Food Security Status for the Rural Households: A Case Study of Diksis Wareda, Arsi Zone, Oromia Reginal State, Ethiopia

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Abstract
One of the most pressing problems in emerging nations, especially Ethiopia, is rural household food insecurity. The major objective of this study was to examine the level of food security in rural households using a descriptive research approach and primary and secondary data sources. From a population of 2341 household heads in nine selected kebeles, 327 sample respondents were determined using statistical formula. Out of the determined sample size, gave data with a 96% response rate. Structured questionnaire was developed to collect data for quantitative analysis and items validity and reliability were checked using statistical techniques. The data collected from samples were entered into SPSS version 23-computer software programme for analysis. Qualitative data were also arranged thematically, analyzed and triangulated. Descriptive and inferential non-parametric tests were used to analyze data. The findings showed that more than half of households (58.5%) earn less than the GDP per capita of 974 USD expected, older ages had relatively higher total annual income; and a very low food security status due to food unavailability; lacks of access, utilization, and sustainability, 100% rarely skipped meals infrequently, 99.4% ate less, and 87.8% were hungry but refrained from eating. In light of the evidence, the researchers draw conclusions that the majority of households make less money than projected each year and this resulted in very low food security status either because they cannot purchase or readily access enough food. Consequently, they skip meals, eat less than they need, and refuse to eat even when they are hungry. Therefore, the concerned local, regional, and federal government bodies should work collaboratively to pull the rural households out of very low food security status and its related risks by introducing irrigation agriculture, rural non-farm activities, and eliminating the causes illustrated in this finding.
Keywords: Diksis Wareda, food security, food security status, rural households

Introduction

Background and problem statement

People experience food insecurity when they do not have enough, safe, and nutritious food to meet their dietary demands and preferences for an active and healthy life, or vice versa (FAO. 2002). Food security refers to the application of this belief to the household level by individuals within households. According to a fresh projection for 2019, 60 million people have been affected by food insecurity since 2014 worldwide. If current trends continue, the world's undernourished population would reach 840 million by 2030. (FAO, 2020). Africa has the highest Prevalence of Undernourishment (PoU) among all continents, with 19.1 percent of the population suffering from it in 2019, up from 17.6 percent in 2014.

This is due to Africa's (PoU), which is twice the global average (8.9%) and the highest of any continent. In terms of the 2030 prediction, Africa is considerably off-truck (SDG 2.1 Zero Hunger target).

If the current pace of increase in (PoU) continues, it will reach to 25.7 percent, suggesting severe food insecurity (FAO, 2020). Conflicts and wars, which were usually exacerbated by climate-related shocks, is blamed for a sizable share of the recent rise in food insecurity. As Africa's second most populated country, Ethiopia's economy is built on agriculture. Indeed, addressing food insecurity is Ethiopia's greatest problem, as around 10% of the population is chronically food insecure, with the number climbing to 15% during droughts. In 2014, 2.7 million Ethiopians needed emergency food assistance, including 238,761 children who needed treatment for severe and acute malnutrition (Birara E. 2015). Around 8.5 million people in Ethiopia were highly food insecure due to the impact of covid-19, desert locusts, relocation, low or erratic rainfall and high food costs, according to the Inter-process communication (IPC) report on Acute Food Insecurity Analysis July 2020–June 2021. Consequently, twenty-one percent of the 41 million people were hungry.

According to data from the health office during this study time, there were 133,041 persons residing in the study Wareda (Diksis), with 66875 men and 66166 women. In the study area, food insecurity disproportionately affects the poorest members of the community, as it does everywhere else. As of November 5, 2021, there were 3366 households in 14 rural Kebeles receiving wheat and oil aid, with 10,098 beneficiaries, according to information acquired from a key informant (Shanbel Alemu, November 2021). In response, Productive Safety Net Program (PSNP) targets two groups in terms of policy strategies developed so far to address the problem of food insecurity within the framework of GTP II: temporary beneficiaries who receive direct assistance for six months and permanent beneficiaries who receive direct assistance for a year. The Arsi Zone's list of targeted Woredas, however, does not include the study area as food insecure. In addition, no studies have been done in the study area that specifically address the issue of rural household food security. If there is, the country level and specific Waredas were given priority. However, a study has been conducted entitled "Food Security Status for the Household: Mohamed OA Bushara and Ibrahim HH University of Gezira, Sudan (2006) researched A Case Study of Al-Qadarif State, Sudan. According to this study's findings, 9 percent, 46 percent, and 45 percent of study participant households scored 0-1, 2-4, and 5-6, respectively, based on coding responses in the six-item module. This indicated that only 9% of research participants had a high or marginal level of food security, while 91% experienced one of two levels of food insecurity. Besides, it focused geographically on arid agro-climatic zones (Birara E. 2015).

