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ASSESSMENT OF INCOME DIVERSIFICATION LEVELS AMONG SMALL-SCALE FARMERS IN YOBE STATE

Abdurahaman Baba Saje ^{1,*} and Ibrahim Musa Waziri ²

¹ Department of Agricultural Technology, College of Agriculture Science and Technology, Gujba, Yobe State, Nigeria.

² Department of Agribusiness and Economics Management, College of Agriculture Science and Technology, Gujba, Yobe State, Nigeria.

* Corresponding Author

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ABSTRACT

This study aims to assess the level of income diversification among Yobe State small-scale farmers. Primary data was collected through a face-to-face survey-based approach through a multistage sampling technique, where 384 small-scale farmers were interviewed. The data were analyzed using statistical package for social science software (SPSS) version 26 for the descriptive analysis of the frequency distribution table, regression analysis and the Simpson Index of Diversification (SID) to test the study's aims and objectives. The results revealed that the respondents engaged in both On-farm and Non-farm livelihood diversification strategies. The overall SID of Non-farm diversification indicated that the respondents had a medium diversification index of 0.55, this primarily driven by participation in wage employment outside agriculture and self-employment. The on-farm diversification index was 0.30, indicating lower diversification than the Non-farm. This lower index is determined mainly by both food crops and cash crops. The study further revealed that small-scale farmers income diversification is influenced by the predictor factors of the farming operation system, average annual income in naira, age, farmland ownership, marital status, farm size, educational level, household size, and farming experience. The study concluded that the lower diversification index of On-farm could be due to the unpredictable risks associated with farming, making it less viable and turning farmers to off-farm activities as a means of coping strategies. And the Non-farm has a medium diversification index. This shows how important Non-farm is in stabilizing small-scale farmers' income and livelihood and signifies the potential risk facing the agricultural productivity in the study area.

Keywords: Small-Scale Farmers; Income Diversification Index; On-Farm; & Non-Farm

1 INTRODUCTION

Food insecurity and poverty, coupled with climate change effects, have become a complex phenomenon that is crippling the living standards of rural small-scale farmers. Several rural small-scale farmers cope with these effects by adopting other income-generating activities outside traditional agricultural practices. These sources of income diversification are increasingly becoming significant to rural farmers as a response mechanism to various pressures, including climate change, market fluctuations, and diminishing land productivity [1]. Diversifying income sources can offer a buffer against risks associated with agricultural production, providing farmers' households with additional financial stability

and resilience [2]. According to [3], income diversification may occur as a deliberate response strategy to agricultural crises by rural farmers. It can be used as a safety net for the rural poor to stabilize their financial needs and income.

Farming, as the primary source of income for rural small-scale farmers, has not successfully ensured sufficient means of livelihood for most Nigerian farming households [4]. The effects of climate change and the farmers-herdsmen conflict over agricultural land further aggravate the situation. Therefore, rural farmers struggle with food security and other livelihood-related issues. Diversification is necessary for any developmental strategy and livelihood sustainability [5]. For instance, by diversifying income sources, rural farmers may avoid the financial risks associated with a sole dependence on crop yields or livestock, especially in regions such as Yobe State that are experiencing significant environmental, social and economic challenges. This can improve rural households' food security and overall quality of life [6]. A study by [7] revealed that income diversification significantly contributed to rural small-scale farmers' household income and rapidly increased economic growth and livelihood sustainability. Several developing countries' governments encourage more output diversification because of the critical role income diversification may play in stabilizing incomes and reducing rural poverty [3].

Despite recognizing the importance of income diversification, there remains a need for localized empirical assessments that capture context-specific patterns and influencing factors. Because rural economies are heterogeneous, and diversification strategies may vary based on agro-ecological zones. A systematic assessment of income diversification levels among small-scale farmers can reveal the extent to which small-scale farmers rely on multiple income streams.

The main objective of the study is to assess the level of income diversification among small-scale farmers and identify the factors influencing diversification patterns.

The specific objectives are:

1. To identify and categorize the major income sources (farm, off-farm, and non-farm) of small-scale farmers.
2. To measure the level of income diversification among small-scale farmers using appropriate diversification indices.
3. To examine the socio-demographic and economic factors influencing income diversification levels among small-scale farmers.
4. To provide policy recommendations aimed at enhancing sustainable income diversification strategies among small-scale farmers.

