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FOOD AND WATER ACCESS PREDICTORS OF FOOD SECURITY AMONG RURAL HOUSEHOLDS IN LANGAI DISTRICT, NORTH-CENTRAL NIGERIA

Philip Adewale Adeoye[1, *], Tolulope Olumide Afolaranmi[1, 2], Mathilda Edmond Banwat[1,2], Esther Oluwapelumi Adeleke[3], Afolabi Oladejo[4] and Daniel A. Ogundijo[5]

[1]Jos University Teaching Hospital, Department of Community Medicine
Jos, Nigeria

[2]University of Jos, Department of Community Medicine
Jos, Nigeria

[3]Benue State University, Centre for Food Technology and Research
Makurdi, Nigeria

[4]Federal College of Forestry, Department of Pest Management Technology
Jos, Nigeria

[5]University of Bedfordshire, Department of Food and Nutrition Science
Luton, United Kingdom

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ABSTRACT

Research has shown that food insecurity in households and communities are increasing globally. More people are reported to now having difficulty in accessing safe and quality foods. This study assessed household food and water access as predictors of food security among rural households. This is a cross-sectional community survey which used validated tools to collect data among 201 households representing a total population of 1284 in Langai district. Levels of household food and water access were determined; and factors associated with food security were assessed using chi-square. Predictors of food security was assessed using multivariable logistic regression. P < 0,05 was adjudged significant. About 90 % of households own a farm; with almost two-thirds (62,2 %) of households acquiring their food from both self-production and market; and 73,6 % engaging in household agriculture. The majority (82,1 %) of the households sourced their water from boreholes and pipe-borne sources. Significant predictors of food security were lower expenditure on food (AOR: 2,19 [95 % CI: 1,5-4,61]; P = 0,038); not engaged in household agriculture (AOR: 2,88 [95 % CI: 1,09-7,59]; P = 0,032); had access to pipe-borne/borehole water (AOR: 2,76 [95 % CI: 1,15-6,44]; P = 0,023) and experienced little or no adverse coping behaviour (AOR: 6,07 [95 % CI: 1,74-21,23]; P = 0,005). Time did not influence food acquisition in the majority of the households. As reported and showcased in this study, the relationship between food security and rural household development is directly proportional in many local communities of a developing country. Efforts should be garnered towards rural household empowerment through improvement in livelihood and security to have sustainable foods and water.

KEY WORDS

food security, water supply, psychological adaptation, food expenditure, household agriculture

CLASSIFICATION

JEL: D12, Q18, Q25, R20

*Corresponding author, η: philipadeoye@gmail.com; +234 8062081617
Department of Community Medicine, Jos University Teaching Hospital, Jos. Plateau State. Nigeria

INTRODUCTION

Empirical studies showed that about 688 million of the world's population were undernourished in 2019 and projected to be 841,1 million by 2030 [1]. In 2020, between 720 and 811 million people were faced with hunger [2]. Food insecurity is a growing global concern, especially in low- and Middle-Income Countries (LMICs) [3-6]. This is because food insecurity has also been recognised as a major global public health challenge [6-8].

Food insecurity has been associated with several adverse health conditions, such as under-nutrition, obesity, micronutrient deficiencies, chronic diseases and generally poor physical and mental health [8-10]. Evidence shows that 51,6 % of the population had moderate-severe food insecurity in Africa compared to 7,9 % observed in North America and Europe [10]. These benchmarks are dependent of nations' food availability, accessibility, utilization, and stability. However, the level of food security assessment could be individual, household, community, national, regional, or global.

In the LMICs, growing population, natural disasters, climate change, insecurity relative to war, insurgency communal conflicts, increase in food demands were reported to affect household food security [8, 11-13]. Interventions toward improving food insecurity often do not trickle down to the grassroots due to the complex and vulnerable food supply chain and uneven distribution of wealth in the LMIC societies. In fact, existing studies have reported how people in these regions are affected with diet-related health conditions as a result of food insecurity they undergo [14-16]. Other factors such as ineffective transportation, inaccessibility to market and unavailability of clean, safe and adequate water supply were also reported as contributors to insecurity in rural populations [8, 12].

