



**DETERMINANTS AND EXTENT OF INCOME DIVERSIFICATION AMONG
MILLET FARMING HOUSEHOLDS IN POTISKUM, YOBE STATE, NIGERIA**

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ABSTRACT

The study assessed income diversification on the livelihood of millet farmers in Potiskum Local Government Area of Yobe State, Nigeria. Stratified random sampling technique was used in selecting 335 farmers. Primary data were collected using structured questionnaires through Kobo collect and analyzed using descriptive statistics, Simpson Index of Diversification (SID), and logistic regression models. The findings revealed that, millet farming is dominated by middle-aged males with a mean age of 45 years and a mean household size of 11 persons. The average farm size was 2.72 hectares. The mean Simpson Index value was 0.5124. The results of the logistic regression showed that, access to credit (0.5181) and extension services (0.3878) significantly enhanced diversification at $P < 0.01$, while exposure to climate shocks (-0.6048) significantly reduced diversification capacity at $P < 0.05$. Also, rainfall sufficiency (0.3981) had a positive effect at $P < 0.05$, and age (-0.0149) had a negative effect on income diversification. The study concludes that income diversification is a viable strategy for improving rural livelihoods and reducing poverty among millet farmers in the study area. The study recommended that strengthening access to credit and extension services, improving market infrastructure, promoting non-farm enterprise training, and encouraging youth participation in diversified livelihood activities in the study area.

Keywords: Income, Diversification, Millet, Farmers

INTRODUCTION

The agricultural sector remains a cornerstone of Nigeria's economy, contributing significantly to employment, food security, and economic growth. According to Nigeria Bureau of Statistics (NBS, 2022), agriculture accounted for about 25.9% of Nigeria's Gross Domestic Product (GDP) in 2022 and employs over 70% of the country's labour force, making it one of the most critical sectors for national development. Despite its contributions, the sector is still plagued by low productivity due to reliance on rain-fed farming, insufficient infrastructure, and limited access to modern farming inputs (Food and Agriculture Organisation [FAO], 2020). Millet is one of Nigeria's key cereal crops, particularly in semi-arid regions like Potiskum in Yobe State, where it serves as a staple food and a source of income for farming households. The cultivation of millet contributes significantly to the livelihoods of many smallholder farmers who depend on it for sustenance and as a source of revenue (Abdulaziz and Bakar, 2021). However, in recent years, climate variability, declining soil fertility, and market challenges have negatively affected millet farmers' productivity and income levels, pushing many to seek alternative income sources (Abdulrahman *et al.*, 2021). This shift towards income diversification is vital for ensuring food security and improving the livelihoods of rural households.

Income diversification, broadly defined as the process by which rural households generate income from multiple sources, is increasingly being recognised as a strategy for coping with economic shocks and enhancing resilience (Awotide *et al.*, 2022). Farmers in Potiskum engage in various off-farm and non-farm activities, such as petty trading, livestock rearing, and artisanal work, to complement their income from millet farming. These activities help mitigate the risks associated with agricultural dependence, such as crop failure, price volatility, and seasonal income gaps (Ahmed *et al.*, 2023). Given the precarious nature of single-crop reliance, income diversification emerges as a viable strategy to enhance economic stability and improve livelihood outcomes (Fadima *et al.*, 2021). According to Ogunniyi *et al.* (2022), income diversification refers to expanding the range of income-generating activities an individual or a household engages in beyond a single activity or economic sector, which



can include on-farm activities (like crop and livestock diversification, agro-processing and value addition), off-farm activities (like trading, wage employment and small-scale enterprises in agriculture sector), and non-farm activities (like employment in urban areas or industries, remittances from family members working elsewhere and investments in real estate or financial instruments). Despite the growing body of research on income diversification, the specific dynamics among millet farmers in Potiskum remain unexplored. The socio-economic characteristics influencing farmers' decisions to diversify, the extent of diversification, and its overall effect on livelihood require detailed analysis. Understanding these factors is crucial for designing policies and interventions that can support millet farmers in achieving sustainable income growth and improving their well-being (Ojo *et al.*, 2021). The specific objectives of the study are to:

- i. describe the socio-economic characteristics of millet farmers in the study area;
- ii. evaluate the level of income diversification among the millet farmers; and
- iii. analyse the factors influencing income diversification in the study area.

