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Post-Conflict Determinants of Household Food Security and Adaptive Coping Strategies in South Wollo Zone, Ethiopia

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ABSTRACT

Background: Violent conflict exacerbates food insecurity by disrupting agricultural production, markets, and mobility. Accordingly, South Wollo Zone, already vulnerable to climate shocks, suffered severe destruction and loss of life during the northern Ethiopia conflict. This study assessed post-conflict household food security using the Household Food Insecurity Access Scale (HFIAS) in selected districts of South Wollo Zone, Ethiopia. It also identified determinant factors of food security and examined consumption-related coping strategies during and after the conflict. **Methods:** A mixed cross-sectional research design was used in this project. Data were collected from 422 randomly selected households, key informant interviews, and focus group discussions, which were complemented by a review of related literature. A HFIAS was also analyzed using ordered logistic regression to identify determinant factors, as implemented in Stata software. **Results:** The results reveal that 45% of the households are severely food insecure, 39% are moderately insecure, 7% are mildly insecure, and only 9% are food secure in the conflict-affected districts of South Wollo Zone. Households with more livestock and larger landholdings were more food secure, while conflict-related losses increased vulnerability. Besides, wealth index and off-farm participation are positively associated with household food security. The impact of drought was dependent on the sufficiency and timeliness of assistance. Thus, households adopted various coping strategies, including dietary changes (89%), rationing (79%), short-term food acquisition (59%), and reducing household size (15%). **Conclusions:** Violent conflict disrupts food systems and exacerbates vulnerabilities, leading to negative coping strategies. Conflict-sensitive interventions, off-farm livelihood support, and livestock restocking are also crucial for recovery.

Introduction

Violent conflict involves social, economic, environmental, and political factors that cumulatively exacerbate food insecurity. In addition to the direct damage of conflict on agricultural produce and agricultural activities, it affects the supporting functions of agriculture, such as irrigation systems, the disruption of markets, and the mobility of people from one place to another for labor activities. Food security is not just about the mere availability of food, but covers the idea of both physical and economic access to sufficient, safe, and nutritious food (Righettini and

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Bordin, 2023).

Food insecurity and conflict are interrelated, with one often being a cause of the other. Countries that experience conflict also experience food insecurity (Martin-Shields and Stojetz, 2019). It was reported that 60% of undernourished people and 79% of stunted children live in conflict-affected countries globally. Furthermore, it has been reported that 80% of acutely food-insecure individuals live in conflict-affected countries in Africa (Africa Center for Strategic Studies (ACSS), 2024).

Violent conflict has a profound effect on household food security. Moreover, conflict can exacerbate existing vulnerabilities by creating barriers to access to food. The destruction of vital infrastructures in the agriculture and health sectors, as well as insufficient humanitarian assistance, further exacerbate food insecurity in the context of violent conflict (Weldearegay and Tedla, 2018, Woldegebriel *et al.*, 2024).

Hunger and food insecurity have remained high for three consecutive years due to multiple factors, including the COVID-19 pandemic, conflict, climate variability, inequality, slow economic growth, and other factors globally. This makes achieving the Sustainable Development Goals (SDGs) of zero hunger difficult without significant improvement (FAO, 2024). UNICEF reported that approximately 733 million people faced hunger in 2023, in addition to 2.33 billion people who might have experienced food insecurity. Given that inequalities play a significant role in accessing food, poor countries have the highest proportion of people who cannot access a healthy diet.

Sub-Saharan Africa is among the regions most affected by protracted conflict worldwide. conflict undermines progress toward sustainable development goals and leaves people in extreme poverty. Several studies, including the one by Vos *et al.* (Vos *et al.*, 2022), have indicated that conflict is one of the major drivers of food insecurity (Tranchant *et al.*, 2021). Conflict undermines household food security by reducing calorie availability at the household level and compromising dietary diversity.

Agriculture is crucial to Ethiopia's economy, but it suffers greatly from conflict and other crises. Agricultural lands are damaged due to conflict, which destroys crops, disrupts markets and veterinary services, constrains labor movement, and distorts local governance, leading to economic losses and worsening food insecurity (Rohwerder, 2017). Beyond its direct effects on food security, the conflict also has social and economic consequences due to the disruption of the entire food system, from production to consumption, which limits production and essential services, and compromises food availability, accessibility, utilization, and stability.

