
	(4.859)	(4.738)	(0.21)	(0.30)	
Asset index	-0.005	-0.055	-0.11	0.02	-0.13
	(1.183)	(1.075)	(0.06)	(0.11)	
Tropical livestock unit	3.662	3.832	3.92	3.70	0.21
	(4.906)	(4.990)	(0.29)	(0.32)	
Housing Condition	-0.072	-0.109	-0.36	0.26	-0.62
	(1.220)	(1.170)	(0.08)	(0.13)	
Farm equipment index	0.025	0.200	0.00	0.49	-0.49
	(1.542)	(1.526)	(0.10)	(0.13)	
Off-farm income	0.185	0.185	0.19	0.18	0.01
	(0.388)	(0.388)	(0.02)	(0.03)	
Household size	4.871	4.780	4.96	4.51	0.44
	(2.274)	(2.207)	(0.08)	(0.10)	
Observations	3,022	2,188	1315	873	

Note: This table presents the descriptive statistics of key variables and balance test. Columns 1 and 2 show the summary statistics of the full sample and sub-sample used in this study, respectively. Columns 3 and 4 reports the summary statistics of armed conflict unaffected (control) and affected (treatment) groups. Column 5 shows the mean difference test between control and treatment groups. These mean comparisons and tests control for zonal fixed effects. The standard errors are displayed in parenthesis. ***, **, and * denote significance at the 1, 5 and 10% levels, respectively.

3. Identification Strategy

We use Difference-In-Differences (DiD) estimation approach to identify the causal relationship between exposure to armed conflict and food (in)security. The approach requires at least two time periods and two groups. Our dataset contains information collected in two periods (2019 and 2023). Considering a sub-sample of households not exposed to armed conflict between 2016 – 2019, we have all not treated households by 2019. However, the households are categorized into treatment and control based on their exposure to armed conflict between 2020 – 2023. This allows us to estimate the average treatment effect on the treated using the DiD approach. We specify the standard DiD estimation as:

$$FS_{it} = \beta_0 + \mu \cdot \text{Year}_t + \theta \cdot \text{Battle}_i + \delta \cdot (\text{Battle}_i \times \text{Year}_t) + X_{it}'\gamma + \alpha_i + \epsilon_{it}$$

where FS_{it} is the food (in)security score of households i at time t. Year_t is a dummy variable that takes a value zero in the pre-treatment period (2019) and one in post-treatment period (2023). Battle_i is dummy variable equal to 1 if the household is treated (exposed to armed conflict) and 0 otherwise. $\text{Battle}_i \times \text{Year}_t$ is the interaction term that captures the treatment effect, which in our case is the causal effect of exposure to armed conflict on food (in)security. Therefore, δ is our coefficient of interest in this study. X_{it} is a vector of control variables. The other coefficients β_0, μ, θ, γ, and α are parameters, while ϵ_{it} is a random term.

4. Results and Discussions

4.1. Main Results

We present the DiD regression results on the impact of armed conflict on food security in Table 2. Households' exposure to armed conflict is measured based on the occurrence of battle events within 15km of the radius of household's residence. Columns 1 and 2 presents estimation results using Food Security Score (FCS) as an outcome variable without and with controls, respectively. As the results from the interaction term that represents the average treatment effect on the treated (ATT) show, there is a statistically significant adverse effect of exposure to armed conflict on food security. The results are consistent without and with controls that include age, sex, and education level of the household head, household size, asset index, off-farm income, tropical livestock unit (TLU), housing condition, and farm equipment index. Those households exposed to armed conflict have about 9.9 points lower FCS than those who were not exposed to armed conflict. This translates to a mean deviation of about 28% differences.

Columns 3 and 4 of Table 2 uses Household Dietary Diversity Index (HDDI) as a measure of food security and present the impact of exposure to armed conflict without and with controls. The control variables are the same as in the preceding estimations. The ATT without control reveals that households exposed to armed conflict have 0.63 points lower score on HDDI. When other household characteristics are controlled, the HDDI consistently resulted in a difference of 0.65 points. The result indicates that exposure to armed conflict leads to mean deviation of 13% lower HDDI.