In terms of methodology, previous studies used simple descriptive statistical analytic approaches such as frequencies and percentages rather than high-standard tests. In order to achieve the defined objectives, the current study made an effort to close any gaps that earlier studies had failed to emphasize or explore in sufficient depth, with a focus on Diksis Wareda. It did so by using scientific methodologies and procedures that provided precise criteria used to classify rural households into various food security status categories. This entire investigation was conducted using a descriptive research design and differs from previously conducted once in terms of scope, focus, depth, breadth, type, methods, procedures, and techniques of data collection and analysis. In order to generate scientific results and meet the objectives, descriptive and inferential non-parametric tests like Kruskal Wallis, Mean Rank, Mann-Whitney U, median values analysis, and effect size statistics were used for data analysis.

Objectives of the Study

General Objective

The general objective of the study was to examine the current food security status of the rural households.

Specific Objectives

The specific objectives were to:

a) assess total annual income of households and
b) identify rural households' food security status

Significance of the study

The findings of this study will be crucially significant to: (1) Productive safety net programme practitioners as they use it to identify population groupings with especially severe conditions and ensure that all households have enough food, (2) Government and policy makers as they can use it to better grasp the importance and role of rural households food security in the national economy and create jobs for the rural unemployed and poorest of the poor, (3) donor organizations as it serves them shedding light on a number of crucial criteria for program design, including the prevalence, distribution, and characteristics of food insecure rural households, (4) rural households as it will help those who are food insecure to overcome their problems because the concerned bodies who will have access to it will use it to assist them in any way they can and (5) researchers and academic communities as it sets the way for future study in the field.

Scope of the study

Geographically, the study area was restricted to Diksis Wareda. Thematically and sample wise, it treated food security status of the rural households. Purpose wise, research along with teaching and learning, is one of the responsibilities of an academic staff member at a university and the study's purpose was this one. Temporal this study project was completed from December 2021 to November 30, 2022.

Theoretical framework

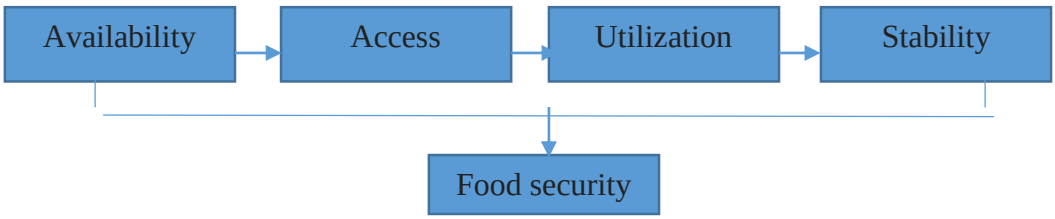

Figure: 1 Theoretical framework of household food security,
Source: Adapted from literatures, May 2021

Method and procedures

Description of the study area

Diksis Wareda is surrounded by the woredas of Robe on the south, Sude on the east, Lode Hetossa and Sire on the north, and Digalu and Tiyo on the west. Located at Latitudes 7054'0" and 8010'30"N and Longitudes 39027'0" and 39043'30"E. Asela, the zonal seat, is 74 kilometers apart from Diksis, the Woreda's capital, and Addis Abeba is 200 kilometers away (Shanbel Alemu, 2019). The Woreda was chosen for the study on purpose. Look at Figure 2.

