



EFFECTS OF NON-FARM INCOME ACTIVITIES ON POVERTY STATUS OF SMALLHOLDER MAIZE (*ZEA MAYS*) FARMERS IN KADUNA STATE, NIGERIA

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ABSTRACT

A study was conducted to investigate the effect of livelihood diversification on poverty reduction among smallholder maize farmers in Kaduna State, Nigeria. Descriptive statistics, FGT poverty indices, Livelihood Diversification Index (LDI) and logistic regression were applied to analyse data collected from 200 households. Results showed that 80.5% of farmers were male, mean age 44 years, average household size 7 and 97% were formally educated. Average farm size was 4.06 ha. Poverty incidence was 37% at a poverty line of 20,556/month with poverty depth and severity of 0.135 and 0.068, respectively. The mean LDI was 0.47, with 80% of households recording moderate to very high diversification, indicating engagement in a combination of on-farm, off-farm, and non-farm activities. Logistic regression showed that non-farm participation, higher diversification, education, larger farm size, and access to extension services significantly reduced the likelihood of being poor. Specifically, non-farm participation and higher livelihood diversification were associated with 56% and 68% lower odds of poverty, respectively. Farmers perceived diversification as increasing income (WMS = 4.00), reducing poverty (WMS = 3.90), providing off-season opportunities (WMS = 3.85), and serving as a survival strategy (WMS = 3.80). The study concludes that diversification, supported by education and institutional services, improves welfare. The study recommends promoting non-farm opportunities, strengthening extension services, improving access to credit, and cooperative membership to contribute to poverty reduction among smallholder maize farmers.

Keywords: Effect, Poverty, Smallholder, Maize, Farmers, Income.

INTRODUCTION

Poverty remains a major problem in rural households across sub-Saharan Africa, particularly in Nigeria where agriculture is the major source of livelihood for most rural populations. Smallholder farmers are important for food production but their incomes are often low and unreliable due to lack of access to inputs, climate variability and market imperfections (Chiejina, 2018; Precious *et al.*, 2025). Thus, the income derived from the farm is often not enough to cover the household's needs. Maize is one of Nigeria's most important staple crops, especially in the northern states like Kaduna. Smallholder maize farmers are important in the provision of national food supply. However, they are heavily dependent on rain-fed agriculture and thus exposed to the risks of production and income. These challenges have encouraged many farming households to engage in non-farm income activities as a means of improving welfare and coping with income shortfalls (Cairns *et al.*, 2021; Adegbite *et al.*, 2023). Income-generating activities outside of farming, such as small-scale trading, wage labour and artisanal work, are commonly identified as key elements in diversifying rural livelihoods. These activities help households to smooth consumption, reduce their vulnerability to agricultural shocks and improve overall income levels (Sallawu *et al.*, 2024). Empirical evidence in Nigeria shows that the incidence of poverty is lower among households involved in non-farm activities than those that depend solely on farming (Lawi *et al.*, 2025). Despite the increasing recognition of the importance of diversification of livelihoods, empirical evidence on smallholder maize farmers in Kaduna State is scanty. Also, few studies incorporate farmers' perceptions to assess the role of non-farm income activities in poverty alleviation. For effective rural development, it is important to understand not only the objective effects of livelihood diversification, but also the subjective perceptions of these effects policies.



Against this backdrop, this study examines the effects of non-farm income activities on the poverty status of smallholder maize farmers in Kaduna State, Nigeria. Specifically, the study measures poverty levels among maize farming households, analyzes the effect of livelihood diversification on poverty reduction, and examines farmers' perceptions of the role of non-farm income activities in poverty alleviation.