The study was conducted in four districts of the South Wollo Zone, located in the Amhara region, which was heavily affected by the northern Ethiopia conflict and frequently impacted by drought and other disasters that hinder agricultural production. The conflict caused significant damage to lives and livelihoods, worsening existing vulnerabilities in the zone. It assessed Household Food Insecurity Access Scales (HFIAS) and coping strategies to highlight the conflict's consequences on food security. It aims to offer new insights into how violent conflict interacts with food insecurity, identifying key factors and coping strategies in the post-conflict context.

Materials and Methods

Study area

South Wollo, part of Ethiopia's Amhara region, is one of the eleven administrative zones. It shares borders with North Shewa to the south, East Gojjam to the west, South Gondar to the northwest, North Wollo to the north, Afar Region to the northeast and Oromia and Argobba special woredas to the east. The zone has around 3.5 million people across 22 districts (Mohammed *et al.*, 2024). Dessie, its capital, lies about 400 kilometers from Addis Ababa. Most residents live in rural areas and rely on farming, with only 10% engaged in non-agricultural work. Limited resources, frequent droughts, and fragmented landholdings all contribute to undermining household food access. The population is mainly

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Amhara ethnic (96%), with Islam (55%) and Orthodox Christianity (39%) as dominant religions (Ethiopian Economic Association and Ethiopian Economic Policy Research Institute, 2002, Haile *et al.*, 2022, Yifru and Miheretu, 2022). In addition to recurring drought, the districts of Delanta, Dessie Zuria, Kalu, and Worebabo suffered significant harm from the conflict in northern Ethiopia. **Figure 1** shows the district map of South Wollo.

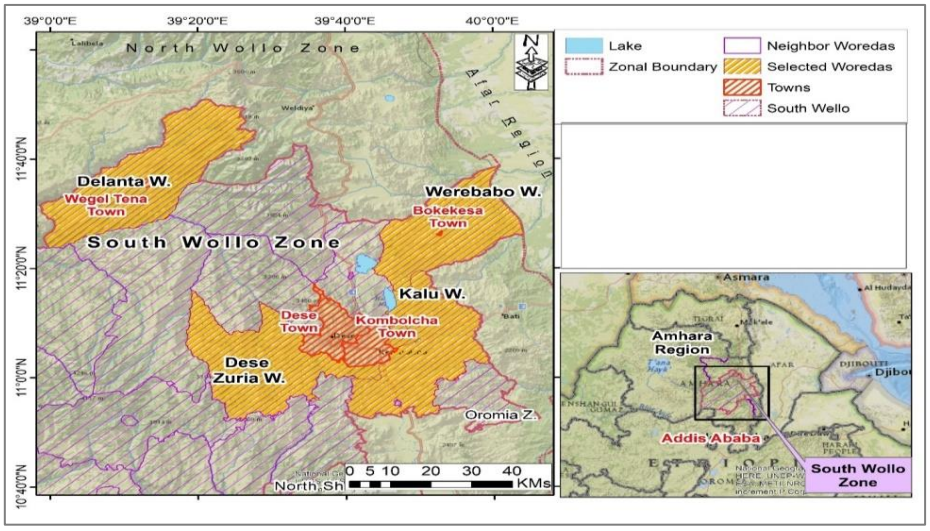


Figure 1. Map of the study area. Source: CSA (2012) with researcher adaptations.

Research design and approach

A mixed cross-sectional design was employed to assess the links between variables affecting household food security after violent conflict in the South Wollo Zone, Amhara Region. This approach incorporated both quantitative and qualitative data from various groups. The post-conflict period spans June 2021 to May 2022, during which HFIAS data was gathered for a four-week reference period.

Sample size and sampling

Four districts were selected purposively based on their exposure to conflict. Within them, villages were stratified by agroecological zones, and 38 were selected via a lottery approach. From these, 422 households were randomly sampled, including a 10% contingency. The sample size was determined using a formula for cross-sectional studies with categorical variables (Bolarinwa, 2020):

$$n = \frac{z^2 pq}{d^2} = 384 + 10\% = 422, \ldots\ldots \quad (1)$$

Where z is the corresponding z score for the 95% confidence interval, p is the percentage of occurrence, q is 1-p, and d is the percentage of precision described as the margin of error.

Key informants and focus group participants were selected based on purposive sampling to provide a broader context and in-depth understanding. The 15 key informants included local leaders, experts, and officials, while 10 Focus Group Discussions (FGDs) with 12 participants from mixed demographics-offered insights into food security and coping strategies. Households residing in the selected villages in the four districts were included. In addition, households that had a status of household head were included in both the quantitative survey and the focus group discussion, while experts in the different government and non-governmental organizations were included in the KII based on their expertise level, knowledge of the context, and the area of food security.