An existing study in this population has shown that a quarter of households were food insecure (diversity and frequency of food consumption); with higher economic vulnerability to food insecurity. Rising food prices were of greatest concern to this rural population [17].

This study aimed to critically evaluate and appraise food and water as predictors of food insecurity in the rural Langai district, and it formed a part of a larger study titled "Food security and vulnerability among rural Plateau Nigerian populations and associated factors: a community survey".

MATERIALS AND METHODS

Full description of the methodology has been described in an earlier publication [17].

Study design: this is a cross-sectional study that was conducted to assess food and water access predictors of food security among rural households in Langai district, North-central Nigeria.

Study area: Langai is a rural district in the Mangu Local Government Area of Plateau state (North-central Nigeria). As previously mentioned, Langai district is the site for the annual rural community diagnosis and community health action for the year 2019 by the Department of Community Medicine, Jos University Teaching Hospital [17]; it is also population of farming minorities in Nigeria; it is a region often bedevilled by incessant farmer-herder crisis a result of limited, and often dwindling resources, to accommodate subsistence arable farming and animal (usually nomadic) husbandry. It is the foremost settlement of the Pyem people as they settle down to life after early years tribal wars before establishing other settlements such as Gindiri and Mangu communities in Mangu local government area. So, studying this district might give hindsight to the struggle for food and water for the survival of locals in the face of the aforementioned challenges.

Pyem is a minority population and a dying language in Nigeria and Plateau state; the experience of whom should also be documented for equity. Pyem tribe and language is one of the two

major tribes/languages of Mangu Local Government Area of Plateau state after Mwaghavul tribe/language. It is the predominant tribe in the Gindiri area; spread across 25 communities/villages[1]. The population has increased from 7 700 in 1952 to 14 000 in 1973, up to its current estimated population of about[2] 25 500. In Langai district, the local predominant Pyem population is spread over three communities of Kadunun, Langai and Babban-Rinji [18, 19].

Commonly grown food crops include maize, Irish potatoes, local olive, coffee, strawberries, apples and vegetables among others. These crops which are often produced at subsistence level are for sale at local markets for onward distribution to farther markets by middlemen. A smaller proportion of what is grown is for domestic consumption[3].

Sample size determination: Cochran formula ($n = Z^2pqd^{-2}$) was used to calculate the minimum sample size [20]. Z = 1,96 at 95 % confidence level; p = 0,863, the proportion of food security in a previous study [21]; q = 0,137, the alternate outcome; d = acceptable error at 5 %. n = 181; adjusting for 10 % nonresponse, n = 199 households.

Sampling procedure: A multi-stage sampling approach was used. The district was selected having being a site for an intervention for community diagnosis. A simple random sampling was subsequently done by balloting the three communities that make up the district; and Langai was selected. All the households (n = 201) containing permanent residents, representing a population of 1284 persons, were surveyed for food security. The sampling units were the households, and adult females in the households were interviewed. This is because adult females are often the ones that can give insight into the state of food security in households and are often available during the day when surveys are usually carried out; especially in developing countries [22]. An adult female per household was interviewed and where we have more than one female in a household, simple random sampling by balloting was used to pick one. From a previous study: the average number of persons in Langai's households is 6 [IQR: 5-8], with a maximum of 13 and a minimum 1 and a mean of 6 (± app. 3); number of households at least 6 was 62,7 %, and at most 5 was 37,3 % [17].

Study instrument: The questionnaire was divided into water and food access, the practice of agriculture, access to markets, coping behaviours, household expenditure on food and food insecurity. The content of the questionnaire comprised Food Consumption Scores (FCS), Coping Strategy Index (CSI) and percentage expenditure on food. FCS majorly measures food quality over the last 7 days. It has a multi-country validation and correlates well with other objective measures of nutritional status and other measures of food security [23-26]. It is a proxy measure of household dietary quality and caloric intake [23, 25]. The CSI majorly measures food insecurity coping behaviours and food quantity security [23-27]. It has a multi-country use, well-grounded construct and correlates well with other measures of food security and measures of nutritional status [24, 25]. The Percentage expenditure on food was also taken to be a measure of food insecurity vulnerability. The higher the proportionate spending on food; the greater the probability of poor food access [24, 26, 27]. The questionnaire was piloted to establish the validity of the tools in similar population, and was translated into the native Hausa language and back-translated into English before the commencement of the study.

