Food security and its determinants among rural households: a case study in Buwenge eastern Uganda

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Abstract. Uganda's population still faces food insecurity, with rural areas disproportionately affected. Rural areas in Eastern Uganda are still threatened by food insecurity. However, there is still insufficient documentation on food security and factors influencing it at the household level in Buwenge, Eastern Uganda. This study aimed to determine the level of food security and its determinants among rural households where food insecurity remains prevalent despite governmental efforts. A cross-sectional, quantitative study involving 250 households was conducted between January and March 2024. Data were collected through systematically sampled, verbally administered questionnaires, assessing food security levels using the Household Food Insecurity Access Scale (HFIAS). Results showed that 90.4% of households faced food insecurity, with 29% severely food insecure. Socio-economic determinants included the age, gender, and marital status of the household head, land availability, and health status. Younger and female-headed households, larger families, and households with limited land access faced higher risks of food insecurity. Additional risk factors impacting food security included reliance on market purchases alone, inadequate food safety, insufficient post-harvest handling techniques, lack of safe water, and engagement in sugarcane monoculture. Households practicing modern post-harvest methods, adequate waste management, and safe water access were more likely to achieve food security.

1 Introduction

Food security is a critical global issue, particularly in developing countries where rural populations rely heavily on agriculture for their livelihoods [1]. Defined by the Food and Agriculture Organization (FAO, 1996), food security is a condition in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food, food security encompasses various dimensions, including availability, access, utilization, and stability of food supplies.

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Uganda still faces significant challenges related to food security, particularly in its rural areas. The Ugandan government has made notable progress in addressing food insecurity, yet challenges persist, especially in remote areas where poverty rates are higher and access to essential resources remains limited. According to the Integrated Food Security Phase Classification, approximately 20% of the Ugandan population experiences food insecurity, with 33.3% of rural households disproportionately affected due to high poverty rates and limited access to resources and services.

Despite efforts to improve agricultural practices and enhance access to food, in Buwenge, Eastern Uganda, where most of the population depends on subsistence farming for their sustenance, food insecurity persists among rural households, negatively impacting the well-being and nutrition status [2]. Food insecurity is exacerbated by several interrelated factors, including socio-economic challenges, such as limited access to markets, inadequate agricultural practices, and the impact of climate change threaten food security [3].

The region also experiences high rates of poverty, with many households unable to afford a diverse and nutritious diet, leading to malnutrition and related health issues. This study aims to delve into food security and its determinants as well as access the prevalence of food insecurity within the study population shedding light on the multifaceted factors influencing the ability of households to access, afford, and utilize nutritious food [4].

2 Materials and methods

A study questionnaire was used which was pre-tested from Bugembe subdivision.

2.1 Study design

A cross-sectional quantitative study design was employed to collect data through a structured pretested questionnaire which was delivered verbally to the participants. Using Lwanga and Lemeshow method $n = Z^{\alpha/2} \times P\,(1-P) / E^2$ with 20.5% estimated prevalence of food insecurity in Buwenge, a sample of 250 households was included in the study. Participants were included using a systematic random sampling technique. The study included participants in rural households, depending mostly of subsistence agriculture for livelihoodness, living in Buwenge for five years or more and agreed to participate in the study. Residents outside the rural parts of Buwenge were excluded and those who did not consent. The dependent variables included the occurrence of food insecurity, and the independent variables were socio economic factors like Household (HH) age, gender, marital status, no of HH children, HH size, land availability, livestock availability, health status.

2.1.1 Data collection

Enumerators were trained to administer the questionnaires verbally, ensuring consistency and clarity in data collection. Enumerators visited households in person to conduct interviews, ensuring a comfortable environment for participants to provide accurate responses.

2.1.2 Tools

The Household Food Insecurity Scale (HFIAS) was used to determine the level and category of household food security. This tool consists of nine occurrence questions related to the three domains of food insecurity including anxiety and uncertainty about food supply, insufficient quality of food, and insufficient food intake in the past 30 days. The responses included rarely (1-2 times), Sometimes (3-10 times) and often (more than 10 times) and were categorized

into four categories: (a) food secure, having no or minimal concerns about food access and can acquire sufficient quantities of safe and nutritious food (scored 0), (b) mildly food insecure, experience worry about food access but can meet food needs without significantly compromising on dietary quality (scored 1-7), (c) moderately food insecure, experience a reduction in the quality and variety of their food. They consume a less diverse diet or reduce portion size though there is no severe hunger (scored 8-14) and (d) severely food insecure, face significant food shortages and frequently run out of food or go entire days without eating (scored 15-27). Households in the last three groups were regarded as food insecure. Study pre-tested questionnaires were used to determine socio-economic factors and risk factors contributing to prevalence of food insecurity among the rural households.