Data sources and collection tools

Data were collected using household surveys, Key Informant Interviews (KIIs), FGDs, and literature review. Quantitative data were collected from 422 households to assess socioeconomic status, food security, the impacts of conflict, and coping mechanisms. Moreover, qualitative insights were derived from the FGDs and KIIs to deepen

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understanding of local conditions.

Ethical considerations

Addis Ababa University reviewed and approved the research and tools, granting ethical clearance in accordance with the IRB-CoDS SOP and guidelines. Researchers explained the study's purpose, questions, data handling, confidentiality, and ethics, and obtained informed consent. Data were handled securely, and no participant photos were taken due to safety concerns in a conflict setting, in accordance with participants' requests.

Data analysis

The HFIAS was used to analyze household food security by examining HFIAS-related conditions (c), HFIAS-related domains (d), HFIAS scores (s) and HFIAS prevalence (p), as outlined in the study by Coates *et al.* (Coates *et al.*, 2007). These parameters were calculated based on the nine HFIAS questions.

$$c = \frac{X_i}{N_i} * 100 \quad (2)$$

Where c represents the HFIAS-related conditions, X represents the affirmative response (yes) for the HFIAS question, and N represents the number of respondents answering HFIAS question i.

$$d_1 = \frac{X_1}{N_1} * 100 \quad (3)$$

$$d_2 = \frac{X_2 \, or X_3 \, or \, X_4}{N_2 or \, N_3 \, or \, N_4} * 100 \quad (4)$$

$$d_3 = \frac{X_5 \, or X_6 \, or \, X_7 \, or \, X_8 \, or \, X_9}{N_5 \, or \, N_6 \, or \, N_7 \, or \, N_8 \, or \, N_9} * 100 \quad (5)$$

Where d is the HFIAS-related domain (d1 is anxiety and uncertainty, d2 is insufficient quality, and d3 is insufficient food intake and its physical consequences), Xs are the affirmative responses to the specific HFIAS questions, and N is the total number of respondents who answered either of the specified HFIAS questions for each domain.

Additionally, the HFIAS score for each household was computed by summing the frequency of occurrence for each HFIAS question. Once the household-level HFIAS score was computed, the average HFIAS score for the research participants was computed as follows:

$$S = \frac{\sum_{s=1}^{n} s}{N} \quad (6)$$

Where S is the average HFIAS score, s is the household-level HFIAS score, and N is the total number of households surveyed.

Household food security status was categorized into four groups: food secure, mildly insecure, moderately insecure, and severely insecure. Each HFIAS question was rated on a scale of 0 (no), 1 (rarely), 2 (sometimes), and 3 (often), based on a four-week recall. This classification followed the FAO recommendation as in the study by Coates, *et al.* (Coates *et al.*, 2007). After the HFIAS categories were determined, an ordered logistic regression model was used to identify the determinants of household food security within the food security categories on the HFIAS scale.

$$logit(P(Y \leq j)) = \beta_{j0} + \beta_1 x_1 + \cdots + \beta_p x_p \quad (7)$$

for j=1, ⋯, J−1 are the food security categories of the outcome variable, and X_1, …, X_p are predictors.

A thematic method was used to analyze and organize data that were collected from related literature, FGDs, and KII.

Results

Sociodemographic information of respondents

The 422 respondents came from villages across various agroecological zones in four districts. The average household size in the study is five. **Table 1** presents respondent numbers and impacts from non-drought events. Also, a chi-square test revealed a significant association between food security and the severity of disaster exposure (P<0.01).

Table 1. Exposure to non-drought climate disasters and food security status.

Food security category	n	Exposure to non-drought disasters			
		n	Low	Medium	High
Food secure	36	0	10	23	3
Mildly food insecure	31	1	14	10	6
Moderately food insecure	165	2	70	73	20
Severely food insecure	190	3	25	130	32
Total	422	6	119	236	61

Drought exposure has a significant impact on household food security. A Pearson Chi-square test confirmed a strong association between drought exposure and food security status (P<0.05). As drought exposure rises, so does the likelihood of

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food insecurity. **Table 2** displays the proportion of households by food security category, based on drought exposure.

Food security levels vary across the four districts, with high rates of severe and moderate food insecurity: 94% in Delanta, 74% in Dessie Zuria, 81% in Kalu, and 92% in Worebabo. **Figure 2** shows the breakdown of food security categories by district. About 15% of respondents were from female-headed households, while 85% were male-headed. **Figure 3** presents food security status by household head gender

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Table 2. Exposure to drought and food security status.

