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Effects of livelihood diversification on poverty status of rural farming households of Kwara State, Nigeria

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Abstract

Over-dependence on agriculture has failed to provide adequate and sustainable livelihoods for rural households. This study assessed the impact of livelihood diversification on the poverty status of rural farming households in Kwara State, Nigeria. Cross-sectional data were collected from 152, farming households over a period of one year using well-structured questionnaires and interview schedules. Descriptive statistics, Shannon diversity index, Foster, Greer and Thorbecke poverty index, fractional logit and probit regression models were used for analysis. Findings revealed that agriculture-related livelihood activities were still the main livelihood strategy in the area. Although farmers in the study area have a wide variety of livelihood options, the different activities carried out by rural households were very similar such as crop farming, fish farming and palm wine tapping which ranked 1^{st}, 2^{nd} and 3^{rd}, respectively. The main determinants of livelihood diversification were age, gender, household size and farming experience. The main determinants of household poverty were access to credit, gender, age and cooperative membership. The main constraints identified were insufficient funds (own capital) for investment, high transport costs, lack of training to acquire skills, and insufficient credit facilities. Based on these findings, it is recommended that the government should organise training courses on asset accumulation for households through extension services.

Keywords: Farmers, deprivation, income, livelihood sources.

1 Introduction

Agriculture is the mainstay of the Nigerian economy, contributing about 24.9 % of the gross domestic product (GDP) in 2022 (National Bureau of Statistics (NBS), 2023). However, its contribution to economic activity is concentrated in the rural areas because it has always been a major activity of the rural dwellers (United Nations (UN), 2007; Dzanku, 2015; Oduniyi, 2019). According to the United Nations Development Programme (UNDP), rural areas are reportedly poorer than urban areas across all regions of the world, and poverty is predominantly rural, with 84 % of all poor people living in rural areas (UNDP, 2023). The study further revealed that about five out of six poor people live in sub-Saharan Africa (SSA; 534 million) and South Asia (389 million).

In Nigeria, rural dwellers are responsible for producing the crops and livestock needed to meet the food needs of the population. They are known to be generally poor, with varying degrees of vulnerability, marginalisation and deprivation in terms of good sanitation, quality health care, infrastructure (such as decent housing and good road networks), quality education, safe drinking water and food security, among others. The NBS (2022) reported that 133 million people in Nigeria (63 %) are multidimensionally poor. This multidimensional poverty is also reported to be higher in rural areas, where 72 % of the 133 million poor in the country reside. Most pathetically, 40.1 % of the Nigerian population lives below the poverty line, while about 86.9 million live in extreme poverty (UN, 2022). This has great implications on their survival and general well-beings. Cases of avoidable deaths and sicknesses has become rampant among households; existence of chronic hunger making them nutritionally deficient with decreased immunity against diseases; increased migration of youths and middle-aged to urban areas for greener pastures causing a reduction in the active labour force; increased drop-out of school children thereby truncat-

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ing the dreams, ambition and aspirations of those children and other members of their households; increased crime rate and high rate of indebtedness. Breaking this vicious cycle of poverty has become more of a mirage as more households are daily plunged into this vicious cycle.

In almost all cases, poverty and vulnerability are often associated with over-dependence on agriculture, which has failed to provide the rural households with sufficient and sustainable livelihoods (FAO, 2004). This is due to the inherent risks and uncertainties of agriculture, such as poor soil fertility, soil erosion, land degradation, product and factor prices, fluctuating yields, unfavourable government policies, weather variability, and other risk factors, resulting in wide fluctuations in farm incomes and access to food (Oduniyi, 2019; USDA, 2023). FAO (2015) affirmed that the implications of weather variability is likely to increase the incidence of natural hazards and affect all aspects of food security including food availability, access, utilisation, and stability.