METHODOLOGY

The Study Area

The study was conducted in Kaduna State, located in the North-West geopolitical zone of Nigeria. The state lies between Latitudes 9°02' and 11°32' North and Longitudes 6°15' and 8°38' East, covering approximately 42,481 square kilometres of land area. Kaduna State experiences a tropical climate characterized by distinct wet and dry seasons, which provides suitable conditions for crop production. The predominant vegetation is the Northern Guinea Savanna, supporting the cultivation of cereals, legumes, and other arable crops commonly grown in the region (Africa Food Export, 2025). According to the Kaduna State Bureau of Statistics, the estimated population of the state was approximately 10.4 million people in 2024 (Punch NG, 2024). Agriculture constitutes a major economic activity in the state, engaging a significant proportion of households in both crop and livestock production. Maize is one of the major staple crops cultivated by smallholder farmers across the state and serves as an important source of food, employment, and income for rural households (Wossen *et al.*, 2023). Maize farming is widely practiced across several Local Government Areas, with thousands of smallholder farming families involved in its production at both subsistence and commercial levels (Kaduna State Bureau of Statistics, 2018).

Sampling Procedure and Sample Size

The study was conducted using a multi-stage sampling technique. The first stage was the purposive selection of Kaduna State on account of its prominence in the production of maize. In the second stage, one Local Government Area (LGA) was purposively selected from each of the Northern, Central and Southern agricultural zones of the state based on the intensity of maize farming activities. The LGAs selected were Soba, Kudan and Lere respectively. In the third stage, from each of the selected LGAs, maize producing communities were randomly selected. In the last stage, smallholder maize farmers were randomly selected from each community using farmers registers obtained from agricultural extension offices and recognised farmer associations. The sampling frame was 398 registered smallholder maize farmers from the surveyed communities. The sample size was determined using Yamane's (1967) formula for finite populations at a 5 percent level of precision, specified as:

$$n = \frac{N}{1 + N(e)^2} \dots (1)$$

where n is the sample size, N is the population size (398), and e is the level of precision (0.05).

Substituting into the formula:

$$n = \frac{398}{1 + 398(0.05)^2} = \frac{398}{1.995} \approx 200$$

Thus, a total of 200 smallholder maize farmers were selected for the study.



Table 1: Population and Sample Size of Smallholder Maize Farmers in the Study Area

Zone	LGA	Community	Sample Frame	Sample Size (50.25%)
Northern Zone	Soba	Bele	40	20
		Liwawa	38	19
		Takalafiya	36	18
		Awai	34	17
		Bauda	30	15
Central Zone	Kudan	Gwibi	42	21
		Hayin Shara	40	20
		Tashar Ya'u	38	19
		Kyaudai	36	18
Southern Zone	Lere	Raminkura	26	13
		Jaja	24	12
		Luwuma	22	11
		Kadere	22	11
Total		13 Communities	398	200

Field Survey, 2025

Method of Data Collection

Primary data were collected from the selected smallholder maize farmers using a structured questionnaire that captured information on household socio-economic characteristics, farm production, livelihood diversification, household income, assets, and farmers' perceptions of non-farm income activities. **A 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree was included in the questionnaire to measure farmers' perceptions of the role of livelihood diversification in poverty alleviation.** The questionnaire was pre-tested in a neighboring community to ensure clarity and reliability. Data were collected through face-to-face interviews conducted by trained enumerators familiar with local languages and farming practices, while farmers' registers from local extension offices were used to verify household information and guide respondent selection. Secondary data on maize production and rural livelihoods were obtained from the Kaduna State Ministry of Agriculture, Kaduna State Bureau of Statistics, and relevant policy documents to complement and validate the primary data.

Analytical techniques

The socio-economic, farm and institutional characteristics of the respondents were analysed using descriptive statistics such as frequencies, percentages, means and standard deviations. The variables were age, sex, household size, educational level, farm size, maize output, access to extension services and participation in non-farm income activities. The results are a summary of the characteristics of the sampled households and variations that are relevant for livelihood diversification and poverty status. Mean scores were used to analyse responses obtained from the 5-point Likert-scale statements on perceived role of livelihood diversification in poverty alleviation.

The mean score for each statement was calculated by multiplying the frequency of each response category by its assigned score, summing the weighted scores, and dividing by the total number of respondents. The decision rule was based on the scale midpoint, where a mean score of 3.50–5.00 indicates agreement, 2.50–3.49 indicates undecided, and 1.00–2.49 indicates disagreement. The mean scores were used to determine the extent to which farmers perceived livelihood diversification as contributing to income enhancement, poverty reduction, off-season employment, and household coping with economic challenges.

