

Research Article

Food Security Among Urban Households: Status, Determinant Factors and Coping Strategies Evidence from Chiro Town, West Hararghe Zone, and Oromia Region, Ethiopia

Tadese Yayeh Adamu^{1,*} , Yabsira Abebe Tsehay² 

¹Department of Geography and Environmental Studies, College of Social Sciences and Humanities, Oda Bultum University, Chiro, Ethiopia

²Department of Natural Resource Management, College of Agriculture, Wolaita Sodo University, Wolaita Sodo, Ethiopia

Abstract

This study examined the food security status, determinant factors, and coping strategies among urban households in Chiro Town, West Hararghe Zone, Oromia Region, Ethiopia. It addressed a research gap by focusing on small and fast-growing towns, which are often overlooked in national studies. A total of 392 households were surveyed using a cross-sectional design and a mixed-methods approach. Food security status was measured using daily calorie intake, with 2,100 kilocalories per adult equivalent used as the cutoff point. The findings showed that 34.44% of the households were food insecure, with varying degrees of severity: 18.88% were marginally insecure, 7.65% were moderately insecure, and 7.91% were severely insecure. The results from binary logistic regression analysis identified key factors that influenced household food security. Households led by individuals with higher education levels, greater income, access to remittances, ownership of a house, and higher food spending were more likely to be food secure. On the other hand, female-headed households, those with larger family sizes, higher dependency ratios, and those relying on daily labor were more likely to face food insecurity. To cope with food shortages, many households used strategies such as reducing the number of meals, working as daily laborers, borrowing money, migrating for seasonal work, and selling livestock or household assets. Some households also relied on food aid, consumed less preferred foods, dropped children from school, or sent them to live with relatives. These coping strategies highlight the serious vulnerability of many urban households. The study concludes that food insecurity is still a major problem in Chiro Town. It recommends targeted support, especially for vulnerable groups, through education, job creation, remittance channels, and improved access to food and financial services. These findings can help guide policies in similar urban areas facing food insecurity challenges.

Keywords

Food Security, Urban Households, Determinants, Coping Strategies

*Corresponding author: tadesseyayeh@gmail.com (Tadese Yayeh Adamu)

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1. Introduction

Food security remained a pressing global issue that affected millions of individuals, particularly in developing nations. The Food and Agriculture Organization [57] defined food security as a state where all people, at all times, had physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and preferences for an active and healthy life. This definition underscored not only the availability of food but also its accessibility and long-term stability. Various global factors threatened food security, including climate change, conflicts, economic instability, and rapid urbanization [27, 72]. The number of individuals facing food insecurity increased significantly over recent years [53]. In 2021, approximately 828 million people were undernourished, marking a rise of about 46 million from 2020, which highlighted the urgent need for effective food security interventions [120]. The COVID-19 pandemic exacerbated these issues by disrupting food systems and increasing food prices [125]. Even as economies began to recover, food market inflation continued to pose serious challenges to food access [122].

In Africa, the food security crisis had become particularly acute, with about 20% of the population experiencing chronic undernourishment [7]. The disruption of agricultural production due to political instability, conflicts, and adverse climate conditions remained major contributing factors [105]. The World Food Programme [126] projected that approximately 300 million people in Africa could face food insecurity by 2025. Sub-Saharan Africa, in particular, exhibited some of the highest rates of food insecurity, mainly due to dependence on rain-fed agriculture and inadequate infrastructure [8]. According to FAO [57], more than 30% of the population in several East African countries, including Ethiopia, Kenya, and Somalia, faced food insecurity. Environmental factors such as droughts and floods continued to disrupt agricultural productivity in the region [88].

Ethiopia made considerable progress in improving food security over the past two decades by reducing both poverty and malnutrition. However, significant challenges persisted. Approximately 37% of children under five were stunted due to chronic under nutrition [66]. Conflicts in the northern regions significantly disrupted agricultural production and food supply chains [58]. In the Oromia Region of Ethiopia, food insecurity remained prevalent among many households, often due to limited market access and underdeveloped infrastructure [5, 114]. Rapid urbanization further increased food demand and created competition for limited resources [3, 99]. In Chiro Town, located in the West Harerge Zone, rising food prices and unemployment severely impacted residents' ability to secure adequate nutrition [80]. Many households adopted coping mechanisms such as reducing meal sizes and seeking assistance from community networks [9].

Despite numerous studies on food insecurity in Ethiopia and the broader East African region, a significant research gap

remained regarding urban households in smaller, rapidly growing towns like Chiro. Much of the existing research focused on rural settings or large urban centers [26]. For instance, Gebremariam *et al* [62] and Hirvonen *et al* [69] concentrated on food insecurity in rural areas where agricultural dependence and drought were predominant concerns. Similarly, Tschirley *et al* [119] and Minten *et al* [96] examined food security in large urban contexts, exploring the effects of urbanization and economic disparity. One notable gap in existing research, as identified by Mastrorillo *et al* [89], was the limited focus on small and mid-sized urban areas experiencing rapid expansion. Unlike larger cities that benefited from robust food distribution systems and governmental support, towns like Chiro lacked such infrastructure, rendering them more vulnerable to food insecurity. The absence of localized data on these towns hindered the formulation of balanced and representative policies. Additionally, the specific local factors that influenced food security in smaller towns, such as proximity to markets and the role of community support systems, were often underrepresented in literature. These towns operated in semi-isolated contexts, and local agricultural disruptions could significantly impact food availability and pricing.