From the foregoing, it can be seen that many of the problems faced by farm families can only be addressed by seeking alternative sources of livelihood and creating economic opportunities outside of agriculture (UN, 2007;Tagesse *et al*., 2020). Livelihood diversification can be defined as the process by which rural families build a diverse portfolio of activities and social support capabilities in order to survive and to improve their standard of living (Ellis, 2007; Khatun & Roy, 2012; Odafe *et al*., 2018). The nature of these livelihood activities depends on the availability of assets, resources, skills, education, social capital, seasonality, agroclimate/agroecology, and gender). Farmers can basically diversify into two major groups of livelihood activities- on-farm (crop production, livestock farming, poultry rearing, fisheries, forest and forest products, and casual labour) and off-farm livelihood activities (small businesses, craft, employment (salary/wages), remittances, pension/social grants, land rent and subsidies) (Oduniyi, 2019).

Thus, diversification of livelihood is imperative as a survival strategy to swim against the tide of poverty and hunger. It could also help to address their food security and nutritional challenges, income shortfalls and basic necessities for survival and their general well-being. Dejene (2023) and FAO (2004) opined that it can help them achieve financial stability, increase assets, reduce the adverse effect of seasonality on consumption, combat poverty, provide employment opportunities, reduce rural-urban migration, and cope with environmental and socioeconomic shocks and trends. It is against this background that this study aims to identify the different sources of livelihood; determine the extent of livelihood diversification, the poverty status of the farming households, and the impact of livelihood diversification on the poverty status of the rural households in the study area.

1.1 Hypothesis of the study

Ho: There is no significant relationship between livelihood diversification and farmers' poverty status in the study area.

2 Materials and methods

2.1 The study area

This study was conducted in Kwara State, Nigeria, located within the north-central part of Nigeria (Information Technology Agreement (ITA), 1995-2022). The State currently comprises 16 local government areas (LGAs) with Yoruba, Nupe, Bariba and Fulani as the principal ethnic groups. The total population of the State is estimated at 3,551,000 people (National population Commission (NPC), 2020), and covers about 76,363 km^2(NBS, 2016). The State lies on 317 m asl. There are two distinct seasons in Kwara State: the dry and rainy season. The rainy season, which begins from March to early September, allows the production of numerous agricultural products such as yam, cowpea, sorghum, maize, sugarcane, cassava and rice. In Ilorin the capital city, the average annual temperature is 26.5 °C and the annual rainfall is around 1217 mm (NBS, 2016). The map of Nigeria showing the study area is presented in Fig. 1.

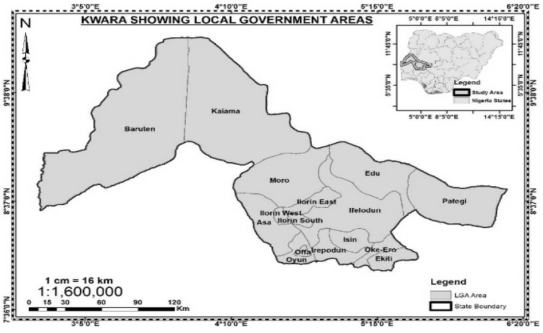

Fig. 1: *Map of Nigeria showing the selected State. Source: Omotesho et al. (2019).*

2.2 Sampling techniques

Kwara State comprises of three agricultural zones I, II and III based on the constituency grouping of the State. Purposive sampling technique was used to select one LGA from each of the zones in the first stage due to observed prevalence of rural households' engagement in both agricultural and non-agricultural livelihood activities in the area. The selected LGAs included Moro, Ifelodun and Oyun. In the second

stage, three towns/villages were selected from each of the LGAs using simple random sampling technique, while proportional sampling technique was used to select 152 farmers, representing 90 % of the sample frame. The list of registered rural farming households obtained from Kwara State Agricultural Development Programme was used as the sample frame for the study.