2 LITERATURE REVIEW

Several developing countries' small-scale farmers, venture into income diversification due to pull or push factors. Pull factors motivate farmers to proactively diversify their livelihood activities, participate in commercial agricultural systems, and pursue enhanced economic opportunities that improve their livelihoods while strengthening their adaptive capacity and resilience [8]. Pull factors are distinct from push factors, which function as survival-oriented motivations underlying rural income strategies in many developing countries.

Push factors, often associated with economic or environmental hardship, further drive rural farmers to seek alternative sources of income as a survival strategy. Particularly, in regions prone to droughts, floods, or soil degradation, the reliance of small-scale farmers on sole agricultural activities becomes increasingly risky, leading rural farmers to pursue non-farm income diversification sources to buffer against income loss [9]. Studies by [10] confirm that push factors like adverse climatic conditions and low agricultural productivity compel rural farmers and communities to diversify their income in search of economic security and reduce vulnerability to environmental shocks.

Agricultural productivity is highly sensitive to environmental conditions. [11] highlight that in regions where agricultural production is consistently constrained by drought or erratic rainfall, rural farming households frequently diversify into non-farm income-generating activities as a means of sustaining their livelihoods. This trend is observed globally but is especially pronounced in areas with high climate sensitivity, such as Sub-Saharan Africa and South Asia, where agricultural losses due to climate events such as changes in temperature, rainfall patterns, or growing seasons significantly reduce agricultural output [12]. The increasing occurrence of climate-related hazards and other environmental shocks has become a significant factor influencing rural farmers to pursue alternative livelihood strategies outside conventional farming. As agricultural production becomes more vulnerable to these climatic stresses, many farmers respond by diversifying their income sources through participation in non-agricultural economic activities to strengthen their household resilience and reduce dependence on agriculture.

The unpredictability of rainfall and the increase in extreme weather events associated with climate change make agricultural activities increasingly uncertain, pushing rural households to seek alternative income sources to cope with

the shocks [10]. These factors attract rural farmers towards non-agricultural income sources to diversify their activities away from agriculture to deal with agricultural risks and smooth income and consumption [3].

Low agricultural productivity in many rural areas, particularly in developing regions, is often limited by small farm sizes, poor soil quality, and lack of access to essential resources like water, fertilizers, and improved seeds [13]. This productivity gap places economic pressure on rural households that rely primarily on agriculture, driving them to diversify their income sources to survive. According to [14], when agricultural output is insufficient to cover basic household needs or meet rising economic hardship, farmers are compelled to turn to non-farm activities to supplement their income. This diversification is not merely an economic choice but is often necessary to mitigate the risks of low agricultural yields. [15] Observes that in many African countries, declining agricultural productivity due to land degradation and climate change has led to a gradual shift in rural livelihood strategies, with households increasingly relying on non-farm income. This trend, commonly called "de-agrarianization," illustrates how low agricultural productivity can push rural farmers and families away from farming, encouraging them to seek employment in non-farming sectors such as small business ventures, trade, and wage labour. Low returns from agricultural activities are a significant factor in the diversification of income sources. Research shows that households facing low agricultural productivity often engage in non-farm income-generating activities to compensate for limited farm earnings and reduce the economic risks associated with volatile agricultural markets [16]. For example, [17] found that rural households increasingly rely on non-farm income due to low and unstable returns from traditional agricultural practices, which are affected by both environmental factors and a lack of access to productivity-enhancing technologies.

Several studies conducted in Nigeria have examined the determinants of income diversification among farming households. For example, studies in Niger State identified factors such as education, farm size, household size, access to credit, and farming experience as significant determinants of diversification choices. Similarly, research in Oyo State and Osun State reported that age, educational level of the household head, household size, and asset ownership significantly influenced the likelihood of farmers' income and livelihood diversification activities. Despite these contributions, important gaps remain in the literature. Most studies focus on whether farmers diversify their income sources, with limited attention given to the intensity or level of diversification and how different socioeconomic factors influence levels of diversification. Consequently, there is a need for further research to comprehensively examine the socioeconomic factors influencing farmers' income diversification in Nigeria.

3 METHODOLOGY

3.1 Study Area

This study was conducted across six selected Local Government Areas (LGAs) within Yobe State of Nigeria. These LGAs represent rural communities where agricultural income diversification is emerging as a vital livelihood strategy. The State is situated in the Northeast part of Nigeria. It has an estimated land area of about 46,609 km² between the latitude 12° 00' north and the longitude 11° 30' east. Sharing an international border with the Niger Republic and a state border with Borno, Gombe, Bauchi, and Jigawa States [18]. The state has sixteen (17) local government areas, with an approximate population of 2,321,339 in 2006.