Food security category	n	Exposure to drought	
		No	Yes
Food secure	36	9	27
Mildly food insecure	31	12	19
Moderately food insecure	165	62	103
Severely food insecure	190	34	156
Total	422	117	305

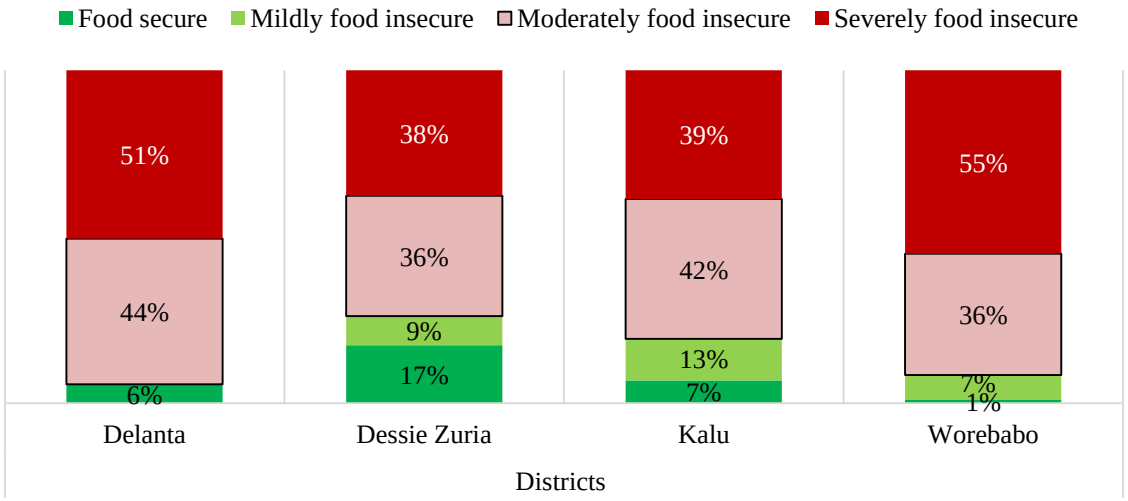


Figure 2. Food security categories per district. Source: survey data from authors.

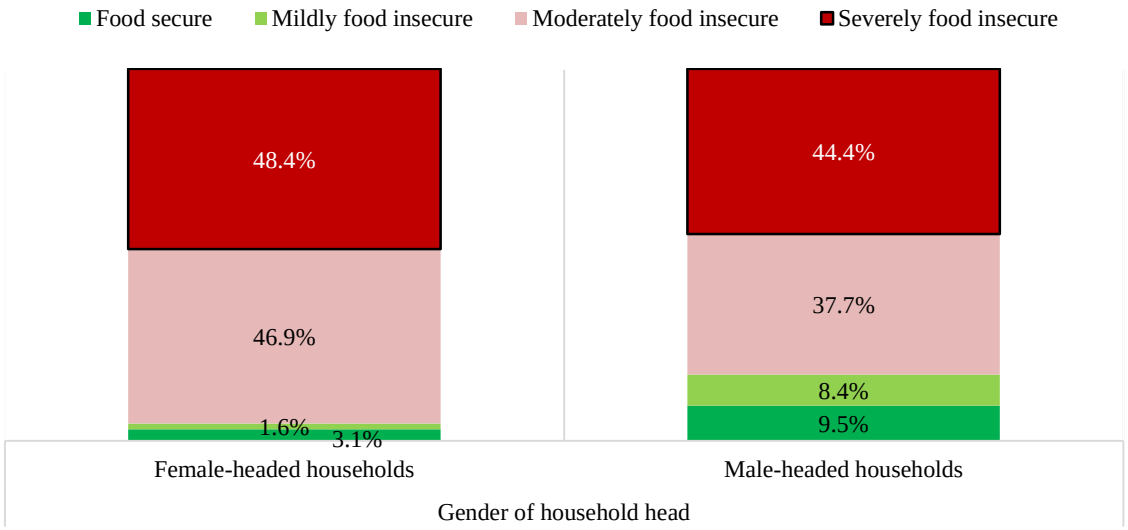


Figure 3. Food security categories per gender of the household heads.

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Livelihood diversification is vital in the area, with 30% of the respondents engaged in both agricultural and non-agricultural work, such as tailoring, salons, carpentry, and small trades. Off-farm activities help improve food security. A chi-square test (P=0.002) showed a strong link between HFIAS and off-farm participation. **Table 3** shows this association with Chi-square results.