Table 1: *Determination of the sample size for the study.*

	Selected		*Sample*	
Zone	*LGA*	*villages*	*frame*	*size (90 %)*
I	Moro	Lanwa	21	19
		Paiye	29	26
		Oloru	14	13
II	Ifelodun	Jagun	12	11
		Saba	18	16
		Ojomu	38	34
III	Oyun	Agara	9	8
		Ago Offa	11	10
		Ajoko	17	15
Total	3	9	169	152

Source: Kwara State Agricultural Development Program, 2021

2.3 Method of data collection

Cross-sectional data were collected from January to May 2022 using a well-structured questionnaire to elicit useful and relevant information from the farmers. The heads of rural farming households were the primary representatives of the households but in the absence of the household head, the next decision maker in the household was used for the survey. A pre-survey was conducted through interviews with the village heads so as to obtain an up-to-date information on the livelihood activities of the farmers and their perceived opinions on the factors responsible for the households' livelihood diversification tendencies. This study used the services of trained enumerators who understand the culture, customs and dialect of the farmers. The data collected included the socio-economic characteristics of the respondents, the livelihood sources, the determinants of livelihood diversification as well as information on their poverty status. For the purpose of this study, the rural households were basically composed of crop farmers.

2.4 Model specifications

According to Xuhuan *et al.* (2020), measurements of livelihood diversification can be determined as a one-dimensional index through counting the number of income-generating activities or through a two-dimensional approach that considers the number of income-generating activities and the proportion of each income.

For the purpose of this study, the latter was adopted using Shannon-Weiner Diversity Index for the determination of the extent of livelihood diversification in the area. The index is used to measure the diversity of the various livelihood sources such as agricultural sources (crop production, livestock farming, poultry rearing, fisheries, forest and forest products, and casual labour), off-farm sources (small businesses, employment (salary/wages), remittances, pension/social grant, land rent and subsidies). The Shannon-Weiner Diversity Index (Shannon Diversity Index) as adopted by Paul *et al.* (2021) is presented as:

$$H = \sum P_i * In\,\rho \tag{1}$$

When $\sum$ = sum, Ln = Natural log, pi = Proportion of income source i to total income.

The higher the value of H, the higher the livelihood diversity in the area. The lower the value of H, the lower the diversity. A value of H = 0 indicates only one livelihood source. The Shannon Equitability Index was used to measure the evenness of the livelihood sources among the rural households in the area. The term "evenness" simply refers to how similar was the abundance of different livelihood sources in the study area. This is represented as:

$$EH = H/ln(S) \tag{2}$$

where: EH = Shannon Equitability Index, H = The Shannon Diversity Index, S = The total number of livelihood sources. This value ranges from 0 to 1 where 1 indicates complete evenness and 0 indicates otherwise.

2.5 Determinants of livelihood diversification

Fractional logit regression model was used to analyse the determinants of livelihood diversification in the study area. All analyses were done using STATA 14 software. Inversed Herfindahl-Hirschman Index was used here for the determination of livelihood diversification index due to its simplicity as presented in Equation 3.

$$IHHI = \left[\frac{1}{\sum_{i=0}^{n} IP_i^2}\right]_j \tag{3}$$

Where, IHHI = Inversed Herfindahl-Hirschman Index, IP_j = the proportion of income source i to total income, n = is the number of income sources for a household.
The implicit form of the fractional logit regression model is presented in equation 4:

$$E(Q/W) = \beta_0 + \sum_{i=1}^{n} \beta_i X \tag{4}$$

The explicit form of the fractional logit regression model is as presented in equation 5:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + b_{14}X_{14} + b_{15}X_{15} + e \quad (5)$$

Where:
Y= Livelihood diversification index
X_1= Age of household head (years),
X_2= Gender of household head (male=1, female=0),
X_3= Household size (No.),
X_4= Level of education of household head (No. of years spent in school),
X_5= Access to credit (₦ = Naira),
X_6 = Farm size (ha),
X_7 = Farming experience (Years),
X_8 = Extension visits (Number of visits per year),
X_9 = Cooperative membership (Member =1, otherwise=0),
X_{10} =Farm income (₦),
X_{11} = Land ownership (Dummy: 1= owned, 0=otherwise),
X_{12} = Marital status (Dummy: 1= married, 0=otherwise),
e = error term