MATERIALS AND METHODS

The Study Area

The study area is Potiskum. Potiskum is one of the seventeen (17) Local Government Areas of Yobe State. It covers a land area of about 559 square kilometres with a population of 538,857 persons as of 2024 at a 5.48 % growth rate, reflecting significant growth from 156,859 in 2006 (National Population Commission [NPC], 2024). Potiskum Local Government Area (LGA) is located at latitude 11.650° to 11.750° North and Longitude 11.050° to 11.150° East at an altitude of approximately 424 metres (1,392 feet) above sea level (Google Maps, 2024). The average temperatures typically range from 29°C to 44°C. Annual Rainfall averages around 700 mm. The dry season usually spans from October to April, which is crucial for local farming activities as farmers prepare for planting (Nigerian Meteorological Station [NMS], 2024). The study area is predominantly an agrarian region known for its cultivation of millet, a staple food crop. The study area's economic activities primarily revolve around agriculture, with millet farming being a critical component due to its resilience to drought conditions (Ibrahim *et al.*, 2023).

Sampling Technique and Sample Size

The target population for this study comprises millet farmers in Potiskum. A stratified random sampling method was used. It involves dividing the population into 10 strata. Then determine the proportion of millet farmers in each ward relative to the total population. Then, randomly sample farmers from each ward based on their proportional representation. The sample size calculation was based on the Yamane formula (1967) as cited in Adam (2020), which is commonly used to determine sample sizes for finite populations in survey research. The formula is given as:

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

Where;

n = required sample size

N = total population size

e = margin of error (e.g., 5% = 0.05)

The total population size, which was obtained from the millet farmers association, was 2250, which served as the sampling frame. Using the Yamane formula, the total sample size was 328 millet farmers. The number of farmers in each ward served as the sampling frame for each ward. From the ward sampling frame, the proportional sample for each ward was calculated using the formula:

$$n_i = \frac{N_i}{N} \times n \dots \dots \dots (2)$$

Where;

n_i = sample size forward *i*

N_i = number of millet farmers in ward *i*

N = total population of millet farmers

n = total sample size

The sampling procedure and size are presented in Table 1.



Table 1: Sampling Procedure and Sample Size

Ward	Sample Frame (N _i)	Sample Size (n _i)
Bare Bari	238	35
Bolewa A	220	32
Bolewa B	255	37
Danchuwa Bula	359	52
Dogo Nini	270	39
Dogo Tebo	235	34
Hausawa	186	27
Mamudo	150	22
Ngojin Alaraba	165	24
Yarimaram	172	25
Total	2250	328

Source: Author’s Computation, 2025

Methods of Data Collection

The primary data for the study were collected using a structured questionnaire that was developed and administered through Kobo Collect, a digital data collection tool. The questionnaire was designed to capture relevant information on the farmers’ socio-economic characteristics, income levels, sources of income, diversification strategies, and factors influencing diversification.

Methods of Data Analysis

The study used both descriptive and inferential statistics to achieve the study objectives.

Descriptive statistics

Descriptive statistics such as frequency distribution, percentages and measures of central tendency were used to achieve objective one. It was used to summarise and organise the data on socio-economic characteristics.

Inferential statistics

Inferential statistics such as the Simpson Diversity Index and logit regression model, were used to achieve the objectives two and three respectively.

The Simpson Index of Diversity

This was used to achieve objective two. The Simpson Index of Diversity (SID) is a statistical measure used to assess the extent of income diversification across various livelihood sources. A higher SID value indicates greater diversification, which can help rural households mitigate risks and improve livelihood resilience. The formula is given as:

$$SID = 1 - \sum(p_i^2) \dots\dots\dots (3)$$

Where P_i is the proportion of income of each source.

Logit Regression Model

The Logit regression model was used to analyse the factors influencing income diversification (Objective 3). This model is appropriate because the dependent variable (Simpson’s Diversity Index) is bounded between 0 and 1. The model is specified as:

$$D_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \epsilon_i \dots\dots\dots (4)$$

Where:

- D_i: Income Diversification (Index value ranges between 0 and 1)
- X₁ = Age (Years)
- X₂ = Education (Years of formal schooling)
- X₃ = Sex (Male=1, Female=0)
- X₄ = Marital Status (Married=1, otherwise=0)
- X₅ = Household Size (Number of persons)
- X₆ = Active HH Farmers (Number of economically active household members engaged in farming)
- X₇ = Farm Size (ha)
- X₈ = Farming Experience (Years)



