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Local Perception of Household Vulnerability to Food Insecurity in Bahi District, Tanzania

Gosbert Lukenku Shausi*

Department of Agricultural Extension and Community Development,
Sokoine University of Agriculture, P. O. Box 3002, Chuo Kikuu, Morogoro Tanzania
*Corresponding author: gshausi2@gmail.com

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Abstract A study was carried out in Bahi District of Central Tanzania to explore local perceptions of food security and vulnerability to food insecurity. In this area millet is the staple food. In this regard, a household without enough millet to feed its members for the whole year was perceived food insecure even if it had access to other foodstuffs. Also, a household that depleted its millet stocks in less than 12 months was perceived food insecure while vulnerability was perceived as a state of being food insecure and/or being at risk of becoming food insecure. Based on local perceptions, 76% of the sampled households were found vulnerable to food insecurity whereas 24% were not. Besides, majority of the households were food insecure (63%) while only 37% households were food secure. Various factors were associated with household vulnerability to food insecurity. These factors include household being headed by a very old person (70 years and above); lack of alternative sources of income; misuse or improper handling of the produced food; a household having dependents (children under 13 years and old persons of over 70 years old). Therefore interventions to improve food security and reduce vulnerability to food insecurity should address these factors and seek to improve millet production.

Keywords: *local perception, food security, food insecurity, vulnerability to food insecurity, Bahi, Tanzania*

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1. Introduction

The United Nations is committed to eradication of poverty and extreme hunger, which is the first of the eight Millennium Development Goals (MGDs) to be attained by 2015[1]. These MDGs, representing the most important promise ever made to the world's most vulnerable people, were adopted by world leaders in the year 2000. It is therefore no wonder that following this commitment efforts both at global and national levels have been directed towards ensuring food security especially in developing countries where it remains a serious challenge. Recent figures indicate that 26.4% of the global population, are still faced with food insecurity and about half (52.5%) of them are found in Sub-Saharan Africa [1]. However, the concept of food security is perceived differently by different people. The multiple definitions of food security reflect the varied nature of food problems experienced by poor people. The early definitions of food security focused on food supply at the national and international levels. Yet, it is established that adequate food supply at the national level does not guarantee sufficient food at household level.

According to [2], food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active healthy life. The author defines household food security as the ability of all members of the household to acquire sufficient amount of food continuously over time for an active healthy life. Food security involves three pillars; availability, accessibility and utilization of food. Food availability implies sufficient production or imports to meet the food requirements of the population. Access refers to the ability of people to obtain food, either through their own production or by purchasing it with money earned from other activities. Food utilization means that the nutrient intake associated with food consumption is not impeded by adequate nutritional information, poor sanitation, and problems in intra household distribution. Similarly, [3] reports that food insecurity exists when people do not have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active healthy life. A household is therefore said to be food insecure when it fails to meet its dietary intake in terms of quantity and quality (Ibid).

Reference [4] contends that, effective policies and interventions to reduce food insecurity should target either individual or groups that are food insecure at present and

[1]Other MDGs starting with the second are to: achieve universal primary education; promote gender equality and empower women, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability, and global partnership for development.

those who are vulnerable to food insecurity. By vulnerability is meant the presence of factors that place people at risk of becoming food insecure [4,5,6]. These factors can be external or internal. External factors include trends such as depletion of natural resources from which the population makes its living, environmental degradation or food price inflation; shocks such as natural disasters and conflict; and seasonality, such as seasonal changes in food production and food prices. Internal factors are the characteristics of people (age, sex, marital status, education level, household size etc), the general conditions in which they live and the dynamics of the household that restrict their ability to avoid becoming food insecure in the future [6,7].

In Tanzania, [8] reports that, food insecurity and vulnerability is present everywhere in the rural parts of the country even though it varies regionally, with the central band of the country showing the highest proportion of households that are food insecure. For instance, it has been shown that in Dodoma, Singida and Tabora regions, 45-55% of the households are food insecure [9]. There is also a high rate (between 24 to 27%) of households that are vulnerable to food insecurity in the regions of Singida, Tabora, Dodoma and Mwanza. An analysis of food production over the last 10 years indicates fluctuations of food production between years of surplus often followed by years of food deficits. As reported by [8], the central band of Tanzania shows the highest proportion of households that are food insecure. A preliminary food crop production forecast survey done by the National Food Security Division (Crop Monitoring and Early Warning) for the year 2009/10 indicated that, nine regions had food deficit and these consist 40 districts including Bahi with high level of vulnerability [9]. Consequently, the report proposed that vulnerable areas would need to be subjected to an in-depth vulnerability assessment for necessary intervention by the government. A good understanding of the factors that determine food insecurity today and, more importantly, those which will influence food insecurity in the near or far future is therefore essential in reducing food insecurity over time.