Poverty Measurement (Foster–Greer–Thorbecke Index – FGT)

Poverty among smallholder maize farming households was measured using the Foster–Greer–Thorbecke (FGT) poverty index, which is widely applied in poverty and welfare analysis due to its ability to capture not only the incidence of poverty but also its depth and severity. Household welfare was proxied by per capita household income, and a poverty line was defined as two-thirds of the mean per capita consumption expenditure of the sampled households.

The FGT poverty index is expressed as:



$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^q \left(\frac{Z - Y_i}{Z} \right)^{\alpha} \dots (2)$$

where P_{α} is the poverty index, N is the total number of households, q is the number of households below the poverty line, Z is the poverty line, Y_i is the per capita household income of the i^{th} poor household, and α is the poverty aversion parameter. When $\alpha = 0$ the index measures poverty incidence (headcount ratio); when $\alpha = 1$, it measures the poverty gap, indicating the depth of poverty; and when $\alpha = 2$, it measures poverty severity, reflecting inequality among the poor.

Livelihood Diversification Index (Herfindahl Index)

The extent of livelihood diversification among smallholder maize farming households was measured using the Herfindahl Index (HI), which captures the degree of income concentration across different livelihood activities. The index is based on the share of income derived from each livelihood source and is commonly used to assess income diversification in rural livelihood studies.

The Herfindahl Index is specified as:

$$HI = \sum_{j=1}^k S_j^2 \dots (3)$$

where HI is the Herfindahl Index, S_j^2 represents the proportion of total household income obtained from the i^{th} livelihood activity, and k is the total number of livelihood income sources. The value of the index ranges from 0 to 1, with values closer to 1 indicating higher income concentration (lower diversification), while values closer to 0 indicate greater livelihood diversification.

To enhance interpretation, a Livelihood Diversification Index (LDI) was derived as:

$$LDI = 1 - HI \dots (4)$$

This transformation ensures that higher values of the index reflect a greater degree of livelihood diversification. The index was used to compare diversification levels among households and to examine the relationship between non-farm income participation and poverty status among smallholder maize farmers.

Logistic regression model

To examine the effect of livelihood diversification on poverty reduction among smallholder maize farmers, a binary logistic regression model was employed. This model is appropriate because the dependent variable (poverty status) is dichotomous, taking a value of 1 if a household is poor and 0 otherwise, based on the defined poverty line.

The logistic regression model is specified as:

$$P_i = \frac{1}{1 + e^{-Z_i}} \dots (5)$$

where P_i is the probability that the i^{th} household is poor, and Z_i is a linear function of explanatory variables expressed as:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_8 X_8 + \varepsilon_i \dots (6)$$

In explicit form, the model is written as:

$$\ln \left(\frac{P_i}{1 - P_i} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_8 X_8 + \varepsilon_i \dots (7)$$

where: P_i = Probability that the household is poor; X_1 = Participation in non-farm income activities (1 = yes, 0 = no); X_2 = Age of household head (years); X_3 = Years of formal education of household head; X_4 = Household size (number of household members); X_5 = Total farm size (hectares); X_6 = Access to extension services (1 = yes, 0 = no); X_7 = Access to formal credit (1 = yes, 0 = no); X_8 = Livelihood diversification index; β_0 = Intercept term; $\beta_1 - \beta_8$ = Coefficients of the explanatory variables; and ε_i = Error term

The estimated coefficients indicate the direction and magnitude of the influence of each explanatory variable on the likelihood of a household being poor. Results were interpreted using odds ratios, and statistical significance was assessed at conventional probability levels.



RESULTS AND DISCUSSION

Socio-economic Characteristics of Smallholder Maize Farmers in the Study Area

Table 2 summarizes the socio-economic characteristics of smallholder maize farmers in the study area. The results indicate that maize farming is largely male-dominated, with 80.5% of respondents being male, reflecting customary land tenure and cultural norms that limit women's access to land and productive resources in northern Nigeria. This pattern is consistent with findings by Marechera *et al.* (2022) similarly reported that male-headed households are more actively engaged in commercial maize production due to better access to land, labor, and capital.