Data collection Procedures: Data collection was done using a validated questionnaire. Due to the rural demography of the study area with little or no access to internet, and low level of education of the study population, thirty well-trained data collectors who are fluent in both the native language (Hausa) and English were trained and used for collecting data from the participants. Participants who could not read nor write were assisted in filling out the questionnaire when the questions were read to them.

Data management and analysis: Data were curated from the paper-based questionnaire into and Microsoft Excel 2010 spreadsheet, and were later synthesized using SPSS version 21. The

composite scores of FCS, CSI and percentage household expenditures were obtained. FCS categorization includes poor (0-21), borderline (21,5-35) and acceptable (> 35) to describe the levels of food security [23, 26, 28]. Further classification into food secure and food insecure categories were made.[23] CSI categorization include low (0-50), medium (51-100) and high (>100) CSI categories [28]. Further classifications of adverse and no adverse coping behaviours were made. Percentage expenditures were categorized into low (< 50 %), medium (50-60 %), high (60-75 %) and very high (> 75 %) levels of vulnerability [24]. Further classifications of higher (very high vulnerability) and lower vulnerabilities were made. The dichotomous classifications of FCS, CSI and percentage expenditures were used in the multivariate regression. Full FCS, CSI and percentage expenditure on food scoring were described in an earlier publication [17].

Chi-square was used to determine the relationship between independent variables and levels of food security. In determining the predictors, earlier univariate logistic regression was done to identify the false discovery rate (FDR) odds ratio that was significant at omnibus $p < 0,10$ (as this is a 3-level regression analysis which generated 2 models predicting food security). Significant variables were loaded into the multivariate omnibus model to determine the significant adjusted predictors of food security at $p < 0,05$. The resulting models have a high predictive power (80,8 % and 80,1 %, respectively) and the Hosmer-Lemeshow Test is greater than 0,05. This shows those independent variables significantly predict food security.

Ethics: Ethics approval was obtained from the Plateau State Ministry of Health Ethics Committee, with the reference MOH/MIS/202/VOL.T/X. Study participation was preceded by written informed consent of each participant; after a thorough explanation and clarification of study aims. Participation in the study was voluntary; with confidentiality and anonymity of study participants assured.

RESULTS

Household water and food Access: In this study, majority (82,1 % and 87,6 %, respectively) of all households sourced their water supply from piped water/borehole, and within a 30 minutes walking distance from their households. Market and self-production were often simultaneously used for food acquisition among more than two-thirds (62,2 %) of households. Firewood was used by almost (94,5 %) of all households as a means of cooking energy. About 40 % of all households had both wife and husband decide on food expenditure; while 57,1 % determined the varieties of food consumed. Many (71,1 %) households have a means of storage of perishable food; with drying being the commonest (52,2 %) means of storage. Bagging was commonly used by almost two-thirds (58.7%) of households for the storage of non-perishable. The majority (86,4 %) were not affected by the duration (or distance) covered in the process of acquiring food. Many (73,6 %) were engaged in household agriculture. The majority (89,9 %) were owners of farms; with 54,6 % involved in arable farming only or arable and animal husbandry, Table 1.

Factors Associated with Household Food Security: All (100 %) 9 households, which is 4,5 % of the total households, utilizing other means (i.e., insecticide/pesticide use, burying and kitchen ceiling storage) of storing non-perishable food significantly reported food security compared to those using bagging and drying. The majority (75 %) that reported that time spent acquiring it does not influence food acquisition were significantly food secure compared to those with this concern. The majority (88,7 %) who were not engaged in agriculture around their households were significantly food secure compared to those who do. The majority (80,9 %) of those who have no adverse coping behaviour were significantly food secure, Table 2.