One of the key criteria underlying the delivery of services from social assistance programs, humanitarian and emergency relief operations is vulnerability. Identification of vulnerable groups and the assessment of the cause of vulnerability are critical to designing of appropriate assistance programs. Knowledge of whom and where the vulnerable are, helps to lower the costs for providing assistance to the people in need, therefore enabling effective targeting. This is one of the practical benefits of using the concept of vulnerability (Tollens, 1998) cited by [10]. The value of this study is documenting Tanzania rural people's own experiences and perceptions of food security and vulnerability to food insecurity.

In this study the local perceptions of food, food security, food insecurity and vulnerability to food insecurity are explored and the characteristics of households that are food insecure and vulnerable to food insecurity are determined. The rest of the article is organized as follows. In the succeeding section the methodology adopted for the study is presented. Next the findings are presented and discussed. Conclusions of the study are drawn towards the end of the article.

2. Research Methodology

2.1. Study Area

The study was conducted in Bahi District in two phases. Phase one of the study involved a reconnaissance visit to the study area in October 2019 to identify the study villages and familiarize with them. Bahi District was chosen as the study area because, based on the research by [9], it is among the worst affected areas in Tanzania in terms of food shortages. The District has a total area of 77 372 km^2, of which arable land is only 596 800 hectares and a dry Savannah type of climate, which is characterized by a long dry season lasting between late April to early December, and a short single wet season (unimodal rainfall) lasting between late December and early April. About 99 (98.8%) of the people live in the rural areas and the remaining small proportion is found in trading centers including Bahi town. The district's economy is almost entirely dependent on agriculture (and livestock rearing), which is characterized by low productivity due to low and erratic rainfall, high evapo-transpiration and low moisture holding surface soils [11].

2.2. Sampling Procedure and Techniques

The target population for this study comprised of all farming households in Mpamantwa, Ibihwa, Mnkola and Bahi Sokoni study villages. A household was defined as people who 'normally lived together' (slept under the same roof) and shared food from the common kitchen. This implied that temporary visitors were excluded but temporary absentees were included. The multistage probability sampling technique was used to select two wards (Bahi and Ibihwa), four villages (Mpamantwa, Ibihwa, Mnkola and Bahi Sokoni) two from each ward and 100 households (25 from each village).

2.3. Data Collection and Analysis

Data collection (November - December 2019) was done in two phases using a combination of qualitative (including key informant interviews) and quantitative methods. During phase one local perceptions of food, food security and vulnerability to food insecurity were explored through in-depth interviews and focus group discussions (FGDs) with a mixed group of men and women, men and women separately and youth groups. The discussions centered on local perception of food, food security, food insecurity and vulnerability to food insecurity. Free listing was used during FGDs to derive definitions of variables and indicators of food security. These definitions and indicators informed the formulation of items for the interview schedule for data collection during phase two of the study, which mainly collected quantitative data through face-to-face interviews with sampled household heads. The coded data were analyzed using descriptive and inferential statistics. The test of statistical significance was done at $\rho \leq 0.05$ levels.

3. Results and Discussion

3.1. Local Perceptions of Food, Food Security, Food Insecurity and Vulnerability to Food Insecurity

3.1.1. Perception of Food

The results of focus group discussions revealed that, traditionally, for the local residents in Bahi (mostly the Gogo), food meant millet, commonly known as *ugali wa uwele* (millet-based stiff porridge) saved with *mlenda* (mostly), *chipali or safe* (traditional vegetables). Also, maize-based *ugali* was eaten but by only few people. Although this study did not explore how big a meal should be to be considered enough, it was said that in good times (period of food security) people would eat until they are satisfied. Most importantly, the amount of food depended on the number of people it is prepared for. Millet was the preferred food in the area because of good taste and the fact that once eaten it lasts longer in the stomach.

3.1.2. Household Food Security/Insecurity

Based on FGDs, food security is determined by the quantity of millet kept in the traditional food storage structure(s) (*kilindo/vilindo*). Thus, a food secure household is one with enough millet for feeding the household members throughout the year. In contrast, a household that does not have enough stored millet to feed its members throughout the year and at the same time doesn't have enough money or other assets like livestock that can be sold or exchanged with food is considered food insecure. It was also reported that a food secure household is one whose members are able to get two enough millet-based meals per day. Conversely, a household, which is not able to provide its members with two meals a day, is considered food insecure. However, during the farming season eating once a day was common in both food secure and insecure households. This is because members in both households spent most of their time carrying out farm operations in the fields, normally located a distance away from home.