Table 2 - The impact of exposure to armed conflict on food security

	FCS		**HDDI**	
	(1)	(2)	(3)	(4)
Year dummy (2023=1)	9.691***	9.493***	1.217***	1.195***
	(1.811)	(1.801)	(0.178)	(0.175)
Battle dummy (15km)	3.637*	2.660	-0.141	-0.278
	(1.872)	(1.747)	(0.207)	(0.194)
Year dummy#Battle dummy	-9.635***	-9.857***	-0.626**	-0.650***
	(2.430)	(2.359)	(0.251)	(0.243)
Constant	31.298***	26.258***	4.592***	4.148***
	(1.342)	(2.246)	(0.139)	(0.244)
Controls	No	Yes	No	Yes
Household FE	Yes	Yes	Yes	Yes
Observations	4,376	4,376	4,376	4,376
Mean of dep. var.	35.672	35.672	5.019	5.019

Note: This table reports DiD estimates on the impact of exposure to armed conflict on food security. Columns 1 and 2 presents results using Food Consumption Score (FCS) as an outcome variable without and with other control variables, respectively. Estimations in columns 3 and 4 uses Household Dietary Diversity Index (HDDI) as an outcome without and with controls, respectively. In the DiD estimations, exposure to armed conflict is measured by occurrence of battle events within 15km radius of the household's residence. The control variables include age, sex, education level of the household head, household size, household's asset index, off-farm income, tropical livestock unit (TLU), housing condition, and farm equipment index. Standard errors reported in parenthesis are clustered at village level. ***, **, and * denote significance at the 1, 5 and 10% levels, respectively.

A consistent result is observed when food security is measured using Household Dietary Diversity Index (HDDI), presented on the right-hand side of the panel. There is adverse impact of exposure to armed conflict on HDDI for rural residents, while the impact is statistically insignificant for urban households. For rural households, those who have exposed to armed conflict have 0.70 points lower HDDI than those who are not exposed. This equates to 14% mean deviation. The difference in the impact between urban and rural residents shows the persistent disruption that armed conflict is imposing on agricultural activities and rural livelihoods.