Table 1. Household Food and Water Access characteristics in Langai District (*n* = 201).

VARIABLES	*F* (%)
Means of water supply	
Well	32 (15.9)
Borehole/pipe-borne	165 (82.1)
Rain and streams	4 (2.0)
Time to get water (*n* = 194)	
< 30 minutes	170 (87.6)
≥ 30 minutes	24 (12.4)
Main source of food acquisition	
Self-production	57 (28.4)
Market	19 (9.4)
both	125 (62.2)
Source of cooking energy	
Charcoal	11 (5.5)
firewood	189 (94.5)
Decision on food spending	
Husband	67 (33.3)
Wife	52 (25.9)
both	82 (40.8)
Determination of food variety (*n* = 198)	
Husband	40 (20.2)
Wife	45 (22.7)
both	113 (57.1)
Storage of perishable food	
No	58 (28.9)
Yes	143 (71.1)
Major Means of storage of perishable food	
Drying	105 (52.2)
Smoking	15 (7.5)
Salting	8 (4.0)
Frying	1 (0.5)
Bagging	14 (7.0)
None	58 (28.8)
Major Means of storage of non-perishable	
Bagging	118 (58.7)
Drying	74 (36.8)
Others×	9 (4.5)
Duration influence on food acquisition (*n* = 198)	
No	171 (86.4)
Yes	27 (13.6)
Engagement in agriculture around Household	
Yes	148 (73.6)
No	53 (26.4)
Type of agriculture (*n* = 152)	
Animal husbandry only	69 (45.4)
At least arable××	83 (54.6)
Farm ownership (*n* = 199)	
No	20 (10.1)
Yes	179 (89.9)

×Delayed harvest, insecticide/pesticide use, burying, kitchen ceiling storage
××either arable farming only or both arable farming and animal husbandry

Table 2. Association between Household Food and water Access and Food Security in Langai District (*n* = 201).

VARIABLES	FCS (%)		χ^2	p-values
	Food Insecurity	Food Security		
Source of water			3.718	0.054
Well, rain and streams	12 (33.3)	24 (66.7)		
Pipe-borne/borehole	31 (18.8)	134 (81.2)		
Time to get water (n = 194)			2.204	0.138
< 30 minutes	34 (20.0)	136 (80.0)		
≥ 30 minutes	8 (33.3)	16 (66.7)		
Source of cooking energy			-	0.463[f]
Charcoal	1 (9.1)	10 (90.9)		
firewood	42 (22.2)	147 (77.8)		
Main source of food acquisition			-	0.376[f]
Market	2 (10.5)	17 (89.5)		
At least self-production[×]	41 (22.5)	141 (77.5)		
% Income expenditure on food			3.291	0.070
Lower vulnerability	23 (17.6)	108 (82.4)		
Higher vulnerability	20 928.6)	50 (71.4)		
Decision on food spending			0.059	0.808
Husband only	15 (22.4)	52 (77.6)		
At least the wife[××]	28 (20.9)	106 (79.1)		
Determination of food variety (n = 198)			1.409	0.235
Husband only	11 (27.5)	29 (72.5)		
At least the wife[×××]	30 (19.0)	128 (81.0)		
Storage of perishable foods			0.836	0.361
No	10 (17.2)	48 (82.8)		
Yes	33 (23.1)	110 (76.9)		
Means of storage of non-perishable food			7.180[L]	**0.029[f]***
Bagging	31 (26.3)	87 (73.7)		
Drying	12 (16.2)	62 (83.8)		
Others[××××]	0 (0.0)	9 (100.0)		
Duration influence on food acquisition (*n* = 198)			4.316	**0.038***
No	33 (19.3)	138 (80.7)		
Yes	10 (37.0)	17 (63.0)		
Engagement in agriculture around HH			4.342	**0.037***
Yes	37 (25.0)	111 (75.0)		
No	6 (11.3)	47 (88.7)		
Type of agriculture practiced (*n* = 152)			0.209	0.648
Animal husbandry only	18 (26.1)	64 (77.1)		
At least arable farming[×××××]	19 (22.9)	51 (73.9)		
Farm ownership (*n* = 199)			-	0.256[f]
No	2 (10.0)	18 (90.0)		
Yes	41 (22.9)	138 (77.1)		
CSI			8.705	**0.003***
Adverse coping behaviour	7 (53.8)	6 (46.2)		
No adverse coping behaviour	36 (19.1)	152 (80.9)		

