

## SOCIOECONOMIC CORRELATES OF HOUSEHOLDS' DIET DIVERSITY IN NORTH-CENTRAL NIGERIA

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### ABSTRACT

*This study examined the relationship between socioeconomic characteristics and households' diet diversity. Based on a multi-stage random sampling technique, the data collected from 494 household heads via a well-structured questionnaire were analyzed using descriptive statistics and ordinary least square regression. The result showed that, most of the respondents are still within their active ages (mean = 48.82 years) with an average farming experience of 28.61 years. The average household size was 6.21 house members and the average farm size was 2.76ha. The average annual farm income was ₦1,305,600 and the average monthly off-farm income was ₦17,350. Most of the respondents (89.68%) were male and majority of them (90.08%) lack access to credit facilities. Majority of the respondents (54.05%) had no formal education, and most of them (78.8%) leased the land used for farming operations. Majority of the households (62.4%) had medium diet diversity scores, and their diet was characterized by high intake of root and tubers, cereals, vegetables, oil and fats, and pulse, legume and nuts, and low intake of milk and dairy products, egg and poultry products, meat, fish and other sea foods. The study further revealed that age (-.034), household size (-.075), educational status (.414), off-farm income (.561), farm income (.260) and sex of household head (.461) are the important socioeconomic factors influencing households' diet diversity. This study concludes that, diet diversity is just at average in the study area and requires significant improvement. Also, the average diet diversity is characterized by high intake of starchy foods and low intake of animal source foods which is an indication of low quality diet. Therefore, food security intervention need to focus not only on the quantity of foods but also on their quality and varieties to ensure an active and healthy living. Furthermore, more attention need to be dedicated towards improving the farming households' education status and access to credit as these factors might enhance their productivity, and consequently, their diet diversity.*

**Keywords:** Diet diversity, food group, socioeconomic characteristics, farming households

### INTRODUCTION

Extensive focus on the whole pattern of food intake as a measure of dietary quality is now gaining considerable attention. This is because nutrient in diets are not consumed in isolation and they interact in a complex way, affecting health and productive outcome (D'Auria et al., 2020).

Dietary diversity has been identified as a key element of diet quality, as eating a variety of foods facilitate adequate intakes of important nutrients and enhance general wellbeing (Ruel, Harris, and Cunningham 2013). Diet diversity pertains to the number of different foods or food groups consumed by an individual or household over a specified period of time (Venter et al., 2019). It involves increase in the intake of different food groups as a way of minimizing nutrient deficiency (Gokhale and Rao, 2022). Tackling nutritional deficiency depend not only on better access to food but also on higher dietary diversity (Headey and Ecker, 2013). In fact, more diverse diets have been reported to have positive influence on lower rates of nutritional problems by facilitating adequate intake of essential nutrients and promoting good health (Popkin and Slining, 2013). The consumption of various food groups promotes the intake of different nutrients which can help to prevent diseases like diabetes, obesity, visual impairments and other related diseases (World Health Organizations, 2013).

Studies have reported mixed findings on the degree of diet diversity, particularly among farming households, refugees, pregnant women and university students. Mukhtar (2020) conducted a study on the dietary diversity of farming households in Kano State, Nigeria. The finding from the study revealed that about 6% of the households fall under low diet diversity category, around 41% are within the medium dietary diversity category and majority of the household (53%) fall under the high dietary diversity group. Mbwana et al., (2016) investigated the dietary diversity of households in Morogoro and Dodoma regions of Tanzania using 12 food groups based on a 24-hour recall. The finding showed an average dietary diversity score of 4.7 and 4.1 in Morogoro and Dodoma regions respectively, and the determinates of household dietary diversity are the literacy status of mothers, prior nutrition training/knowledge, size of cultivated land and distance to water source. Fawole et al., (2016) examined the diet diversity of households in Osun state and revealed that most of the households have low diet diversity scores. Morseth et al., (2017) also assessed the diet diversity of adult Saharawi refugees living in Algeria and found that majority of the respondents have low diet diversity scores and are at risk of low dietary adequacy. Also, positive association was found between diet diversity and socioeconomic characteristics like assets, income and education while age of the respondents was negatively related to their diet diversity. Gokhale and Rao, (2022) investigated diet diversity among pregnant women in India and reported that majority of the respondents (56.4%) have low diet diversity. Hernández and Camardiel, (2021) studied diet diversity among University students in Venezuela. The study revealed a low diet diversity among the students with a mean of 3.5 foods, confirming the prevalence of monotonous diet in the country.