Household food insecurity access scale (HFIAS)

Post-conflict data provided affirmative responses to different food insecurity situations and frequencies of occurrence against the nine HFIAS questions to assess household food insecurity access-related conditions, food insecurity access-related domains, HFIAS scores and HFIAS prevalence. The affirmative response of households for the nine HFIAS-related conditions is indicated under **Table 4**.

Table 3. Food security status and off-farm participation.

Food security	n	Off-farm participation	
		No	Yes
Food secure	36	16	20
Mildly food insecure	31	19	12
Moderately food insecure	165	125	40
Severely food insecure	190	136	54

Table 4. Affirmative responses for the HFIAS questionnaire.

HFIAS questions	Affirmative responses	Frequency of responses		
	n [a]	Yes	Rarely	Sometimes	Often
Worry about food	327	77.5	60.2	29.4	10.4
Unable to eat preferred food	347	82.2	55.6	32.9	11.5
Eat a limited variety of foods	348	82.5	49.4	35.9	14.7
Eat food that you did not want to eat	309	73.2	55.7	29.1	15.2
Eat a smaller portion of meal	322	76.3	56.5	28.0	15.5
Eat fewer meals in a day	297	70.4	60.0	18.5	21.5
No food of any kind to eat	133	31.5	72.2	25.6	2.2
Go to sleep at night hungry	67	15.9	76.1	20.9	3.0
Go a whole day and night without eating	75	17.8	77.3	20.0	2.7

[a]: *Number of responses against 422 respondents.*

HFIAS conditions are grouped into domains: question #1 reflects anxiety and uncertainty; questions #2–4 relate to food quality; and questions #5–9 address inadequate intake and physical effects. Approximately, 77% of the respondents experienced anxiety over food access, 90% reported poor food quality, and 83% faced insufficient intake during the post-conflict period. Figure 4 shows the share of households affected in each HFIAS domain (**Figure 4**).

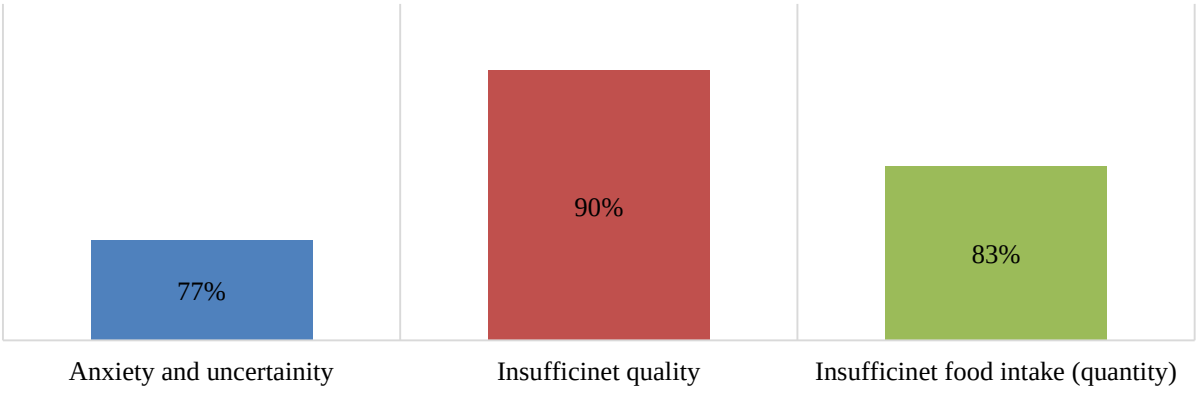


Figure 4. HFIAS-related domains. Source: survey data from authors.

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The mean HFIAS score was 8.16, with a minimum value of 0 and a maximum value of 25. The HFIAS prevalence, a categorical indicator of the food insecurity access scale, was computed for the study target groups according to the method recommended by (Coates *et al.*, 2007), as used in the FAO indicator guide.

HFIAS prevalence

As indicated in **Figure 5**, 45% of the respondent households were severely food insecure, 39% were moderately food insecure, 7% were mildly food insecure, and only 9% were food secure in the post-conflict reference period. This indicated that the vast majority of respondents experienced varying degrees of food insecurity.