Most existing studies also tended to explore either the causes of food insecurity or the coping strategies employed by households, but rarely both together in smaller urban settings. Macro-level contributors such as income inequality and climate change were frequently analyzed [1, 42, 61], while household-level coping mechanisms like meal size reduction and reliance on informal networks were examined in isolation [21, 68]. Kenea *et al* [77] emphasized the need for a comprehensive approach that considered both structural factors and household responses to better understand food insecurity in small towns. This dual lens provided valuable insights into how these communities could build more resilient food systems. Furthermore, generalizations at national or regional levels, as seen in the works of Tesfaye *et al* [116] and Berhanu *et al* [28], failed to capture the unique realities faced by towns like Chiro. Wossen *et al* [127] and Elias *et al* [47] pointed out that such broad analyses limited the ability to address specific local challenges effectively. To address this gap, the present study aimed to assess food security among urban households in Chiro Town, focusing on determinant factors and coping strategies. As Chiro underwent rapid urbanization, pressures from rising population density and shifting economic activities increased the risk of food insecurity. Unlike major cities, Chiro lacked the capacity to absorb external shocks such as price volatility or drought, and its internal challenges included inadequate market access. By investigating both the root causes of food insecurity and the strategies households used to cope, this research intended to generate localized insights that could guide practical policy solutions. The findings would not only support Chiro Town but also offer lessons applicable to

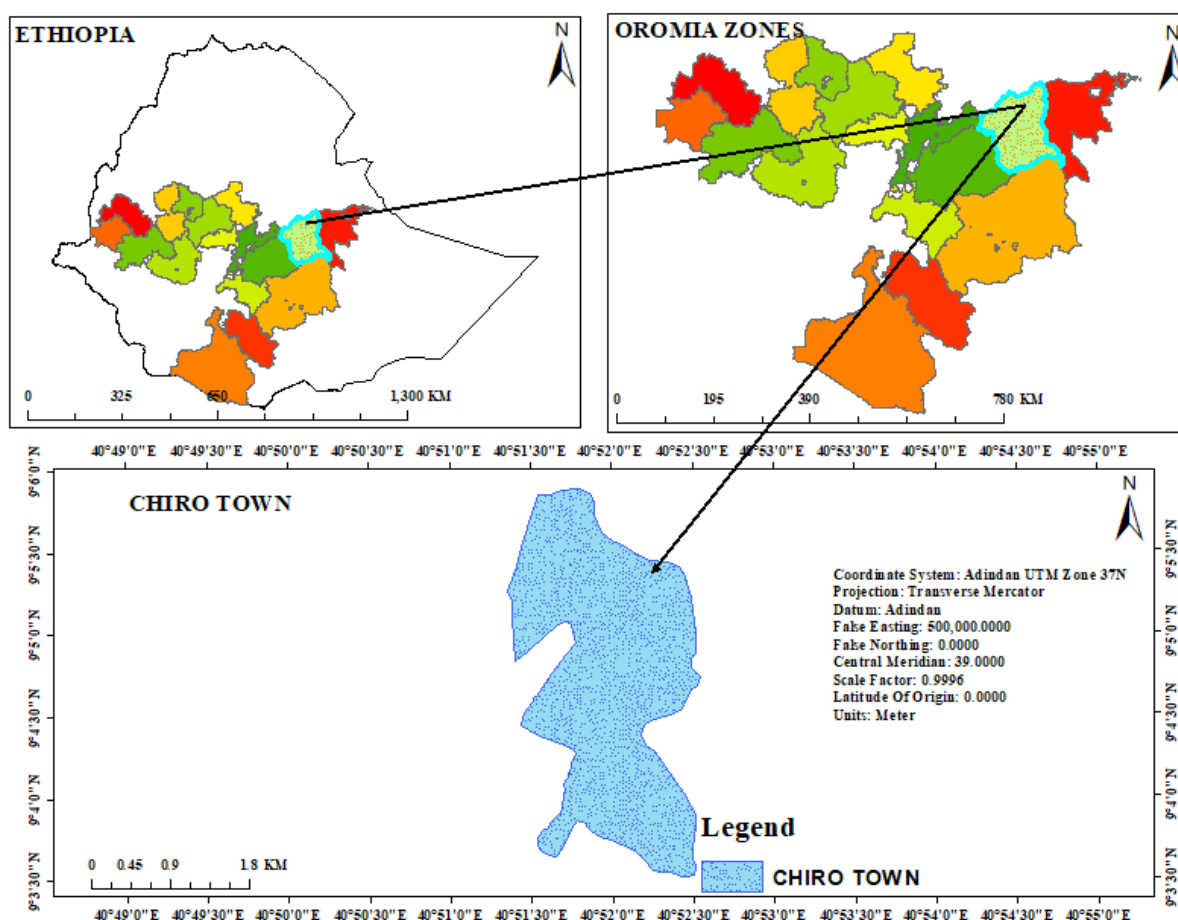
other smaller, fast-growing towns in similar contexts. Ultimately, the study sought to deepen understanding of urban food insecurity and inform targeted, sustainable interventions.