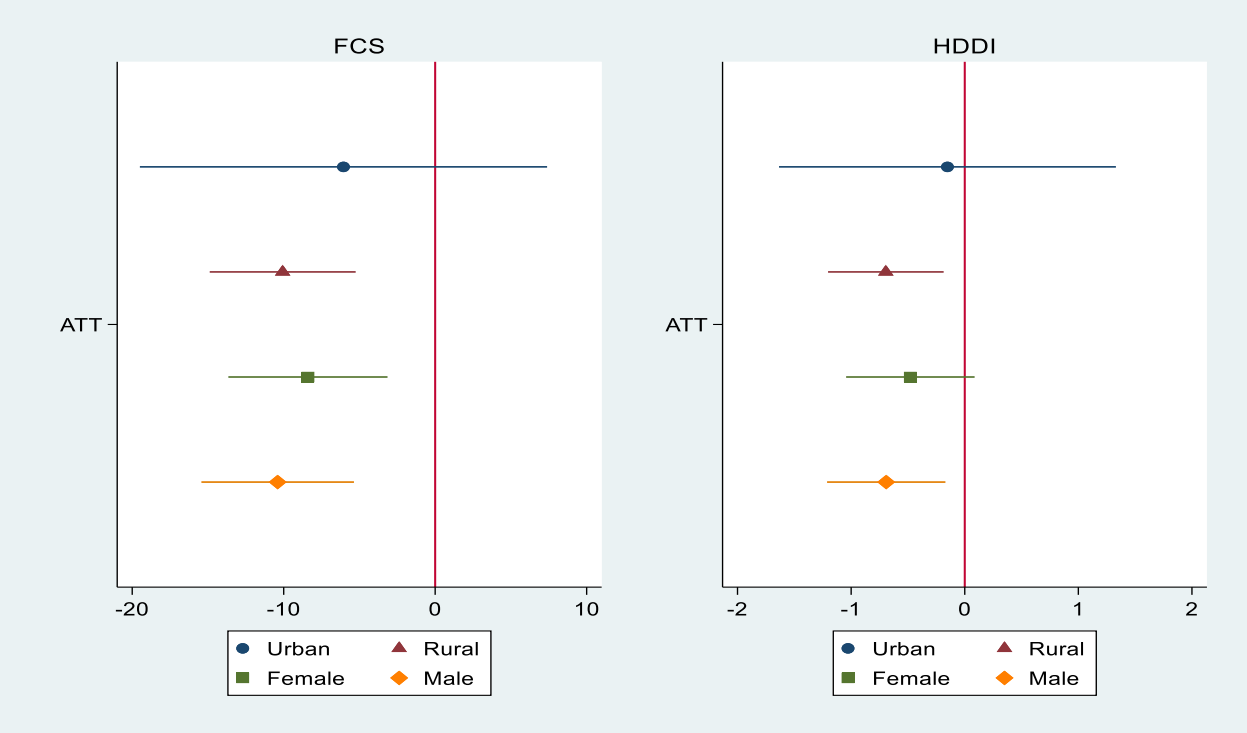


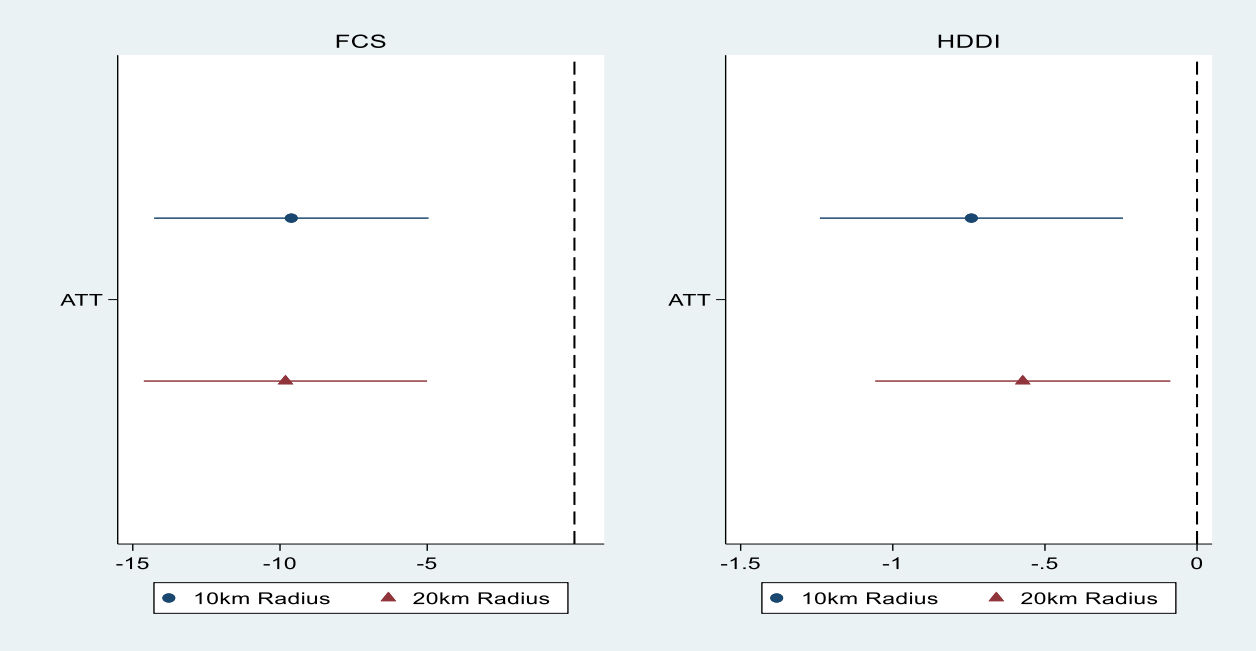
Figure 4 – The impact of armed conflict on food security by place of residence and gender

Note: The figure presents the heterogenous impact of armed conflict on food security by place of residence and gender. The left-hand panel uses FCS as the measure of food security, while the right-hand panel presents the same results using HDDI.