2.6 Poverty status of the households

Poverty indices of the rural farming household was calculated through the use of Foster, Greer and Thorbecke (FGT) poverty index (1984) as used by Ojo *et al*. (2015). The FGT model postulated that there are three different ways by which poverty can be measured which are headcount, poverty gap and squared poverty gap (FGT, 1984). The basic formula for the model is:

$$P\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - y_i}{z}\right]^2 \quad (6)$$

Where, z = the poverty line; q = the number of farming households below poverty line; n = the total number of households in the sampled population; y_i = the income of the ith household; α = poverty aversion parameter and takes on the values 0, 1 and 2, representing incidence depth or severity of poverty; P = Poverty gap.

When $\alpha = 0$, then P was reduced to headcount ratio which measures the incidence of poverty; when $\alpha = 1$, it shows the intensity of poverty that is, how far the households are below the poverty line and $\alpha = 2$ gives the severity of poverty.

The poverty line was set at the Universal Standard Poverty Line of US $1.90 per day which is equivalent to ₦29,070 per month at the exchange rate of ₦510 per US $ in November, 2021. Therefore, any rural household whose monthly income falls below ₦29,070 was considered poor. Those whose income fell below one third of the poverty line, i.e. ₦8,721, were classified as "very poor", while whose income fell between 1/3 and 2/3 of the poverty line (₦8,721 – ₦19,477) were classified as "moderately poor", and those whose income fell between 2/3 of the poverty line and the poverty line (i.e. ₦19,477 – ₦29,070) were categorize considered "poor", while those whose income was above the poverty line were categorised as "non poor".

In order to determine the effect of livelihood diversification on poverty status of the rural households in the study area, probit regression was used:

$$InY = \beta_0 + \sum_{i=1}^{n}\beta_i X \quad (7)$$

Where, Y = poverty status of the rural households (1 = non-poor i.e income > ₦29,070 and 0 = poor i.e income < textnaira29, 070); X_1 = Age of household head (years), X_2 = Gender (dummy: 1 = male, 0= female), X_3 = household size (No.), X_4 = level of education (years), X_5 = access to credit (amount of credit obtained in Naira), X_6 = farm size (ha), X_7 = farming experience (years), X_8 = extension visits (number of extension contacts per year), X_9 = Membership of cooperative (years of membership in cooperative), X_{10} = Farm income (₦), X_{11} = Land ownership (dummy: 1= owned, 0= otherwise), X_{12} = per capita household expenditure (₦), X_{13} = farm distance (km) and X_{14} = livelihood diversification (number of livelihood activities engaged in by a given farm household head), U_i = error term.

The equation 4 (fractional logit model) is used when the outcome variable is a fractional response variable, i.e. a variable taking a value between zero and one. Equation 7 (binary probit) is useful when the dependent variable is dichotomous in nature i.e. 0 or 1. E(Q/W) which represents the proportion of amount from each source over the total realised from all souces of diversification (The values range from 0 to 1 while Y in equation 7 is dichotomous - 1 = Non-poor, 0 = poor).

3 Results

3.1 Sources and extent of livelihood diversification among the rural households in the study area

The findings of this study as revealed in Table 2 shows that the farmers diversified into 16 different on-farm and off-farm activities. The main livelihood activities included crop farming, fish farming, palm wine tapping, livestock rearing, petty trading, marketing and processing of agricultural produce, among others while few of them however, engaged in music entertainment, farm labour. carpentry, and hunting as secondary livelihood activities. However, out of the 16 livelihood activities engaged by the farmers, 10 were

agriculture-related. In addition, the findings showed that the Shannon Diversity Index (SDI) was 2.74 while the Shannon Equitability Index (SEI) was 0.97. The value of the SDI implied that there was a high diversity of livelihoods among the farmers in the study area, while the value of the SEI revealed that the abundance of different livelihood activities undertaken by the rural households were very similar to each other.