2. Materials and Methods

2.1. Description of the Study Area

Chiro Town, also known as Asebe Teferi, served as the capital of the West Hararghe Zone in the Oromia Region of Ethiopia. According to Figure 1, the study area was geographically located at approximately 9°05'N latitude and 40°52'E longitude [32]. It lay about 325 kilometers East of Addis Ababa along the main road that connected Addis Ababa to Harar, which made it a vital hub for trade and transportation in the region [50]. Positioned at an altitude of around 1,800 meters (5,905 feet) above sea level, Chiro experienced a temperate climate with cooler night temperatures compared to lower-altitude towns, contributing to a comfortable living environment [124]. The climate was characterized by distinct rainy and dry seasons, with the rainy period spanning from

June to September. During this time, the area received significant rainfall that influenced daily life and infrastructure, while average temperatures ranged from 10 °C to 25 °C. Socio-economically, Chiro faced challenges such as widespread poverty and income inequality. The economy primarily depended on agriculture, especially the cultivation of chat and coffee, which played a significant role in local livelihoods. However, many residents struggled to access basic services, education, and employment opportunities, resulting in limited economic mobility [4]. Demographically, as of July 2023, the town had an estimated population of 73,258, with 38,416 males and 34,842 females, reflecting a relatively balanced gender distribution [33, 48]. The population included both urban and semi-rural communities [98], with many engaged in farming and small-scale trade. Educational attainment varied significantly [51, 97], with 17.7% of residents having no formal education, while others held diplomas or degrees, presenting both opportunities and challenges for local development [51, 97, 98]. These conditions collectively influenced the town's socio-economic growth and quality of life.



Source: researchers own preparation, 2025

Figure 1. Map of the study area.

2.2. Research Methods

2.2.1. Research Design

A cross-sectional research design was employed to collect data at a single point in time from a wide range of participants. This approach was useful for examining relationships and identifying patterns among variables within the population, particularly with regard to food security and socio-economic conditions. Although the design provided valuable insights into associations, it could not establish cause-and-effect relationships due to its limitations in capturing temporal dynamics [20, 85].

2.2.2. Research Approach

The researchers adopted a mixed-method approach, combining both quantitative and qualitative data collection techniques. This approach enabled a comparative analysis between numerical data and contextual insights. Quantitative findings were supplemented and validated with qualitative data, ensuring a more comprehensive understanding of the research problem. This strategy strengthened the study's reliability and offered a nuanced explanation of the food security challenges in Chiro Town [74].

2.2.3. Sampling Techniques and Sample Size Determination

1) Sampling Techniques

In the first stage, Chiro Town, the capital of the West Hararge Zone, was purposively selected due to its significance in supporting the region's urban food security and poverty reduction initiatives. In the second stage, all six urban kebeles: Ifa Najabas, Burka Chiro, Chafe Arara, Ifa Misoma, Mada Bekumsa, and Burka Wadeyti were included, given the widespread prevalence of food insecurity issues across these areas.

2) Sample Size Determination

The sample size was determined using Yamane's formula [128], which is suitable for survey-based research aiming for a 95% confidence level and 5% margin of error. With a total of 20,352 households in the town, the required sample size was calculated as follows;

$$n = \frac{N}{1+N(e^2)} = \frac{20352}{1+20352(0.05^2)} = 392.28 \approx 392 \quad (1)$$

Where,

n = Sample size for the study, which is 392,

N = Total population size of 20,352 individuals,

e = Margin of error of 5%, commonly accepted for surveys aiming for a confidence level of 95%.

The total number of households for each kebele was as follows: Ifa Najabas (3,625), Burka Chiro (3,763), Chafe Arara (2,304), Ifa Misoma (3,537), Mada Bekumsa (2,985), and Burka Wadeyti (4,138) (Table 1). Finally, by applying the

proportional sample size determination formula shown below, the research was determined the final sample size for each kebele, as presented in Table 1.

$$n = \frac{N_1}{N} * n_1 \quad (2)$$

Where,

1) n = Sample size for each kebele.

2) N_1 = Total number of households in a specific kebele.

3) N = Total number of households across all kebeles combined.

4) n_1 = Overall sample size that the researcher plans to use for the entire study

Table 1. Proportional Sample size of the study kebeles.

Kebele Name	IN	BC	CA	IM	MB	BW
Total Households	3,625	3,763	2,304	3,537	2,985	4,138
Sample size	70	72	44	68	57	81
Total	392					

Note: IN = Ifa Najabas, BC= Burka Chiro, CA= Chafe Arara, IM = Ifa Misoma, MB=Mada Bekumsa, BW= Burka Wadeyti. Source: own computation (2025) and Respective Kebele offices

2.2.4. Data Sources

To achieve the study's objectives, both primary and secondary data sources were utilized. Primary data were gathered through household surveys, key informant interviews, and focus group discussions focusing on demographics (sex, age, education, marital status, family size) and socio-economic variables (occupation, income, remittance, food price, housing ownership, and access to credit services). Institutional data were also collected on food supply chains, savings programs, and coping strategies for food insecurity. Secondary data came from published and unpublished materials, including reports from the Chiro Town administration, finance and development offices, and relevant NGOs.

2.2.5. Tools of Data Collection

1) Household Survey Questionnaire

The questionnaire served as the principal data collection tool and included both open-ended and closed-ended items. It was designed to collect information on household demographics, food security status, income, housing, and coping mechanisms such as meal skipping and credit access. The questionnaire's was prepared in English, translated into Afan Oromo, and pre-tested for validity. Enumerators were trained

to ensure ethical standards and data consistency.

2) Key Informant Interviews

Twelve key informants were purposively selected based on their knowledge of local food security conditions. These included officials from kebele administrations, the Chiro town office, finance and economic development offices, and representatives from NGOs. Semi-structured interviews were conducted to gather detailed insights on the town's food security challenges and policy responses.

3) Focus Group Discussions

Two focus group discussions were conducted, each consisting of six purposively selected participants from various community segments, including kebele elders, Edir leaders, and religious figures. These discussions facilitated deeper understanding of the community's perspectives on food insecurity, coping mechanisms, and proposed interventions.

2.2.6. Method of Data Analysis

To achieve the objective, the researcher used both quantitative and qualitative methods for data analysis. Descriptive and inferential statistics served as the main quantitative tools for analyzing the data. The researcher employed SPSS software version 26 and Microsoft Excel to analyze the quantitative data. First, the quantitative data were coded and entered into SPSS for further calculations. Qualitative data from open-ended questionnaires, key informant interviews, and focus group discussions were analyzed by triangulating them with the quantitative data.