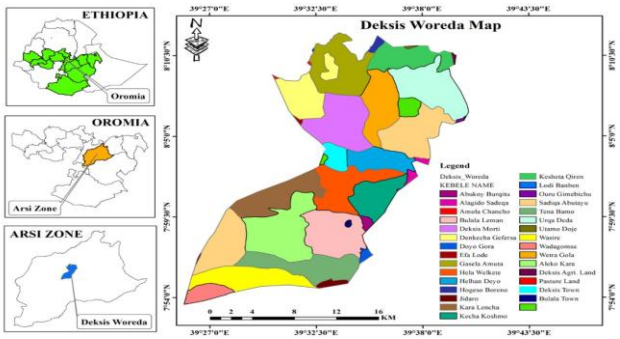

Figure 2 Map of the study area

Source: EthioGIS Data Base, ArcMap 10.8, February 2022

Research design, methods and procedures

To better understand the current situation of food security for rural households, a descriptive research design was used. The collection of quantitative and qualitative data types involved accessing both primary and secondary data sources. The study's target population was 34886 rural household heads (18690 males and 15807 females), and the study population was 2341 household heads from nine specifically chosen kebeles, with a secure sampling frame. When n is the total number of units sampled and N is the total number of units in the population, a one-stage sample design and random sampling technique were used. The following equation produced the overall sampling fraction (n), which was then calculated using the standard table of Krejcie, R. V., & Morgan, D. W. (1970).

$S=X^2$ NP (1-P) ÷ d^2 (N-1) +X2 P (1-P)

S = required sample size.

X^2=the table value of Chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size,

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d = degree of accuracy expressed as a proportion (0.05).

The sample size of 327 was obtained using the aforementioned formula, and nine kebeles were systematically assigned using the common table of (Kerjcie and Morgan, 1970). The USA Six-Item Food Security survey Module: Six-Item Short Form and self-designed survey questionnaire items were used for data collection. In designing the instruments, first, the research background was reviewed and items for the questionnaire were conceptualized. Second, instrument formats were identified and fixed. Third, preliminary investigation was conducted in order to obtain realistic and relevant information. Fourth, instruments were validated and their reliability was established. Ultimately, main field data was collected from the pre-determined samples with response rate of 96% greater than the pre-planned target. Data gathered were converted into numerically coded and arranged answer values, words, texts, and variable measures and organized. The raw data was tabulated and loaded into IBM SPSS version 23.0 for Windows using a codebook and a data file. The raw data was also carefully screened, cleansed, sorted, and appraised for outliers, accuracy, utility, and completeness. After that, it underwent editing, categorization, and formatting to become responses. The analysis, interpretation, and creation of relevant summaries, conclusions, and suggestions were then condensed in order to make it usable.

Results and Discussion

Demographic characteristics of respondents

Gender

What gender are you? The research question. Are men and women in rural Kebeles equally accountable for managing the household as head? The data was investigated using descriptive statistics (Table 1) and results are shown.

Table 1 Gender of respondents (N=314)

Gender	Frequency	Percent
Male	264	84.1
Female	49	15.6
Missing	1	0.3
Total	314	100

Source: Calculated from field survey data, May, 2022

Table 1 shows that there are significantly more male-dominated rural households than female-dominated ones. This made it possible for the researcher to draw the conclusion that there is a significant discrepancy between male and female household heads.

Age

In this contemporary context, the entire number of years a rural household has existed or inhabited is referred to as age. The researcher was able to determine which age group was predominately handling the responsibility of being the household head of the family and why thanks to the thinking of this variable. What age group is most in charge of providing nurturing household leadership, according to the study? With the aid of descriptive statistics (Table 2), the data was analyzed, results were summarized and presented.

Table 2 Age of respondents (N=314)

Age category	Frequency	Percent
15-24 years	21	6.7
25-54 years	253	80.6
55-64 years	36	11.5
65 years and over	1	.3
Total	311	99.0
99.00	3	1.0
Total	314	100.0

Source: Calculated from field survey data, May, 2022

As Table 2 reveals, out of 314 rural food insecure households for whom survey questionnaire was disseminated 21 (6.7%) of the respondents were youth in the age category ranging between 15-24. The majority of the household respondents 253 (80.6%) were in the working age group ranging between 25-54 years old. Those in the mature working age group ranging 55-64 were 36 (11.5%). The negligible number 1 (.3%) was in the elderly age of 65 years and above. Besides, 3 (1.0%) of the respondents refused to reply to their age. This comparison of frequencies and percentages uncovered the fact that mature working age group were the dominant age groups engaged shouldering the responsibility of being household head. Therefore, the answer to the research question was that the dominant age group shouldering the responsibility of carrying household leadership were those in the mature working age.