- X₉ = Access to Credit (Yes=1, No=0)
- X₁₀ = Cooperative Membership (Member=1, Non-member=0)
- X₁₁ = Extension Services Access (Yes=1, No=0)
- X₁₂ = Rainfall Sufficiency (Sufficient=1, Non-sufficient=0)
- X₁₃ = Climate Shocks (Experienced shock=1, No shock=0)
- X₁₄ = Market Distance (Kilometers, km)
- β₀ = Intercept
- β₁ – 14 = Coefficients of the independent variables
- ε_i = Error term

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

The result in Table 2 revealed that, the average age of millet farmers was 45years which implied active workforce. This indicates a predominantly middle-aged farming population actively engaged in millet production. This aligns with findings by Adeola and Omonona (2021), who reported that middle-aged farmers are often more responsive to income diversification due to their energy, experience, and need for financial stability. The average household size was 11 persons. This suggests a predominantly large household structure, typical of northern Nigerian agrarian communities. Large household size provides more labour supply, which can encourage diversification through off-farm activities, as confirmed by Yusuf *et al.* (2023). Also, the result further revealed the average farming experience was 17 years. This indicates that most respondents are experienced millet farmers, likely possessing indigenous knowledge of climate patterns and production cycles. Experienced farmers often diversify to manage production risk and income uncertainty (Barrett *et al.*, 2021). The average farm size was 2.7 hectares. This reflects smallholder-dominated production, consistent with national patterns. Studies such as Ahmed *et al.* (2023) reported smallholder millet farmers in northern Nigeria typically cultivate less than 3 hectares. Similarly, the results revealed average amount spent on farming inputs of ₦213,967.00. The average distance to the nearest market was 9.13 km, suggesting moderate market access for most farmers. Market proximity enhances access to inputs, price information, and off-farm income opportunities (Yusuf *et al.*, 2023).

Table 2: Quantitative Socio-Economic Characteristics of Millet Farmers in the Study Area (n=328)

Variable	Min.	Max.	Mean	Std. Dev.
Age (Years)	18	79	45.12	12.547
Household Size (No.)	1	45	11.00	6.813
Farming Experience (Years)	1	60	17.00	11.311
Farm Size (Ha)	.5	13.0	2.715	1.3620
Inputs Expenditure (₦)	20,000.00	850,000.00	213,966.68	116953.512
Distance to Market (km)	1	23	9.13	4.648

The result in Table 3 showed that, majority (66.9%) of the respondents were male, indicating male dominance in millet farming. This finding is supported by Kure *et al.* (2023), who observed that while male farmers dominate land ownership and crop production, women often engage in post-harvest and non-farm activities, enhancing household income diversity. The result further revealed that, majority (65.7%) of farmers were married. This implies that married farmers often bear greater family responsibilities and thus may diversify income to meet household needs. This is consistent with the findings of Ibrahim *et al.* (2023), who reported that marital status significantly influences farmers' decisions to diversify due to economic pressure and food security needs. The results also revealed that 32.2% had secondary education, 29.9% had no formal education, 20.9% tertiary education, and 17.0% primary education. Education is a critical determinant of diversification behaviour. Farmers with higher education are more likely to access market information, credit, and training (Adeola & Omonona, 2021). The result indicated that the most cultivated variety was *Gero* (Pearl Millet) (66.9%), followed by *Maiwa* (24.2%). The result also revealed that majority (72.2%) own their land, land ownership enhances



tenure security and encourages long-term investment in income-diversifying activities, such as Agro-processing or livestock (Yusuf *et al.*, 2023). The result revealed that most respondents used seeds (95.2%), fertilisers (80%), labour (60.9%), and pesticides (49%). These figures show relatively good adoption of basic inputs. Access to and use of farm inputs are positively linked with household income and diversification (Ahmed and Nwaigwe, 2020). The results further showed that primary source of finance was personal savings (93.4%). The overwhelming reliance on personal savings and informal finance highlights financial exclusion among rural farmers. As observed by Abubakar and Bello (2021), a lack of access to formal credit limits investment in off-farm ventures and hinders income diversification. Furthermore, the result indicated that only 22.7% had regular access, 54.6% occasionally, and 22.7% had no access to extension services. Extension services play a crucial role in promoting awareness and adoption of income diversification strategies (Fadima *et al.*, 2021). Also, the results revealed that majority (76.7%) of the farmers were members of cooperatives. Membership enhances access to credit, input subsidies, and training, making it a vital enabler of diversified livelihood strategies (Ogunniyi *et al.*, 2022).