The researcher assessed urban household food security status in the study area using the daily calorie intake approach, based on the FAO [56] food security threshold. Data on food quantities consumed over the past week were gathered through a survey and converted to kilocalories using the Ethiopian Food Composition Table [49]. The energy requirements, adjusted by age and sex, were calculated by converting all household members to adult equivalents based on standard conversion tables [55]. Households were classified as food secure or insecure by comparing their average daily calorie intake to the minimum threshold of 2100 kcal per adult equivalent, which equated to about 225 kg of grain per person per year, as established by the Ethiopian government. The estimated calorie content was calculated using a nutrient composition table of commonly consumed Ethiopian foods. Weekly per capita calorie intake was determined by dividing total household calorie intake by the number of adult equivalents, and daily per capita intake was found by dividing this weekly total by seven [19]. According to Aragie and Genan [17], adult equivalents were calculated using a specific formula.

$$AE = (A + 0.5C)^{0.9} \quad (3)$$

Where,

AEU= Adult equivalent, A=Number of adults above the age of 15 years, C=Number of children below the age of 15

years in a household.

$$\text{Calorie Intake per AE per Day} = \frac{\text{Total Household Kcal Intake}}{\text{AE} \times \text{Number of Days}} \quad (4)$$

To identify the factors influencing urban household food security in the study area, the researcher applied a binary logistic regression model, as household food security, measured in dietary energy (kcal), was treated as a binary variable.

a) Model Specification

In binary logistic regression, the formula expresses the relationship between a binary dependent variable (food security status) and 12 independent variables.

Binary Logistic Regression Model

1. Formula

Logistic Model Equation:

$$P(Y = 1 | X) = \frac{e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}}{1 + e^{(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)}}$$

Where:

- 1) p = probability of being food secure (coded as 1).
- 2) β_0 = intercept of the model.
- 3) $\beta_1, \beta_2, \dots, \beta_{12}$ = coefficients for each independent variable

2. Logit Transformation:

The model can be written in terms of the logit function, which is the natural logarithm of the odds of Y:

$$\text{logit } P(Y = 1 | X) = \ln \frac{P(Y=1|X)}{1-P(Y=1|X)} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$

$$Y = \beta_0 + \beta_1 \text{sex} + \beta_2 \text{age} + \beta_3 \text{M_stat} + \beta_4 \text{Edu_Stat} + \beta_5 \text{F_size} + \beta_6 \text{D_ratio} + \beta_7 \text{H_income} + \beta_8 \text{O_stat} + \beta_9 \text{H_own} + \beta_{10} \text{F_exp} + \beta_{11} \text{Ac_remi} + \beta_{12} \text{Ac_credit}$$

3. Interpretation of Coefficients:

- 1) Intercept (β_0): Represents the log-odds of the outcome when all X-values are zero.
- 2) Coefficients (β_i): The change in log-odds of Y for a one-unit increase in X_i , holding other predictors constant.
- 3) Y = observed food security status

Taking the exponent of β_i yields the odds ratio, which reflects how the odds of the outcome variable (Y) change with a one-unit increase in the predictor variable (X_i). Prior to analyzing the model, an assessment of model fit and the assumptions underlying binary logistic regression was performed.

b) Variables Specification

The study hypothesized that twelve explanatory variables were key determinants of household food insecurity in Chiro Town. These independent variables included sex, age, marital status (M-stat), education level (Edu-stat), family size (F-size), dependency ratio (D-ratio), household income (H_income), occupational status (O-stat), housing ownership

(H-own), food expenditure (F-exp), access to remittances (Ac-remi), and access to credit services (Ac-credit) (Table 2). These variables were selected based on their theoretical and

empirical relevance to household food security and were expected to influence the likelihood of a household being classified as food secure (coded 1) or insecure (coded 0).

Table 2. Variable name, description, Expected sign and citation.

Variable Name	Variable Description	Expected Sign	Sources
Sex	Dummy (0 = Female, 1= Male)	±	[15, 16, 30, 31, 101]
Age	Continuous	+	[45, 103]
Marital status	Dummy (0 = Single, 1 = Married)	±	[38, 79]
Education	Categorical (0= Illiterates, 1= Read & Write, 2=Secondary Education, 3=Diploma and above)	+	[40, 41, 82, 104]
Family size	Continuous	–	[60, 83, 84, 108]
Dependency ratio	Continuous	–	[14, 24, 25, 102]
Household income	Continuous	+	[39, 92, 93]
Occupational status	Categorical (0= Paid work, 1= daily labor, 2= merchant, 3= Small scale, 4= Pension)	±	[21, 22, 37, 59]
Housing ownership	Dummy (0 = Rental house 1 = Own house)	±	[86, 106-111]
Food expenditure	Continuous	+	[71, 100, 107]
Access to remittance	Dummy (0 = no 1 = yes)	+	[11, 12, 18, 75]
Access to credit service	Dummy (0 = no 1 = yes)	+	[35, 52]

Note: Dependency ratio refers to the number of dependents (children < 15 years plus old peoples > 65) per economically active (between 15 to 65 years) members of the family.

Source: Own preparation from different literature, 2025

To address exploring coping strategies used by urban households in response to food insecurity, the researcher collected data on a range of household coping mechanisms. These strategies reflected actions taken by households to reduce the impact of food shortages and to manage periods of insufficient food supply [2]. Based on previous literature (Table 3), the researcher identified 14 commonly employed coping strategies that households had adopted during times of food insecurity [87]. Data on the adoption of these coping mechanisms were gathered from sampled respondents, and the strategies were ranked according to their frequency of use and relative importance during episodes of food scarcity.