Educational status

In this context, the level of education of rural households is referred to as their educational status. It therefore refers to the building of human capital through education and training, which is the fundamental means of bringing about socioeconomic, political, and technological growth. Understanding this variable makes it easier to understand how schooling affects rural households' access to food. Thus, the following study questions were developed: (1) What is your level of education? With the aid of descriptive statistics (Table 3), the data was examined and results are summarized and presented.

Table 3 Educational status of respondents (N=314)

Educational status	Frequency	%
Grade 1 to 4	261	83.1
Grade 5 to 8	33	10.5
Grade 9 to 10	13	4.1
No education	6	1.9
Total	313	99.7
99.00	1	.3
Total	314	100.0

Source: Calculated from field survey data, May, 2022

It can be comprehended (Table 3) that respondents were not moderately educated as a group. From the analysis output in the table, the whole majority of the rural household respondents 261 (83.1%) were at the lower educational status of grade 1-4. By combining two categories, 46 (14.7%) had an educational level of only grades 5 to 10 while negligible number 6 (1.9%) had no education. Besides, 1 (0.3%) of the respondents refused to reply to his/her educational status. The result of the analysis allowed answering the research question. Accordingly, this study uncovered the fact that rural households have heterogeneous educational status with the highest group had grades 1-4. Therefore, the answer to the

research question was that grades 1 to 4 dominate in the educational level of rural households in the study Wareda.

Marital status

The status of being married is what is considered married legally. There were many other marital statuses, including single, married, widowed, divorced, separated, and, in some cases, registered partnership. Individuals who have never been lawfully wed were referred to as never-married people. Understanding this variable makes it easier to comprehend how family size affects the overall annual income of rural households. What is your marital status? Reads the next research question. With the aid of descriptive statistics, the data was examined. Results are summarized and shown in Table 4.

Table 4 Marital status (N=314)

Marital status	Frequency	%
Married	293	93.3
Single	1	.3
Divorced	9	2.9
Widowed	3	1.0
Widower	6	1.9
Total	312	99.4
99.00	2	.6
	314	100.0

Source: Calculated from field survey data, May, 2022

It is realized (Table 4) that almost the whole majority of rural household respondents making 293 (93.3%) were married and this was the answer for the first research question. By combining categories, 1 (.3%), 9 (2.9%), 3 (1.0%), 6 (1.9%), were single, divorced, widowed, and widower respectively. Besides, 2 (0.6%) refused to reply to their marital status. From this result, the researcher inferred that almost all rural households were married and negligible number were in other marital statuses. The other research questions were, hereafter formulated.

Results of basic research questions

Total annual income of households

The sum of all household members' gross annual income is referred to as the household total annual income. This sum includes the wages of all adults living together, regardless of relationship who were in a working age group. According to a World Bank estimate Ethiopia's GDP per capita for 2021 was 925 USD while that of 2022 was 974 USD (WB, 2021). Knowing the total annual income of rural households enabled the researchers to detect whether they were able to generate sufficient incomes that

equals the World Bank's GDP per capita report and guarantee their food security or not. For the purpose of this study, the 2022 estimate of 974 USD was used. "How much is your total annual income from your farm income, non-farm income and livestock?" was the research question asked. Responses were analyzed using descriptive statistics. Table 5 shows a summary of their responses.

