Household characteristics and food insecurity and their association with nutritional outcome of under-five children of a rural farming community of Sokoto State, Nigeria.

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Abstract

Background: Malnutrition is a global problem and continues to be one of the major health problems among children particularly for the poor and underprivileged as poverty remain a fundamental cause of household food insecurity and consequently malnutrition.

Objective: To determine household characteristics, food Security status and their association with nutritional status of under five children of a rural community.

Methodology: A community-based descriptive cross-sectional study was conducted among 200 households' in a rural community. Sampled households with eligible children were selected using multistage sampling technique. Interviewer-administered questionnaires were used to collect data through face-to-face interview. Data was analyzed using SPSS version 23.0. Both univariate and bivariate analyses were carried out. Statistically significant level was set at $p<0.05$.

Results: Respondents average age was 42; IQR: 33-51 years. Nearly two-thirds (62.8%) had only Qur'anic education. More than three quarters (86.8%) of respondents experienced food shortage in the recent past, 47.9% are food insecure and 24.5% of the under-five children were acutely malnourished. Respondents' age (p=0.001); households head educational level (p=0.001); family composition (p=0.001); type of household food insecurity suffered (p=0.001) showed statistically significant association with children nutritional status.

Conclusion: A significant proportion of the households head are of low-social status and food insecure. Majority of households in the recent past experienced food shortage and a quarter of under-five children were acutely malnourished.

Keywords: Households characteristics, Food security, Nutritional status, Rural community.

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Introduction

Freedom from hunger and malnutrition is a basic human right and their alleviation is a fundamental prerequisite for human and national development [1]. Sustainable development goals 1 and 2 focus on the eradication of extreme poverty and hunger, achieving food and nutrition security and making agriculture sustainable [2]. Malnutrition is one of the major public health challenges in developing countries. Usually referred to as a silent emergency, it has devastating effects on children, women, society and future humankind [3]. Low socio-economic status is highly related to household nutritional status. Characteristics of low socio-economic status are reflected in low monthly household income, low income per capita, low educational level, unemployment among adult members and large households [4]. Malnutrition is typically associated with low-income, poverty, food insecurity, limited access to health care and lack of sanitary conditions [5]. These associations are particularly salient in Africa where malnutrition continues to be a major public health issue [6,7]. Studies have identified poverty as the chief determinant of malnutrition in the developing country that perpetuate into inter-generational transfer of poor nutritional status among children and prevent social improvement and equity [8,9].

Food insecurity is a worldwide problem. A household is considered food insecure if it has limited or uncertain physical and economic access to secure sufficient quantities of nutritionally adequate and safe foods in socially acceptable ways to allow household members to sustain active and healthy living [10].

It is common for low-income households to experience food insecurity, as poverty is the principal cause of food insecurity and consequently malnutrition [11]. The food security problem in Nigeria is pathetic as more than 70 percent of the populace lives in households too poor to have regular access to the food that they need for healthy and productive living [12]. Studies done in Nigeria revealed that between 37.8 and 63% of households are food insecure and therefore unable to meet the recommended daily per capital calorie requirement [13,14]. A study from Bangladesh revealed that 33.3% of the surveyed households were found to be food insecure and could not get the minimum and above recommended calorie level per capita per day [15]. Children from food insecure households have higher probability of being underweight and stunted than those from food-secure households [16]. A study done in Kelantan showed that prevalence of underweight, stunting, and wasting among children from food insecure homes in Kelantan were

61.0%, 61.4% and 30.6%, respectively [17]. Nepal study reported greater number of malnourished children in food insecure households, with slightly higher prevalence rates of stunting and underweight, though the prevalence of wasting was almost similar in food secure and insecure households [18].

Nigerian government through its economic diversification efforts invested heavily on agriculture to boost food production for self-sufficiency and improvement in nutritional wellbeing of households. Therefore, it is with this background that the study was conducted to assess the household characteristics and food insecurity status and their association with nutritional status of under-five children in a rural farming community of Sokoto state. The study objectives are: 1) To assess the food insecurity status in the community; 2) To measure the nutritional status of the children and 3) To determine the association between the household characteristics, food insecurity status and nutritional status of under five children.