×either self-production only or both self-production and market
××either the wife only or both husband and wife
×××|either the wife only or both husband and wife
××××delayed harvest, insecticide/pesticide use, burying, kitchen ceiling storage
×××××either arable farming only or both arable farming and animal husbandry
[f]Fisher's Exact Test
[L]likelihood ratio
*significance at p < 0,05

Water and Food Access Predictors of Food Security: The significant predictors from the final multivariable model revealed that households sourcing their water from pipe-borne, or boreholes were almost three times significantly more likely to be food secured compared to households who source their water from well and other sources. Households with lower expenditure (lower vulnerability) on food were two times significantly more likely to be food secure compared to those with higher expenditure and vulnerability. Households who do not practice household agriculture were almost three times significantly more likely to be food secure compared to those who do. Households who have no adverse coping behaviours were six times significantly more likely to be food secure (quality) compared to those who have adverse coping behaviours, Table 3.

Table 3. Multivariable Food and Water Access Predictors of Food Security in Langai District Northcentral-Nigeria (continued on p.205). OR^{+}/AOR^{+} is Odd Ratio/Adjusted OR.

VARIABLE	Univariate Logistic Regression		Multivariate Model I		Multivariate Model II	
	OR^{+} (95 % CI)	p-value	AOR^{+} (95 % CI)	p-value	AOR^{+} (95 % CI)	p-value
Source of water						
Pipe-borne/ borehole	2.16 (0.98-4.79)	0.058**	2.34 (0.96-5.71)	0.061**	**2.76 (1.15-6.44)**	**0.023***
Well/Rain and streams (ref)	1		1		**1**	
Time to get water						
< 30 minutes	2.00 (0.79-5.06)	0.143	--------	---	--------	---
≥ 30 minutes (ref)	1					
Source of cooking energy						
Charcoal	2.86 (0.36-22.96)	0.323	--------	---	--------	---
Firewood (ref)	1					
Main source of food acquisition						
Market	2.47 (0.55-11.14)	0.239	--------	---	--------	---
At least self-production[×] (ref)	1					
% Income expended on food						
Lower vulnerability	1.88 (0.95-3.73)	0.072[ϕ]	**2.17 (1.03-4.58)**	**0.041****	**2.19 (1.05-4.61)**	**0.038***
Higher vulnerability(ref)	1		**1**		**1**	
Decision on food spending						
At least wife[××]	1.09 (0.54-2.22)	0.808	--------	---	--------	---
Husband only (ref)	1					
Determination of food variety						
At least wife[×××]	1.62 (0.73-3.60)	0.238	--------	---	--------	---
Husband only (ref)	1					
Storage of perishable foods						
No	1.44 (0.66-3.16)	0.362	--------	---	--------	---
Yes (ref)	1					

Table 3. Multivariable Food and Water Access Predictors of Food Security in Langai District Northcentral-Nigeria (continuation from p.204).

VARIABLE	Univariate Logistic Regression		Multivariate Model I		Multivariate Model II	
	OR+ (95 % CI)	p-value	AOR+ (95 % CI)	p-value	AOR+ (95 % CI)	p-value
Duration influence on food acquisition						
No	2.46 (1.03-5.86)	0.042ϕ	1.89 (0.75-4.79)	0.180	--------	---
Yes (ref)	1		1			
Engagement in agriculture around HH						
No	2.61 (1.03-6.60)	0.043**	**2.76 (1.04-7.36)**	**0.042****	**2.88 (1.09-7.59)**	**0.032***
Yes (ref)	1		**1**		**1**	
Farm ownership						
No	2.67 (0.60-12.01)	0.199	--------	---	--------	---
Yes (ref)	1					
Type of agriculture practiced						
At least arable farming××××	1.19 (0.57-2.50)	0.648	--------	---	--------	---
Animal husbandry only (ref)	1					
CSI						
No Adverse coping behaviour	4.93 (1.56-15.55)	0.007**	**5.94 (1.71-20.67)**	**0.005****	**6.07 (1.74-21.23)**	**0.005***
Adverse coping behaviour (ref)	1		**1**		**1**	