3.2 Sampling Procedure

A multistage sampling technique was employed for this study. In the first stage, the northern part of the state was selected. In the second stage, six local government areas were randomly selected; these include Machina, Nguru, Yusufari, Yunusari, Bade and Geidam. The third stage involved random selection of one ward with sixty-four (64) respondents from each of the local government areas. This made it three hundred and eighty-four (384) randomly selected respondents from the LGAs.

3.3 Method of Data Collection

Data were collected through trained enumerators using a structured questionnaire administered in face-to-face interviews. The questionnaire covered different aspects of income diversification, including Demographic information such as age, gender, and educational level; economic factors, average annual income and land ownership; and social factors such as household size.

3.4 Data Analysis

Data collected were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive Statistics (mean, frequency, percentages) were used to categorized the major income sources of the respondents.

The share of mean income technique was employed to estimate the income share acquired by each respondent in the corresponding income sources. This approach reflects the importance of a given income source in an aggregated income in general.

The derivation index is expressed as:

$$MSi = \sum_{h=1}^n \frac{y}{Y} \dots \dots \dots (1)$$

Where: i = the income source, y = income from particular source, Y = Total income, n = the number of the income source

The sum of the total income is given as:

$$TI = \sum_{j=1}^9 Yj \dots \dots \dots (2)$$

Where: TI = Total income, thus income from all sources $j, j = 1, 2, 3 \dots 9$

The share of mean Non-farm Income is given as:

$$NFIS = \sum (J1/TI + \sum J2/TI + \sum J3/TI + \sum J4/TI + \sum J5/TI + \sum J6/TI + \sum J7/TI + \sum J8/TI + \sum J9/TI \dots \dots \dots (3)$$

The share of mean farm Income is given as:

$$FIS = \sum (J1/TI + \sum J2/TI + \sum J3/TI \dots \dots \dots (4)$$

The extent of small-scale farmers' non-farm income diversification was measured using the Simpson diversification index. Simpson Index of Diversification Formular is defined as:

$$SID = 1 - \sum_{i=1}^N (Pi) \dots \dots \dots (5)$$

Where: N = Number of income sources, Pi = proportion of income coming from the diversification sources i

A multiple linear regression will be employed to examine the socio-demographic and economic factors influencing income diversification levels among small-scale farmers. This will be used to analyzed objective 3. The model is expressed as:

$$Yi = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + e \dots (ii)$$

Where,

Where: γ = Dependent Variable (DV)

$\times$ = Independent Variables (IVs) Predictors

α = intercept

b = slope to be estimated

$\times 1$ = Age

$\times 2$ = Educational Level

$\times 3$ = Marital Status

$\times 4$ = Household Size

$\times 5$ = Average Annual Income in Naira

$\times 6$ = Farm Land Ownership

$\times 7$ = Farm Size

× 8 = Farming Experience
 × 9 = Farming Operation System

4 RESULT AND DISCUSSION

The results presented in Table 1 reveal that small-scale farmers engage in a wide range of non-farm income-generating activities to supplement their agricultural earnings. The most common sources of diversified income were wages obtained outside agriculture (38.5%) and self-employment (37.8%), accounting for over three-quarters of all reported non-farm income sources. This finding suggests that rural small-scale farmers increasingly rely on non-agricultural employment and entrepreneurial activities to stabilize their income, reduce dependence on seasonal farming, and improve their resilience against agricultural risks such as climate variability, fluctuating market prices, and declining farm productivity.

Income from livestock constituted 8.3% of the reported diversification strategies, making it the third most common source of supplementary income. Livestock production provides an important buffer against crop failure by generating regular income through the sale of animals and animal products. Similarly, machinery services provided to other farmers accounted for 5.5%, indicating that some farmers have invested in agricultural equipment and generate additional revenue by hiring out these assets. Pension, share dividends, and government bonuses contributed 4.4%, reflecting a relatively small proportion of households with access to formal social protection or investment returns.

On the other hand, several income sources were minimally utilized. Agricultural wage labour on other people's farms represented only 2.3%, while income from fish mongering and processing (1.3%), leasing out farms and other productive resources (1.0%), and remittances from family members and relatives (0.8%) contributed very little to small-scale farmers' income diversification. The low dependence on remittances may indicate limited migration opportunities or weak financial support networks, whereas the minimal contribution from leasing and fisheries suggests that these activities are either underdeveloped or constrained by limited access to productive resources and suitable market opportunities.