The mean age of 44.09 years shows that most farmers are within the economically active age group, particularly between 31 and 60 years, suggesting substantial farming experience and capacity to engage in both farm and non-farm activities. The standard deviation of 11.31 years indicates moderate variation in farmers' ages around the mean, showing that the respondents comprised both younger and older farmers. This aligns with Billa (2022), who found that middle-aged farmers are more likely to diversify livelihoods and adopt income-enhancing strategies than younger or elderly farmers.

Moreover, the predominance of married respondents (81%) and the relatively large mean household size of 7.03 persons reflect the family-based nature of rural livelihoods. The standard deviation of 2.61 persons indicates some variation in household size, although most households were relatively close to the mean. While large households can provide family labor for maize production and non-farm activities, earlier studies have shown that they may also increase dependency burdens and poverty risk when income growth is inadequate (Yu *et al.*, 2023).

Educational attainment among respondents was relatively high, with 97% having some level of formal education. This suggests improved capacity to adopt improved technologies, access non-farm employment, and respond to market and extension information. Similar studies have established that education significantly enhances participation in non-farm income activities and reduces poverty among rural households (Shutong *et al.*, 2025).

In terms of production characteristics, the mean total farm size of 4.06 hectares and mean maize farm size of 2.22 hectares indicate that most respondents operate at the upper end of smallholder farming, with maize serving as a major enterprise. The standard deviations of 1.21 hectares for total farm size and 0.96 hectares for maize farm size indicate moderate variation in landholdings among the farmers. Correspondingly, maize output was relatively high, with 76% producing 31 bags or more. The mean maize output of 49.68 bags, with a standard deviation of 22.37 bags, indicates considerable variation in output among farmers, reflecting differences in farm size, production practices, input use, and other farm-level conditions. Comparable findings have been reported in northern Nigeria, where larger farm sizes are associated with higher output levels, although production risks remain significant (Omotilewa *et al.*, 2021).

Despite these production levels, non-farm income plays an important role in household livelihoods. About 61% of respondents earned ₦20,001–₦50,000 monthly from non-farm activities, supporting earlier evidence that rural households rely on non-farm income to stabilize earnings and cope with agricultural income fluctuations (Lawi *et al.*, 2025). The mean monthly non-farm income of ₦24,804.44, with a standard deviation of ₦15,146.74, indicates substantial variation in the amount of income generated from non-farm activities among households.

Total household income further reveals income heterogeneity, as a sizeable proportion of households earned high incomes while others remained below ₦100,000. The mean total household income of ₦185,366.80 and standard deviation of ₦88,035.39 further indicate considerable variation in household income levels, suggesting differences in households' income-generating capacity. This pattern mirrors findings by Mbanasor *et al.* (2013), who documented substantial income inequality among Nigerian farming households, reinforcing the relevance of poverty analysis.

Access to institutional support was relatively limited, with fewer than half of respondents having access to cooperatives, extension services, or formal credit. Previous studies consistently report that such institutional constraints hinder productivity growth and livelihood diversification among smallholder farmers (Balana & Oyeyemi, 2022).



Finally, land acquisition was evenly distributed among inheritance, purchase, and leasing, reflecting mixed land tenure systems common in rural Nigeria. Aslam & Fazal (2025) similarly found that inherited land often restricts land expansion and access to credit, while purchased and leased land may encourage commercialization and diversification but at higher costs.

Table 2: Distribution of Smallholder Maize Farmers based on Socio-economic Characteristics