Table 2: *Measurement techniques of different independent variables.*

Source of livelihood	*Percentage**
Crop farming	92.8
Fish farming	91.1
Palm wine taping	78.9
Livestock rearing	71.1
Marketing of agricultural produce	71.1
Petty trading	67.8
Agro-processing (cassava and yam flour)	64.5
Tailoring	63.8
Bee keeping	59.2
Saloon operators	59.2
Food vending	51.3
Music/entertainment	38.8
Farm labour	36.2
Civil service	29.6
Carpentry	17.1
Hunting wild animals	8.6
Extent of diversification	
Shannon diversity index (SDI)	2.74
Shannon equitability index (SDI)	0.97

*Multiple responses. Number of observations (N) = 152; Sum total of livelihood sources = 16.

3.2 *Determinants of livelihood diversification among the rural household*

Table 3 shows the result of the fractional logit regression of the determinants of livelihood diversification among rural households in the study area. The result revealed that four variables namely age, gender, household size and farming experience were statistically significant out of the included explanatory variables. Age and gender were significant at 10 % level, farming experience at 5 % level and household size was significant at 1 % level. The result further showed that age and household size were negative though significant.

3.3 *Poverty status of the rural households*

Analysis of the poverty levels of the households considered in this research is very important in understanding the households' level of vulnerability, deprivation and access to basic necessities of life that households need to survive. It is also essential to guide the formulation and implementation of poverty reduction policies in the area. Table 4 shows that only 42 % of the households were non-poor. Besides, The poverty line was ₦29,070/month while poverty incidence, poverty gap and poverty severity among rural farmers were about 83.4 %, 46.9 %, and 30.7 %, respectively. The incidence of poverty, poverty gap and severity of poverty index help to provide a useful marker of the extent of poverty and the intensity of poverty among the sampled households.

Table 3: *Distribution of the farmers according to their socio-economic characteristics.*

Variables	*Coefficient*	*T- values*
Constant	3.8605	31.81
Age	−0.0026	−1.95*
Gender	0.6944	1.73*
Household size	−0.0072	−3.04***
Level of education of HH	0.0150	1.23
Access to credit	0.0138	0.45
Farm size	−0.0023	−0.23
Farming experience	0.0029	2.17**
Extension visits	−0.0206	−0.85
Cooperative membership	0.0038	0.15
Farm income	$3.24 \times 10^{-0.7}$	0.75
Land ownership	0.0150	0.64
Marital Status	−0.0184	0.0198
Number of observations	157	
LR Chi^2 (12)	22.91	
Prob > chi^2	0.0285	
Log likelihood	657.19	

***, ** and * implies 1 %, 5 % and 10 % significant level.

Table 4: *Distribution of households according to Foster, Greer and Thorbecke (FGT) poverty index.*

	Poverty		
Indicators	*incidence*	*depth/intensity/gap*	*severity*
Poverty status	0.834395	0.468736	0.306632
Poverty line*	₦29,070		

*% of poor households = 58; % of non-poor = 42.

3.4 *Effect of livelihood diversification on poverty status of the rural households*

Table 5 presents the result of the analysis of the probit regression model on the impact of livelihood diversification

Table 5: *Effect of livelihood diversification on poverty status of the rural households.*

Variables	*Coefficient*	*T- values*	*Marginal effect*
Constant	−0.465	−0.61	−0.436
Age	−0.0224	−1.77 *	−0.94
Gender	0.9634	2.85***	0.672
Household size	0.0082	0.38	0.061
Level of education of HH	0.0441	1.20	0.274
Access to credit	0.869	2.98***	0.132
Farm size	0.107	1.19	0.182
Farming experience	−0.014	−1.06	−0.257
Extension visits	−0.096	−0.40	0.06
Cooperative membership	-1.64×10^{-5}	−3.88 ***	−0.131
Farm income	-1.25×10^{-6}	−0.29	−0.088
Land ownership	0.12	0.36	0.072
Per capita expenditure of household	-1.51×10^{-6}	−0.46	−0.042
Farm distance	0.074	0.55	0.097
Livelihood diversification	−1.767	−1.35	−0.436
Number of observations	157		
Wald $chi^2(14)$	113.61		
Prob > chi^2	0.0000***		
Pseudo R^2	0.257		
Log likelihood	−78.869		

