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# Food Insecurity and Dietary Diversity of the Vulnerable Group in Nigeria: Drivers and Coping Strategies

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## ABSTRACT

The vulnerable group is the most prone to artificial or natural shocks, which could expose them food insecurity. Yet, there exists a dearth of practical information on their dietary diversity and food security status. This study, therefore, assessed the food security status and dietary diversity of the vulnerable group of Fadama III Additional Financing in Nigeria. Primary data collected from 165 respondents were analyzed using descriptive statistics, cost-of-calories, logit model, household dietary diversity score and Tobit model. The results revealed that the vulnerable group was aged smallholder farmers with a low average monthly income of ₦13,718 (USD 37.13). The majority (88.5%) were food insecure, while only 11.5% met the daily calorie intake of 2,260 kcal per capita. Educational level, income, and value of productive assets positively influenced their food security status, while household size negatively impacted them. Most of the vulnerable group had low dietary diversity, with a range of 0.31 to 0.40, indicating poor nutrition among them. The determinants of dietary diversity among them were gender, educational level, and household size. The most commonly employed food insecurity coping strategies were allowing children to eat first, collecting food from the wild, selling assets to buy food, eating once a day and purchase food on credit. This study suggests policy measures for educating the vulnerable group ,providing production assets and better family planning for the vulnerable group to enhance their dietary diversity and food security.

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## INTRODUCTION

Food security is one of the significant determinants of the level of people's welfare and well-being, economic growth, and development (Mukaila et al., 2021). Food insecurity remains a global challenge, as over 820 million people are hungry (FAO, 2019). Developing nations have the highest number of food-insecure globally, as they account for 95.1 percent of the global food insecure people (De La O Campos et al., 2018; FAO, 2015). African nations are faced with hunger and low purchasing power (Mukaila et al., 2022; Uzel et al., 2021). Around 25 million people in Nigeria face undernourishment, and about 18 million are severely food insecure (FAO, 2020). For instance, Nigeria was ranked 38th in 2014 among the nations with food deficiency (Global Hunger Index, 2014). Though several measures have been put in place to reduce food insecurity in the country and to remove Nigeria from the Global Hunger Index (GHI), this has not been achieved by the nation, as Nigeria keeps appearing and ranking high every year among the countries with food deficits. The GHI (2019) still shows that Nigeria is still suffering from a serious level of hunger, with a GHI score of 27.9. The rural areas of the country are the most hit in terms of food insecurity, as more than forty percent of rural households are faced with severe food insecurity (Mukaila et al., 2020; Nigeria MDGs End-point report, 2015).

Malnutrition is widely spread in Nigeria, especially among rural dwellers. The vulnerable group, which includes those with chronic health conditions, children, the elderly, smallholder farmers, lactating mothers, pregnant women, the poor, and the physically challenged, are mostly faced with food insecurity. Many of them have fragile health conditions that require adequate nutrition to keep them strong. They suffer from the consequences of artificial or natural shocks. Malnutrition and undernutrition are common among them, especially in children (Ghosh, 2020). Inadequate protein and energy intake may result in

low maternal weight and low weight gain in the infant, which may affect the general household health status. This is because inadequate nutrient/food intake is a significant driver of undernutrition (Marinda et al., 2018).

Smallholder farmers, who are part of the vulnerable group, also face the challenge of food insecurity as the majority of them live in rural areas. Interventions through Fadama III additional financing (AF) group could provide an essential alternative strategy for reaching the vulnerable group in Nigeria. The Fadama III project, which started in the year 2009, is aimed at increasing the income of rural farmers on a sustainable basis through accessibility to land and water resources. At the end of the Fadama III project in 2013, Fadama III Additional Financing was introduced in 2014, following the successes of the parent project in the 36 states of Nigeria. Several authors have assessed the dietary diversity and food security in households (Ahmadzai and Akbay, 2020; Ambali et al., 2015; Babatunde et al., 2007; Egwue et al., 2020; Mukaila et al., 2020; Obasan et al., 2017; Omotesho et al., 2006; Oyebanjo et al., 2013; Obasan et al., 2017). However, there is still a shortage of practical information on the food security status of the vulnerable group. But then, food insecurity may exist among the vulnerable group because of their low purchasing power and low food production to meet their food needs borne out of community food production resources and indices. The issues of adequate farm resources and supply could also come into play in determining food security status in communities. In line with this, this study was poised to investigate the level of food security of the vulnerable group in Niger State, Nigeria, using the vulnerable group of the Fadama III AF as a case study. Specifically, the study assesses the food security status of the vulnerable group; examines the factors influencing food security among the vulnerable group; assesses their level of dietary diversity; investigates the determinants of their level of dietary diversity; and assesses how they cope with food insecurity. This would serve as empirical evidence for policy intervention to lower the menace among the vulnerable group.

