



**EFFECT OF CROP DIVERSIFICATION ON THE LIVELIHOOD OF
ARABLE CROP FARMERS IN KWARA STATE, NIGERIA**

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ABSTRACT

The study examined the effect of crop diversification on the livelihood of arable crop farmers in Kwara State, Nigeria. Using a three-stage sampling technique, primary cross-sectional data were collected from 208 respondents via a well-structured questionnaire. Data were analyzed using descriptive statistics and multiple regression analysis. Results revealed that farmers in the study area were predominantly experienced middle-aged farmers with an average of 20 years of farming experience and 44 years of age. Most had a land size of less than 5ha, with the average being 6.5ha, and mostly had secondary education. Most of the farmers (67.8%) diversified into cereals, legumes and tubers for proper risk management. Multiple regression revealed that the number of crops grown ($p=0.014$), diversification into cereal and legumes ($p=0.063$), diversification into cereals and tubers ($p=0.001$), household size ($p=0.010$), level of education ($p=0.040$), and access to extension service ($p=0.006$) all have a significant positive impact on farmers' livelihood. The study concludes that crop diversification significantly improves livelihood outcomes and recommends that extension access, credit access, education, and climate-resilient policies should be prioritized to promote sustainable adoption among arable crop farmers in Kwara State.

Keywords: Credit, Access, Crop, Diversification, Extension, Services.

INTRODUCTION

Agriculture in developing nations like Nigeria engages approximately one-half of the available labor force (Celestina *et al.*, 2023). A greater portion of rural communities, particularly the rural poor, are directly or indirectly dependent on agriculture through farming activities, agri-business, food processing endeavors, fishing technology, forestry and wildlife, vocational skills, and trade (Rukwe *et al.*, 2019). An enormous segment of the agricultural output is in small-holder farmers' hands, usually with average holdings of roughly 1-3 hectares. These are farmers with little or no access to enhanced modern technology to improve their farming activities. Their overall condition does not always portray excellence in noticeable investments in human capital development, raw material inputs, and outputs (Abiodun *et al.*, 2019). These challenges affect individual farmers and put the household welfare of the farmer at risk. This risk encourages smallholder farmers to engage in the cultivation of more crops as a means of diversification into the production of various crops expected to increase income and improve their livelihood. Generally, to increase farmers' income, curtail unemployment, and stabilize the income flow, diversification of crops emerges as a major strategy.

Aside from diversifying risk, crop diversification also contributes to healthier diets through greater diversity in household food consumption, particularly for women and children, especially in settings where most food is produced for home consumption (Debela *et al.*, 2021; Murendo *et al.*, 2018; Adjimoti and Kwadzo, 2018). Evidence suggests that crop diversification may enhance household food consumption scores by increasing both the quantity (calories) and variety of food that households consume (Mango *et al.*, 2018), thereby enhancing food security (Appiah-Twumasi and Asale, 2024). Agricultural biodiversity also provides ecosystem services such as soil and water conservation, soil fertility maintenance, biomass management, and plant pollination. Furthermore, agricultural biodiversity is essential to meet basic human needs for food and to secure livelihoods (FAO, 2021).

However, arable crop farming households encounter numerous challenges, including limited access to resources such as improved seeds, fertilizers, and irrigation facilities. In addition to limited access to resources, arable crop farmers may also face challenges in accessing credit and financial



services, which hinders their ability to invest in agricultural inputs or expand their operations. Furthermore, arable crop farmers are highly vulnerable to the impacts of climate change, including erratic rainfall patterns and prolonged droughts, which can significantly impact crop yields and livelihoods (Odetola and Etumnu, 2013). Despite these challenges, arable crop farming households demonstrate resilience and adaptability by employing innovative strategies to overcome obstacles and sustain their livelihoods.