***, ** and * implies 1 %, 5 % and 10 % significant level; values in parenthesis are t-values.

Table 6: *Distribution of farmers according to constraints associated with livelihood diversification.*

Constraints	*VS (%)*	S*(%)*	*UD(%)*	*NS (%)*	***NVS (%)***	*WM*	*RMK*
Inadequate funds for investment	0.0	64.3	5.1	30.6	0.0	3.55	MAC
High cost of transportation	0.0	53.5	5.1	41.4	0.0	3.21	MAC
Pests & diseases outbreak	0.0	51.6	8.9	38.9	0.0	3.1	MAC
Poor storage facilities	0.0	51.0	7.6	41.4	0.0	3.08	MAC
Lack of training on skill acquisition	0.0	47.1	12.2	40.8	0.0	3.05	MAC
Inadequate credit facilities	0.0	48.4	21.0	30.6	0.0	3.05	MAC
Poor market outlets	0.0	50.3	8.9	40.8	0.0	3.02	MAC
Bad road network	0.0	53.5	12.7	33.8	0.0	3.01	MAC
Land tenure arrangements	0.0	47.1	7.0	45.9	0.0	3.00	MAC
Multiple government taxation	0.0	22.3	47.8	29.9	0.0	2.88	MIC
Problem of theft	0.0	35.0	8.9	56.1	0.0	2.78	MIC
Poor access to social amenities	0.0	12.1	56.1	31.8	0.0	2.77	MIC
Community culture, value and norms	0.0	38.9	10.2	51.0	0.0	2.67	MIC
Environmental degradation	0.0	19.1	54.8	26.1	0.0	2.44	MIC
High cost of labour	0.0	38.9	12.7	48.4	0.0	2.34	MIC

Note: VS = very severe, S = severe, UD = undecided, NS = not severe, NVS = not very severe, WM = weighted mean, RMK = remark, MAC = major constraint, MIC = minor constraint.

on the poverty status of the farmers in the study area. The Prob > chi^2 = 0.000 and Pseudo R^2 = 0.6970 indicated that the regression model had high prediction power. The results revealed that gender and access to credit both had positive and significant effect on poverty status of the households (p>0.01) The marginal effect of access to credit was 0.132. On the contrary, age and cooperative membership were negative but significant at 10 % and 1 % levels of probability with marginal effect of -0.94 and -0.131, respectively.

3.5 Constraints associated with livelihood diversification

Table 6 reveals the distribution of farmers according to the constraints associated with livelihood diversification into on-farm and off-farm livelihood activities in the study

area. The results showed that the major constraints associated with livelihood diversification were inadequate funds for their investment options (3.55), high cost of transportation (3.21), pest and disease outbreak (3.10), poor storage facilities (3.08), inadequate credit facilities (3.05), inadequate training for skill acquisition (3.05), poor market outlets (3.02), poor road network (3.01), and poor land tenure arrangements (3.00).

4 Discussion

4.1 Sources and extent of Livelihood

The findings showed that farmers were not lazy, but were seeking means of survival for themselves and their households by diversifying their livelihoods. High number of agricultural related livelihood sources showed that agriculture is still a key livelihood strategy for many families in rural areas where traditional agriculture is the predominant source of income. The finding support that of Adeniyi *et al*. (2018) who reported that farming, trading and livestock farming were the most common sources of livelihood in Kwara State, Nigeria. This finding showed the willingness of the households to engage in income generating activities that could ensure their financial stability and reduced seasonal shocks. However, the findings revealed that 29.6 % of the farmers were also civil servants. This is not surprising as agriculture is a major activity encouraged by the Nigerian government to be practiced by every citizen to enhance food security. This is consistent with the report by Vihi *et al*. (2021), Olutumise *et al*. (2021) and Adeniyi *et al*. (2018) that public service was one of the livelihood strategies adopted by farming households in Nigeria. Furthermore, the similarity in the different livelihood activities of the households could be due to their limited knowledge and lack of empowerment on other income generating alternatives in the area. The extension agents, local government authorities and other stakeholders need to prioritise capacity building and training workshops on skills acquisition for the farmers to increase the diversity of their livelihood choices.