## MATERIAL and METHOD

### Study Area

This study was conducted in Niger State, Nigeria. The state is the largest in Nigeria and lies at a latitude of 3.20° E and a longitude of 11.30° N. The state is bordered nationally by Kogi, Kebbi, Zamfara, Kwara, and Kaduna states and the Federal Capital Territory. The state shares an international border with the Republic of Benin. The state has a 76,363 km$^2$ with 25 Local Government Areas (LGAs), which are grouped into three agricultural zones. The Fadama III Additional Financing covers the three agricultural zones of the state. Its beneficiaries are called Fadama User Groups (FUGs). One of the FUGs was composed mainly of the most vulnerable groups in society and is located in some of the LGAs of the state. Agriculture is the primary means of people's livelihood in the state.

### Design and Sampling Techniques

In this study, the vulnerable group of the Fadama III Additional Financing Programme was used as the respondents. This was because there was no formal list of the vulnerable group in the study area. Thus, the only list of the vulnerable group that was available to the researchers was that of the program. Though this may limit the research to respondents with nearly the same primary occupation (farming), the outcome of the study is expected to influence policy interventions to improve the food security status of the vulnerable group in society. A three-stage sampling technique was employed for selecting the respondents.

In stage one, Mokwa and Bida LGAs (in Zone A), Paikoro, Shiroro, Munya and Bosso LGAs (in Zone B), and Kontagora LGA (in Zone C) were randomly selected. A list of the vulnerable beneficiaries was compiled from the seven LGAs with the help of the Fadama Facilitators. The second stage was the purposive selection of the vulnerable group across the three zones. Lastly, 165 members of the group were randomly selected from a population of 280 people based on the proportion of the vulnerable beneficiaries using probability proportion to size techniques (Table 1). It is given as:

$$n = \frac{N*X}{(X+N-1)} \quad (1)$$

$$X = \frac{Z\alpha}{2^2} * P * \frac{(1-P)}{MOE^2} \quad (2)$$

Where;

N is the population size (280), $\frac{Z\alpha}{2^2}$ is the critical value (1.96) at α/2, confidence (α is 0.05), p is the sample proportion (0.5) and margin error is 0.05. This gives a minimum sample size of 162 respondents. For a good representation of the population, the study used a sample size of 165 respondents.

### Source of Data and Data Collection

The study obtained its data from primary sources, collected through a questionnaire and an interview schedule. The study also conducted Focus Group Discussions (FGD) to make the study more participatory and interactive. The questionnaire was structured and validated to collect data on their socioeconomic characteristics, productive assets accessed through participation in the Fadama III AF Development Programme, the monetary value of food (calories) consumed within the last 24 hours, and measures of coping during a food crisis.

Table 1. Sample design

| ADP Zone | Number of LGAs | LGAs with Vulnerable FUGs | The Vulnerable Group by Names | Number of Beneficiaries | Sample size |
|---|---|---|---|---|---|
| A | 8 | Mokwa | HIV Support Group Association | 50 | 29 |
| | | Bida | HIV Support Group Association | 30 | 18 |
| B | 8 | Paikoro | Chanchita Farmers Association | 20 | 12 |
| | | Shiroro | Alai Cooperative Society | 30 | 18 |
| | | Munya | Abelo Cooperative Group | 40 | 23 |
| | | Bosso | Alheri Farmers Association | 30 | 18 |
| C | 9 | Kontagora | Cripple Group Association | 80 | 47 |
| Total | | | | 280 | 165 |

### Data Analysis and Model Specification

The data was analyzed using descriptive statistics, cost of calories, household dietary diversity score, Tobit and logit models. Descriptive statistics (percentage, frequency, and mean) were employed to examine the socio-economic characteristics of the respondents. A Likert scale rating was used to investigate their measures of coping with food insecurity.