Table 3: Distribution of Respondents according to their Socioeconomic Characteristics (n=328)

Variables	Frequency	Percentage
Sex		
Male	224	66.9
Female	111	33.1
Marital Status		
Divorce	27	8.1
Married	220	65.7
Single	53	15.8
Widow	35	10.4
Educational Level		
No Formal Education	100	29.9
Primary Education	57	17.0
Secondary Education	108	32.2
Tertiary Education	70	20.9
Millet Variety		
Dauro (Early-maturing Pearl Millet variety)	20	6.0
Gero (Pearl Millet – <i>Pennisetum glaucum</i>)	224	66.9
IITA/ICRISAT Variety	10	3.0
Maiwa (Finger Millet – <i>Eleusine coracana</i>)	81	24.2
Land Ownership		
Communal	9	2.7
Own	242	72.2
Rent	84	25.1
Input Used		
Seeds	319	95.2
Fertiliser	268	80.0
Pesticides	164	49.0
Labour	204	60.9
Source of Finance		
Personal Savings	313	93.4
Loan from Cooperatives	75	22.4
Bank Loan	22	6.6
Family/Friends	198	59.1
Access to Extension Services		
No	76	22.7
Yes, Occasionally	183	54.6
Yes, Regularly	76	22.7
Membership of Cooperatives		
No	78	23.3
Yes	256	76.7

Source: Field Survey, 2025

Level of Income Diversification among Millet Farmers

The result as presented in Table 4 revealed that, the Simpson Index of Diversity (SID) value was 0.5124. This indicates that, on average, millet farmers achieved a moderate level of income diversification. According to Simpson's Index, a value closer to 1 implies greater diversification, while 0 indicates complete specialisation. Thus, a mean of 0.51 suggests that many households generate income from more than one source but are not fully diversified. This finding aligns with Ahmed *et al.* (2023), who reported a SID mean of 0.48 among dryland farmers in Northern Nigeria, highlighting the increasing but partial engagement in diverse income activities. The result also indicated that, millet income remains the largest contributor to household income, with a mean value of ₦1,022,610.1



constituting about 53.87% of total household income (Millet Proportion = 0.5387). This dominance of millet income suggests that while diversification exists, millet farming remains the economic backbone for most households. This is consistent with studies by Yusuf *et al.* (2023) and Ibrahim *et al.* (2023), who confirmed that cereal crops remain the mainstay of rural income in semi-arid regions despite increasing non-farm activities.

Table 4: Level of Income Diversification among the Millet Farmers(n=328)

Variables	Min.	Max.	Mean	Std. Dev.
SID	.00	.75	.5124	.28987
Income				
Millet Income	50000	1500000	1022610.1	1336698.92
Other On-Farm Income	0	1250000	432089.55	370678.845
Non-Farm Income	0	1250000	382835.82	377962.573
Off-Farm Income	0	1250000	386567.16	385708.588
Total Income	80000.0	18750000.0	2224102.6	1879399.87
Proportion				
Millet Proportion	.01	1.00	.5387	.29377
Other on-farm Proportion	.00	.58	.1793	.12263
Non-farm Proportion	.00	.36	.1420	.10879
Off-farm Proportion	.00	.42	.1401	.11267
Proportion Squared				
Millet Proportion squared	.00	1.00	.3762	.36070
Other on-farm Proportion squared	.00	.33	.0471	.04732
Non-farm Proportion squared	.00	.13	.0320	.02943
Off-farm Proportion squared	.00	.17	.0323	.03112