We conducted similar heterogeneity analysis by gender of the head of the household. Regardless of the gender of the head of the household, exposure to armed conflict leads to lower food security status. Female headed households who are exposed to armed conflict have 8.4- and 0.48-points lower FCS and HDDI compared to female headed households who are not exposed to armed conflict, with later only marginally significant. This amounts to 24% and 9.7% of mean deviations, respectively. The ATT for male headed households shows a 10.4- and 0.70-points lower FCS and HDDI, accounting for 29% and 14% mean deviations, respectively. The result, therefore, indicates that male headed household exposed to armed conflict are relatively more affected than female headed households, though they have the same average FCS and HDDI. This could be due to the disruption of armed conflict on major agricultural activities that make male headed households to underutilize their available resources.

4.2. Robustness Checks

We adopted alternative measures of food (in)security and exposure to armed conflict to check the robustness of our results. In all our prior estimations, we used 15km radius of the household to measure exposure to one or more battle events. To check the robustness of our results, we considered alternative narrow and wider buffers. Figure 5 presents the coefficient estimates of exposure to armed conflict measured in 10km and 20km radius of the households and using FCS and HDDI as outcomes.



Note: The figure presents the DiD estimates of the impact of armed conflict on food security using a 10km and 2km to define exposure to conflict. The left-hand panel uses FCS as the measure of food security, while the right-hand panel presents the same results using HDDI.

Our result is robust to the change in the radius considered to categorize households into conflict affected (treatment) and unaffected (control) groups. Using a 10km buffer shows that households exposed to armed conflict have 9.6- and 0.7-points lower score on FCS and HDDI, respectively. Similarly, changing the radius to 20km produces consistent results, where exposure to armed conflict (in 20km) leads to 9.8- and 0.6-points lower in FCS and HDDI, respectively. These compared to the main estimation also provide reasonably similar magnitude of impacts. This, therefore, confirms the robustness of our results to changes in our measure of exposure to conflict. In general, our results show the adverse impact of exposure to armed conflict on food security.

4.3. Plausible Mechanisms

Table 6 presents fixed effect panel data estimation of exposure to armed conflict in 15km radius on plausible mechanisms that include loss of productive assets, loss of household member that contributes to the income of the household, displacement of households from their residence, and presence of uncultivated own agricultural land. We use the full sample to explore the relationship between conflict and the aforementioned variables. Column 1 shows the positive and statistically significant impact of exposure to armed conflict on loss of productive assets. Exposure to armed conflict leads to about 16 percentage points higher likelihood of loss of productive assets. This suggests the extended impact on their productive and income generating capability, which ultimately undermines their food security.

Table 6 - Plausible mechanisms that leads exposure to conflict to affect food security

	(1)	(2)	(3)	(4)
	Loss of productive asset	Loss of HH member	Displacement	Inability to farm HH land
Battle dummy (15km)	0.158***	0.044***	0.042***	0.017***
	(0.036)	(0.016)	(0.009)	(0.006)
Constant	0.133***	-0.006	-0.001	0.023*
	(0.040)	(0.020)	(0.012)	(0.012)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes
Observations	5,672	5,672	2,705	2,705

Note: This table reports coefficients of fixed effect estimates on the effect of exposure to armed conflict of alternative mechanisms. Columns 1 and 2 report fixed effect estimates by considering loss of productive assets and loss of household members that economically support the household, respectively. Column 3 uses displacement as an outcome. Column 4 considers inability of the household to cultivate available farmland as an outcome. In the estimations, exposure to armed conflict is measured by occurrence of battle events within 15km radius of the household's residence. The control variables include age, sex, education level of the household head, household size, household's asset index, off-farm income, tropical livestock unit (TLU), housing condition, and farm equipment index. Standard errors reported in parenthesis are clustered at village level. ***, **, and * denote significance at the 1, 5 and 10% levels, respectively.