Table 3. Major coping strategies used by sampled households.

Major coping strategies
Reduction of meal
Work as a daily labourer
Borrowing money to purchase food

Major coping strategies

Migrate to work (seasonal)
 Sell of livestock
 Sell of household assets
 Sell of fire wood, charcoal, wild grass as a forage
 Receive food aid
 Eating less preferred food
 Dropping children from school
 Begging
 Borrowing grain
 Sending children to relatives
 Become daily labor
 Other

Source: Own preparation from different literature, 2025

3. Result and Discussion

3.1. Socio-Economic and Demographic Characteristics of Respondents and Their Association with Food Security Status

The findings revealed that sex of the household head was significantly associated with food insecurity, with female-headed households experiencing a higher rate (50%) compared to male-headed ones (25.8%) ($p = 0.002$) (Table 4). This disparity supports prior research by Pruitt *et al* [65, 101], which highlighted systemic gender inequalities in access to food, land, and productive resources, placing women at a disadvantage in urban Ethiopian contexts. This gender-based vulnerability aligns with broader global findings on food insecurity disparities [46].

Similarly, Abebe and Taffese [6] emphasized that gender-based disparities in access to agricultural resources significantly undermine food security outcomes for female-headed households in Ethiopia. The age of household heads showed a significant relationship with food security status. Food-insecure household heads had a higher average age (44.9 years) compared to their food-secure counterparts (40.7 years) ($p = 0.002$) (Table 4), suggesting that aging may limit income-earning potential and physical capability, thereby exacerbating vulnerability to food insecurity, a finding corroborated by Balde *et al* [23]. Marital status was also significantly associated with food security. Married households were more food insecure (42.3%) than single or unmarried ones (12%) ($p = 0.001$) (Table 4), likely due to the greater family sizes and associated economic burdens common in married households, as noted by Mekonnen and Desta [90]. Educational attainment demonstrated a strong negative correlation with food insecurity. Only 12% of households headed by individuals with a diploma or higher were food insecure, compared to 72.5% of illiterate households ($p < 0.001$) (Table 4). This supports the view that education enhances food security by improving access to employment and increasing household income and planning capacity [113]. Moreover, family size and dependency ratio were both significantly higher among food-insecure households. The mean family size among food-insecure households was 5.89, and

their dependency ratio averaged 0.91, compared to 4.98 and 0.64 respectively among food-secure households ($p < 0.001$ for both) (Table 4). This finding aligns with Worku *et al* [123], who reported that larger families with more dependents tend to face greater challenges in meeting their dietary needs due to higher consumption requirements. Household income was another critical factor, as food-secure households had a significantly higher mean monthly income (3,501 ETB) than food-insecure ones (2,417 ETB) ($p < 0.001$) (Table 4). This confirms earlier studies by Yami and Bekele [129], indicating that higher income directly contributes to improved food access and dietary diversity. In terms of occupational status, households with formal employment were more food secure (84.6%) compared to daily laborers (41.4%) ($P < 0.001$) (Table 4), underlining that informal employment, typically low-wage and unstable, heightens food insecurity [59]. Surprisingly, housing ownership was also significantly associated with food insecurity, as homeowners showed slightly higher food insecurity rates than renters ($p = 0.023$) (Table 4). This counterintuitive result may reflect that homeownership does not necessarily translate to higher disposable income [76], particularly when households allocate large portions of their income to housing-related costs, as discussed by Kassa and Mohammed [73]. The analysis also found that food expenditure was significantly associated with food security status. Food-secure households spent more on food (mean = 1,350 ETB) than food-insecure ones (mean = 899 ETB) ($p < 0.001$) (Table 4), reinforcing the argument that higher food spending reflects better access and nutritional adequacy [64]. Access to remittances emerged as another protective factor; households receiving remittances were significantly more likely to be food secure ($p < 0.001$) (Table 4). External financial support, such as remittances, provides a cushion during times of hardship and enhances purchasing power, as shown by Ali and Hassan [10]. On the other hand, access to credit was unexpectedly associated with higher food insecurity ($p = 0.044$) (Table 4). This may imply that loans were primarily used for immediate consumption rather than for income-generating investments, or that repayment obligations placed additional financial strain on already vulnerable households. This interpretation is consistent with findings by Chen and Zhao [36], who observed similar patterns in other developing contexts.

Table 4. Socio-economic and demographic characteristics of respondents and their association with food security status ($n = 392$).

Variable	Category / Type	Food Secure (%)	Food Insecure (%)	Test Used	Test Value	p-value
Sex	Male	74.2%	25.8%	χ^2 -test	$\chi^2 = 9.56$	0.002
	Female	50.0%	50.0%			
Age (years)	Continuous	Mean = 40.7	Mean = 44.9	t-test	$t = -3.11$	0.002
Marital Status	Married	57.7%	42.3%	χ^2 -test	$\chi^2 = 10.86$	0.001
	Single / Other	88.0%	12.0%			