Despite the importance of diet diversity, particularly in low and medium countries like Nigeria where diets are majorly based on starchy staples with little or no animal products, and few fruits and vegetables, studies on dietary intake based diet diversity are still relatively limited.

Also, socioeconomic status is one of the major factors influencing healthy diets in high income countries and research has revealed that higher socioeconomic status may be related to diet diversity in low and medium income countries as well (Mayen et al., 2014). Therefore, the present study explores the relationship between socioeconomic characteristics and households’ diet diversity in North-Central Nigeria.

**MATERIAL AND METHODS**

**Study Area and Sampling Procedures**

The study area for this research is North-Central Nigeria. A multi-stage sampling technique was employed to select households for the research. Based on this, purposive sampling was used to select Kwara and Niger states as the sampling frame within which the sample for the research were drawn. This was due to two main considerations; (1) Niger state is the poorest state in North-central Nigeria based on Per capita GDP (World Bank, 2022) and (2) Kwara state is one of the oldest state in Nigeria which has witnessed significant influx of other ethnics, particularly of Benue and Kogi origin. Since Kwara and Niger states have three senatorial districts each, two Local Government Areas were randomly selected in each senatorial for each state and two rural communities were randomly selected in each of the selected Local Government Areas. Subsequently, every fifth inhabited structure was selected within the rural community. In total, 560 respondent households were included in the study. Table 1 highlights the sample distribution.

**Table 1: Sample Distribution**

Kwara State			Niger State		
Selected L.G.As	Estimated Population of LGA	Total Selected/LGA	Selected L.G.As	Estimated Population of LGA	Total Selected/LGA
1 Asa	88,452	40	1. Gbako	102,816	32
2 Oyun	67,000	30	2. Lavun	170,000	48
3 Irepodun	145,388	64	3. Shiroro	190,984	56
4 Isin	42,194	26	4. Rafi	150,822	44
5 Moro	77,112	36	5. Magama	147,089	44
6 Edu	143,025	64	6. Kontagora	123,180	36
Total number of selected households		260			260

The estimated population of LGA was based on 47.25% rural population ( World Bank, 2022)

## Household Diet Diversity

The diet diversity scores were constructed by conducting a simple count of foods or food groups consumed in the last 24 hours. Following Leroy et al., (2015), this study identified twelve food groups, namely, (1) cereals group, (2) root and tubers group, (3) fruits group, (4) vegetables group, (5) meat group, (6) egg and poultry products group, (7) fish and other seafood group, (8) pulses, legumes and nuts group, (9) milk and dairy products group, (10) oil/fats group, (11) sugar/honey group and (12) miscellaneous group (condiments and beverages). Based on the quantities of all the food items consumed within the households in the previous 24 hours, each of the food items were then grouped based on their content. Consumption of each food group was assigned a value of 1, and individual household total diet diversity score is the sum of all the food groups consumed in such household. Subsequently, households were classified as low diet diversity (consumed 1 – 3 food groups), medium diet diversity (consumed 4 – 5 food groups) and high diet diversity (consumed 6 – 12) food groups (Okwoche and Benjamin, 2012).

## Statistical Analysis

Frequency and percentage were employed to summarize the categorical data while mean and standard deviation were employed to summarize the continuous data. Ordinary Least square regression (OLS) was used to examine the relationship between socioeconomic characteristics and households' diet diversity. The inclusion of the independent variables was based on previous studies on households' food consumption. This include household heads sex (Bogale and Shimelis 2010), farming experience (Wudil et al., 2023), educational status (Amao and Ayantoye 2017), farmland ownership and farm income (Mbwana et al., 2016), off-farm income (Agada and Igbokwe, 2014), age and household size (Paola et al., 2020, and Chen et al., 2021), farm size (Ogundari, 2017, and Wudil et al., 2023). The OLS model is as illustrated below:

$$Y = \alpha_0 + \beta_1 Age + \beta_2 GD + \beta_3 FEX + \beta_4 EDU + \beta_5 HZ + \beta_6 FLO + \beta_7 FZ + \beta_8 FI + \beta_9 OFFI + \beta_{10} ATC + \varepsilon$$

Where

$Y$  = households' diet diversity scores

$\alpha_0$  = constant or "*Y-Intercept*"

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ , and  $\beta_{10}$  = Parameter estimates

$\varepsilon$  = the random error term or residuals.