2.2 Statistical analysis

Data was analysed using SPSS and chi-squared used to examine significant associations. P-values < 0.05 were considered as significant statistically.

3 Results and discussion

3.1 Household socio-economic factors

The determinants identified include the household age, gender, marital status, number of children, land availability, and health status as being statically significant in household food security (Table 1). This highlights the complexity of the issue and the interplay between social and economic factors.

Table 1. Household socio-demographic characteristics

Variable	Frequency (n=250)	Percent	% Food secure (n=24)	% Food insecure (n=226)	P- value
HH head age					
18-28	33	13.2	0.0	100	
29-39	82	32.8	9.9	90.1	0.02
40-50	65	26.0	12.8	87.2	
Above 50	70	28.0	14.7	85.3	
HH gender					
Male	159	63.6	21.3	78.7	0.012
Female	91	36.4	5.5	94.5	
Marital status					
Married	112	44.8	19.0	81.0	
Divorced	84	33.6	5.2	94.8	0.026
Widowed	54	21.6	3.8	96.2	
Other	7	2.8	0.5	99.5	
Number of children in HH					
0-1	66	26.4	6.7	93.3	
2-4	91	36.4	2.0	98.0	0.003
>5	93	37.2	1.1	98.9	
HH size					
0-3	57	22.8	11.0	89	
4-6	93	37.2	4.3	95.7	0.723
>7	100	40.0	8.5	91.5	
land availability					
Yes	178	71.2	13.4	86.6	0.006
No	72	28.8	6.2	93.8	

Table 1. Household socio-demographic characteristics (continue)

Variable	Frequency (n=250)	Percent	% Food secure (n=24)	% Food insecure (n=226)	P- value
Livestock					
Yes	140	56.0	11.4	88.6	0.338
No	110	44.0	2.0	98.0	
Heart status					
Healthy	184	73.6	8.1	91.9	
Not healthy	49	19.6	3.8	96.2	0.001
Other	17	6.8	1.4	98.6	

The HH with household heads between 18-28 years were more food insecure this is due to lower income, less established social networks, and fewer assets [5]. Younger heads of households may also face challenges in accessing credit and markets, limiting their ability to invest in productive assets [6–8]. Female-headed households also experience food insecurity due to fewer employment opportunities, the gender wage gap and more caregiving responsibilities, which can limit their participation in income-generating activities thus reducing economic stability.

Married participants where more food secure which could be attributed to dual income and shared responsibilities which can alleviate the financial burden associated with feeding a family. Households with more children were more food insecure due to the increased demand for food and other expenses. Land availability enables own food production so households with limited land access were more food insecure compared to those with land [9–11]. Those households with healthy members were more food secure than the disabled and unhealthy ones as health issues can limit work capacity and increase healthcare expenses.

3.2 Prevalence and severity of household security

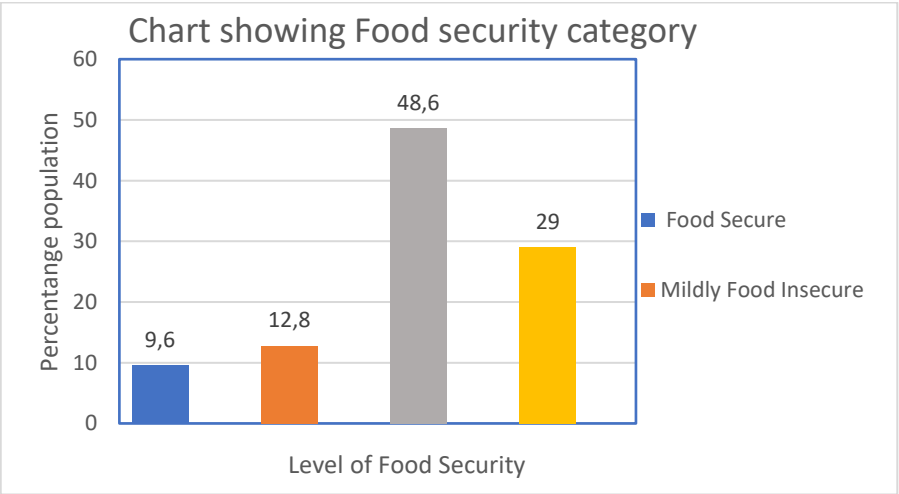

Fig. 1. Food security category

The study discovered that 90.4% of the households faced food insecurity with only 9.6% regarded as food secure. Fig. 1. The findings of this study revealed that 29% of the respondents were severely food insecure which is above the global level of 11.3% according

to the Food Security and Nutrition in the World 2023(FAO, WFP, WHO 2023) and below that of Karamoja region in Uganda which is 45% according to Integrated Food Security Phase Classification (IPC, 2023). 48.6% had moderate food insecurity and 12.8 had mild food insecurity.