Variable	Category / Type	Food Secure (%)	Food Insecure (%)	Test Used	Test Value	p-value
Education Level	Illiterate	27.5%	72.5%	χ^2 -test	$\chi^2 = 21.44$	0.000
	Diploma & Above	88.0%	12.0%			
Family Size	Continuous	Mean = 4.98	Mean = 5.89	t-test	t = -4.27	0.000
Dependency Ratio	Continuous	Mean = 0.64	Mean = 0.91	t-test	t = -6.15	0.000
Household Income (ETB)	Continuous	Mean = 3,501	Mean = 2,417	t-test	t = 8.04	0.000
Occupation	Formal (Paid)	84.6%	15.4%	χ^2 -test	$\chi^2 = 22.08$	0.000
	Daily Labor	41.4%	58.6%			
Housing Ownership	Own House	60.5%	39.5%	χ^2 -test	$\chi^2 = 5.18$	0.023
Food Expenditure (ETB)	Continuous	Mean = 1,350	Mean = 899	t-test	t = 8.61	0.000
Access to Remittance	Yes	81.2%	18.8%	χ^2 -test	$\chi^2 = 12.85$	0.000
Access to Credit	Yes	56.9%	43.1%	χ^2 -test	$\chi^2 = 4.05$	0.044

Source: Own computation from household survey data, 2025

3.2. Food Security Status and Calorie Consumption of Households

The food security status of households was assessed based on daily calorie intake. As shown in Table 5, out of 392 surveyed households, 257 (65.56%) were classified as food secure, while 135 (34.44%) were food insecure. This finding indicated that a considerable proportion of urban households met the minimum daily energy requirement, which is consistent with the national food security goal [58]. However, the remaining one-third of the population faced food insecurity, suggesting persistent livelihood challenges in the study area. These results aligned with the findings of Teshome *et al* [116, 117], who reported that nearly 35% of rural households in northern Ethiopia were food insecure due to constraints in agricultural productivity, limited access to markets, and climate-related shocks. Moreover, food insecurity was more prevalent among households with smaller landholdings, limited irrigation access, and high dependency ratios [29].

Table 5. Food security status of sample households.

Food Security Status	Frequency (N)	Percentage (%)
Food Secure	257	65.56%
Food Insecure	135	34.44%
Total	392	100%

Source: Own computation from household survey, 2025

Table 6 presents the descriptive statistics of daily calorie

consumption among food secure and food insecure groups. Food secure households had a minimum daily intake of 2,109 kcal and a maximum of 10,637 kcal, with a mean consumption of 3,442.8 kcal (SD = 1,198.36). In contrast, food insecure households consumed between 501 and 2,027 kcal, with an average intake of 1,392.6 kcal (SD = 471.3). The overall mean daily calorie intake for all households was 2,417.4 kcal (SD = 1,532.6). These results revealed a stark contrast in dietary energy intake between the two groups. On average, food secure households consumed more than double the calories consumed by food insecure ones. This disparity suggested unequal access to food resources, which could be attributed to variations in income levels, agricultural production, and household size. According to WFP [122], adequate calorie consumption is a critical indicator of food security, and values below the recommended threshold of 2,100 kcal per adult per day are considered insufficient for maintaining a healthy life. The relatively high standard deviation among food secure households implied wide variability in food access, possibly linked to differences in economic activities or livelihood diversification. These findings highlight the need for targeted food security interventions, including support for vulnerable groups and the promotion of income-generating opportunities [73].

Table 6. Calorie consumption characteristics of sample household's.

Group	N	Min (kcal)	Max (kcal)	Mean (kcal)	SD
Food Secure	257	2,109	10,637	3,442.8	1,198.36
Food Insecure	135	501	2,027	1,392.6	471.3

Group	N	Min (kcal)	Max (kcal)	Mean (kcal)	SD
Insecure					
Total	392	501	10,637	2,417.4	1,532.6

Source: Own computation from household survey, 2025

3.3. Level of Food Security Among Households

The level of food security among urban households was analyzed based on per capita daily calorie intake, with 2,100 kcal per adult per day used as the minimum nutritional threshold [54]. Households consuming more than this threshold were categorized as food secure, while those consuming less were further classified into marginal, moderate, or severe food insecurity levels based on the depth of calorie shortfall, as proposed by Devereux [44]. According to the findings, 257 households (65.56%) were food secure, successfully meeting or exceeding the minimum energy requirement. However, 135 households (34.44%) were food insecure and exhibited varying levels of severity. 74 households (18.88%) were marginally food insecure, consuming

between 1,800 and 2,100 kcal/day. 30 households (7.65%) were moderately food insecure, consuming between 1,500 and 1,800 kcal/day. 31 households (7.91%) were severely food insecure, consuming less than 1,500 kcal/day (Table 7). These results indicate that nearly one-third of the urban population continued to face challenges in securing sufficient food. The presence of 7.91% severely food insecure households suggests critical vulnerability, likely linked to limited access to productive resources, unstable incomes, and climate-related stresses such as irregular rainfall or drought. This pattern aligns with recent findings by Gebremedhin *et al* [63], who reported that structural issues such as fragmented landholdings, weak market integration, and inadequate rural infrastructure significantly contribute to persistent food insecurity in Ethiopia's highland regions. Furthermore, the high proportion of marginal and moderate food insecurity suggests that many households are at risk of sliding into more severe conditions without timely interventions. Thus, targeted policies are required to address both chronic and transitory food insecurity. Interventions may include expanding access to irrigation, improving agricultural extension services, and supporting urban household income diversification, as emphasized by the International Food Policy Research Institute [73].

Table 7. Level of Food Insecurity among Households.