Since local perceptions of food security is based on the quantity of millet produced at household level, the number of months a household took to exhaust its own produced millet was used as an indicator of household food security. Specifically, households that took 12 months (from 2017/18 to the 2018/19 season) to exhaust household millet stocks were categorized as food-secure. On the other hand, households that had no stock of millet and those that took less than 12 months to exhaust the millet stock were classified as food-insecure. Using this indicator, of the 100 survey households, about 37% and 63% were food secure and food insecure respectively (Table 1).

3.1.3. Household Vulnerability to Food Insecurity

Drawing on FGDs, a household was considered vulnerable to food insecurity if it does not have enough and preferred food (millet) and/or it is at risk of failing to have enough and preferred food (millet) in the future. Moreover, a household vulnerable to food insecurity is one with the following characteristics:

- It is headed by an old person (70 years and above)
- Lacks alternative sources of income other than relying on the sale of farm produce
- Has a small piece of land that is not enough for household production of millet or unable to cultivate all its available land due to different reasons
- Misuses or does not handle properly harvested food through for example, almost selling all of it, making local brew, and exchanging it with local brew
- Has many dependents (children under 13 years and old persons of over 70 years old) and;
- Has a household head or ordinary household member who is chronically ill and/or physically disabled who needs to be taken care of.

Using these indicators, 76% of the sampled households were found vulnerable to food insecurity whereas 24% were not. Besides, majority of the households were food insecure (63%) while only 37% households were food secure (Table 1).

Table 1. Distribution of Households by Food Security and Vulnerability Status (n=100)

Variable	Frequency	Percentage
Food security status		
Food secure	37	37.0
Food insecure	63	63.0
Vulnerability to food insecurity status		
Vulnerable	76	76.0
Non-vulnerable	24	24.0

3.2. Factors Associated with Household Vulnerability to Food Insecurity

3.2.1. Age of Household Head

The age of household head was associated with household vulnerability to food insecurity. It was pointed out during FGDs that when the household head is very old (70 years or older) it was highly likely that his or her household will be food insecure or fall into food insecurity because of his or her inability to undertake household activities. As indicated in Table 2, majority (82.0%) of the household heads were in the economically active age group, i.e. less than 64 years, whereas the remaining (18.0%) were in the dependent age group, i.e. 70 years and above. However, of the 82% economically active household heads, 62.0% were from households vulnerable to food insecurity whereas 20.0% were from non-vulnerable ones. The chi-square test results (χ^2=13.807, p=0.017) indicated a statistically significant relationship between the mean ages of household head and households' vulnerability to food insecurity at $\rho \leq 0.05$.

Table 2. Distribution of Respondents by Age of Household Head (N=100)

Variable	Non-vulnerable		Vulnerable		Total		χ^2-test
Age group	n	%	n	%	N	%	P-Value
24 - 33	5	5.0	9	9.0	14	14.0	
34 - 43	2	2.0	11	11.0	13	13.0	
44 - 53	8	8.0	22	22.0	30	30.0	
54 - 63	5	5.0	11	11.0	15	15.0	
64 - 73	0	0.0	10	10.0	10	10.0	0.017
74 - 83	0	0.0	18	18.0	18	18.0	
Total	**20**	**20.0**	**80**	**80.0**	**100**	**100.0**	

3.2.2. Presence of Chronically Ill and/or Disabled Household Members

Households are susceptible to other shocks that may make them more vulnerable to food insecurity [12]. Household heads or members may experience illnesses that would prevent them from engaging in productive activities, which may in turn erode household food security. In fact, Leatherman's analysis of Peruvian households, for example, shows that the poorest households can lose up to 75 person-days of work a year to illness [13]. In this study the chronically ill or disabled person was defined as one who was not able to participate in any household production activities. As such, the presence of chronically or disabled person(s) in the household could lead to reduced labour force and use of much of the household resources in taking care of such a person. The study found that of the surveyed households only 4 (4.0%) had chronically ill and/or disabled members and that all vulnerable to food insecurity. However, the chi-square test (χ^2=7.733, p=0.301) did not reveal any significant relationship between the presence of chronically ill or disabled person in the household and household vulnerability to food insecurity (Table 3).