As a result of unexpected shocks, the household should not be at risk of losing food. If smallholder farmers invest in crop diversification, they will be able to mitigate the problem of food insecurity by increasing yields, as reported by several previous studies such as Makate *et al.*, (2016), and bringing yield stability and insurance effect because if one crop fails, they will still be able to rely on the other crop. A study by Adjimoti & Kwadzo (2018) found that crop diversification has a positive effect on household food security status. The diversification of crops grown through dietary diversification can improve household food security. In rural remote areas where household access to food depends largely on its production, crop diversification provides farmers with the different crops that they cannot access either because of the cost or because of the poor infrastructure constraints (physical access). According to Mango *et al.* (2018), the combination of various crops in agro-ecosystems in smallholder farming not only permits more efficient utilization of agro-ecological processes but also provides diversification of the human diet and/or improves household income, nutrition, and security. Meanwhile, despite the potential of diversification to improve livelihood, research on the effect it has on the livelihood of arable crop farmers in Kwara State is scarce. Hence, this study aimed to;

- i. describe the socio-economic characteristics of arable crop farmers in the study area.
- ii. investigate the effect of crop diversification on the livelihood of arable crop farmers in Kwara state.

METHODOLOGY

The Study Area

The study was carried out in Kwara State, Nigeria. Kwara State is located in the North Central geopolitical zone of Nigeria. The state, situated between latitudes 7° 45’ and 9°30’ North and longitudes 2° 30’ and 6° 25’ East, Bounded by Niger State to the north and the River Niger to the east, Kwara State shares borders with Kogi, Oyo, Ekiti, and Osun States to the south. It has a population of about 2.37m (NPC, 2006), with a 2026 projected population of about 4.3m (PopulationStat, 2025) at an annual growth rate of 3.05% yearly. It has a total land area of about 32,500 square kilometer and boasts a humid tropical climate and has two distinct seasons, the wet and the dry season. The wet season spans between April and October, while the dry season spans between November and March. The rainfall ranges between about 50mm during the driest period and about 2,415mm in the wettest months. The temperature ranges between 21°C and 35°C.

Agriculture dominates the economy, producing livestock such as cattle, goats, sheep, and poultry, as well as key crops like maize, sorghum, millet, beans, cassava, and rice.

Sampling Procedure and Sample Size

The population of the study consist of all registered arable crop farmers in Zone C of the study area. A three-stage sampling technique was used for the study. The first stage involves the purposive selection of Zone C of the ADP zones. The second stage involves the selection of four (4) local government areas in the zone. The Local Government areas covered include Moro, Ilorin West, Ilorin East and Ilorin South. In the third stage, the Yamane (1967) formula for sample size determination was used. The formula is expressed as;

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

where;

n = the sample size;

N = the population size

e = Margin of error (0.06).



Table 1: Sampling Procedure and Sample Size

LGA	Population	Sample Size
Moro	314	80
Ilorin West	208	53
Ilorin East	152	39
Ilorin South	141	36
Total	815	208

Data Collection

Primary data sources were used for the study; Cross-sectional data were collected using structured questionnaire, which was supplemented with an oral interview.

Analytical Techniques

Descriptive statistics

Arable crop farmers in the study area were described according to their socio-economic status and demographics using descriptive statistics, which include counts, percentages, means, and averages of the data.

Multiple Regression Analysis

The study made use of multiple regression analysis to analyze the effect of crop diversification on the livelihood of arable crop farmers. Livelihood Index was the dependent variable, and Number of crops grown and other variables were the independent variables.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \dots + \beta_{10}X_{10} + \varepsilon \dots \dots \dots (3)$$

where Y = Livelihood Index (Individual Household Livelihood Status)

The livelihood indicators used include; food availability, household condition, water facilities, health situation, sanitation, and participation in social activity. The total obtainable household livelihood score was derived by adding total actual scores on all the household indicators.

$$OHLS = FA + HC + Wa + He + Sa + SP \dots \dots \dots (4)$$

Where;

OHLS = Obtainable Household Livelihood Score

FA = Food availability

HC = Housing condition

Wa = Water facilities

He = Health Situation

Sa = Sanitation

SP = Participation in social activities

The household's obtained score was divided by the obtainable score to get the individual household livelihood score.

$$IHLS = HOLS \div OHLS \dots \dots \dots (5)$$

where;

IHLS = Individual Household Livelihood Score

HOLS = Household Obtained Livelihood Score

OHLS = Obtainable Household Livelihood Score

X₁ = Number of crops grown (Number), X₂ = Cereal and Legume (Yes = 1, No = 0), X₃ = Cereal and Tubers (Yes = 1, No = 0), X₄ = Cereal, Legume and Tubers (Yes = 1, No = 0), X₅ = Household size (Numbers), X₆ = Education level of the farmer (Years in School), X₇ = Farm size (Hectares), X₈ = Farming experience (Years), X₉ = Annual Farm Income (₦), X₁₀ = Access to Extension Services (Monthly = 4, Quarterly= 3, Yearly=2, Rarely= 1), β₀= Constant, β_{1 - 12}= Coefficient
 ε= Error term



RESULTS AND DISCUSSION

Socio Economics Characteristics of Arable Crop Farmers in Kwara State.