Overall, the findings demonstrate that diversification among small-scale farmers is primarily driven by participation in wage employment outside agriculture and self-employment rather than dependence on passive income sources such as remittances or pensions. This pattern indicates that farmers actively seek alternative livelihood opportunities to enhance their income and reduce vulnerability associated with exclusive reliance on farming. The results underscore the importance of promoting rural entrepreneurship, vocational skills development, access to microfinance, and small enterprise support as strategies for strengthening livelihood diversification and improving the economic resilience of small-scale farming households.

Table 1: Distribution of identified major Non-farm income

Sources of Non-Farm Income	Frequency	Percentage (%)
Wage obtained outside of agriculture	148	38.5
Wage of agriculture labour supply on other people's farms	9	2.3
Self-employment	145	37.8
Machinery service for other farms	21	5.5
Remittances received from family members and relatives	3	0.8
Pension/share dividend/ government bonus gift	17	4.4
Revenue from leasing out farms and other resources	4	1.0
Income from livestock	32	8.3
Income from fish mongering and processing	5	1.3
Total	384	100%

Table 2 indicates that the majority of respondents (79.9%) derived their on-farm income from a combination of both food and cash crop production, while only 12.8% relied solely on food crops and 7.3% depended exclusively on cash crops. This finding suggests that most farmers have diversified their on-farm agricultural activities by integrating food and cash crop cultivation rather than specializing in a single enterprise.

The predominance of farmers cultivating both food and cash crops reflects a deliberate diversification strategy aimed at improving food security while simultaneously generating income from the sale of commercial crops. Producing food crops enables households to meet their consumption needs and reduces expenditure on food purchases, whereas cash crops provide an important source of revenue to meet other household and farming expenses. This combination reduces the risks associated with fluctuations in crop yields, market prices, and adverse climatic conditions, thereby enhancing farmers' resilience and livelihood sustainability.

The relatively low proportions of farmers relying exclusively on food crops (12.8%) or cash crops (7.3%) indicate that specialization is less common among the respondents. Farmers who depend solely on food crops may face limited opportunities for cash income, while those concentrating only on cash crops may become more vulnerable to market price volatility and may need to purchase food for household consumption. These findings therefore suggest that diversification through the simultaneous production of food and cash crops is the preferred livelihood diversification strategy among small-scale farmers.

Overall, the results demonstrate a high level of on-farm income diversification within the study area. The widespread adoption of mixed crop production indicates that farmers recognize the economic and food security benefits of combining subsistence and commercial agriculture. This strategy is likely to strengthen household resilience, stabilize farm income, and contribute to improved livelihood outcomes under changing socioeconomic and environmental conditions.

Table 2: Distribution of identified On-farm Income

Sources of On-Farm Income	Frequency	Percentage (%)
Food Crops	49	12.8
Cash Crops	28	7.3
Both food crops and cash crops	307	79.9
Total	384	100%

To estimate the degree of small-scale farmers' non-farm income diversification. A cutoff value of 0.00 – 0.40, 0.41 – 0.60, and 0.61 – 1.00 are categorized as low, medium, and high, respectively (19). They were set to determine the level and extent of source of income diversification among the respondents. It was observed that the respondents had diversified their income from nine different non-farm sources in the study area.

Table 3 illustrates the extent of income diversification, ranging from low, medium and high. It depicted that wages outside agriculture (activities such as formal and informal constructions, education and fetching firewood for charcoal production) had a medium level of non-farm income diversification activities (SID = 0.52), Self-employment activities (SID = 0.56), the respondent involved in self-employment activities such as owning a barbing saloon, shop keeping, traditional mat weaving, blacksmithing, tailoring, carpentering and commercial tricycle riding machine (Keke Napep) also display medium levels of diversification among the different sources of diversification. Machinery services for other farms had a medium-income diversification level (SID = 0.48).

The study found that Wages from agricultural labour supply on other people's farms, such as clearing of farmland towards the commencement of rainfall, and remittances received from family members and relatives living in urban areas had a low diversification index of (SID = 0.35) and (SID = 0.21) respectively, these could be linked with most small-scale farmers carried out farm labours with their other family members (family labour). Pension/share dividend/government bonus gift from a retired civil servant and government empowerment gift had a (SID = 0.52). Income derived from revenue generated from leasing out land and other resources also had a medium level of diversification (SID = 0.44). It can also be seen from the table that income generated from livestock activities had a medium index of diversification (SID = 0.57), and Income from fish mongering and processing had a (SID = 0.42).