Table 5 Summary households' total annual income (N=311)

Income categories	Average of lower and upper		Frequency	%	Rank
	Eth.Birr	USD			
4500.00-6000.00	5250.00	102.1	10	3.2	7th
6001.00-20,000.00	13,000.50	252.9	85	27.1	2nd
20,001.00-40,000.00	30,000.50	583.7	87	27.7	1st
40,001-60000.00	50,000.50	972.7	50	15.9	3rd
60001.00-80,000.00	70,000.50	1361.9	20	6.4	6th
80,001.00-100,000.00	90,000.00	1751.0	26	8.3	5th
100,001.00-150,000.00	125,000.50	2432.0	32	10.2	4th
Above 150,000:00	150,000.00	2918.3	1	0.3	8th
	Total		311		

Source: Calculated from field survey data, May, 2022

Table 5 reveals two major findings. First, 232 (74.6%), reported average total annual income ranging from minimum of 102.1 USD to maximum of 972.7 USD below 974 USD /person as per the GDP per capita estimate for Ethiopia stated in the World Bank's report from 2022. Considering the average of minimum (102.1 USD/HH) and maximum (972.7 USD/HH) gives 537.4 USD/HH/Year which is much less than the expected GDP per capita. Dividing 537.4 USD/12=44.8 USD/HH/Month. Again if 44.8 USD/30 days=1.5 USD/HH/day (rounded) much less than the new poverty line of 2.5 USD. Furthermore, considering the average family size of 4.9 for Ethiopia, 1.5 USD/4.9 persons=0.31 USD/Person/day which is below the new poverty line.

Second, 79 (25.4%) reported average total annual income of 1361.9 USD to 2918.3 USD both above 974 USD. Still averaging the minimum and maximum gives 2141.1 USD/HH/Year, which is above the expected GDP per capita of 974 USD. Dividing 2141 USD/12=178.3 USD/HH/Month. Again, if 178.3 USD/30 days=6 USD/HH/Day (rounded) above the new poverty line of 2.15 USD. Furthermore, considering the average family size of 4.9 for Ethiopia, 6 USD/4.9 persons=1.2 USD/person/day much less than 2.15 USD.

Household food security status

The researchers were able to detect the rural households' very low food security status. This made it possible for the researchers to illustrate the food conditions, cost, and size of meals in rural households. The U.S. household food security survey module: six-item short form was used to collect responses of respondents. The food (I/we) bought over the last year since March 2021 just did not last and (I/We) did not have money to get more. How true has that been for you? Question interrogated. The responses were analyzed using descriptive statistics. Table 6 displays a summary of their responses.

Table 6 Responses to U.S. household food security survey module: six-item short form scale (N=314)

No	Designations	Questions	Affirmative responses	
			Responses	%
1	"Food last"	The food (I/we) bought over the last year since March 2021 just did not last and (I/We) did not have money to get more. How true has that been for you? Cods of affirmative responses were as follows: Often true=1, Sometimes true=1	1	100.00
2	"Balanced meal"	I/we could not afford to eat balanced meals in the last 12 months. How true was that for you? Cods of affirmative responses were as follows: Often true=1, Sometimes true=1	1	100.00
3	"Skip meals"	In the last 12 months, since March 2021, did (you or other adults in your household) ever cut the size of your meals or skip meals because there was not enough money for food? Cods of Responses were as follows No=0, Yes=1	1	94.60
4	"How often"	If yes to Q above, how often did this happen to you? Cods of Affirmative Responses were as follows: Almost every month=1 Some months but not every month=1	1	97.80
5	"Eat less"	In the last 12 months, since March 2021, did you ever eat less than you felt you should because there was not enough produce or money for food? Cods of Responses were as follows: No=0, Yes=1	1	99.40
6	"Hungry"	In the last 12 months, since March 2021, were you ever hungry but did not eat because there was not enough money for food? Cods of Responses were as follows: No=0, Yes=1	1	87.00
Total raw score			6	

Source: Calculated from field survey data, May, 2022

The raw scores were used to assess the status of food security, as can be seen in Table 6. The raw score is the sum of the households' responses to the six questions about their level of food security. The raw scores 2-4 and 5-6 reflect households with low and very low food security status. The households in this instance scored an aggregate of 6 on the six questions pertaining to food security status. The researchers concluded that rural households in the study area fall into the category of very low food security status. This implies that the study area is experiencing a green drought and is mistakenly ineligible to receive assistance from the Productive Safety Net Program. The next pages contained analysis results related to food availability and/or sufficiency, access, meals skipped, utilization, sustainability and hungry but did not eat of food, which further supported the above conclusion. The results of the dimensions of food security were also corroborated by descriptive statistical analytical techniques of non-parametric tests of Mann-Whitney U test, Mean Ranks, Median values, and Effect size statistics.