### The Cost of Calories

Greer and Thorbecke (1986) proposed this method for measuring food security and has been employed by researchers (Ahmed et al., 2015; FAO, 2009; Babatunde et al., 2007). A daily intake of 2260 kcal per adult equivalent (AE) was used as the food security baseline. A value equal to or above it is considered food secure, and below it is considered food insecure.

$$lnX = \alpha + \beta C \quad (3)$$

$$S = (\alpha + bL)e \quad (4)$$

Where: X is the food expenditure per AE (₦), $\alpha$ is the intercept, $\beta$ is the coefficient, C is household daily calorie intake (per AE), S is the cost of purchasing 2260Kcal of food and L is 2260kcal minimum daily FAO (2009) calorie recommendation.

### Logit Model

The logistic model is a predictive regression model that can perfectly account for dummy or binary dependent variable (İkikat Tümer and Birinci, 2020; Mukaila et al., 2022). It was employed in examining the factors that determined the vulnerables group's household food security. It was specified as:

$$Y = \beta_0 + \beta_1 Gd + \beta_2 Ed + \beta_3 A + \beta_4 HS + \beta_5 In + \beta_6 FE + \beta_7 FS + \beta_8 TVP + e \quad (5)$$

Where:

Y (1 or 0) is a dummy variable for food security status (food secure = 1, 0 = food insecure), Gd = Gender (male = 1, female = 0), Ed = Educational level (years), A = Age (years), HS = Household size (Adult equivalent; see appendix), In = Income in Naira (₦) per month, FE = Farming experience (years), FS = Farm size of a household in hectare, TVP = Total value of productive Assets, $\beta_0$ = constant and $e$ = error term.

### Household Dietary Diversity Score (HDDS)

The HDDS was used to determine the level of food diversity of the vulnerable groups. Legumes, fruit, vegetables, roots and tubers, nuts and seeds, cereals, fish and seafood, meat, beverages, oils and fat, sugar and honey, and milk and milk products were the twelve food groups in the HDDS (FAO, 2007). For each food group, a household was scored 1 if the food group was consumed and 0 if it was not consumed. The HDDS was derived by adding the number of foods eaten by the household within a specified period and dividing it by 12, which is the total number of food groups in the HDDS. The value ranges from 0.10 to 1.00. Values from 0.10 to 0.42 imply low dietary diversity, while values from 0.43 to 1.00 imply high dietary diversity (FAO, 2008). They were utilized to detect the quality of the food intake of the respondents.

### Tobit Regression

A Tobit regression model was employed to identify the factors that determined the level of dietary diversity of the vulnerable group. It was specified as:

$$Y = \beta_0 + \beta_1 G + \beta_2 Ed + \beta_3 A + \beta_4 HS + \beta_5 In + \beta_6 FE + \beta_7 FS + \beta_8 TVP + e \quad (6)$$

Where Y = level of dietary diversity (HDDS ranges from 0.10 to 0.60), G = Gender (male = 1, female = 0), Ed = Educational level (years), A = Age (years), HS = Household size, In = Income of a household per month (₦), FE = Farming Experience (years), FS = Farm Size of a household in hectare, TVP = Total value of productive assets, $\beta_0$= constant, $e$ = error term.

## RESULTS and DISCUSSION

### Demographic and Institutional Features of the Vulnerable Group

The distribution of the group based on their socioeconomic profile was presented in Table 2. The majority of the respondents were males, while 21.8% were females. This implies that vulnerable group

households' heads were dominated by males. About 48% of the respondents were over 50 years old, 19.4% were between 31 and 40 years old, and only 10.9% were below or equal to 30 years old. The respondents had an average age of about 51 years. This suggests that the vulnerable group was advanced in age, which could affect their physical ability. Age is an important determinant of labor availability, physical capacity, and farm productivity (Ağır and Akbay, 2022; Gbigbi, 2021). The majority of the vulnerable group were married. This implies that the respondents have to cater for their family members' needs through farming. Regarding the level of education, 52.8 percent of them had no formal education, 23.6% had a first school leaving certificate,