The average SID value was (0.55). The computation shows the extent of income diversification among the respondents. This may relate to the uncertain prospects of agricultural production. The study further noted that income diversification increases the ability of the respondents to manage the adverse effects of climate change and other agricultural problems in the study area.

Table 3: Simpson Index of Diversification on Non-farm Activities

Sources of Income	Simpson Index of Diversification (SID)	Diversity Status
Wage obtained outside of agriculture	0.52	Medium diversification
Wage of agriculture labour supply on other people's farms	0.35	Low diversification
Self-employment	0.56	Medium diversification
Machinery service for other farms	0.48	Medium diversification
Remittances received from family members and relatives	0.21	Low diversification
Pension/share dividend/ government bonus gift	0.53	Medium diversification
Revenue from leasing out farms and other resources	0.44	Medium diversification
Income from livestock	0.57	Medium diversification
Income from fish mongering and processing	0.42	Medium diversification
Overall SID Value	0.55	Medium diversification

The results in Table 4 provide a detailed level of on-farm diversification. Diversification of on-farm by planting food crops; in this case, food crops such as maize, millet, and guinea corn are the staple foods in the study area. Cash crops are sesame, hibiscus and cowpea. At the same time, food and cash crops mean farming both food and cash crops on the same piece of land.

To evaluate the extent of on-farm income diversification. Table 4 indicates that planting both food and cash crops as a means of on-farm diversification had (SID = 0.61). The overall mean level of diversification (SID = 0.30). This may result from small-scale farmers prioritising other sources of income over their primary livelihood activity to sustain their families in the study area. This may also be linked to the availability of different non-farm income diversification sources and as a measure of reducing dependency on rainfed agriculture due to agricultural risks and other climate change related issues in the study area.

The study further noted that small-scale farmers in the study area had at least one non-farm or on-farm income diversification source to improve their household food insecurity and poverty level effectively. The study observed that non-farm income diversification had a significant diversification index (SID = 0.55) compared with On-farm sources of diversification (SID = 0.30).

Table 4: Simpson Index of Diversification for On-farm activities

Sources of Income	Simpson Index of Diversification (SID)	Diversity Status
Food Crops	0.89	High diversification
Cash Crops	0.58	Medium diversification
Both Food & Cash Crops	0.61	High diversification
Overall SID Value	0.30	Low diversification

Table 5: ANOVA Table

ANOVA Table						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.483	9	.387	4.008	.000b
	Residual	36.106	374	.097		
	Total	39.589	383			

a. Dependent Variable: Small-scale farmers income diversification
b. Predictors: (Constant), Farming Operation System, Average Annual Income in Naira, Age, Farm Land Ownership, Marital Status, Farm Size, Educational Level, Household Size, Farming Experience

The ANOVA table shows the P- P-value of .000, which is less than .05. Therefore, the overall regression model was significant. This indicates that small-scale farmers income diversification is influenced by the predictor factors of the Farming Operation System, Average Annual Income in Naira, Age, Farmland Ownership, Marital Status, Farm Size, Educational Level, Household Size, and Farming Experience. The model explains a significant portion of the variation in the dependent variable.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.297 ^a	.088	.066	.31071
a. Predictors: (Constant), Farming Operation System, Average Annual Income in Naira, Age, Farmland Ownership, Marital Status, Farm Size, Educational Level, Household Size, Farming Experience				
b. Dependent Variable: Income diversification				

From the model summary table, the adjusted $R^2 = .066$, which means that 66% of the variation of the predictors' variables is attributed to variation in Small-scale farmers' income diversification

Coefficients Table						
Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.125	.119		34.528	.000
	Age	0.022	0.038	0.041	0.594	0.553
	Educational Level	0.032	0.010	0.179	3.214	0.001
	Marital Status	-0.032	0.048	-0.035	-0.663	0.508
	Household Size	-0.007	0.034	-0.012	-0.194	0.846
	Annual Income in Naira	-0.041	0.009	-0.245	-4.342	0.000
	Farmland Ownership	0.002	0.006	0.017	0.325	0.745
	Farm Size	0.074	0.024	0.174	3.136	0.002
	Farming Experience	0.025	0.022	0.080	1.160	0.247
	Farming Operation System	-0.612	0.215	-0.143	-2.846	0.005
a. Dependent Variable: Small-scale farmers income diversification						

The coefficient table shows the factors influencing small-scale farmers income diversification. The t-value (3.214) and p-value (**0.001**) of educational level; average annual income t-value (-4.342), p-value (**0.000**); respondents farm size t-value (3.136), p-value (**0.002**); and farming operation system t-value (-2.846) and the p-value (**0.005**). Since all the p-values are less than .05, it positively signifies the predictors' influence on the respondents' income diversification.