Food availability

The researcher was able to evaluate whether or not rural households had sustainable means of sustenance by knowing how well fed they had been over the course of the previous year. "The food we bought over the last year since March 2021 just did not last and we did not have money to get more," how true has that been for you? The research question posed. Responses were analyzed using descriptive statics. Table 7 displays a summary of their responses.

Table 7 Food availability (N= 314)

Responses of food bought did not last	Frequency	%
Often true	259	82.5
Sometimes true	55	17.5
Total	314	100.0

Source: Calculated from field survey data, May, 2022

In response to the research question they were asked (Table 7), all 314 rural households (100%) responded it was "often true" and "sometimes true" that food they bought over the last year since March 2021 just did not last and they did not have money to get more. This shows that rural households faced serious issues with food availability and lacked the funds to purchase additional food. This implies that the study area does not meet the first dimension for the realization of food security. Furthermore, descriptive statistics analysis of the Mann-Whitney U test was used for data analysis. Results are summarized and presented in Table 8.

Table 8. Test descriptive statistics (N=314)

Test	Responses of food bought did not last
Mann-Whitney U	5746.500
Wilcoxon W	6971.500
Z	-1.881
Asymp. Sig. (2-tailed)	.060
a. Grouping Variable: Gender	

a. Grouping Variable: Gender

Source: Calculated from field survey data, May, 2022

The Z value and the significance level, which is denoted as Asymp. Sig. in Table 8, were the two key metrics we needed to focus on in the result (2-tailed). In the aforementioned scenario, the Z value is -1.881 and p=.060. Hence, the result is not significant because the p value is almost higher than.05 and the food that households purchased over the last year did not last for which they lacked the funds to purchase more, does not statistically differ from one another. This is evident in the column Mean Rank of the Ranks of the Mann-Whitney U Test. The results are shown in Table 9.

Table 9. Ranks (N=313)

Responses of food bout did not last	Gender	N	Mean Rank	Sum of Ranks
	Male	264	159.73	42169.50
	Female	49	142.28	6971.50
	Total	313		

Source: Calculated from field survey data, May, 2022

As can be seen (Table 9), 159.73 and 142.28 were Mean Ranks for male and female respectively. However, when presenting results, it would be better to report the median values for each group by running median values analysis since no statistically significant difference. Result was presented in Table 10.

Table 10 Median (N=313)

Responses of food bout did not last		
Gender	N	Median
Male	264	1.0000
Female	49	1.0000
Total	313	1.0000

Source: Calculated from field survey data, May, 2022

Effect size is derived using Table 10's median values and analysis. Applying the equation r=z/square root of N, descriptive statistics were computed (Table 8). In this instance, N = 314 and z = -1.9 (rounded),

r=-1.9/square root of 314 thus equals -1.9/17.72, which equals -0.1. Using Cohen's (1988) criteria of.1 = small effect, .3 = medium effect, and.5 = large effect, this would be seen as the absence of even a modest effect size, revealing no statistically significant difference between male and female responses. Accordingly, the analysis's findings were as follows: "A Mann-Whitney U test revealed no statistically significant difference in the replies of males (Md=1, n=264) and (Md=1, n=49), U=5746.500, z=-1.881, p=.060, r=-0.1."

Note: In order to avoid repetitions or monotonicity of tables and narrations of Mann-Whitney U tests used for results of food availability, only analysis findings were reported for testing results of food access, meals skipped, frequency of meals skipped, meals eaten less and hungry but not ate.

Food access

The understanding that food commodities being available but not affordable by people to access by any of the strategies helped the researcher to corroborate the fact that a situation of very low food security status was prevalent in the study Wareda. The research question was: “We could not afford to eat balanced meals in the last 12 months since March 2021. How true was that for you in the last 12 months? Descriptive statics was used in analyzing responses. An overview of their responses were shown in Table 11.