Variable	category	frequency	percentage (%)	Mean	std. dev.
Sex	male	161	80.5	44.09	11.31
	female	39	19.5		
age (years)	18–30	29	14.5	7.03	2.61
	31–40	57	28.5		
	41–50	45	22.5		
	51–60	52	26		
	61+	17	8.5		
	no formal education	6	3		
marital status	married	162	81	4.06	1.21
	single	38	19		
household size (persons)	1–4	44	22	2.22	0.96
	5–8	90	45		
	9–12	66	33		
	primary	83	41.5		
education level	secondary	77	38.5	49.68	22.37
	tertiary	34	17		
	≥3.01	162	81		
total farm size (ha)	1.01–2.00	7	3.5	24,804.44	15,146.74
	2.01–3.00	31	15.5		
	≥3.01	162	81		
maize farm size (ha)	≤1.00	25	12.5	185,366.80	88,035.39
	1.01–2.00	61	30.5		
	≥2.01	114	57		
maize output (bags)	11–20	23	11.5	49.68	22.37
	21–30	25	12.5		
	≥31	152	76		
	no	101	50.5		
monthly non-farm income (₦)	≤20,000	78	39	24,804.44	15,146.74
	20,001–50,000	122	61		
	≥50,000	8	4		
total household income (₦)	50,001–100,000	41	20.5	185,366.80	88,035.39
	100,001–200,000	64	32		
	≥200,001	87	43.5		
	yes	99	49.5		
cooperative membership	no	101	50.5	49.68	22.37
	yes	86	43		
extension visits	yes	86	43	49.68	22.37
	no	114	57		
access to formal credit	yes	96	48	49.68	22.37
	no	104	52		
land acquisition	inherited	69	34.5	49.68	22.37
	leased	62	31		
	purchased	69	34.5		

Source: Field survey, 2025

Poverty Levels among Maize Farming Households

Table 3 presents the poverty status of maize-farming households using the Foster–Greer–Thorbecke (FGT) indices. The results show that **37% of households were poor, while 63% were non-**



poor, based on a poverty line defined as two-thirds of mean per capita household income. The observed poverty incidence is lower than the broader national poverty situation reported for Nigeria. The World Bank estimated that the share of Nigerians living below the national poverty line increased from **40.1% in 2018/19 to 56.0% in 2024**, reflecting the effects of slow economic growth, inflation, and declining purchasing power (World Bank, 2024). More recent World Bank estimates indicate that the national poverty rate increased further to **61% in 2024 and an estimated 63% in 2025** (World Bank, 2025). The relatively lower incidence observed among the sampled maize-farming households may therefore reflect differences in livelihood opportunities, farm resources, household income, and the specific poverty threshold adopted in this study. The estimated poverty incidence (P_0) of 0.37 indicates that slightly more than one-third of maize-farming households live below the poverty threshold, closely aligning with the 36% headcount ratio reported by Adebayo (2023) among rural crop farmers.

In addition, the poverty depth index (P_1) of 0.135 suggests that poor households fall, on average, 13.5% below the poverty line, indicating moderately deep poverty. Similar poverty gap estimates (12–16%) were reported by Agyepong & Kuuwill (2025), who showed that households without non-farm income experience significantly deeper poverty. Furthermore, the poverty severity index (P_2) of 0.068 reflects inequality among poor households, indicating that the poorest are substantially worse off. This result supports the findings of Pu *et al.* (2024), who documented that unequal access to education, credit, and remunerative non-farm opportunities intensifies poverty severity in rural areas.

Finally, the poverty line estimates show a mean per capita family income of **₦30,834 and a study-specific poverty threshold of ₦20,556 per month**. In addition to this relative poverty threshold, the findings can be compared with the **National Bureau of Statistics (NBS) national poverty line of ₦137,430 per person per year** and the **World Bank international poverty line of US\$2.15 per person per day** applicable to the period of the study. These benchmarks provide a broader basis for interpreting the poverty status of maize-farming households and assessing the extent to which the findings align with national and international measures of poverty.

Table 3: Poverty Status of Maize Farming Households

Poverty Category	Freq.	%
Non-poor	126	63
Poor	74	37
Total	200	100
Poverty indices	Value	
Poverty Incidence (P_0)	0.37	
Poverty Depth (P_1)	0.135	
Poverty Severity (P_2)	0.068	
Poverty lines		
MPCFI	₦ 30,834 per month	
$2/3 \times \text{MPCFI}$	₦ 20,556 per month	

Livelihood Diversification among Maize Farming Households

T Table 4 shows that livelihood diversification is common among maize-farming households in the study area, although the degree of diversification varies. About 80% of households exhibit at least moderate diversification, with 35% moderately diversified, 30% highly diversified, and 15% very highly diversified, while 20% remain weakly diversified. The mean Livelihood Diversification Index (LDI) of 0.47 indicates an overall moderate level of diversification, suggesting that households generally generate income from a combination of on-farm, off-farm, and non-farm activities rather than relying solely on maize farming. For example, a household may combine maize production with livestock rearing or the cultivation of other crops as on-farm activities, agricultural labour or other wage employment as off-farm activities, and petty trading, transportation, or small-scale businesses as non-farm activities. This pattern indicates that livelihood diversification provides households with alternative sources of income and may help reduce their dependence on agricultural income alone. The



finding is comparable to that of Amaka and Muhammad (2021), who observed moderate livelihood diversification among rural households in Nigeria as a response to income instability from agriculture.