Educational Level: The coefficient of the educational level was found to be positive (t-value 3.214) and statistically significant (p-value 0.001) at the 5% significance level. The positive coefficient of the respondent's educational level indicates a significant relationship between the level of education and small-scale farmers income diversification strategy. This indicates that the higher the level of education obtained by the respondents, the more likely they are to diversify their income strategy.

Annual Income: The coefficient of annual income was negatively signed (t-value -4.342) and (p-value **0.000**), statistically significant at the 5% significance level. The negative sign indicates that the more farmers earn a high income, the less they diversify their income strategy.

Farm Size: The coefficient of farm size was positive and statistically significant (t-value 3.136), and then, p-value **0.002**) at the 5% significance level. The positive coefficient implies a significant relationship between the variables in the sense that, as farm size increases income diversification strategy of small-scale farmers also increases.

Farming Operation System: The coefficient of the farming operation system, based on the analysis was negatively signed t-value (-2.846) and significantly related to income diversification strategy, with a p-value (**0.005**) at the 5% significance level. Therefore, the negative sign implies that the more farming operation systems, the less the respondents diversify their income strategy.

Abbreviations

- SID: Simpson Index of Diversification
- LGAs: Local Government Areas
- NBS: National Bureau for Statistics
- SPSS: Statistical Package for the Social Sciences
- ANOVA: Analysis of Variance
- DV: Dependent Variable
- IV: Independent Variable

5 CONCLUSION AND RECOMMENDATIONS

From the results of this study, the findings demonstrate that diversification among small-scale farmers is primarily driven by two strategies. Mostly, participated in wage employment outside agriculture and self-employment rather than other income sources such as remittances or pensions. The results further demonstrate a high level of on-farm income diversification within the study area. The widespread adoption of mixed crop production by the respondents indicates that they are economic and food security benefits of combining subsistence and commercial agriculture.

The average SID computation value of (0.55) shows that the extent of income diversification among the respondents may relate to the uncertain prospects of agricultural production which further noted that income diversification increases the ability of the respondents to manage the adverse effects of numerous agricultural problems in the study area. The findings further noted that small-scale farmers in the study area had at least one non-farm or on-farm income diversification source to improve their household food insecurity and poverty level effectively. The study observed that non-farm income diversification derived a significant diversification index (SID = 0.55) compared with On-farm sources of diversification (SID = 0.30).

Based on the outcome of the research, the following recommendations were suggested:

- Government and development partners should strengthen policies and programmes that would promote non-farm employment opportunities in rural areas. This will enable small-scale farmers to diversify their income sources and reduce their dependence on agriculture, particularly during periods of low agricultural productivity.
- Capacity-building programmes focusing on entrepreneurship, vocational skills, and small business management should be provided to rural households. These interventions will improve farmers' ability to establish and sustain profitable non-farm enterprises.
- Government and Non- Governmental agricultural extension services should encourage and provide technical support for mixed crop production and integrated farming systems. This will enhance farm productivity, improve food security, and increase household income while reducing production risks.
- There is a need for credit facilities, microfinance schemes, and agricultural loans with favourable conditions to be made more accessible to small-scale farmers to invest in both farm and non-farm income-generating activities.
- Governments and other relevant projects should improve rural infrastructure, including roads, electricity, irrigation facilities, storage facilities, and market access. Better infrastructure will lower production and marketing costs, stimulate rural enterprises, and encourage income diversification.
- Agricultural extension agents should integrate income diversification strategies into their advisory services by educating farmers on viable livelihood options, value addition, agribusiness development, and risk management practices.
- Farmers should be encouraged to engage in all value chain activities such as agro-processing, packaging, and marketing of agricultural products. Strengthening market linkages and value chain addition will increase income opportunities and reduce post-harvest losses.
- Policymakers should design and implement rural livelihood support programmes that complement agricultural income through public works, enterprise development, and targeted social protection

measures. Such interventions will enhance household resilience against agricultural shocks and improve food security.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Statement of informed consent

Informed consents were obtained from all individual participants included in the study.

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