The results from Table 2 below showed that the mean age of respondents was 44 years. This implied that the majority of farmers were in their economically active age, suggesting adequate energy for farm diversification. This age distribution aligns with Jimoh *et al.* (2024), who noted that middle-aged farmers demonstrate willingness to diversify due to their balance of experience and risk tolerance. The average household size was 7 members, with 88.9% of respondents having fewer than 10 household members. This indicates sufficient labor availability, which could facilitate on-farm diversification. Similar household composition was reported by Adesiyani *et al.* (2024), who reported that moderate household size often means efficient labor organization and better household welfare. The results indicated that 52.9% of the respondents possessed 11 to 30 years of farming experience. The mean of which was 20 years, reveals that most farmers were well experienced, which likely improve their ability to adapt and make decisions as regards diversification. This result is consistent with the findings of Sumo *et al.* (2022), who discovered that experienced farmers tend to integrate different crops to reduce production risk and stabilize income.

Farm size distribution showed that 66.3% of the respondents cultivated below 5 hectares of land, with an overall average farm size of 6.5 hectares. This shows the prevalence of smallholder farming in the region, a limitation typical of Nigeria's agricultural landscape. This small average size however, implied restricted economies of scale and limited capacity to expand crop production capacity. Jimoh *et al.* (2024) similarly discovered that small farm holdings usually impede commercialization and the intensity of crop diversification.



Table 2: Socio-economic Characteristics of Arable Crop Farmers

Characteristics	Category	Frequency	Percentage	Mean
Age (Years)	≤20	1	0.5	44.2
	21-40	89	42.8	
	41-50	63	30.3	
	>50	55	26.4	
	Total			
Household Size	≤10	85	88.9	7
	11-20	21	10.1	
	>20	2	1.0	
	Total	208	100.0	
Farming Experience (Years)	≤10	66	31.7	20.2
	11-30	110	52.9	
	>30	32	15.4	
	Total	208	100.0	
Farm Size (Ha)	≤5	138	66.3	6.5
	5.1-15	56	26.9	
	>15	14	6.7	
	Total	208	100.0	
Annual Farm Income (₦)	100,000-999,999	126	60.6	2,867,355.8
	1,000,000-10,000,000	75	36.1	
	>10,000,000	7	3.4	
Education Level	None	33	15.9	
	Informal Education	9	4.3	
	Primary	48	23.1	
	Secondary	77	37.0	
	Tertiary	41	19.7	
	Total	208	100.0	
Access to Extension Services	No	165	79.3	
	Rarely	4	1.9	
	Yearly	6	2.9	
	Quarterly	20	9.6	
	Monthly	13	6.3	
	Total	208	100.0	

Field survey, 2025

The result also indicated that 60.6% earned between ₦100,000 and ₦1,000,000 annually as farm income. The average annual income was ₦2,867,355.76; this indicates that most farmers operated on a low to medium income level. This pattern indicates limited access to productive resources and markets, similar to findings by Adesiyan *et al.* (2024), who linked low farm income to less investment in farm diversification and the use of innovative approaches.

The level of education of the farmers revealed that 37.0% had secondary education. This implied that more than half (56.7 %) of respondents had secondary education, reflecting a moderate literacy level that could have influence the usage of improved technologies and diversification practices. This result agrees with Vilakazi *et al.* (2025), who reported that education improves farmers' ability to process information and make effective agricultural decisions. Access to extension agents was notably poor, as 79.3% of respondents had no contact with extension officers, and only 20.7% reported contact with extension agents. Limited extension contact shows a major constraint to technology dissemination and diversification awareness. This complied with the observation of Jimoh *et al.* (2024), who stated that insufficient extension services greatly impede the adoption of diversification strategies in Nigeria.



The Choice of Crop Diversification among Arable Crop Farmers in Kwara State

Table 3 showed that diversification across crop groups was dominated by farmers cultivating cereals, legumes, and tuber crops, which accounted for 67.8% of the respondents. It can be explained that the dominance of these combinations highlighted the subsistence-oriented nature of farming in the area, where farmers strategically selected crop mixes to meet household consumption needs while minimizing production risks under prevailing resource constraints.