4.2 Determinants of livelihood diversification among the rural household

The analysis of the determinants of livelihood diversification among households showed that age was negative but significant, implying that an increase in the age of farmers, holding other variables constant, reduces the likelihood of livelihood diversification in the area. As household heads get older, their strength, agility and management skills begin to decline, which could reduce their desire to diversify into other livelihoods which is consistent with the report by Danladi *et al*. (2021). In addition, an increase in household size reduced the likelihood of livelihood diversification. This could occur if household members were used as a source of cheap family labour, thereby reducing production costs. It is worth noting that family labour is more accessible and may be willing to work longer hours on the farm knowing that their survival depends solely on the output realised from the farm. This could serve as a motivation for households to remain attached to their agricultural activities. This finding is consistent with the reports of other studies with parameters such as gender, formal education, age, marital status, family size, dependency ratio, and extension services which influenced the further adoption of livelihood diversification strategies among farming households in the various study sites (Khatun & Roy, 2012; Ayantoye *et al*., 2017; Adeniyi *et al*., 2018; Wan & Fuyuki, 2020; Akinyemi *et al*., 2021; Dejene, 2023).

4.3 Poverty status of farmers

The analysis of the poverty levels of the households is very important in understanding the households' level of vulnerability, deprivations and how difficult it was to access basic necessities of life that are essential for their survival. It is also vital for guiding policy formulation and implementation for poverty reduction in the area. The poverty line of ₦29,070 per month showed that each household required this minimum to secure basic necessities of life needed for their survival. The findings further revealed that about 83.4 % of the households lived below the poverty threshold. It also shows high level of vulnerability and deprivations among the rural households in the area. The poverty gap of 46.9 % showed that their mean incomes were 46.9 % below the poverty line which implied that each household required about ₦13,633.83/,month (46.9 % * ₦29,070) to eliminate extreme poverty. Besides, they also needed about 30.7 % increase in their per capita income to push them out of poverty severity. The higher percentage of poor households despite diversification of their livelihoods in the study area is contrary to the a priori expectations, and was due to low farmers productivity due to the use of traditional production methods. This is in line with the findings of Ojo *et al* (2013), who reported that the low productivity of farmers in Nigeria was associated with the use of traditional production systems and their subsistence nature. Furthermore, it could also be due to climate variability with resultant fluctuating production yields (Nzeh *et al*., 2016; Agboola & Fayiga, 2016), low level of formal education which could negatively affect their entrepreneurial skills and development (Danladi *et al*, 2021; Eteng *et al*., 2021), non-inclusive public policies on

capacity building and empowerment, and poor rural infrastructure such as poor road network (Ogunlela & Ogungbile, 2006; Eteng *et al*., 2021). In addition, the SEI result had previously shown a high degree of similarity between the different livelihood activities undertaken by farmers, which could result in a poor market for their produce. All this could lead to low income from livelihood activities, which could hardly reduce the household's financial burden. Homi *et al* (2020) opined that if the current trends of increasing poverty among the rural poor continue without decisive action to ameliorate its impact on the poor, Nigeria may not make any gains in poverty reduction in the next decade. World Bank (2022) reported that Nigeria's multiple exchange rates and the country's trade restrictions can have a negative impact on poverty reduction. This is because trade restrictions can make the goods that poor households consume, especially food, more expensive, thereby reducing people's purchasing power and welfare. To reduce poverty in Nigeria, and by extension in the study area, government at all levels must be at the forefront of providing essential public services to ensure redistribution that reduces rural-urban and inter-regional inequalities (World Bank, 2022).