Age = age of household heads (years), Sex = sex of household heads (Male = 1, Female = 0), FEX = farming experience of household heads (years), EDU = educational status of household heads (Educated = 1 or Uneducated = 0), HZ = household size (count), FLO = households' farmland ownership (Owned = 1, Not owned = 0), FZ = households' farm size (count), FI = households' farm income (Naira/year), OFFI = households' off-farm income (Naira/month), ATC = households' access to credit (Yes = 1, No = 0).

## **RESULTS AND DISCUSSION**

### **Socioeconomic Characteristics of the Respondents**

About 95.0% of the administered questionnaires were deemed appropriate and usable for the study. As displayed in Table 2, most of the respondents are still within their active ages. Age can be an influential factor in households' food availability and diet diversity. This is because the ability to undergo challenging farming operations declines with increase in age. This is corroborated by Amao and Ayantoye (2015) who opined that active engagement, particular in tedious farming activities may reduce as the farmers get older and this can limit food availability within the household. The average farming experience was 28.61 years, indicating that most of the household heads have been farming for close to 30 years. This can have positive implication on household diet diversity as experience is the best avenue for learning on the job, and thus, household heads with more farming experience are likely to realize more farm produces which can boost the availability of different varieties of foods within the household. Wudil et al., (2023) reported that household heads with more farming experience have higher likelihood of being food secure. Furthermore, the average household size of 6.21 household members is larger than the national rural average of 5.4 (National bureau of statistics, 2020). This can have either positive or negative implication on food availability, and by extension households' diet diversity. Large household with more number of dependents are likely to be affected negatively as there are more mouth to feed relative to the number of active people who can participate in farming operations. On the other hand, large household with less number of dependents are likely to cultivate more land and realize more produces as majority of the household members can participate in farming activities. The average farm size of 2.76ha shows that majority of households cultivated less than 3ha and this is quite low. This low level of land cultivation indicates that the scale of agricultural production is not at optimum, and this may have negative implication on households' diet diversity as households who could barely feed themselves are less likely to improve the varieties in their diets. The average yearly farm income is also very low in the study area as majority of the respondents barely earn close to ₦1,400,000 per annum. Also, majority of the respondents earn less than ₦20,000 per month in off-farm income. These level of incomes are quite low and can pose significant influence on household food consumption (Agada and Igbokwe, 2014).

Furthermore, majority of the households are male headed and this can contribute positively to diet diversity. This is because male can contribute more energy to farming activities than female, thereby improving diet diversity through increased food availability. Bogale and Shimelis (2010) noted that male heads can put in more physical effort in farming operations and are less vulnerable to food insecurity. It was also observed that majority of the households leased the land used in farming activities. This can affect the type and the extent of land that can be cultivated. The households maybe limited to planting certain type of crops especially annual crops and discouraged from biennial and perennial crops as they can be required to vacate the leased land upon quite notice. This can impact household diet diversity as most farming households consume what they cultivate. With regards to educational status, it was observed that majority of the respondents have no formal education.

Education is essential as it can expose the farmers to new ideas and increase the tendency of adopting new and improved techniques that can enhance their farming operations. Thus, the low level of education witnessed in the study area can have negative implication on households' food availability and consequently, on their diet diversity. Finally, the finding revealed that most of the respondents lack access to credit facilities. This is usually due to collateral and high interest rate as well as short-term and fixed payback period for agricultural loans by financial institution (Dayo, Nkonya, Pender and Oni, 2009). Increased access to credit will likely increase the scope of agricultural operations and the households' diet diversity.

**Table 2: Socioeconomic Characteristics of the Respondents**

Socioeconomic Variables	Mean	Standard Deviation
Age (years old)	48.82	9.27
Farming experience (years)	28.61	8.42
Household size	6.21	2.55
Farm size (Ha)	2.76	1.89
Farm income (year)	1305600	1495900
Off-farm income (month)	17350.80	10995.90
	Categories	Percentage
Sex	Male	89.68
	Female	10.32
Farmland Ownership	Owned	21.2
	Leased	78.8
Educational status	No formal education	54.05
	Primary education	28.34
	Secondary education	11.94
	Tertiary education	5.67
Access to credit	Yes	9.92
	No	90.08