3.3 Risk factors to household food Insecurity

Some of the risk factors to household food insecurity assessed included food source, food safety, post-harvest handling, safe water access, waste management and sugarcane growing.

Table 2. Risk factors for household food security

Variable	Food secure		Food insecure		Total		P-value	OR
	n	(%)	n	(%)	n	(%)		
Food source								
Own production	4	1.6	29	11.6	33	13.2		
Own + Market Purchase	12	4.8	59	23.6	71	28.4	0.084	4.14
Market purchase only	8	3.2	138	55.2	146	58.4		
Food safety								
Adequate	15	6.0	70	28.0	85	34.0	0.044*	4.03
Inadequate	9	3.6	156	62.4	165	66.0		
Post-harvest handling								
Traditional methods	15	6.0	191	76.4	206	82.4	0.731	3.20
Modern technology	9	3.6	35	14.0	44	17.6		
Safe water								
Adequate	18	6.9	71	28.4	89	35.0	0.029*	6.69
Inadequate	6	2.0	155	62.0	161	65.0		
Waste Management								
Proper	14	5.6	40	22.8	54	21.6	0.050*	7.51
Improper	3	1.2	193	73.3	196	78.4		
Sugarcane growing								
Yes	4	1.6	214	85.6	218	86.7	0.034*	
No	14	5.6	18	7.2	32	13.3		0.03

Adequate food safety practices make households approximately four times (OR=4.0) likely to be food secure compared to those with inadequate food safety measures. Proper food safety practices prevent foodborne illnesses and ensure that food is safe to consume. Healthy household members are better able to work and contribute to food production and income generation, thereby enhancing food security. Adequate food safety practices reduce food spoilage and waste, ensuring that more food is available for consumption. This finding is line with a study made in low- and middle-income countries.

Households using modern post-harvest technology are over three times (OR= 3.2) more likely to be food secure [13]. Modern post-harvest technologies, such as improved storage facilities (refrigeration) and pest control methods reduce food loss. Modern post-harvest technologies help in preserving the quantity and quality of harvested crops reducing food loss. This leads to greater availability of food throughout the year. Proper post-harvest handling can increase the market value of crops, increasing household income and thereby enhancing the ability to purchase food. Access to adequate safe water significantly increases the likelihood of food security, making households nearly seven times (OR=6.69) more likely to be food secure reducing the prevalence of water borne diseases which can sap household resources and reduce productivity. Healthy individuals are more capable of maintaining consistent food production and securing income. Safe water is crucial for food preparation

such as cooking, cleaning, and maintaining hygiene, which are essential components of food safety and nutrition. Proper waste management practices are strongly associated with food security, making households over seven times (OR= 7.5) more likely to be food secure [14]. Proper waste management reduces environmental contamination and health hazards, contributing to overall household health and productivity. Efficient waste management can also involve recycling organic waste into compost, enhancing soil fertility and agricultural productivity.

Households engaged in sugarcane growing are less likely to be food secure compared to those not involved in sugarcane growing, indicating a potential negative impact on food security (OR= 0.03). Sugarcane growing is associated with monocropping, which can reduce biodiversity and soil fertility, making households more vulnerable to food insecurity if the sugarcane crop fails. Sugarcane is a perennial cash crop which takes a long time to be harvested and may not directly contribute to household food supplies. The market dynamics predict the prices for sugar cane and if the prices are low or there are difficulties in selling the crop, households may struggle to purchase sufficient food [2,15]

4 Limitation

There was self-reported data regarding food security status. This method is subject to recall bias, where participants might not accurately remember or report their behaviours resulting in social desirability bias where participants may report what they believe the researchers wanted to hear.

5 Conclusion

In conclusion, the study indicates that 90.4% of households faced food insecurity, with 29% severely food insecure. The key socio-economic determinants included the age, gender, and marital status of the household head, land availability, and health status. Younger and female-headed households, larger families, and households with limited land access faced higher risks of food insecurity. Additional risk factors impacting food security included reliance on market purchases alone, inadequate food safety, insufficient post-harvest handling techniques, lack of safe water, and engagement in sugarcane growing. Households practicing modern post-harvest methods, adequate waste management, and safe water access were significantly more likely to achieve food security. The local government and developing partners should advocate and implement policies that support food and nutrition security such as the Uganda Nutrition Action Plan.

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