Methods

The study was conducted in a rural community in Wamakko Local Government Area (LGA) of Sokoto State from January to March 2018. A community-based descriptive cross-sectional study was conducted among households' head whose predominant occupation is farming. The criteria selection in the study was being household head, farmer, resident of the study community and willingness to participate in the study. The required sample size for the study was determined using the formula, n=Z2pq/d2, Where; n=minimum sample size desired; Z=standard normal deviate corresponding to Z value at alpha level of 0.05=1.96; p=prevalence or proportion of factor under study in the previous similar study; q=complimentary probability of p=1-p; d=level of precision=5%=0.05 [19].

A multistage sampling technique was used to select the study respondents. Interviewer-administered questionnaire with closed ended questions were used to collect field data through face-to-face interview. The questionnaires were pretested in a farming community in another LGA.

All the household heads gave verbal consent prior to data collection. The questionnaire consisted of three sections: Socio-demographic characteristics; assessment of food security using a validated Radimer/Cornell Hunger scale [11]. The anthropometric measures such as weight, height and mid-upper arm circumference (MUAC) were taken. Weight and height of the children were measured using a weighing scale and a stadiometer while MUAC using Shakir's strip. The measurement procedures for MUAC were adopted from the National Guidelines for Community Management of Acute Malnutrition [20]: the left arm of the child was bent at right angle; located the tip of shoulder (acromion) and elbow (olecranon); measured the distance between the two points and located the midpoint; with the left arm relaxed, wrapped the tape around the midpoint and measure the circumference in centimeter and also noted the color coding. Data collected ensured that the measuring tape was snugged against the skin without pinching or leaving gaps. A MUAC of less than 11.5 cm (red) was adjudged severe acute malnutrition, MUAC of greater than 11.5 cm and less than 12.5 cm (yellow) as moderate acute malnutrition and MUAC of 12.5 cm and above (green) as being normal. For the purpose of this study, the dependent variable, nutritional status, was categorized into Normal MUAC of 12.5 cm and above (green) and malnourished as MUAC of less than 12.5 cm.

Statistics

Data was entered and analyzed using SPSS Version 23.0. Respondents' age was summarized using median and interquartile range. Categorical data were expressed in frequencies and percentage. Chi square test of association was performed to identify the respondents' socio-demographic characteristics, household characteristics and food insecurity status that were associated with under-five nutritional status in the community. The level of statistical significance (alpha error) for the test was set at $p<0.05$. Ethical permission to conduct the study was sought and obtained from the Sokoto State Research Ethics Committee. Permission for community entry was obtained from the LGA and village head while consent was obtained from individual household heads before questionnaires was administered.

Results

Respondents' average age was 42; IQR:33-51 years. Those aged between 40-64 years were more represented, while age group 25 to 39 years accounted for 42.0%. All respondents are Muslims and most (96.5%) of them are Hausas. Nearly two thirds (62.8%) had only Qur'anic school education, 16.6% had secondary education while only 6.5% had tertiary level of education. Almost (88.2%) all the respondents have off-farm activities like trading and artisan (Table 1).

Table 1. *Socio-demographic characteristics of the respondents.*

Variables	Number	Percentage
Age group (years)		
22-24	1	0.5
25-39	84	42
40-64	102	51
≥ 65	13	6.5
Religion		
Islam	200	100
Tribe		
Hausa	192	96.5
Fulani	5	2.5
Others	2	1
Educational level of Household head		
Qur'anic school only	125	62.8

Primary school	28	14.1
Secondary school	38	16.6
Tertiary school	13	6.5
Off-farm Activity		
Trading	76	39.4
Artisan	60	31.1
Civil servant	26	13.5
Nothing	22	11.8
Others	9	4.2

Almost all the households (99.5%) are male headed and 39.9% of the families are polygamous. Households' young and adult dependents population was 679, with a population dependent ratio of 1.4. Millet is the commonest staple food produced in the area and more than half of the respondents (57.4%) felt the quantities of food produced were inadequate. Almost half (47.5%) of the households were food insecure and 24.5% of children below five years in the households were malnourished as 55.1% of this figure had severe acute malnutrition (Table 2).