Source: Field Survey, 2025

Factors Influencing Income Diversification among Millet Farmers

The results in Table 5 showed that, access to credit had a positive and statistically significant influence on income diversification among millet farmers at $P < 0.01$. This implies that households with access to formal or informal credit sources were more likely to engage in multiple income-generating activities compared to those without such access. This finding aligns with empirical evidence reported by Ogunniyi *et al.* (2022) and Adeyemo *et al.* (2023), who found that financial inclusion enhances farmers' capacity to undertake alternative livelihood activities and strengthens income portfolio diversification in rural economies. Regular access to extension services also showed a positive coefficient (0.388) and statistically significant effect on income diversification among millet farmers at $P < 0.01$. This indicates that farmers who had frequent contact with extension agents were more likely to engage in multiple income-generating activities. This result is consistent with the findings of Fadima *et al.* (2021), who reported that access to extension services significantly improves farmers' awareness and adoption of diversified livelihood strategies. In contrast, the experience of climate-related shock such as droughts, floods, and erratic rainfall exerted a negative (-0.605) and statistically significant influence on income diversification at $P < 0.01$. This suggests that millet farmers who experienced adverse climatic events were less likely to diversify their income sources. Although diversification is often considered a coping strategy against risk, this finding indicates that severe climate shocks may instead constrain households by depleting productive assets, reducing savings, and limiting access to capital required to initiate new ventures. As a result, affected households may retrench into survival-oriented activities rather than expand into additional income streams. These findings were supported by Barrett *et al.* (2021), who noted that climate shocks can trap rural households in low-return livelihood portfolios. Similarly, Mohammed and Ibrahim (2023) found that extreme climatic conditions in Northern Nigeria often leads to reduced livelihood flexibility and constrained diversification outcomes. Also, age of the household head had a negative coefficient (-0.015) and marginally significant influence on income diversification at $P < 0.1$, indicating that younger farmers were more likely to diversify their income sources than older farmers. This finding is consistent with the evidence provided by Adeola and



Omonona (2021) and Babatunde *et al.* (2020), who observed that younger rural household heads are more responsive to diversification opportunities due to greater flexibility and social connectivity.

Table 5: Factors Influencing Income Diversification (SID) among Millet Farmers

Variable	Coefficient (β)	Std. Error	z-value	p-value
Age	-0.0149*	0.0079	-1.89	0.059
Education	0.0744 ^{NS}	0.0577	1.29	0.198
Sex	-0.0050 ^{NS}	0.1577	-0.03	0.975
Marital Status	0.1192 ^{NS}	0.0993	1.20	0.230
Household Size	0.0164 ^{NS}	0.0173	0.95	0.344
Active HH Farmers	-0.0161 ^{NS}	0.0374	-0.43	0.667
Farm Size	0.1021 ^{NS}	0.0819	1.25	0.213
Farming Experience	0.0060 ^{NS}	0.0098	0.61	0.540
Access to Credit	0.5181 ***	0.1928	2.69	0.007
Cooperative Membership	-0.2384 ^{NS}	0.1932	-1.23	0.217
Extension Services Access	0.3878 ***	0.1386	2.80	0.005
Rainfall Sufficiency	0.3981 **	0.2142	1.86	0.063
Climate Shocks	-0.6048 ***	0.2168	-2.79	0.005
Market Distance	0.0051 ^{NS}	0.0161	0.32	0.752
Constant	-0.5741	0.4167	-1.38	0.168
LR Chi ² value	28.16			
Prob > chi2	5			
Pseudo R ²	0.0242			

Source: Field Survey, 2025

CONCLUSION AND RECOMMENDATIONS

The study concluded that millet farmers in the study area engage in income diversification as a key strategy for managing risk, enhancing resilience, and improving household livelihoods. Socio-economic factors such as education and cooperative membership create enabling conditions for diversification, while institutional and environmental factors particularly access to credit, extension services, and climate shocks play a decisive role in shaping diversification outcomes. Nonetheless, while millet farming remains the dominant source of household income, the growing contribution of on-farm, off-farm, and non-farm activities reflects a gradual transition toward more integrated and resilient livelihood systems in the study area.

Based on the findings of this study, the following recommendations were made:

- i. Establish farmer-friendly microcredit schemes and strengthen farmers and cooperative lending to ease capital constraints.
- ii. Strengthen extension services and capacity building, and promote diversified livelihood skills, for farmers.
- iii. Introduce drought-tolerant millet varieties, and early warning systems to mitigate climate shocks.
- iv. Provide input subsidies and starter kits for alternative ventures such as livestock rearing, horticulture, and small-scale agribusiness.
- v. Upgrade rural roads, storage facilities, and market information systems to reduce transaction costs and strengthen product competitiveness.
- vi. Develop inclusive policies that promote youth and women's participation in off-farm activities and ensure grassroots reach of support Programmes.