Table 3: The Choice of Crop Diversification among Arable Crop Farmers in Kwara State

Diversification Category	Frequency	Percentage
Cereals and Legumes	14	6.7
Cereals and Roots & Tubers	53	25.5
Cereals, Legumes, and Tubers	141	67.8

Field survey, 2025

Household Livelihood Status

Table 4 shows the distribution of households based on their livelihood score. The study uses a threshold of less than 4.99 and greater than 4.99 to classify household livelihood status into two categories: High and Low. Findings however revealed that majority of the household sampled fell within the high livelihood category representing 54.3% of the sample size. With an average score of 4.99. The result resonates with the findings of Yisa *et al.*, (2022) who found that rice farmers enjoyed improved livelihood in Niger state.

Table 4: Household Distribution based on Livelihood Status Score

Livelihood Category	Frequency	Percent	Mean	SD
Low	95	45.7	4.99	0.44
High	113	54.3		
Total	208	100.0		

Field survey, 2025

Effect of Crop Diversification on Farmers' Livelihood

The result from Table 5 showed that several socio-economic and other factors significantly influenced farmers' livelihood in Kwara State. The number of crops grown was positively significant ($P < 0.05$), which implies that each additional unit of crop produced has a significant improvement on livelihood, as more crops reduce risks and provide a steady food/income. Cereals and Tubers were also significant at 5% showing that farmers who adopt this choice of diversification have higher livelihood scores, and this is likely due to the reliability of stable production offered by combinations such as maize-cassava. Adjimoti & Kwadzo, (2018) also reported that households diversifying into many crops especially the ones diversifying into cereals and tubers are more likely to be more food secure.



Table 5: Effect of Crop Diversification on Farmers' Livelihood

Variables	Coefficients (B)	Std. Error	t-value	p-value
Constant	4.254***	0.177	24.027	0.000
Number of Crops Grown	0.054**	0.022	2.482	0.014
Cereal and Legume	0.065*	0.034	1.905	0.063
Cereal and Tubers	0.482***	0.138	3.499	0.001
Cereal, Legumes and Tuber	0.009	0.095	0.100	0.920
Household Size	0.022**	0.008	2.589	0.010
Education Level	0.012**	0.006	2.064	0.040
Farm Size (ha)	0.008	0.008	1.085	0.279
Farming Experience (years)	-0.004	0.003	-1.362	0.175
Annual Farm Income	-4.000E-9	0.000	-0.470	0.639
Access to Extension Services	0.063**	0.023	2.797	0.006

Dependent Variable: Individual Household Livelihood Score
 $R^2=0.500$, Adjusted $R^2= 0.485$
*** 1% level of Significance Level, ** 5% Significance Level * 10% significance level

Field survey, 2025

Cereal and legumes was also positively significant at the 10% significance level, thereby implies the ability of this combination to serve as a buffer for higher yield and greater utilization of available resources. This agrees with the findings from Maitra *et al.* (2020), who found that this combination ensures income enhancement as well as yield enhancement, which strengthens the economy of small and marginal farmers practicing the system. It was also revealed that **household size** positively and significantly influenced livelihood. Farmers with larger households will mostly benefit from increased availability of family labor, which reduced production costs and improved farm productivity. This aligns with Abegunde *et al.* (2020), who observed that larger households in rural agrarian communities leverage family labor and pooled resources to strengthen livelihood security. **Access to extension services** also exhibited a positive and significant effect on livelihood. Farmers with regular contact with extension agents recorded better livelihood outcomes due to improved access to technologies, agronomic practices, and market information. This corroborates the study of Adepoju *et al.* (2022), which demonstrated that agricultural extension contact enhances household welfare by improving resource management and technology adoption among smallholders.

CONCLUSION AND RECOMMENDATION

The study concludes that crop diversification significantly improves livelihood of the arable farmers in the study area. Also, the number of crops grown, diversification choices like cereals and legumes, and cereals and tubers have a significant positive influence on farmers' livelihood while **age**, **household size**, educational attainment, farm size, farm income, and contact with extension services also influenced the farmers' welfare outcomes.

The study recommends that government should design **inclusive policy incentives and credit schemes** that support labor-rich and financially capable households in adopting high-level crop diversification, thereby improving income, resilience, and overall welfare.

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