The income source of the household which plays the major role in securing food for the household could be affected by loss of the household member due to conflict. The estimate, presented in column 2, reveals the impact of conflict on loss of household members. Accordingly, there is 4 percentage point likelihood of losing an economically supportive household member due to armed conflict. Column 4 presents the impact of exposure to armed conflict on the use of available agricultural land for cultivation. The result shows positive and statistically significant impact of armed conflict on the likelihood of unutilized agricultural land, increasing by 1.7 percentage points.

5. Conclusion

One of the key Sustainable Development Goal (SDG) is to end hunger and achieve food security by 2030. However, food security remains a challenge globally, with higher prevalence in developing countries like Ethiopia. One out of eleven people are food insecure, while the proportion rises to one out of five in Africa (Unicef, 2024). Ethiopia is one of the top countries with high poverty and acute food insecurity (Crises, 2025).

This study investigates the impact of exposure to armed conflict on food insecurity in Ethiopia using two rounds of household panel data collected by the IFPRI in 2019 (baseline) and 2023 (end-line). The panel data cover all regional states of Ethiopia, allowing for a nationally representative analysis of the consequences of conflict on food security outcomes. The study employs a DiD approach to estimate the causal impact of exposure to conflict on three key food security indicators: the FCS, the HDDI, and the FIES. Exposure to conflict is defined by the proximity of battle events within a 15-kilometer radius of the household's residence, while alternative buffers (10km and 20km) are used for robustness checks.

Our results show that conflict has a statistically significant and economically large negative effect on food security outcomes. Specifically, we find that exposure to conflict is associated with a 9.9-point or 28% reduction in FCS and a 0.65-point or 13% decline in HDDI. The adverse effects are strongest in the early rehabilitation phase, diminish in the medium term, and disappear beyond 18 months. That is, the evidence indicates progressive improvement in food security as rehabilitation lengthens. These effects are not only sizable but also consistent across gender and location, indicating that both male- and female-headed households are adversely affected by conflict, while only rural residents affected by conflict. The results are robust to alternative measures of food security and exposure to armed conflict. Loss of productive assets, economically supportive household members, displacement, and uncultivated farmland due to conflict are the key mechanisms that link conflict with food insecurity. This uniformity underscores the widespread and indiscriminate nature of the impacts of conflict on household welfare in Ethiopia.

This study contributes to the broader literature in three important ways. First, it adds to the growing body of empirical work on the relationship between conflict and food security, providing context-specific evidence from Ethiopia, a country that has recently experienced one of the most devastating conflicts in the world. Second, it enhances our understanding of how covariate shocks such as war interact with food systems to exacerbate vulnerability. By using panel data and applying a quasi-experimental research design, the study establishes a credible causal link between conflict exposure and food insecurity. More specifically, the study explores the persistent impact of exposure to armed conflict on food security through utilizing differences in rehabilitation period. Third, it enriches policy discussions by identifying the key transmission mechanisms through which conflict undermines household welfare through disruptions to economic activities and agricultural productions.

From a policy perspective, the findings underscore the need for conflict-sensitive development interventions. Recovery efforts should go beyond emergency food aid to include the restoration of agricultural systems, support for displaced populations, and investment in rural infrastructure. Strengthening social protection programs such as the PSNP, expanding access to credit and agricultural inputs, and improving market connectivity are essential to rebuilding household resilience. Furthermore, incorporating early warning systems and conflict monitoring tools into food security programming can help preempt future crises and target assistance more effectively. Special attention should be paid to the needs of rural residents, who are disproportionately affected by conflict and often have limited access to recovery resources.

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