Food Security Status	Calorie Intake (kcal/day)	Number of Households	% of Total (N=392)	% of Food Insecure (N=135)
Food Secure	> 2,100	257	65.56%	-
Marginally Food Insecure	1,800-2,100	74	18.88%	54.81%
Moderately Food Insecure	1,500-1,800	30	7.65%	22.22%
Severely Food Insecure	< 1,500	31	7.91%	22.96%
Total	-	392	100%	100%

Source: Own computation from household survey, 2025

3.4. Determinants of Household Food Insecurity in Chiro Town

3.4.1. Assumption Tests for Binary Logistic Regression

Prior to executing the binary logistic regression analysis, several critical assumptions were assessed to ensure the appropriateness and validity of the model. First, the dependent variable must be binary. In this study, household food security

status was operationalized as a dichotomous variable, coded as 1 for food secure and 0 for food insecure, thereby satisfying this essential requirement [70]. Second, the assumption of independence of observations was considered. Since the data were collected from distinct households without repeated measures, it was reasonable to assume that individual observations were independent [91]. Third, the model assumes the absence of Multicollinearity among predictor variables. This was examined using the Variance Inflation Factor (VIF), with all predictors registering values well below the conservative cutoff of 5. These results indicate that Multicollinearity was

not a concern [94]. Fourth, the assumption of a linear relationship between continuous independent variables (such as age, family size, and dependency ratio, income, and food expenditure) and the logit of the dependent variable was tested using the Box-Tidwell transformation. None of the interaction terms were statistically significant, suggesting that

the assumption of linearity in the logit was met [112]. Finally, model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test, which yielded a p-value of 0.46. This result indicates that the model adequately fits the data [70]. Together, these diagnostic checks affirmed the suitability of the data for binary logistic regression analysis.

3.4.2. Binary Logistic Regression Results

Table 8. Binary logistic regression results.

Variable	B	S. E.	Wald	p-value	Exp (B)
Constant (Intercept)	-1.25	0.50	6.25	0.012*	0.29
Sex (1=Male)	0.63	0.29	4.73	0.030*	1.88
Age	0.02	0.01	3.84	0.050*	1.02
Marital Status (1=Married)	-0.41	0.33	1.55	0.213	0.66
Education (Ref: Illiterate)					
- Read & Write	0.54	0.34	2.55	0.110	1.72
- Secondary	0.97	0.35	7.70	0.006**	2.64
- Diploma and above	1.51	0.45	11.23	0.001**	4.53
Family Size	-0.31	0.08	15.02	0.000***	0.73
Dependency Ratio	-0.46	0.19	5.86	0.015*	0.63
Household Income	0.0004	0.0001	10.20	0.001**	1.0004
Occupational Status (Ref: Paid Work)					
- Daily Labor	-0.75	0.41	3.34	0.068	0.47
- Merchant	0.65	0.35	3.46	0.063	1.91
- Small-scale	0.44	0.42	1.11	0.292	1.55
- Pension	0.12	0.48	0.06	0.803	1.13
Housing Ownership (1=Own)	0.81	0.29	7.88	0.005**	2.25
Food Expenditure	0.007	0.002	12.83	0.000***	1.007
Access to Remittance (1=Yes)	0.92	0.38	5.86	0.015*	2.51
Access to Credit (1=Yes)	0.66	0.33	3.93	0.047*	1.93

Significance Levels: $p < 0.05 \rightarrow *$ (significant), $p < 0.01 \rightarrow **$ (very significant), $p < 0.001 \rightarrow ***$ (highly significant)

Model Summary Statistics: Model Chi-square = 89.76, $df = 17$, $p < 0.001$, Nagelkerke $R^2 = 0.42$, Hosmer-Lemeshow Test: $\chi^2 (8) = 6.93$, $p = 0.46$, Overall Classification Accuracy = 81.4%

Source: Own computation from household survey, 2025.

3.4.3. Interpretation of Findings

According to Table 8; the results of the binary logistic regression revealed several key predictors of household food security in Chiro Town. The gender of the household head was a significant determinant ($p = 0.030$) (Table 8), with male-headed households being 1.88 times more likely to be

food secure than female-headed ones, corroborating earlier studies that link gender with resource access and decision-making power [16, 30]. Age had a marginally significant positive effect ($p = 0.050$) (Table 8), suggesting that older household heads might benefit from experience and social networks that enhance food access [103].

Although marital status had a negative coefficient [81], its effect was not statistically significant ($p = 0.213$) (Table 8),

indicating that being married did not significantly influence household food security, contrasting with findings from Kim et al [78]. Education level was a strong and significant predictor. Households whose heads had attained secondary education or above were significantly more likely to be food secure ($p < 0.01$) (Table 8), reflecting the role of education in improving income opportunities and food-related decision-making [40, 41, 104].

Both family size and dependency ratio negatively impacted food security ($p < 0.05$) (Table 8), implying that larger households and those with more dependents were at greater risk of food insecurity, likely due to increased consumption needs relative to income-generating capacity [24, 25, 43, 83]. Household income, while having a small coefficient, was statistically significant ($p = 0.001$) (Table 8), reinforcing the idea that even marginal increases in income can enhance food access [92].

Occupational status had mixed results. Households relying on daily labor had lower odds of being food secure, while those involved in trade (merchants) were somewhat better off, though these were only marginally significant ($p \approx 0.06$) (Table 8). This reflects the precarious nature of informal employment [21]. Homeownership significantly increased the likelihood of food security ($p = 0.005$) (Table 8), potentially due to reduced expenditure on rent and greater financial stability [86].

Food expenditure showed a highly significant positive association with food security ($p < 0.001$) (Table 8), suggesting that households allocating more resources to food were more likely to meet their nutritional needs [109]. Access to remittances and credit services were also significant predictors ($p < 0.05$) (Table 8), underscoring the importance of external financial support in cushioning households against food insecurity [11, 34].

3.5. Coping Strategies Adopted by Households in Chiro Town

Table 9. Major Coping Strategies Employed by Sampled Households ($N = 392$).