×either self-production only or both self-production and market
××either the wife only or both husband and wife
×××either the wife only or both husband and wife
××××either arable farming only or both arable farming and animal husbandry
*significance at $p < 0,05$
**significance at $p < 0,10$ which were included in the multivariable models

DISCUSSION

The majority of the households in the district source their water from water pipes or boreholes. This is similar to studies from the Southern province of Zambia, Mongoro in Tanzania and Pune in India where water is sourced from improved sources [29, 30]. On the contrary, less than half of all households in rural areas of western Kenya and Kahemba-DRC have access to a safe water source just two weeks before a study was conducted [30, 31]. Similar to the current study, the majority of the rural households in western Kenya have their water sources within 30 minutes from their households [31]. These differences might be due to the various water project that the state government of the study area had been involved with over the years and seasonal variations when the studies were done. Access to safe water supply has been said to improve health, economic development and gender empowerment; especially among women and girls who usually bear the burden of household water availability [29, 31].

The high number of participants that were seen to engage in household agriculture in our study is higher than those reported in the rural areas of Myanmar [32]. Household agriculture and ready access to markets might be responsible for our study's households' perception that time does not affect food acquisition. Household agriculture plays important role in achieving social capital, ready access to fresh farm produce, dietary diversity, sustainable income, and food security. It however needs long-term technical and financial support for it to be successful [9].

Similarly, the practices of the observed households in the current study that bag or dry their non-perishable agricultural products during storage is similar to how the storage of agricultural products is practised in many LMICs. This practice increases the risk of vermin (flies, birds, and rodents) coming in contact with food products which can lead to post-harvest loss and food-borne diseases. Globally, Asia and sub-Saharan Africa account for the highest burden of incidence, disability-adjusted life and mortality of foodborne diseases [33].

The low expenditure on food that is a significant predictor of food security among households in Langai district is consistent with similar Nigerian study [34]. However, a higher level of risk has been reported in rural and urban Free State South Africa [9]. Contrariwise, lower levels of expenditure have been reported in all the regions of Yemen [24]. Despite higher expenditure on food among rural households, they however have a lower per capita expenditure on food and higher transaction cost compared to their urban counterparts. Poverty and rurality have therefore increased household vulnerability to food insecurity [9].

Access to quality water (pipe-borne/borehole) that was found to be a significant predictor of food security in our study is similar to existing studies of the rural Lesotho, Kenya, South Africa, and elsewhere [9, 30, 35, 36]. For example, Brewis et al. [30] reported that an increasing water quality and quantity and reduced time spent on getting it significantly predict household food security. This is because food production and preparation require adequate access to quality water which may limit household access to food of sufficient quantity, quality and choice. The need to procure and treat water can significantly affect household income and food budget thereby giving those of lower socioeconomic status limited choice but to cut food budget and divert such funds and time towards water procurement [30]. Effort spent procuring water undermines households' activities towards mitigating food insecurity. Limited access to safe water can render food unsafe with adverse nutritional outcomes and a higher burden of diseases [30, 36-38].

A lower household expenditure on food that significantly predicts rural Langai household food security in this study is also consistent with the findings reported in Tanzania, Uganda, Ukraine etc. [3, 39-41]. For example, an analysis of food security in Ukraine during periods of economic instability shows that the most significant of total household expenditure was food expenditure having been increasing over the years with consequential reduction in calorie intake over the years [41]. It has been said to be the strongest single predictor of food insecurity and underlies the vulnerabilities of small-holder farmers to food insecurity in a cross-country analysis of food securities globally [3] This has been said to be due to storage losses, climate change, market failures, increasing cost of food, lack of access to banking credits, reduced income and reducing affordability leading to increased household expenditure on food and food insecurity [3, 41]. Further disaggregation of data revealed that the poorer households and nations reported higher food budget share and lower levels of food security compared to the richest households and high-income countries [9, 40, 42]. The food consumed by these poorer households is usually basic, mostly cheap calories which are nutritionally empty which are the main drivers of malnutrition in many countries [40, 41]. In addition, according to Engel's law, poorer households tend to spend a larger share of their budget on food to avoid starvation compared to richer households [42].