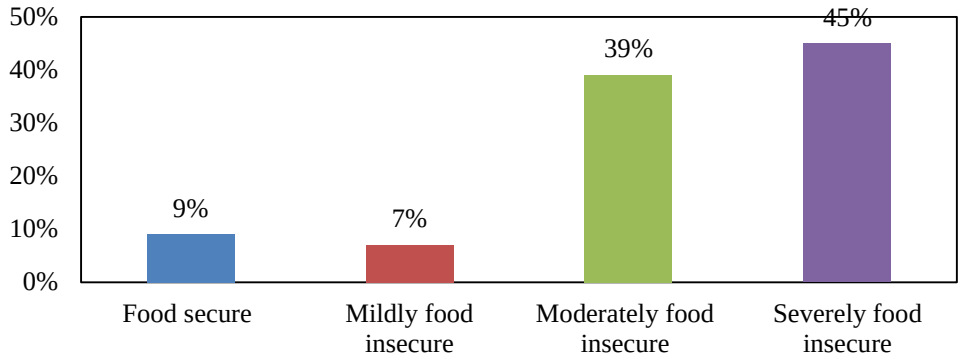


Figure 5. Prevalence of household food insecurity access scale. Source: survey data from authors.

Determinants of household food security

Logistic regression assumptions-low multicollinearity, linearity with odds ratios, and adequate sample size-were tested. The work ratio showed nonlinearity and was excluded. Ordered logistic regression was also applied using HFIAS prevalence, categorized into food secure, mildly, moderately, and severely food insecure, as the dependent variable. **Table 5** presents the regression results and key factors.

Table 5. Ordered logistic regression of the HFIAS prevalence categories during post-conflict reference.

Variables	Coefficient	Standard error	Z	P>|z|	Confidence interval - 95%	
					Lower bound	Upper bound
Age	0.011	0.011	1.00	0.319	-0.010	0.031
Sex	0.237	0.444	0.53	0.593	-0.634	1.108
Literacy	-0.041	0.227	-0.18	0.856	-0.486	0.403
Total livestock unit	-0.342	0.112	-2.98	0.003	-0.567	-0.117
Ecology	-0.410	0.174	-2.35	0.019	-0.752	-0.069
Distance to livestock market	-0.007	0.002	-3.78	0.001	-0.010	-0.003
Total land size	-0.222	0.056	-3.97	0.001	-0.332	-0.113
Wealth index	-1.822	0.890	-2.05	0.041	-3.567	-0.077
Off farm participation	-0.528	0.245	-2.15	0.031	-1.008	-0.047
Use of fertilizer	-0.487	0.226	-2.15	0.031	-0.930	-0.044
Family support	0.000	0.000	3.16	0.002	0.000	0.000
Aid	0.839	0.243	3.46	0.001	0.363	1.314
Family size	0.139	0.061	2.27	0.023	0.019	0.259
Exposure to drought	0.504	0.219	2.30	0.021	0.075	0.932
Marital status	-0.098	0.160	-0.62	0.538	-0.412	0.215
Amount of off farm income	-0.00003	0.000	-1.92	0.055	-0.0001	0.000
/cut1	-4.057	0.880			-5.782	-2.332
/cut2	-3.229	0.873			-4.940	-1.517
/cut3	-0.862	0.858			-2.545	0.820

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The ordered logistic regression model was significant (P=0.0001). Key factors affecting food security included livestock units, ecological variability, livestock market distance, land size, wealth index, off-farm participation, fertilizer use, family support, aid, family size, drought exposure, and off-farm income. Moreover, family support, aid, larger family size, and exposure to drought were associated with higher food insecurity.

Livestock ownership, measured by total livestock unit (TLU), positively affects household food security. As TLU increases, households are less likely to experience food insecurity, with livestock providing resources during and after conflict, when financial systems are disrupted. Furthermore, agroecology plays a key role in determining household food security in the study area, where a reduction in food insecurity is recorded from the highlands (Dega) to the midlands (Weyna Dega) and lowlands (Kolla). The distance to livestock markets significantly influences food security. The regression analysis indicates that longer distance is associated with increased household food security. Moreover, larger land sizes and the use of improved fertilizers improve food security. Larger farms provide more food, and the fertilizer use increases food security chances. The wealth index, based on household assets, reduces the likelihood of severe food insecurity. Greater assets are linked to improved food security. Also, off-farm participation diversifies livelihoods, reducing risks tied to agriculture and conflict. Increased off-farm income ultimately improves food security at P-value of less than 0.1.

Even though humanitarian aid and family support are crucial for household food security, their impact was negative in the study areas. Aid contributes to deteriorated household food security due to its negative association. Family size also influences food security, with larger households facing more food insecurity. Though more family members can contribute to production or off-farm labor, they also increase food demands. Exposure to drought, alongside conflict, has a negative association with household food security, which was also aggravated by the conflict. Drought and conflict contributed significantly to reduced food security in the region as well.