Table 2. *Household characteristics and under five nutritional status.*

Variables	Frequency	Percent
Head of household (n=199)		
Men	198	99.5
Women	1	0.5
Family composition (n=198)		
Monogamous	119	60.1
Polygamous	79	39.9
Household dependents		
0-14 years	185	92.5
65 and above years	67	33.5
Type of farm produce annually		
Cereals (maize, Millet, guinea corn, rice)	193	96.5
Legumes (beans, g/nut etc.)	155	77.5
Vegetables/fruits	18	9
Perception of Quantity produced		
Marginal amount	60	30.5
Inadequate amounts of food	113	57.4
Adequate amount	24	12.2
Average Household Monthly income (n=172)		
Below poverty index	20	11.6
Above poverty index	152	88.4
Sources of the household income		
Farming	177	89.8
Livestock keeping	59	29.9
Household labour	28	14.2
Small businesses	96	48.7
Children support	3	1.5
Pension payment	1	0.5
Others (specify)	1	1
Food security status (n=200)		
Food secured	105	52.5
Food insecure	95	47.5
Under 5 nutritional status (n=190)		
Malnourished	49	24.5
Normal	141	75.5
MUAC values (n=49)		
Red	27	55.1
Yellow	22	44.9

Nearly all the respondents (92.9%) own a farmland, of which more than three quarters (88.3%) obtained the lands by inheritance. More than three quarters (86.8%) of the respondents experienced food shortage in the recent past. Inadequacy of farmland and lack of other resources to facilitate farming activities were largely identified as a key contributing factor by 47.9% and 38.2% of the respondents respectively (Table 3).

Table 3. *Availability and adequacy of land.*

Variables	Frequency	Percentage
Ownership of a farm land		
Yes	183	92.9
No	14	7.1
Source of the land		
Inheritance	143	88.3

Purchase	17	10.5
Gifts from relatives or friends	2	1.2
Non-owners source of land		
Hire	11	78.6
Borrow	3	21.4
Availability of stores/ local silos for farm produce		
Yes	183	92.9
No	14	7.1
Experienced food shortage		
Yes	165	86.8
No	25	13.2
How often did you experience the shortage (n=165)		
Most time of the year	25	20
Some times	72	41.1
Occasionally	68	38.9
Contributing factors to occurrence of food shortage (n=165)		
Lack of adequate land	79	47.9
Lack of other resources to facilitate farming activities	63	38.2
Low harvest due insect infestation	13	7.9
Limited access to land ownership	9	5.5
Female headed household	1	0.5
Coping method adopted during food shortage (n=165)		
Purchased food to supplement own production	137	83
Sold assets especially land and livestock to buy food	14	8.5
Rationed household consumption	5	3.1
Dietary changes (meal skipping)	3	1.8
Altered household food distribution (considered vulnerable)	3	1.8
Migrated to neighbouring area for paid labour	3	1.8
Allocation of household expenditure		
Food purchase	182	94.8
Other home expenses	113	58.9
School payment	25	13
Health care	24	12.5
Purchase of agricultural inputs like fertilizers, seeds	14	7.3

Slightly above half (52.0%) of the households produce their own food. Less than two-third (59.8%) of the households' current food stock can only last between four and six months. Reasons were: little or no alternative sources of income, small farm size, shortage of labour due to few members of the household and large number of dependents (Table 4).

Table 4. *Household access to food.*

Variables	Frequency	Percentage
Household methods of access to adequate food		
Direct access method (produce own food)	103	52
Produce and purchase food stuff	93	46.9
Transfer from relatives/friends	2	1.1
Accessible resources for direct food production		
Sufficient and fertile land	76	38.2
Labour	98	49.2
Tools (improved technology)	41	20.6
Seeds	20	10.1
Credit	6	3
Knowledge to grow crops and raise animals	18	9
Means of procuring food		
Bartering	69	35.2
Purchase	179	91.8
Food-for-work	3	1.5
Sell assets such as small livestock	20	10.3
Engage in wage labour	4	2.1
Receive food as gifts	8	4.1
Transfers from relatives/friends	3	1.5
Women involved in farming activities		
Yes	3	1.5
No	193	98.5
Form of farming activities engaged		
Subsistence farming activities,	3	100
Available food adequate till next harvest		
Yes	14	7.1
No	184	92.9
Time foodstuff can last the household (months)		
2-3	31	15.6
4-6	119	59.8
7-11	49	24.6
Reasons foods cannot last household till next harvest		
I have a small farms	41	31.1
Shortage of labour due to few number the household	15	11.4
Many dependents within the household	31	23.5
Have little or no alternative sources of income	45	34.1
Conduct of land clearing and preparation including planting, weeding and harvesting		
Myself	86	43.4

My children	29	14.6
Myself and my children	77	38.9
Engage labourers	111	56.1

Crop failure resulting from low rain or pest infestation (62.0%), lack of other source of income (36.0%) and market fluctuations (32.5%) were the commonest problems that affect household food supplies. Majority (55.5%) of the households experienced transitory food insecurity while 44.5% suffered seasonal food insecurity. More than three quarters (83.5%) of households were able to regain food supply quickly after food shortage (Table 5).