**Consumption of foods by households based on food groups**

Table 3 revealed that root and tuber foods and cereal foods were predominantly consumed by 96.35% and 84.40% of the households in their daily diet respectively. This is followed by vegetables (80.36%), oil and fat (63.56%), and pulse, legume and nut (56.48%). The high consumption of root and tuber foods and cereal food shows that most of the respondents consume more of starchy foods such as rice, and foods prepared from maize, millet, yam, and cassava. The high consumption of vegetables is understandable as they are usually consumed in conjunction with other foods, particularly the foods prepared from root and tuber group. Also, oil and fat are also important part of soup ingredients in local delicacies. Notably, milk and dairy products (3.44% of households), egg and poultry products (8.70% of households), meat group (12.96% of households), fish and other sea food group (18.01% of households) are least consumed. This indicates low consumption of animal source foods in the study area.

The low consumption of animal source foods implies that the households are lacking quality animal proteins in their diet and this can have significant impact on their wellbeing, particularly on the health and development of the children. Also, low animal protein consumption signifies unbalanced diet which can lead to nutritional problems through inadequate intake of essential nutrients (Popkin and Slining, 2013). Inappropriate balanced diet, especially poor animal protein consumption can be due to challenges related to affordability. According to Amao (2013), majority of households did not consume protein foods because they could not afford it, even though they are aware of the benefits to the body system.

Table 3: Food groups consumed by households in the previous 24 h

Food Group	Frequency	%
Cereals	412	84.40
Root and tuber	476	96.35
Pulse, legume and nut	279	56.48
Vegetables	397	80.36
Fruits	158	31.98
Meat	64	12.96
Fish and other sea foods	89	18.01
Egg and poultry products	43	8.70
Milk and dairy products	17	3.44
Sugar/honey	214	43.32
Oil and fat	314	63.36
Miscellaneous (condiment and beverages)	119	24.09

(Source: survey, 2023)

### **Household dietary diversity**

Eating a variety of foods facilitates adequate intake of essential nutrients which are important for the general wellbeing of the household members. Thus, diversifying diets has been acknowledged to be one of the key elements of diet quality and by extension, dietary pattern (Ruel et al., 2013). Table 4 presents the household diet diversity scores for the households. The result of the study showed that 14.8% of the households have low diversity scores. This indicates that around 14.8% of the households consumed not more than three food groups throughout the day. Furthermore, majority of the households (62.4%) have medium diet diversity scores (4 – 5 food groups). This shows that majority of the households consumed not more than 5 food groups throughout the day. Finally, about 22.8% of the households have high diet diversity scores.

This denotes that less than one-quarter of the households consumed more than five food groups throughout the day. Thus, dietary quality based on consumption of different food varieties is just at average in the study area. This finding is not consistent with Fawole et al., (2016) who reported low diet diversity scores among majority (44%) of households in Osun state, and Mukhtar (2020) who reported high diet diversity score among majority (53%) of farming households in Kano state. This disparity can be due to various reasons such as the difference in study location, the current economic situation and the stage of the season when the study was conducted.

Table 4: Household Dietary Diversity (HHD)

HHD Score	Remark	n	%
1 – 3 (Food Groups)	Low diet diversity	73	14.8
4 – 5 (Food Groups)	Medium diet diversity	308	62.4
6 – 12 (Food Groups)	High diet diversity	113	22.8

(Source: survey, 2023)

#### **Association between Socioeconomics Characteristics and Households' Diet Diversity**

Ordinary least square regression was used to examine the relationship between households' diet diversity and socioeconomics characteristics. As shown in Table 5, the result of the OLS model revealed that age of household heads and household size have statistically significant negative coefficient while educational status, off-farm income, farm income and sex of household heads have statistically significant positive coefficient.

The significant negative coefficient of age indicates that 1% increase in the age of household head will lead to a decrease in household's diet diversity by 3.4%. Labour contribution is expected to reduce as household heads get older. This may have negative implication on households' diet diversity since food availability may decline with household heads lack of productive strength for tedious farming activities. This is corroborated by Amao and Ayantoye (2015) who noted that age of respondents has positive and significant influence on households' probability of being food insecure. Similarly, the significant negative coefficient of household size indicates that 1% increase in household size will lead to a decrease in household's diet diversity by 7.5%. That is, as household size increases, there is a likelihood that there will be a negative shift in diet diversity. This indicates that smaller households are likely to have better diet diversity than larger ones. This might be because small households have less mouths to feed and can afford more varieties of foods compared to large ones. Adeniyi and Ojo (2013) noted that household size, particularly small family size is an important factor influencing food availability and consumption.