3.2.3. Presence of Dependents In a Household

Presence of dependents, i.e. children under 13 years and persons over 70 years in a household was thought by respondents to increase vulnerability of a household to food insecurity in the study area. This age group was considered by community members as unproductive because of not participating actively in farming activities. Participants in focus group discussions reported that most households with a large number of members in this age group did not have enough food to feed themselves for the whole year. Some few households (not presented here) were mentioned as examples of households, which usually struggle to get enough to feed themselves because of presence of dependents. The chi-square test (χ^2=4.229, p=0.000) revealed significant relationship between number of dependents in the household and household vulnerability to food insecurity.

Table 3. Distribution of Households by Presence of Unproductive Household Members

Variable	Non-vulnerable		Vulnerable		Total		χ^2-test
	n	**%**	**n**	**%**	**N**	**%**	**P-Value**
Household has disabled or chronically ill members							
Yes	0	0.0	4	4.0	4	4.0	
No	20	20.0	76	76.0	96	96.0	0.301
Total	***20***	***20.0***	***80***	***80.0***	***100***	***100.0***	
Household has members who are beyond the economically active age							
Yes	2	2.0	31	31.0	33	33.0	
No	18	18.0	49	49.0	67	67.0	0.000
Total	***20***	***20.0***	***80***	***80.0***	***100***	***100.0***	

3.2.4. Lack of Alternative Sources of Income

Income has influence on food security because it is used to buy farming inputs and foodstuffs particularly during the period of food deficit [14,15]. Lack of income can hinder one's ability to afford buying food, rendering him/her to be food insecure. Income is more important to rural people who are engaged in activities other than farming) such as carpenters as well as urban dwellers who depend solely on income for buying all kinds of foodstuffs [12,16]. Table 4 shows that the three major sources of income were sale of farm produce (35.1%), petty business (31.3%), and casual labour (19.0%).

Table 4. Distribution of Respondents by Number of Income Sources (N=100)

Variable	Non vulnerable		Vulnerable		Total		χ^2-test
	n	%	n	%	N	%	P value
Number of income sources							
One source	2	2.0	49	49.0	51	51.0	
Two sources	7	7.0	27	27.0	34	34.0	0.002
Three sources	11	11.0	4	4.0	15	15.0	

Relying on the sale of farm produce only for the household (lack of alternative sources of income), was thought to increase vulnerability to household food insecurity. Table 4 shows that 51% of all the surveyed households relied on only one source of income, 34% relied on two sources whereas 15% relied on three sources. The chi-square test (χ^2 = 5.230, $\rho < 0.002$) indicates a statistically significant relationship between number of income sources and household vulnerability to food insecurity. A similar relationship is also reported by [12] who assessed vulnerability to food insecurity in urban slums in Nairobi, Kenya. The findings further show that sale of farm produce (35.1%) and petty business (31.3%) was the main source of income for the respondents households. Other sources were as presented in Table 5.

Table 5. Distribution of Respondents by Source of Income (N=100)

Household income source	**Frequency**	**Percent**
Sale of farm produce	63	35.1
Petty business	56	31.3
Casual labour	34	19.0
Remittances	16	9.0
Sale of animals and animal products	10	5.6
Total	179	100.0

Note: Frequencies do not add up to 100 because of multiple responses.

3.2.5. Inadequacy of Land for Household Food Production

Land is one of the principal means of agricultural production. It is essential for the generation of income, accumulation of wealth and most importantly it is a hedge against food insecurity. Access to land enables a farmer to produce for subsistence or cash. According to [17], food production can be increased extensively through expansion of areas under cultivation. Therefore, under subsistence agriculture, farm size is expected to play a significant role in influencing household's food security. Table 6 shows that, of the surveyed households, 44% owned less than two hectares, 32% owned between two to five hectares, 15% owned more than five hectares whereas nine percent owned no land at all. In this study it was hypothesized that a household that did not have enough land to produce its own food would have insufficient food and thus increase its vulnerability to food insecurity. However, the chi-square analysis ($\rho = 0.062$) at $\rho<0.05$ did not reveal a statistically significant relationship between land adequacy and household vulnerability to food insecurity.