Coping strategies for food insecurity

The coping strategies related to consumption in the research area were identified using twelve questions (**Table 6**), grouped into four major strategies: dietary change, short-term measures to increase food availability, reducing household numbers, and rationing. Respondents indicated their household's experience and frequency of these strategies over a seven-day recall period. The mean Coping Strategy Index (CSI) was 22.4, with a range from 0 to 127. The CSI also varied across different food security categories and by the gender of the household head. Furthermore, the mean CSI for female-headed households (26.7) was higher than for male-headed households (21.6). A two-way sample t-test revealed a significant difference in the mean CSI, highlighting the greater vulnerability of female-headed households and their use of more negative coping strategies.

Table 6. Coping strategy questions.

Question code	Description of the questions
A.	Rely on less preferred and less expensive foods
B.	Borrow food, or rely on help from a friend or relative
C.	Purchase food on credit
D.	Gather food from garbage or collect from leftovers
E.	Do labor work for friends, relatives, neighbors in exchange for food
F.	Send household members to eat elsewhere
G.	Send household members to beg
H.	Limit portion size at mealtimes
I.	Restrict consumption by adults for children to eat
J.	Feed working members at the expense of nonworking members
K.	Reduce number of meals eaten in a day
L.	Skip entire days without eating

The coping strategies were classified into four broad categories by grouping related questions.

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These strategies include dietary change (question A), short-term strategies to increase the availability of food at the household level (questions B, C, D, and E), decreasing the number of people (questions F and G), and rationing strategies (questions H, I, J, K, and L).

Approximately, 89% of the respondents reported relying on less preferred, less expensive food during periods of food insecurity. Conflict forced many to consume food they would usually avoid in times of better harvests and market access. To cope, households sought help from relatives, bought food on credit, or worked for food. Only 5% mentioned eating leftovers. Initially, these strategies were common in South Wollo, but as the conflict deepened, aid delays, market breakdowns, and widespread hardship weakened credit, labor, and support options. Sending household members elsewhere to eat (12%) or beg (6%) was rare. Since the crisis affected nearly everyone, community support systems broke down, making this option largely not viable. Rationing was the second most used strategy after dietary change. It included reducing meal portions, prioritizing children, feeding only working members, or skipping meals altogether. **Figure 6** shows how often each strategy was used.

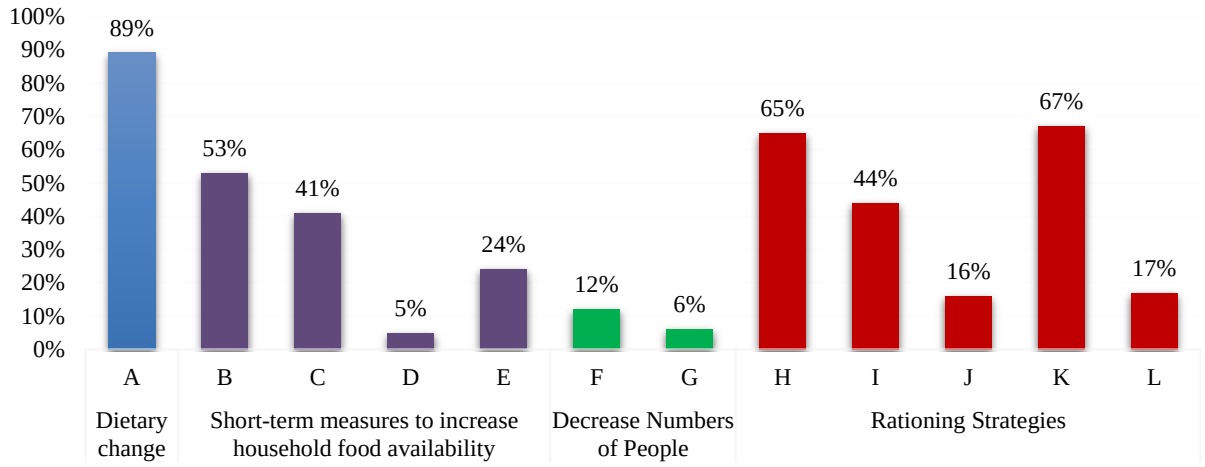


Figure 6: Coping strategies for food insecurity: affirmative responses. Source: survey data from authors.

Discussion

The northern Ethiopia conflict had complex and far-reaching consequences on household food security in the study area, which was already vulnerable to recurring drought, pests, and flooding. The conflict affects economic activities and essential services, impacting the lives and livelihoods of many. Food insecurity was widespread, cutting across gender and household types. While more male-headed households were food secure, the rates of severe food insecurity were nearly the same for both groups, indicating the widespread nature of the conflict.