REFERENCES

- Abdulaziz, S., and Bakar, A. (2021). The Economic Potential of Millet Farming in Nigeria. *Nigeria Journal of Agricultural Economics*, 7(3): 45-56.
- Abdulahman, S., Yaro, M.A., and Bello, A. G. (2021). Climate Change and Its Impact on Millet Farming in Northern Nigeria. *African Journal of Agricultural Economics*, 16(2): 45-46.



- Abubakar, I. M., and Bello, A. G. (2021). Analysis of Income Diversification and Its Effect on Rural Household Welfare in Northwestern Nigeria. *Journal of Development and Agricultural Economics*, **13**(5): 214-223.
- Adam, A. M. (2020). *Sample Size Determination in Survey Research*. *Journal of Scientific Research and Reports*, **26**(5): 90–97.
- Adeola, R., and Omonona, B. T. (2021). Education as a Driver of Rural Income Diversification in Sub-Saharan Africa. *African Journal of Agricultural Research*, **16**(4): 251-263.
- Adeyemo, R., Ayanwale, A. B., and Oyinbo, O. (2023). Access to Credit and Livelihood Diversification among Rural Households in Nigeria. *African Journal of Economic and Management Studies*, **14**(2): 257–274.
- Ahmed, A., and Nwaigwe, T. (2020). The Role of Credit Access in Promoting Income Diversification among Rural Farmers. *African Journal of Agricultural Economics*, **14**(1): 123–138.
- Ahmed, K.A., Mohammed, S.M., and Musa, B.A. (2023). Income Diversification as a Strategy for Rural Livelihood Improvement: Evidence From Northern Nigeria. *Journal of Development Studies*, **58**(3): 123-140.
- Awotide, B.A., Ayinde, O.E., and Olagunju, F.I. (2022). Off-Farm Income and Household Welfare in Rural Nigeria. *Journal of Rural Studies*, **95**(2): 89-97.
- Babatunde, R. O., Fakayode, S. B., and Adewumi, M. O. (2020). Determinants of Income Diversification among Rural Households in Nigeria. *Agricultural Economics*, **51**(2): 255–266.
- Barrett, C. B., Reardon, T., and Webb, P. (2021). Income Diversification and Its Impact on Household Welfare in Rural Areas. *Journal of Development Economics*, **66**(2): 287-303.
- Fadima, A., Mohammed, U., and Abdullahi, S. (2021). The Role of Income Diversification in Enhancing Farm Household Resilience. *African Journal of Agricultural Research*, **16**(4): 216-225.
- FAO. (2020). Millet: Production and Importance. Retrieved from <http://www.fao.org/millet-production>.
- Google Maps. (2024). Potiskum, yobe State, Nigeria. Retrieved 25 December 2024 from <https://maps.google.com>
- Ibrahim, H. Y., Umar, H. S., and Sadiq, M. S. (2023). Income Diversification and Welfare Effects among Smallholder Farmers in Northern Nigeria. *Nigerian Journal of Agricultural Economics*, **13**(2): 45–59.
- Kure, T. M., Adamu, A. Y., and Sulaimon, M. A. (2023). Income Diversification Strategies and their Effects on the Livelihoods of Rural Farmers In Nigeria. *Journal of Rural Economics*, **58**(2): 112-126.
- Mohammed, A., and Ibrahim, R. (2023). The Extent of Income Diversification among Millet Farmers in Nigeria. *African Journal of Agricultural Research*, **12**(4): 123-134.
- National Bureau of Statistics (NBS). (2022). *Nigeria poverty and inequality report 2022*. NBS.
- National Population Commission (NPC). (2024). **Nigerian Population and Housing Census: National summary report**. National Population Commission, Nigeria.
- Ogunniyi, A., Olawale, I., and Salawu, T. (2022). Rural Income Diversification: Strategies and Challenges in the Northern Nigerian Context. *International Journal of Agricultural Policy*, **13**(4): 123-139.
- Ojo, A. A., Ogunniyi, A. I., and Alabi, O. (2021). Factors Influencing Income Diversification among Smallholder Farmers in Nigeria. *Journal of Development Studies*, **58**(6): 901-916.
- Yamane, T. (1967) **Statistics: An introductory analysis** (2nd ed.) Harper and Row.
- Yusuf, M. A., Baba, K. M., and Ahmed, S. B. (2023). Drivers and Constraints of Rural Income Diversification in Northern Nigeria. *Nigerian Journal of Development Studies*, **15**(1): 47–60.