Coping Strategy	Frequency (n)	Rank Order
Reduction in number of meals per day	348	1
Working as a daily labourer	295	2
Borrowing money to purchase food	267	3
Migrating for seasonal work	213	4
Selling livestock	189	5
Selling household assets	174	6
Selling firewood, charcoal, wild grass	163	7
Receiving food aid	152	8
Eating less preferred/less expensive food	146	9
Dropping children from school	108	10
Begging	94	11
Borrowing grain	81	12
Sending children to relatives	64	13
Engaging children/self in daily labor	52	14
Other (e.g., help from neighbors or churches)	38	15

Source: Own computation from household survey, 2025.

The results from the household survey conducted in Chiro Town revealed a wide spectrum of coping strategies that urban households adopted in response to food insecurity (Table 9). These strategies, which ranged from dietary adjustments to asset depletion and labor migration, reflected both immediate survival tactics and longer-term livelihood adaptations. The most preva-

lent strategy reported was the reduction in the number of meals per day, employed by 88.8% of households (Table 9). This finding is consistent with the work of Minas et al [95], who noted that meal reduction is a commonly used first-line coping mechanism in urban food-insecure settings. While it offers short-term relief, this practice may lead to adverse nutritional

outcomes, particularly for children and the elderly.

The second most frequently reported strategy was engaging in daily labor, cited by 75.3% of respondents (Table 9). Informal, low-wage work provides quick cash but lacks stability and sufficient earnings to ensure consistent food access, thereby underscoring the vulnerability of these households [13]. In addition, borrowing money to purchase food was reported by 68.1% of households, making it the third most common coping strategy (Table 9). This reliance on informal credit reflects both the scarcity of liquid income and the short-term nature of financial relief, with potential long-term risks of debt accumulation [67]. Seasonal migration for work was the fourth most common strategy, used by 54.3% of respondents (Table 9). This practice often arises in areas with limited local employment opportunities and can lead to family separation and unstable support systems, as highlighted by Tadesse and Gebresilassie [115]. Closely related were strategies such as selling livestock and household assets, reported by 48.2% and 44.4% of households, respectively (Table 9). These asset-based coping mechanisms may provide immediate income, but they diminish a household's future income-generating potential and exacerbate vulnerability over time [64].

Households also resorted to selling firewood, charcoal, and wild grass, a strategy reported by 41.6% of respondents (Table 9). While this approach generates income, it often involves the unsustainable exploitation of local natural resources and contributes to environmental degradation [13, 95]. Receiving food aid was another strategy, reported by 38.8% of households. Although food aid plays a critical safety net role, its relatively lower frequency suggests either limited access to aid programs or reliance on other coping strategies [95].

Some households (37.2%) (Table 9) adopted consumption of less preferred or cheaper food, reflecting a shift in diet that, while cost-effective, may compromise nutritional quality [121]. As indicated in Table 9 and corroborated by previous research [118], 27.6% of households reported withdrawing children from school as a coping strategy in response to food insecurity. This strategy, though less frequently reported, carries severe long-term consequences by undermining children's education and future economic potential [115].

Among the least common yet highly revealing strategies were begging (24%), borrowing grain (20.7%), sending children to live with relatives (16.3%), and engaging children in labor (13.3%) (Table 9). These practices underscore the extreme vulnerability of some households, who resort to socially disruptive or exploitative responses when other options are exhausted. As Habte and Alemu [67] observed, these strategies often emerge from deep-rooted poverty and the breakdown of household resilience mechanisms. Collectively, the data reveal that households in Chiro Town employed a layered and multidimensional set of coping strategies, many of which have harmful social, economic, or nutritional consequences over time.

4. Conclusion

The study aimed to assess the status of food security among urban households in Chiro Town, Ethiopia, identify its determinant factors, and explore the coping strategies employed. This research addressed a significant gap in existing literature, which often focuses on rural or large urban areas, overlooking the unique challenges faced by small, rapidly growing towns like Chiro.

The findings revealed that a considerable proportion of urban households in Chiro Town faced food insecurity. Specifically, 34.44% of the surveyed households were classified as food insecure, with varying levels of severity, including marginal, moderate, and severe food insecurity.

Several factors were found to be significant determinants of household food security in the town. Higher educational attainment, greater household income, access to remittances, and homeownership were associated with increased food security. Conversely, larger family sizes, higher dependency ratios, and female household headship were linked to a higher likelihood of food insecurity. Occupational status also played a role, with informal employment like daily labor contributing to vulnerability.

Households adopted a range of strategies to cope with food insecurity. The most frequently employed strategies included reducing the number of meals per day, engaging in daily labor, and borrowing money to purchase food. Other strategies, such as selling assets or natural resources, receiving food aid, and distressingly, withdrawing children from school or engaging them in labor, were also used, reflecting the severity of the challenges faced by some households. These findings underscore the precarious livelihoods and the need for targeted interventions in small urban centers like Chiro Town.

Abbreviations

AE	Adult Equivalent
CSA	Central Statistical Agency
ETB	Ethiopian Birr
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
HH	Household
IFPRI	International Food Policy Research Institute
Kcal	Kilocalorie
KII	Key Informant Interview
NGO	Non-Governmental Organization
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
UN	United Nations
VIF	Variance Inflation Factor
WFP	World Food Programme

Author Contributions

Tadesse Yayeh Adamu: Conceptualization, Data curation, Formal Analysis, Investigation, MethodologySupervision, Validation, Writing –original draft, Writing –review & editing

Yabsira Abebe Tsehay: Data curation, Formal Analysis, Investigation, Methodology, Validation, Writing –review & editing

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Ethics Approval and Consent to Participate

The study complied with the ethical principles of the Declaration of Helsinki. Verbal informed consent was obtained from all participants after explaining the study's purpose, benefits, and confidentiality.

Consent for Publication

Not applicable.

Availability of Data and Materials

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Conflicts of Interest

The authors declare no conflicts of interest.

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