Table 2. Socio-economic characteristics distribution of respondents

| Variables | Category | Frequency | Percentage | Mean |
|---|---|---|---|---|
| Gender | Male | 129 | 78.2 | |
| | Female | 36 | 21.8 | |
| Age (years) | ≤ 30 | 18 | 10.9 | 50.7 |
| | 31-40 | 32 | 19.4 | |
| | 41-50 | 36 | 21.8 | |
| | 51 – 60 | 36 | 21.8 | |
| | > 60 | 43 | 26.1 | |
| Educational level | No formal education | 87 | 52.8 | |
| | Primary | 39 | 23.6 | |
| | Secondary | 31 | 18.8 | |
| | Tertiary | 8 | 4.8 | |
| Marital status | Married | 142 | 86.1 | |
| | Single | 12 | 7.3 | |
| | Widowed | 6 | 3.6 | |
| | Divorced | 5 | 3.0 | |
| Household size | ≤ 5 | 41 | 24.8 | 8 |
| | 6 - 10 | 91 | 55.2 | |
| | > 10 | 33 | 20.0 | |
| Primary occupation | Civil Servant | 5 | 3.0 | |
| | Farming | 132 | 80.0 | |
| | Trading/Commerce | 12 | 7.3 | |
| | Artisan | 16 | 9.7 | |
| Farming experience | ≤ 10 | 70 | 42.4 | 16 |
| | 11 – 20 | 45 | 27.3 | |
| | > 20 | 50 | 30.3 | |
| Farm size (acre) | ≤ 1 | 122 | 73.9 | 1.5 |
| | 2 – 2.99 | 18 | 10.9 | |
| | > 2.99 | 25 | 15.2 | |
| Monthly income (₦) | ≤ 10,000 | 47 | 28.5 | 13,718 |
| | 10,001 – 20,000 | 100 | 60.6 | |
| | 20,001 – 30,000 | 13 | 7.9 | |
| | > 30,001 | 5 | 3.0 | |
| Extension contacts | Yes | 88 | 53.3 | |
| | No | 77 | 46.7 | |
| Access to credit | Yes | 8 | 4.8. | |
| | No | 157 | 95.2 | |

18.8% had secondary education, and only 4.8% had tertiary education. This implies that education is a big challenge among this vulnerable group. Low education can negatively influence their decision-making process and the adoption of innovation (Falola et al., 2021). Regarding their household size, a larger percentage (55.2%) of them had between 6 to 10 household members, 24.8% had less than or equal to 5 household members, and 20% had more than 10 household members. They had an average household size of eight people per household. This shows that they have a relatively large household size, which could be due to the high birth rate and their polygamous nature (Achoja and Obadaya, 2019; Mukaila et al., 2021). The large family size could be used as labour for their farming operations. However, this would increase the

household dependency ratio, which will, in turn, enhance their vulnerability to food insecurity. This is because high food insecurity is common in households with larger household sizes (Mukaila et al., 2020).

The majority (80%) of the vulnerable group were farmers who practiced mixed cropping; 9.7% were artisans; 7.3% were traders; and only 3% were civil servants. This result shows that agriculture plays a significant role in the livelihood of this vulnerable group, and they depend on it for their sustenance. The majority (73.9%) of the respondents had less than one hectare of land, 15.2% had more than 3 hectares, and only 10.9% had between 2 and 3 hectares of land. The average land size operated by the respondents was 1.5 hectares. This implies that the group operates on a small-scale level. The result of the farming experience showed that 42.4% of the group had farming experience of fewer than 10 years, 30.3% had more than 20 years, and 27.3% had 11 to 20 years. Their average year of experience in farming was 16 years. This shows that they were well experienced in farming activities. The majority (60.6%) of them earned between ₦10,000 (USD 27.07) and ₦20,000 (USD 54.13) monthly income, 28.5% earned less than ₦10,000 monthly income, while only 10.9% earned above ₦20,000 per month. They earned an average of ₦13,718 (USD 37.13) per month. This implies that this vulnerable group is living on a low monthly income, which can make them more susceptible to food insecurity because they have low purchasing power. This will also affect their total livelihood negatively, especially among the larger households. Regarding contact with extension agents, 53.3% of the vulnerable group had contact with extension agents, while 46.7% did not. The majority (95.2%) of them could not access credit. This low access to credit could negatively affect their food production and general well-being (Falola et al., 2022).