Table 5. *Household food supplies stability.*

Variables	Frequency	Percentage
Common problems encountered		
Crop failure resulting from low rain or pest infestation	124	62
Lack of other source of income	72	36
Market fluctuations such as sudden price rise	65	32.5
Loss of productive capacity because of sudden illness	1	0.5
Regain adequate food supply after shortage		
Yes	167	83.5
No	33	16.5
Risk faced with the farming activities		
Lack of fertilizer	139	69.5
Pest infestation	60	30
Lack of improved seeds	48	24
Poor access to irrigation	48	24
Large, sudden price rises	14	7
Lack of market	13	6.5
Lack of storage facilities for the harvested farm product	12	6
Illness that affect my work	5	2.5
Type of food insecurity suffered by the household		
Transitory food insecurity	111	55.5
Seasonal food insecurity	87	43.5
Chronic food insecurity	2	1

Chi square test of association revealed that respondents' age group (p=0.001); household head educational level (p=0.001); family composition (p=0.001); perception of quantity produced (p=0.02); type of household food insecurity suffered (p=0.001) showed statistically significant association with under five nutritional status (Table 6).

Table 6. *Relationship between under-5 nutritional status and household characteristics.*

Variables	Under 5 Nutritional status		
	Normal, n (%)	Malnourished, n (%)	Test statistic and p value
Household head			
Man	151 (100)	48 (98.0)	X^2_{LR}=0.55

Woman	0	1 (2.0)	df=1; p=0.46
Age group (years)			
≤ 24	0	1 (2.0)	Fisher Exact=115.17 p=0.001
25-39	37 (24.2)	28 (57.2)	
40-64	99 (65.3)	19 (38.8)	
≥ 65	16 (10.5)	1 (2.0)	
Educational level of household head			
Qur'anic school only	108 (71.6)	27 (54.8)	Fisher Exact=71.29 p=0.001
Primary school	19 (12.6)	8 (15.4)	
Secondary school	14 (9.5)	11 (23.1)	
Tertiary	10 (6.3)	3 (6.7)	
Other activities other than farming			
Civil servant	20 (13.2)	8 (13.7)	Fisher Exact=4.40 p=0.35
Trading	51 (40.7)	19 (38.2)	
Artisan	40 (26.4)	17 (35.3)	
Nothing	25 (16.5)	3 (6.9)	
Others	5 (3.3)	2 (4.7)	
Family composition			
Monogamous	65 (43.2)	37 (75.7)	X^2=15.60 df=1; p<0.001
Polygamous	86 (56.8)	12 (24.3)	
Farmland ownership			
Yes	145 (95.7)	44 (90.4)	X^2_{LR}= 2.43 df=1; p>0.14
No	6 (4.3)	5 (9.6)	
Perception of Quantity produced			
Marginal amount	50 (33.1)	10 (20.4)	X^2=7.92 df=2; p<0.02
Inadequate amounts of food	77 (51.0)	36 (73.5)	
Adequate amount	24 (15.9)	3 (6.1)	
Food security status			
Food Secured	49 (32.6)	16 (32.4)	X^2= 0.001 df=1; p>0.14
Food Unsecured	102 (67.4)	33 (67.6)	
Type of food insecurity suffered			
Transitory food insecurity	98 (64.9)	11 (22.4)	Fisher Exact =27.85 p=0.001
Seasonal food insecurity	51 (33.7)	36 (73.5)	
Chronic food insecurity	2 (1.4)	2 (4.1)	

Discussion

Child malnutrition has been a long-standing public health problem and serious socioeconomic challenges in the many developing countries. Nutritional status is an element of household food security and lack of access to food influences intake of food and this will consequently impact on health and nutritional status of household [21].