The analysis identified several factors determining household food security. Access to livestock, land for cultivation, household assets, and alternative income sources also played key roles. Households with more livestock were better able to cushion the shock despite some losses due to looting and displacement. This reflects livestock's dual role as a source of food and income, consistent with other findings (Acosta *et al.*, 2024, Adesogan *et al.*, 2020, Getaneh *et al.*, 2022).

According to Akukwe, longer distances to livestock markets hinder livestock health and reduce market access, contributing to household food insecurity (Akukwe, 2020). However, longer travel distances to well-established markets result in better prices for livestock, though mobility

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challenges constrained travel to these markets during the conflict period. This might be a result of poorly developed local markets that do not offer competitive prices. Therefore, it was confirmed that the more livestock owners manage to travel long distances, the more they reach well-developed, structured markets that provide competitive prices for livestock.

Land size was also tied to better outcomes, echoing previous work that emphasizes land as a vital productive asset (Mekonnen *et al.*, 2021). Similarly, a higher wealth index-reflecting ownership of tools, durable, productive assets, and other goods-was linked to better food security, as seen in studies like those by Hjelm *et al*. (Hjelm *et al.*, 2016). Off-farm income also helped reduce vulnerability, reinforcing evidence from Endiris, and Kuwornu, (Endiris *et al.*, 2021, Kuwornu *et al.*, 2018).

However, the support systems that might have mitigated the challenges due to the conflict did not perform reliably. Delayed aid and interruptions in productive safety net programs left many households to manage on their own. Where support existed, it was often insufficient to offset the growing demand, particularly in large households. As noted by Akbar *et al*. and Mengistu *et al*., larger families face limited access to income and mobility, leading to more severe food security challenges. Surprisingly, the education level of the household head did not show a strong link to food security (Akbar *et al.*, 2023, Mengistu and Kassie, 2022). While education is often viewed as a protective factor, in the context of the study, physical access to resources and income proved more decisive than formal education or literacy level.

Coping responses followed a clear pattern: as food insecurity worsened, households increasingly resorted to short-term, often damaging strategies. Those in the most insecure categories reported the highest CSI scores, highlighting the severity of the food security situation.

Generally, these findings indicate that food insecurity in conflict-affected areas is influenced by a combination of environmental exposure, market conditions, asset ownership, and the reliability of humanitarian and family support mechanisms. Responses must consider these factors to rebuild food systems and household resilience effectively.

The study has several advantages and limitations. This study provides timely and context-specific evidence on household food security and coping strategies in a post-conflict setting, an area with limited prior research. It captures insights from a conflict-affected population using a representative sample. The study also contributes to the understanding of how households adapt in fragile contexts, offering valuable inputs for post-conflict recovery policies and food security interventions. However, this study has also encountered some limitations. The cross-sectional design restricts causal interpretation of the findings. The inaccessibility of some conflict-affected areas due to security concerns extended the data collection period, which may have impacted the study. Additionally, the findings are context-specific, and the interpretation and generalization of the study's findings to other contexts should be conducted with caution.

Conclusions

Households in the study area employed different coping strategies, ranging from dietary changes to rationing and seeking alternative means of acquiring food. As food insecurity deepened, more negative coping strategies were adopted, reflected in a higher CSI, especially among the severely food insecure compared to the other categories. In addition to inclusive peace dialogues to prevent future conflicts, it is recommended that reconstruction and rehabilitation efforts enhance the functionality of markets and social services, which play a key role in household food security. Rebuilding livelihoods is essential: livestock restocking, small business revival, and support for off-farm activities can help households recover and diversify income. Food security interventions must consider all components of the food system and recognize the distinct characteristics of the conflict. Humanitarian responses should be timely

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and coordinated, involving local community leaders and leveraging international influence, to ensure that fighting groups adhere to humanitarian principles and adapt to the dynamic conditions of conflict. Additionally, the link between market access and food security deserves further study for future programming.

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Authors' contributions

Jemal HM, Desalegn YA, and Temesgen TT designed the research; Jemal HM conducted it; Jemal HM, Desalegn YA, and Temesgen TT analyzed data; Jemal HM wrote the paper; Desalegn YA and Temesgen TT reviewed the paper, and Jemal HM had primary responsibility for the final content. All authors have read and approved the final manuscript.

Conflict of interests

The authors declared no conflicts of interest.

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