## Productive Assets Accessed Through Participation in Fadama III AF Development Programme

Table 3 presents the different productive assets accessed by the vulnerable group through participation in the Fadama III AF Development Programme to boost their productivity and welfare. Table 3 shows that the majority (79.4%) of the group had access to productive assets, while 20.6% did not. The majority (62.6%) had access to productive assets valued between ₦10,000 (USD 27.07) and ₦20,000 (USD 54.13), while 28.3% had access to assets valued at ₦20,000 to ₦30,000 (USD 81.20). The average value of assets the group had access to was ₦18,190 (USD 49.23). The majority of the group had access to herbicides (76.4%), seeds (64.2%), and fertilizer (64.2%). About 33% of the group had access to sprayers. A few members of the group had access to hoes (13.3%), cutlasses (9.1%), feed (2.4%), and wheelbarrows (0.6%). These results imply that some of the productive assets, such as sprayers, cutlasses, hoes, wheelbarrows, and animal feed were not accessible by most of the vulnerable groups in the study area.

Table 3. Productive assets

| | Category | Frequency | Percentage | Mean |
|---|---|---|---|---|
| Access to productive asset | Yes | 131 | 79.4 | |
| | No | 34 | 20.6 | |
| Value of productive asset (₦) | ≤10000 | 2 | 1.5 | 18.190 |
| | 10001 – 20000 | 82 | 62.6 | |
| | 20001 – 30000 | 37 | 28.3 | |
| | >30001 | 10 | 7.6 | |
| Productive assets | Sprayer | 54 | 32.7 | |
| | Cutlass | 15 | 9.1 | |
| | Hoe | 22 | 13.3 | |
| | Wheelbarrow | 1 | 0.6 | |
| | Feed | 4 | 2.4 | |
| | Fertilizer | 106 | 64.2 | |
| | Seed | 106 | 64.2 | |
| | Herbicides | 126 | 76.4 | |

## Food Security Status of the Vulnerable Group

Table 4 presents the food security status of the vulnerable group. The cost of 2260kcal (food) in the study area was ₦530.67 (USD 1.44). Therefore, any household with a daily per capita food expenditure of ₦530.67 was considered food secure, while those that spent less were considered food insecure. The result reveals that food insecurity is pervasive among the vulnerable group as the majority (88.5%) of the vulnerable groups were food insecure while only 11.5% were food secure. Further investigation revealed that the few vulnerable group that were food secure were those with low household sizes and relatively high education. Due to their low income, a household with a larger size would be faced with the burden of feeding the members, resulting in a deficient quantity of food being consumed. The food insecurity level reported in

this result is higher than previous studies reported (Adeniyi and Ojo, 2013; Ambali et al., 2015; Ahmed et al., 2015; Egwue et al., 2021; Mukaila et al., 2020). This high percentage indicates a severe level of food insecurity among this vulnerable group, which requires government intervention.

Table 4. Food security status

| Food security status | Frequency | Percentage |
|---|---|---|
| Food insecure | 146 | 88.5 |
| Food secure | 19 | 11.5 |
| Total | 165 | 100 |

## Factors influencing Food Security Status among the Vulnerable Group

Table 5 shows the results of the logistic regression used to examine the factors that determined the food security status among the vulnerable group interviewed. As shown in Table 4, four variables were statistically significant. Educational level ($P < 0.05$), household income ($P < 0.05$) and value of productive assets ($P < 0.01$) were positively substantial, while the household size was negatively significant ($P < 0.05$).

The educational level positively influenced the food security status of the group. This implies that the higher the number of years spent in school, the higher the likelihood of household food security and vice versa. Thus, the highly educated among them were more food secure than their counterparts with little or no education. This conforms with Ambali et al. (2015) and Girma (2012), that food security tends to be influenced by the level of education.

Household size influenced the food security of the group negatively. This implies that there will be a reduction in the probability of a household's food security as the household size increases. This large household size puts more pressure on household head income as well as the per capita income of the household. Thus, it could also limit the access of each member of the household to nutritious, safe, and adequate food for a healthy life. Therefore, a household with many members has a higher probability of being food insecure, while those with few members are more food secure (Mukaila et al., 2020). This conforms to Ahmed et al. (2015), Ambali et al. (2015), and Egwue et al. (2020), who reported that an increase in household members increased the likelihood of household food insecurity.