This study is one of the few that showed that household farming is associated with food insecurity. An example is the Canadian study [43] among vulnerable populations that showed that most families participating in gardening were moderate to severely food insecure. A systematic review on food security in South Africa also concluded that household farming or gardening does not ensure food security [9]. This may be because yield may not be adequate to ensure food security; may require long-term support to be successful; often practised with limited plot sizes; crops and animals are often at risk of theft, pests and diseases; limited

marketing opportunities; social and cultural barriers; households more likely to sell agricultural products to meet other family needs than to improve food consumption, especially among low-income households [9, 44-46]. However, adequately and well-supported household agriculture has been shown to reduce hunger, reduce adverse coping behaviour, improved food consumption, reduced proportionate spending on food, improved food diversity, improve household income, have beneficial effects on the environment, improve access to fresh produce thereby improving general well-being, especially of vulnerable populations and households [9, 32, 43-46].

As showcased, this study demonstrates that households having no adverse coping behaviour is a significant predictor of food security. Similar observations have been made in South Africa, south-eastern Malawi and Bangladesh, [4, 9, 46-48]. In Bangladesh, for example, moderately and severely food-insecure households are more likely to adopt adverse coping strategies compared to food secure households [48] Compromising coping strategies adopted by food-insecure households include reduced frequency, quality and size of food consumption [4, 9, 46, 47]. Others include begging from neighbours, purchasing food on credit, and using savings to cover food expenses [47]. With deepening adversity and vulnerabilities, households begin to sell off their agricultural and fixed assets and females begin to engage in transactional sex [48, 49].

Results from this study may only apply to the study population and may not be generalizable to the whole state or nation. However, food security in this study is similar to the national average; and can be said to provide an understanding of local and household food security experiences. This may help inform policymaking and the design of interventions by policymakers and non-governmental organizations. Social desirability bias might be present in this study as individuals may be embarrassed to reveal their 'failings' at ensuring food security of their households as this study relies on self-reports of food security measures. Thus, future research may use objective and direct measures of food security to be able to determine the internal validity of subjective measures in populations. Also, the impact of food security (and otherwise) may be studied, especially among vulnerable members of households. Causal relationships cannot be established in this study; however, the study has added to the body of knowledge about predictors of food insecurity among rural households. A longitudinal study of food security trends and interventions to mediate this will be of utmost importance to delivering interventions to rural communities.

CONCLUSIONS

A lower budget share on food, not engaged in household agriculture, having access to safe water supply and little or no adverse coping behaviours were significant predictors of food security in the study population. There should be improved support for agriculture or household agriculture as a means of addressing food security. This should include agricultural extension services for improving agricultural practices and yield through the use of low-tech approaches and the use of indigenous crop varieties. Improving home agriculture will indirectly improve women's empowerment as women are generally involved in home agriculture in many parts of the world. This will expand the household fiscal space for improved per capita food purchase while reducing budget shares for food consumption among vulnerable households and reducing the financial barrier to healthy eating. With increasing vulnerabilities, worsening security situations and economic hardship in many parts of the world, households might be left with adopting food and financial coping strategies in the face of rising food insecurities many parts of the world. Government should ensure that highly vulnerable households have sustained agricultural and financial support to weather household food insecurity.

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REMARKS

[1]http://www.rogerblench.info/Language/Niger-Congo/BC/Plateau/Southeast/Fyem/Fyem%20wordlist.pdf.

[2]https://www.endangeredlanguages.com/lang/5303, and https://www.peoplegroups.org/explore/GroupDetails.aspx?peid=13784.

[3]https://www.plateaustate.gov.ng/uploads/Investing-in-Plateau-State-OSS-booklet.pdf.

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