Table 4: Livelihood Diversification among Maize Farming Households

LDI Category	LDI Score Range	Freq.	%
Low	0.00 – 0.25	40	20
Moderate	0.26 – 0.50	70	35
High	0.51 – 0.75	60	30
Very High	0.76 – 1.00	30	15
Total		200	100
Mean LDI	0.47		
Std. dev	0.18		

Effect of Livelihood Diversification on Poverty Reduction

Table 5 presents the logistic regression results examining the effect of livelihood diversification on poverty reduction among maize-farming households. The model is statistically significant (LR $\chi^2 = 38.75$; $p < 0.01$), indicating good overall explanatory power, while the pseudo- R^2 of 0.155 is comparable to values reported in similar rural poverty studies in Nigeria, including Ojo *et al.* (2024), who examined the effects of livelihood diversification on poverty status among rural farming households in Kwara State, and Alawode *et al.* (2017), who investigated income diversification, inequality, and poverty among rural households in Oyo State using FGT poverty indices and regression analysis. Participation in non-farm income activities has a negative and highly significant effect on poverty status. The coefficient ($\beta = -0.824$) and odds ratio (0.44) imply that households engaged in non-farm activities are about 56% less likely to be poor than those relying solely on farming. This finding strongly supports earlier studies by Hashmi (2025), who found that non-farm participation significantly reduces the likelihood of household poverty by providing additional and more stable income sources.

Education of the household head also has a significant poverty-reducing effect, as shown by the negative coefficient ($\beta = -0.085$) and odds ratio of 0.92. This indicates that additional years of schooling reduce the probability of being poor. This result is consistent with findings by Shutong (2025), who reported that education enhances access to better-paying non-farm jobs, improves decision-making, and facilitates adoption of income-enhancing strategies. Total farm size is negatively and significantly associated with poverty, suggesting that households with larger landholdings are less likely to be poor. This aligns with evidence from Baiyegunhi *et al.* (2022), who found that farm size positively influences income and welfare among maize farmers, as larger farms enable higher output and surplus production for the market.

Access to extension services also significantly reduces the likelihood of poverty, with households having extension contact being about 48% less likely to be poor. This finding corroborates earlier studies showing that extension services improve farmers' access to improved technologies, management practices, and market information, thereby enhancing productivity and welfare (Alam *et al.*, 2024).

Most importantly, the livelihood diversification index (LDI) has a strong and statistically significant negative effect on poverty, with an odds ratio of 0.32. This implies that higher levels of diversification substantially reduce the probability of household poverty. This result is consistent with Gebre *et al.* (2023), who empirically demonstrated that diversified households experience lower poverty incidence and depth compared to non-diversified households.

Table 5: Logistic Regression Result of the Effect of Livelihood Diversification on Poverty Reduction

Variable	Coef. (β)	Std. Err.	z-value	Odds Ratio
Non-farm participation	-0.824	0.365	-3.26***	0.44
Age of household head	0.012	0.014	0.86	1.01
Education (years)	-0.085	0.038	-2.24**	0.92
Household size	0.056	0.043	1.30	1.06
Total farm size (ha)	-0.213	0.101	-2.11**	0.81
Access to extension	-0.661	0.289	-2.29**	0.52
Access to formal credit	-0.197	0.241	-0.82	0.82
Livelihood diversification index (LDI)	-1.142	0.468	-2.44**	0.32
Constant	1.891	0.703	2.69	6.63
Log likelihood	-105.42			
LR chi2 (11)	38.75			
Prob >chi2	0.000			
Pseudo R ²	0.155			