Household income also positively influenced the food security of the group. An increase in household income enhances the probability of being food secure as it influences purchasing power. All things being equal, high-income earners are more food secure than households with low incomes. This might be because such households (high-income earners) would have a lot of money to buy food. Omotesho et al. (2006) and Mukaila et al. (2020) posited that household income is a significant tool for household access to food and food security.

Table 5. Determinant of food security status among the respondents

| Variables | Coefficient | Std. Err. | z | P>z |
|---|---|---|---|---|
| Gender | 2.378 | 1.672 | 1.422 | 0.155 |
| Age | -0.053 | 0.034 | 1.559 | 0.122 |
| Educational level | 0.190** | 0.085 | 2.235 | 0.005 |
| Household size | -0.337** | 0.143 | -2.357 | 0.018 |
| Monthly income | 0.051** | 0.023 | 2.217 | 0.011 |
| Farming experience | 0.002 | 0.030 | 0.067 | 1.956 |
| Farm size | 0.174 | 0.436 | 0.399 | 0.689 |
| Total value of productive asset | 3.793*** | 1.010 | 3.831 | 0.007 |
| Constant | -5.124*** | 2.122 | -2.415 | 0.026 |
| Pseudo R-Square | 0.542 | | | |
| LR Chi-square | 47.689 | | | |
| Prob > $chi^2$ | 0.0000 | | | |
| Log likelihood | -60.781 | | | |

*** p<0.01, ** p<0.05

The total value of the productive assets is also significant and positively influences the group's food security. This implies that as the value of productive assets owned by the group increases, so does the probability of their households' being food secure. This may be because productive assets can give households direct access to food, which will, in turn, serve as an additional source of income to the household, thereby increasing the amount earned or received by the households and may give them indirect access to food.

## Assessment of the Dietary Diversity of the Vulnerable Group

Table 6 presents the dietary intake of the group. The result shows that a higher proportion (52.1%) of them had between 0.31-0.40 dietary diversity, 27.9% had

between 0.41-0.50, 13.2% had between 0.21-0.30, and 1.8% had between 0.51-0.60 dietary diversity. This result implies that the group had low dietary diversity. This could affect their nutritional and food security status as they consume fewer food items.

Table 6. Dietary diversity

| Dietary Diversity | Frequency | Percentage |
|---|---|---|
| 0.11-0.20 | 7 | 4.2 |
| 0.21-0.30 | 23 | 13.9 |
| 0.31-0.40 | 86 | 52.1 |
| 0.41-0.50 | 46 | 27.9 |
| 0.51-0.60 | 3 | 1.8 |
| Total | 165 | 100.0 |

## Determinants of Dietary Diversity among the Vulnerable Group

Table 7 shows the determinants of dietary intake among the vulnerable group in the study area. Gender ($p < 0.05$), age ($p < 0.10$) and educational level ($p < 0.05$) were the positive factors that influenced their dietary diversity, while household size influenced it negatively ($p < 0.01$). Gender positively influenced the dietary diversity of the group's households. This result implies that the likelihood of a household being headed by a male tends to increase the dietary diversity of vulnerable households. This could be result from provision of money needed to purchase several food items by the male household heads. Thus, households headed by females had a low dietary diversity score. Age also influenced the dietary diversity of the vulnerable group positively. This implies that as age increases, the probability of dietary diversity in the household increases. This conforms with the findings of Kundu et al. (2020) that age positively influenced the dietary diversity of the households.

The educational level also positively influenced the dietary diversity of vulnerable group households. This implies that the higher the educational level, the higher the likelihood of having a high dietary diversity score. Thus, education plays a vital role in increasing the dietary intake of vulnerable groups. Kundu et al. (2020) and Taruvinga et al. (2013) also reported that education influenced dietary diversity positively. Household size had a negative effect on the group's dietary diversity. This implies that there will be a reduction in the dietary diversity of the vulnerable group as household size increases. This is so because as the number of dependents increases, it will reduce the individual's food intake in the household. Large household sizes put more pressure on household income, thereby reducing food availability in the household. Thus, a large household size reduces the dietary diversity of the household (Kundu et al., 2020).