Table 11 Affording to eat balanced meals in the last 12 months (N=314)

Responses of inability to afford to eat balanced meals	Frequency	%
Often true	215	68.5
Sometimes true	99	31.5
Total	314	100.0

Source: Calculated from field survey data, May, 2022

As seen in Table 11, all 314 (100%) rural households stated that it was "often true" and "sometimes true" that they had not been able to afford to eat balanced meals throughout the previous 12 months since March 2021. Due to their inability to access and obtain an acceptable amount of food on a regular basis, the researcher concluded that rural households have a serious problem with food access. This implies that the study area does not meet the second dimension for the realization of food security. Therefore, the results of this analysis test was presented as "A Mann-Whitney U test revealed no significance difference in the responses of males (Md=1, n=264) and (Md=1, n=49), U=5764.000, z=-1.502, p=.133, r=-0.1".

Adult (s) cut or skip meals

The researcher depicted the prevalence of food insecurity by knowing whether households (adults) adopt coping mechanism or not. The inquiry was: "Have you or other adults in your household ever reduced the amount of your meals or skipped meals because there wasn't enough money for food in the last 12 months since March 2021?" Responses were examined using descriptive statics. Table 12 displays a summary of their responses.

Table 12 Cutting the size of meals or skip meals (N=314)

Responses of meals reduced or skipped	Frequency	%
Yes	297	94.6
No (Skip Q below)	17	5.4
Total	314	100.0

Source: Calculated from field survey data, May, 2022

Table 12 makes it evident that nearly all 297 respondents (94.6 percent) indicated "Yes" when asked if they had cut back on the number of meals they ate or skipped meals because they did not have enough money for food. Contrarily, insignificant number 17 (5.4%) responded "No," indicating that they did not skip meals or limit the amount of their meals as a result of a lack of moneys for food, indicating that they were food secure. This data leads to the conclusion that the vast majority of rural households (adults) in the research used meal reduction or meal skipping as a coping strategy because they did not have enough money for food. This implies that the study area does not meet the third dimension for the realization of food security.

Therefore, the results of this analysis test was presented as "A Mann-Whitney U test revealed significance difference in the responses of males (Md=1, n=264) and females (Md=1, n=49), U=5808.000, z=-2.813, p=.005, r=0.2."

Frequency of skipping meals

According to the analysis, results (Table 15) 94.6 percent reported that they had skipped or cut back on meals because they did not have enough money for food in the previous one year. The study's main question here was “If your answer to question asked for previous question as “Yes", how often did this happen to you in the last 12 months since March 2021?" Descriptive statistics was used for response analysis. The responses of respondents were summarized and presented in Table 13.

Table 13 Frequency of skipping meals

Responses of how often meals were skipped	Frequency	%
Almost every month	167	54.2
Some months but not every month	141	45.8
Total	308	100

Source: Calculated from field survey data, May, 2022

As demonstrated (Table 13), considering replies of “Almost every month" and "Some months but not every month" as affirmative responses "Yes", the whole majority 308 (100 percent) affirmed that they skipped meals but infrequently. This finding leads to the conclusion that even though rural households ate, they were regarded to be food insecure since they had irregular access to food, which put their nutritional status at danger of declining. This implies that the study area does not meet the fourth dimension for the realization of food security. The test results of the above findings was reported as "A Mann-Whitney U test revealed no significance difference in the responses of males (Md=1, n=259) and female (Md=1, n=48), U=5892.000, z=-.664, p=.507, r=.04."

Eat less

The researcher was interested in learning if historically, rural households consumed less food than they believed they required during the course of the previous year. The main research question was, "In the last 12 months since March 2021, did you ever eat less than you felt you should because there was not enough produce or money for food?" Descriptive statistics (Table 14) was used to conduct a response analysis and present results.

Table 14 Eat less (N=314)

Responses meals less eaten than felt	Frequency	%
Yes	312	99.4
No	2	.6
Total	314	100.0

Source: Calculated from field survey data, May, 2022

According to Table 14, nearly all respondents (312) (99.4%) indicated that they ate less than they believed they should since there was not enough produce or money for food in the 12 months following March 2021 by answering "Yes". Given that, respondents reported eating less than they felt they should because they did not have enough money to buy food during the course of the previous year this data supports the notion that the respondent households had very low food security status. This implies that the study area does not meet the fourth dimension for the realization of food security. The test results of

the above findings presented as "A Mann-Whitney U test revealed no significance difference in the responses of males (Md=1, n=264) and female (Md=1, n=49), U=6419.000, z=-.610, p=.542, r=.03".