Furthermore, during 2018/19 cropping season of the 98 households, which reported to own land, 42 (42.9%) cultivated all the land owned while 57% did not (Table 6). About 32% of 42 households that cultivated all their land were vulnerable to food insecurity while the remaining 11 (11.2%) were not. This indicates that these households either did not have enough land to cater for their food production or the productivity was too low to cater for food requirement. [1] report that most of households in Sub Saharan Africa cannot produce enough food for use until the next farming season. Some of the stated reasons are drought, disease and pests, which are a result of climate change. Findings further show that land ownership was found to significantly be associated with vulnerability to food insecurity (p=0000). However. Adequacy of land had no significant relationship with vulnerability to food insecurity (p=0.062).

The study also found that, apart from owning land, some households were unable to cultivate even the little land they had. Of the 94 respondents who owned land, only 53% reported to have cultivated all the land in the farming season before the study (Table 6). Various reasons were given to explain households' inability to cultivate all their land. The three most important reasons for not cultivating all the household land were shortage of labour force in the household (30.4%), selling labour (19.6%), and inadequate money to manage the farm (16.1%). This was further attested by FGDs where it was reported that some of the households in the study area spend most of their time working in other people's farms so as to earn a living.

3.2.6. Misuse or Improper Handling of Available Food

How the harvested produce is used in the household was also found to be an important determinant of household vulnerability to food insecurity. Table 7 shows that of the 98 households, which had harvested crops, 28 (28.5%) used the harvested crop for food, 5 (5.1) sold it, whereas the remaining (66.4%) had multiple uses of the harvested crops. The chi-square analysis ($p = 0.000$) at $\rho < 0.05$ revealed a significant relationship between the number of uses of the crop harvests and household vulnerability to food insecurity.

Table 6. Distribution of Respondents by Land Size, Opinion on Land Size and Reasons for Not Cultivating All The Household Land

Variable	Non vulnerable		Vulnerable		Total		χ^2-test
	n	**%**	**n**	**%**	**N**	**%**	**P value**
Land size in hectares owned by the household (N = 100)							
No land at all	2	2.0	7	7.0	9	9.0	
<2	1	1.0	43	43.0	44	44.0	0.000
2 - 5	8	8.0	24	24.0	32	32.0	
>5	9	9.0	6	6.0	15	15.0	
Adequacy of land (N = 98)							
Yes	15	15.3	49	50.0	64	65.3	0.062
No	5	5.1	29	29.6	33	34.7	
Cultivated all the land in 2009/10							
Yes	12	12.8	41	43.6	53	56.4	
No	11	11.7	30	31.9	41	43.6	
Reasons for not cultivating all the land							
Inadequate labour force in the household	4	9.8	16	38.9	20	48.7	
Poor working tools	0	0	6	14.7	6	14.7	
Discouraged by the unpredictable rainfall	1	2.4	5	12.2	6	14.7	
Working as a casual labourer in other people's fields	0	0	3	7.3	3	7.3	
Inadequate money to manage the farm	0	0	4	9.8	4	9.8	
Fallowing for improving fertility	2	4.9	0	0	2	4.9	

Table 7. Distribution of Households by Common Uses of Harvested Crops (N = 98)

Common uses of harvested crops	Non-vulnerable		Vulnerable		Total		χ^2-test
	n	%	n	%	N	%	P-Value
Food	17	17.3	11	11.2	28	28.5	
Cash	0	0	5	5.1	5	5.1	
Food and cash/sold	3	3.1	17	17.3	20	20.3	0.000
Food and local brewing	0	0	27	27.7	27	27.7	
Food, local brewing and Ceremonies	0	0	18	18.4	18	18.4	
Total	20	20.4	78	78.6	98	100.0	

4. Conclusion and Recommendations

Millet is a staple food in the study area. In this regard, a household without enough millet to feed its members for the whole year was perceived food insecure even if it had access to other foodstuffs. Also, a household that depleted its millet stocks in less than 12 months was perceived food insecure while vulnerability was perceived as a state of being food insecure and/or being at risk of becoming food insecure. Based on local perceptions, 76% of the sampled households were found vulnerable to food insecurity whereas 24% were not. Besides, majority of the households were food insecure (63%) while only 37% households were food secure. Various factors were found to be associated with household vulnerability to food insecurity. These factors include household being headed by a very old person (70 years and above); lack of alternative sources of income; misuse or improper handling of the produced food; a household having dependents (children under 13 years and old persons of over 70 years old). Therefore interventions to improve food security and reduce vulnerability to food insecurity should address these factors and seek to improve millet production.

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List of Abbreviations

BDP	Bahi District Profile
FAO	Food and Agriculture Organization
FEWS NET	Farming Early Warning Systems Network
MDGs	Millennium Development Goals
WFP	World Food Organization

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