A significant proportion of the households were found to be food insecure even though only about a quarter of under five children in the surveyed households were found to be acutely malnourished. As long as the households continue to experience food shortage and insecurity, malnutrition will remain an endemic problem. But for the deep rooted northern culture that encourage sharing of resources with less privileged

and vulnerable, food transfers from friends and relatives could explain the disparity between insecurity and number of malnourished in the community. Respondents' were largely farmers and their predominant means of land ownership is through inheritance, which implies that average size of each household landholdings continue to steadily decline over the successive family generation. Non-members of the community are not likely to have access to farmland at all or must pay heavily to obtain it. Also because of the prevailing economic hardship and fluctuating prices of foodstuff, many of hitherto non-farming working populations engage in agriculture as a marginal economic activity further depriving the poor farmers. The farmers are left with insufficient farmland, coupled with pest infestation and large dependents to cater for will continue to be a trigger of observed pattern of food shortage and insecurity. Land continues to be a critical determinant of the socioeconomic position of rural families and thus a critical determinant of food security and nutritional status of the households. An earlier study in Sokoto among farming communities along Rima basins, revealed more serious insecurity status of 59% among households. The study was conducted following flood disaster which resulted in mass destruction of farm lands, stored food items and livestock [22]. Similar study in North central Nigeria revealed more serious level where nearly two thirds (64%) of households were food insecure [23]. The large gap between the two zones is due to the fact that in Sokoto state many farmers engage in both wet and dry season farming whereas in the central region most of the farmers predominantly farm during the raining season. Food availability, accessibility and supplies stability are key elements of food security. Availability and adequacy of farmland among other factors will influence food availability at household level. Others are land acquisition pattern and decreasing soil yield, as there is no opportunity for land fallowing to regain lost mineral content coupled with poor access to farm input such as fertilizer to boost their yield. This study revealed that inadequacy of farmland, lack of resources to facilitate farming activities and insect infestations were contributing factors to the food shortage which have potential to lead to malnutrition.

Most of the households have very poor due low average monthly income, which is shared with other competing needs within the household. Similarly, lack of other income generating activities forced the farmers to sell nearly half of their harvest to meet up with other household expenditures. All these factors interplayed and resulted to food shortage. Although majority of household heads produce are subsistent, some are able to achieve commercial production while few receive gifts from families and friends. Therefore vast majority of household do not have access to adequate amount of food due to poor alternative sources of income, small farm size, large number of dependents resulting from polygamous nature of family system and lack of inputs to facilitate farming. The low purchasing power of the household heads and populated household with largely young dependent age group contributed negatively to food availability and access. Similarly, a multiagency study done on food consumption pattern in rural area of northern Nigeria showed that 65.7% of the respondents purchase food while few get their food from farming [24]. Entrenched irrigation farming system in Sokoto provide opportunity for many farming families to access food from their farms whereas some other northern communities focus more on wet season farming, as such many of resident have rely on market purchase.

Household heads' age, household heads' educational level, family composition and type of household food insecurity suffered were associated with under five nutritional status. And composition of the household family being the key determining factor of household under five nutritional status. Islamic religion has a great influence on cultural values and beliefs including marriage and family norms of the respondents. All the respondents are Muslim and Islam encourages polygamy, which result to large family size. Although the large family size is supposed to be an advantage with respect to contribution to family income but many are young dependents. Findings from a similar study from North Western Nigeria showed that household size was a major determinant of food security [25]. This is in contrast to findings in another study in Ondo State, South West Nigeria where household income was the only determinant of food security [26]. Households in Ondo are predominantly civil servant and largely rely on market purchase from family income unlike Sokoto where farming is the predominant occupation. Another study in Pakistan identified family income level as the most decisive variable for food security [26]. Findings from another study showed that household characteristics are strong predictors of both acute and chronic indicators of nutritional status and those households with poor socio-economic characteristics such as those with less access to adequate food for all members, or resident in low-income neighborhoods are likely to have children with poor growth [27].

Sokoto state is one of the states with high under five malnutrition and currently being supported by development partners in community management of acute malnutrition. Improving household nutrition through intersectorial collaboration is one of the cardinal principles of primary health care. Therefore to combat malnutrition means that every household must have access to food in quantity and quality and ensure the food supply is stable.

Conclusion

There is high level of food insecurity and malnutrition in the rural communities especially from food insecure household. Households were characterized by low educational status and level, large family size and large young dependents and low average monthly income. In view of study findings, it is recommended that government should support the farmers with basic inputs including credit facilities to facilitate farming activities while farmers are also sensitized to engage in other profitable off-farming activities to complement their income generation.

Conflict of Interest

The author declares no competing interests.

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