Hungry

The researcher was interested in learning if rural households were hungry but did not eat because they could not afford enough food they required during the course of the previous year. The main research question was: "In the last 12 months since March 2021, were you ever hungry but did not eat because there was not enough money for food?" Descriptive statistics (Table 15) was used to conduct a response analysis and present results.

Table 15 Households hungry but did not eat because there was not enough money for food (N=311)

Responses of hungry but did not eat	Frequency	%
Yes	273	87.8
No	38	12.2
Total	311	100

Source: Calculated from field survey data, May, 2022

From Table 15, it can be portrayed that more than three-quarters 273 (87.8%) of those surveyed respondents in the year following March 2021 responded "Yes" when asked whether they were hungry but refrained from eating because they did not have enough money for food. This data indicated that the majority of households had very low food security status, as seen by the fact that, despite being hungry, they did not eat because they could not buy enough food. The test results the above findings was also summarized and presented as "A Mann-Whitney U test revealed no significance difference in the responses of males (Md=1, n=263) and female (Md=1, n=47), U=5988.500, z=-.597, p=.550, r=.03."

Conclusion and Recommendation

The general objective of this study was to examine the current food security status of the rural households. The specific objectives were to assess total annual income and food security status rural households. The purpose of the study was address the key fundamental research questions, develop, and test conceptual descriptive model that describes food security status of rural households. This made it possible for the researchers to present the following conclusions.

Almost majority of rural households are with in prime working age group with low educational status of grade 1-4 lower than the national average. Less educated rural households less likely invest in modernizing their farming practices, developing their skills, and adopting new technologies and less likely look for improved market access. Married households make up the bulk of rural households with very low overall annual earnings less than the GDP per capita of 974 USD expected and food security

status. Bad work habits, poor saving habits, insufficient yearly income, excessive living costs, unproductive age groups, wasteful sociocultural events, and a lack of financial institutions that offer credit services mainly caused very low overall annual earnings and food security status. According to the data, out of 311 rural households, 96 (30.9%), 87 (27.7%), 32 (10.2%), and 1 (.3%) have annual incomes of 40,001 to 100,000, 20,001 to 40,000, 100,001 to 150,000, and above 150,000, respectively. By contrast with World Bank's report from 2020, more than half 182 (58%) rural households had less than the GDP per capita of 974 USD with statistically significant difference in the estimated total annual income of rural households between the four age groups at a significance level of.001. Rural households are surviving on less than $2.15 per day/person and that they are facing severe food insecurity.

Compared to households in other age groups, households in the senior working age group have a greater projected total income. This finding demonstrates that age affects the total annual income of rural households either favorably or unfavorably. This implies that rural household heads are dominantly in productive senior working age group while children and elderly aged are dependent on the incomes earned by household head. In light of the evidence, rural households have a very low food security status, as indicated by their overall score of 6 on the six food security-related questions. Another point worth noting is that rural households in the study area fall under the category of very low food security because they cannot afford enough food, cannot easily obtain enough food, rarely skip meals, consume less food than they believe to be sufficient, and do not consume even when they are hungry. Concerned local, regional, and federal government bodies are advised to use these finding and work collaboratively to eliminate causes of very low food security status and its related risks by either introducing irrigation agriculture, rural non-farm activities, and fostering saving habits of households and others and/or revisiting the effectiveness of existing rural development policy strategy. Concerned bodies need to understand actual situation and determinants, create assumptions, conduct nationwide research on actual condition and reconsider the existing rural development policy strategies based on the findings.

Data availability

The data, which could support the results of this study, are included within the body of the article and they could be obtained from the corresponding author when necessary.

Conflict of interest

We, authors have no conflicts of interest to disclose.

Notes: This work is from the corresponding author’s research project report sponsored by Arsi University, its methodology, figures, tables, and sentences could not be similar to other published and unpublished articles.

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