On the other hand, the significant positive coefficient of education status implies that 1% increase in educational status of household heads will lead to a rise in households' diet diversity by 41.1%. This implies that the more educated the household heads, the more likely that households will diversify their diet. Education is important because it can improve household heads' receptiveness to nutritional awareness and other beneficial campaigns associated with diet diversity. Furthermore, educated household heads are likely to earn higher income through adopting improved farming practices, and thereby, increasing their affordability of nutritious diets. This is in accordance with Agada and Igbokwe, (2014) who reported a significant negative relationship between educational level and inadequate access to sufficient and nutritious foods required for an active and productive life. Also, the significant positive coefficient of off-farm income implies that 1% increase in off-farm income will lead to a rise in households' diet diversity by 56.1%. This reveals that households that engage in off-farm activities and earn more off-farm income are likely to consume more varieties of foods than those that did not participate in off-farm activities. Furthermore, off-farm income will increase households' total income which invariably may increase their ability to afford nutritious foods.

Olayemi and Ayegbokiki (2017) recommend that rural households should be encouraged to diversify their income as a way of improving their food security status. Similarly, the significant positive coefficient of farm income indicates that 1% increase in farm income will lead to a rise in households' diet diversity by 26%. This is expected as the ability to produce more farm produces will increase households' food availability and farm income through selling surplus produces in the market. Thus, improved food affordability resulting from high farm income will have positive effect on households' diet diversity.

Households with surplus produces can sell them in the market, thereby increasing their purchasing power for other essential food items which are required for a balanced and diversified diet. This is corroborated by Mbwana et al., (2016), who noted that farm income increases the tendency of food availability and access within the household. Also, the significant positive coefficient of sex indicates that male headed households are 0.461 more likely to diversify their diets compared to female headed households. This is consistent with the research of Zhang et al., (2021). Thus, age of household heads, household size, educational status, off-farm income, farm income and sex of household heads are the important socioeconomic factors influencing households' diet diversity in the study area. The reported R-squared value of 0.314 implies that about 31% of the variations in households' diet diversity is explained by the model. The reported F-statistics of 13.171 and its p-value of 0.000 indicate that the statistics is significant and therefore, the overall model is statistically significant.

**Table 5: Association between Socioeconomic Characteristics and Households' Diet Diversity**

Variables	Coefficient	Std. Error	t	p-value
C	5.185	.502	10.334	.000
Age	-.034	.007	-5.030	.000**
FE	.006	.008	.740	.460
HZ	-.075	.024	-3.068	.002**
FZ	.001	.029	.042	.966
ATC	.391	.250	1.563	.119
EDU	.414	.204	2.032	.043*
OFFI	.561	.160	3.500	.001**
FLO	-.018	.184	-.096	.923
FI	.260	.127	2.048	.041*
Sex	.461	.219	2.101	.036*
R <sup>2</sup>	0.314			
F-stat	13.171			.000

(Source: survey, 2023) (\*\* significant at 1%) (\* significant at 5%)

*Note: EDU is educational status; FEX is farming experience; HZ is household size; FZ is farm size; FLO is farmland ownership; FI is farm income; OFFI is off-farm income; ATC is access to credit;*

### CONCLUSION AND RECOMMENDATIONS

The households can be classified under medium diet diversity, implying that their diet quality based on diet diversity is just at average and requires significant improvement. This medium diet diversity is characterized by high intake of starchy foods like root and tuber foods and cereal foods and their corresponding compliments like vegetables, oil and fats, and pulse, legume and nuts; with low intake of animal source foods. This is a further indication of low quality diet as animal protein are one of the essential source of micronutrients for healthy growth and development. Households' socioeconomic characteristics like age of household head, household size, educational status, off-farm income, farm income and sex of household head have significant influence on diet diversity. Households with younger head and small family size are much more likely to diversify their diet. Similarly, male headed households with higher educational attainment, and higher farm income and off-farm are most likely to consume more diversified diet. In accordance with these findings, the research highlighted the following recommendations:

1. Food security intervention need to focus not only on the quantity of foods but also on their quality to ensure a productive and healthy living. That is, specific attention is required, particularly in ensuring adequate consumption of animal source foods like meat, fish, egg, milk and other healthy dairy products
2. The low-level of income among the farming households requires special and deliberate attention. In fact, programmes dedicated to improving agricultural productivity and by extension, farmers' income need to form one of the core components of rural development and food security policies.

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