4.4 Effect of livelihood diversification on poverty status

The marginal effect of access to credit was 0.132 which implied that a 1 % increase in access to credit led to13.2 % probability of reduction in poverty level of the households. Accessibility to credit facilities could increase farmers' access to fund for investment in other businesses/livelihood activities. The income generated from these businesses/livelihood activities could help in the improvement of households' welfare thereby improving their poverty status. On the contrary, the marginal effect of -0.94 and -0.131 for age and cooperative membership showed that a 1 % increase in each of the variables led to 94 % and 13.1 % increase in poverty incidence among the households, respectively. As the household head advances in age, the drive and the will-power for diversification of livelihood tends to reduce and hence could make them linger on in vicious cycle of poverty entanglement. Further, though joining a cooperative society gives a household head benefits of access to credit, new technologies, new innovations and trainings on how to maximize the use of available resources (inputs) to get maximum output, a non-functional cooperative society or poor management of the affairs of the association by the elected officials could deprive the farmers of these benefits and thereby increase the poverty level of the farmers. Diversion of accessed loan from the association to unproductive venture and/or untimely delivery of purchased inputs by the association for the farmers' farming operations could have serious negative impact on their production and hence their poverty level. The finding agrees with Danladi *et al*. (2021) and Vihi *et al*. (2021) but contradicts that of Oyinbo and Olaleye (2016) who found that livelihood diversification was significant but was negatively related to the poverty level of the farmers in Giwa Local Government Area of Kaduna State, Nigeria.

4.5 Constraints associated with livelihood

The finding showed, among others, that finance to take on new portfolio of activities was a major challenge in the area. Though government at different point in time have come up with different programmes to solve crop production challenges, the finding revealed that these problems are still persistent. The farmers also raised the problem of lack of trainings in more productive livelihood activities that could build their capacity and raise their income levels. If rural households are trained, they can create wealth within their environment and beyond. Moreover, even with limited owned-capital of the households, credit facility which was also inadequate, would have been a booster for easy diversification of their livelihood sources. This is possible when loan at low interest rate is made available to the farmers through commercial, micro finance and agricultural banks. The three tiers of government in Nigeria must come up with relevant policies to tackle and provide immediate succour to ameliorate the sufferings of these rural households. This is at variance with the findings of Etuk *et al*. (2018) who reported that the major constraints to livelihood diversification among farm households in Akamkpa Local Government Area, Cross River State, Nigeria were unstable electricity, poor access to market, insufficient market price of commodity, inadequate access to loan, inadequate skilled labour, high cost of business premises and appreciation in tax rate.

5 Conclusion

In conclusion, agriculture is still an important livelihood strategy for many farmers and their different livelihood activities were very similar. The main determinants of livelihood diversification included age, gender, household size and farming experience. Despite the high level of involvement in diversified livelihood activities, many households were still trapped in a vicious cycle of poverty. Unfortunately, livelihood diversification did not have a significant impact on the poverty status of households. The main factors influencing the poverty level of the households were access to credit, gender, age and cooperative membership, while the major constraints identified were inadequate funds (own capital) for investment, high cost of transportation, lack of

training for skill acquisition and inadequate credit facilities. Based on the findings, it is recommended that the government through extension agents should organise training on wealth creation and also empower them to undertake more productive livelihood activities. This will increase their income and assets, reduce vulnerability thereby causing a reduction in their poverty level.

1. There should be rural-urban linkages to promote better market outlets for agricultural and non-agricultural products from their livelihood portfolio.
2. There should be an urgent policy framework to develop the rural areas through improved infrastructural facilities. This will attract cottage industries and other firms into the area and help generate employment opportunity for members of the rural households.
3. The Central Bank of Nigeria should formulate policies that could make credit easily accessible the households at very low interest rate.
4. Since their livelihood activities clustered more around agriculture, government should short, medium and long term goals of transforming agriculture in the study area and, the entire country.

Conflict of interest

The authors declare no conflict of interest.

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