Table 7. Determinants of dietary diversity among the group

| Variables | Coef. | Std. Err. | t | P>t |
|---|---|---|---|---|
| Gender | 0.037** | 0.016 | 2.33 | 0.021 |
| Age | 0.002* | 0.001 | 1.94 | 0.058 |
| Education | 0.003** | 0.001 | 2.13 | 0.044 |
| Household size | -0.118*** | 0.038 | -3.11 | 0.002 |
| Monthly income | 1.28e-06 | 9.98e-07 | 1.28 | 0.201 |
| Farming experience | -0.000 | 0.001 | -0.22 | 0.828 |
| Farm size | 0.009 | 0.006 | 1.43 | 0.162 |
| Total value of productive asset | 8.10e-07 | 5.04e-07 | 1.61 | 0.110 |
| Constant | 0.308*** | 0.037 | 8.32 | 0.000 |
| Pseudo R-square | 0.5143 | | | |
| LR chi2(8) | 34.15 | | | |
| Prob> chi2 | 0.0000 | | | |
| Log-likelihood | 64.398653 | | | |

*** p<0.01, ** p<0.05, * p<0.1

## Coping strategies employed against food insecurity

Table 8 presents the food insecurity coping strategies employed by the group. The result from Table 8 shows that allowing children to eat first ranks first among the methods used by the respondents. In the absence of enough food in the household, the household heads and adults allowed the children to eat first, as the children could not cope with hunger like adults. The group also collected food from the wild or garden (ranked 2nd) as a coping strategy. The group also employed eating once to cope with food insecurity. The group also used selling assets to buy food to increase food availability in the household, which will, in turn, enhance food security. This was followed by buying food on credit, ranked fifth, and eating less preferred food, ranked sixth. The seventh coping strategy by rank is limiting the amount of food consumed, picking up left-over food at social functions, maternal buffering, and traveling to search for jobs. Skipping a meal once a day was ranked last among the coping measures. Some of the coping strategies employed by the vulnerable group may result in health challenges in the long run, as some of the strategies will reduce their nutrition intake.

Table 8. Coping strategies

| Statement | Never | Occasionally | Regularly | Very often | Weighted score |
|---|---|---|---|---|---|
| Allowing children to eat first | 0 | 0 | 22 | 143 | 638 |
| Collecting food from the wild or garden | 2 | 5 | 11 | 147 | 633 |
| Eating once a day | 0 | 6 | 20 | 139 | 628 |
| Selling assets to buy food | 0 | 1 | 32 | 132 | 626 |
| Buying food on credit | 1 | 1 | 32 | 131 | 623 |
| Eating less preferred food | 1 | 4 | 27 | 133 | 622 |
| limiting size of food consumed | 0 | 1 | 46 | 118 | 612 |
| Picking of left-over food at social functions | 3 | 4 | 52 | 106 | 591 |
| Maternal buffering | 7 | 6 | 44 | 108 | 583 |
| Travel to search for jobs | 5 | 5 | 53 | 102 | 582 |
| Skipping meal within a day | 15 | 9 | 48 | 93 | 549 |

## CONCLUSION

This study revealed that the vulnerable group has a low monthly income, which reduces their purchasing power, and a high illiteracy exists among them. The majority of households are food insecure and have a low dietary intake. Educational level, household income, and value of productive assets were the influencing factors that enhanced food security, while household size enhanced food insecurity among the group. Gender, age, and educational level enhanced dietary diversity, while household size inhibited dietary diversity among the group. This study suggests, based on its findings, that government and development agencies should provide sound education to this group of individuals. This can be achieved via afternoon or weekend adult education and the provision of educational materials and other incentives. This would reduce the high level of illiteracy among them and improve their food security. This would also enlighten them about increasing their dietary diversity and adopting modern family planning. Policy measures that will increase their income are also required for their food security and general well-being. This could be in the form of grants, credit, and the provision of productive assets by relevant institutions and the government. The provision of nutrition-oriented programs will also enhance their dietary diversity.

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### Statement of Conflict of Interest

The authors have declared no conflict of interest.

### Author's Contributions

The contributions of the authors are equal.

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Appendix: Adult equivalent scale used to derive the household size

| Age category (Years) | Female | Male |
|---|---|---|
| < 1 | 0.00 | 0.00 |
| 1 to 4.9 | 0.20 | 0.25 |
| 5 to 9.9 | 0.50 | 0.60 |
| 10 to 14.9 | 0.75 | 0.75 |
| 15 to 59.9 | 0.90 | 1.00 |
| > 60 | 0.65 | 0.80 |

Source: Adapted from Falusi (1985)