Note: ***, **, and * implies statistically significance at 1%, 5%, and 10% level

Farmers' Perceptions on the Role of Livelihood Diversification in Poverty Alleviation

Table 6 presents farmers' perceptions regarding the role of livelihood diversification in poverty alleviation. The results indicate that respondents generally agree that diversification enhances income and reduces poverty, with weighted mean scores of 4.00 and 3.90, respectively, corresponding to 80% and 78% agreement. Similarly, farmers acknowledged that diversification provides off-season employment and serves as a survival strategy, with WMS values of 3.85 and 3.80. These findings suggest that smallholder maize farmers perceive non-farm income activities as essential for stabilizing earnings and improving household welfare, consistent with previous studies highlighting diversification as a key strategy for coping with income shocks (Baah *et al.*, 2026).

Farmers also agreed that non-farm activities offer higher income (WMS = 3.60) and that high cost of living motivates participation in non-farm income (WMS = 3.85), indicating that economic necessity and potential returns drive engagement in livelihood diversification. This aligns with Tesgera *et al.* (2024), who found that rural households increasingly rely on off-farm activities to smooth consumption and reduce vulnerability to agricultural risks.

In contrast, there was moderate agreement that land tenure influences diversification (WMS = 3.40) and that lack of knowledge drives diversification (WMS = 2.90), suggesting that institutional and informational constraints shape how households diversify. This reflects findings by Amegnaglo *et al.* (2024), who noted that limited access to land, credit, and extension services can both constrain and motivate non-farm engagement depending on household circumstances.

Table 6: Perception of Farmers on the Role of Livelihood Diversification in Poverty Alleviation

Statement	SD	D	UD	A	SA	WM	WMS	%
Diversification enhances income	10	25	20	110	35	4.00***	1600	80
Diversification reduces poverty	12	28	25	105	30	3.90***	1560	78
Provides off-season opportunity	15	30	20	110	25	3.85***	1540	77
Diversification is a survival strategy	18	32	22	102	26	3.80***	1520	76
Lack of knowledge drives diversification	40	60	20	50	30	2.90***	1160	58
Non-farm activities offer higher income	20	35	25	90	30	3.60***	1440	72
Land tenure influences diversification	25	40	30	75	30	3.40***	1360	68
High cost of living motivates diversification	15	30	20	105	30	3.85***	1540	77
Grand mean						3.66***		

Note: * Disagree (WMS of less than 2.50), ** Undecided (WMS between 2.5 to 3.49) and *** Agree (WMS of 3.50 and above) WS = weighted score, WMS= weighted mean score, SDA=strongly agree, DA=disagree, N=neutral, A=Agree, SA=strongly agree



CONCLUSION AND RECOMMENDATION

In conclusion, smallholder maize farmers in Kaduna State are predominantly male, middle-aged, and married, with relatively large households and some level of education. The study found that 37% of households were poor, while the mean LDI of 0.47 indicated moderate livelihood diversification. Logistic regression showed that non-farm participation, education, farm size, access to extension services, and livelihood diversification significantly reduced the likelihood of poverty. Farmers also perceived diversification as important for increasing income, reducing poverty, providing off-season employment, and serving as a survival strategy. The study therefore concludes that livelihood diversification, supported by education and access to institutional services, can contribute to poverty reduction and improved household welfare. Based on these findings, the following recommendations are proposed to enhance income stability, livelihood diversification, and poverty reduction among smallholder maize farmers in Kaduna State:

- i. Since participation in non-farm income activities and higher diversification were shown to reduce poverty, rural development agencies should support smallholder farmers in accessing non-farm employment, petty trading, and skill-based enterprises to stabilize income and improve welfare.
- ii. Given that education and access to extension services significantly reduced poverty, policymakers should expand agricultural extension outreach and provide training on modern farming techniques, financial literacy, and income-enhancing strategies to improve farmers' capacity to diversify livelihoods.
- iii. As farm size, institutional membership, and land tenure influenced poverty and diversification, interventions that improve access to land, cooperative membership, and formal credit can enable farmers to increase production, invest in off-farm activities, and reduce vulnerability to income shocks.

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