IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 17, Issue 8 Ser. 2 (August. 2024), PP 14-22
www.iosrjournals.org

Socio-Economic And Institutional Drivers Of Livelihood Diversification Among Smallholder Maize (*Zea Mays* L.) Farmers In Kaduna State, Nigeria

Yakubu, I., Oladimeji, Y. U., Saddiq, N. M., Suleiman, R., Sani, A.A.
Department Of Agricultural Education, School Of Vocational And Technical Education, Nuhu Bamalli Polytechnic Zaria, Nigeria
Institute For Agricultural Research / Faculty Of Agriculture, Department Of Agricultural Economics, Ahmadu Bello University, Nigeria
Institute For Agricultural Research / Faculty Of Agriculture, Department Of Extension And Rural Development, Ahmadu Bello University, Nigeria

Abstract
Maize (Zea Mays L) performs a critical part in the survival of millions in Nigeria, particularly for smallholder farmers in Kaduna State. However, dependence on a single crop can be risky and limit livelihood options. This study investigates the socio-economic and institutional drivers of livelihood diversification among smallholder maize farmers in Kaduna State, Nigeria. Employing a multistage sampling procedure, data was sought from 405 smallholder maize producers based on their socio-economic and institutional profiles, and the types of non-farm activities undertaken by farmers were identified and analysed using descriptive statistics and the multinomial logit model. The result indicated that 80.6% of the smallholder maize farmers were married and skewed towards male folk (93%), with 75% of the farmers literate. The result shows that the majority of the maize farmers (72.3%) were in adulthood, with an average farming experience of 18 years. Furthermore, the average family size was 9 people per household, with 76.8% of the maize farmers belonging to cooperative associations. The distribution of livelihood strategies shows that non-farm activities play a significant role in the earnings of 38% of maize farmers. The determining factors such as education, experience, extension contact, sex, marital status, cooperative membership, farm size, age, household size, and credit influence farmers' decisions to diversify their livelihoods. The study concludes that both cooperatives and extension services play crucial roles in supporting farmers by facilitating diversification and enhancing livelihood resilience. It is recommended that the creation of enabling environments for off-farm and non-farm businesses and the provision of reasonable credit facilities go a long way towards stimulating smallholder maize farmers' entrepreneurial interests. More so, the encouragement of social capital, training, and extension services should be effectively considered to improve their skills and techniques.

Keywords: *Livelihood diversification, smallholder farmers, maize, socio-economic, Nigeria*

Date of Submission: 03-08-2024 Date of Acceptance: 13-08-2024

I. Introduction

Maize (*Zea Mays* L) performs a critical part in the survival of millions across Nigeria, serving as a vital staple crop and cornerstone of rural livelihoods (Ogundari *et al.,* 2015; Nkomoki *et al.,* 2019'; Ameh, and Oladimeji, 2020). In Kaduna State, maize production holds significant importance, supporting food stability and generating income for numerous smallholder farmers. However, these farmers face various challenges that threaten their livelihoods, such as land degradation, climate change, and volatile market prices (Ogundari *et al*., 2015; Nkomoki *et al.,* 2019'; Ameh and Oladime, 2020). Livelihood diversification emerges as a promising strategy to help smallholder farmers navigate these challenges. By engaging in activities beyond maize production, farmers can spread dependence across multiple income sources, reducing their vulnerability to shocks in maize production, which generate additional income to improve economic well-being and household food security (Olalekan and Adebayo, 2020; Abdulai and Huffman, 2021; Nyau *et al.,* 2023). Despite the potential benefits, the extent and drivers of livelihood diversification among smallholder Kaduna State maize farmers remain unclear. While diversification is acknowledged as a strategy, the specific factors influencing its adoption within Kaduna's maize-dependent context remain unclear. Debates exist about the effectiveness and potential drawbacks of diversification, leaving farmers and policymakers unsure of optimal approaches. Without detailed knowledge, policy solutions and development interventions supporting diversification may lack effectiveness and target the wrong issues.

Current knowledge about livelihood diversification among smallholder Kaduna State maize farmers is limited, and this lack of understanding presents a significant problem because farmers may not be equipped with the necessary knowledge and resources to effectively diversify their livelihoods (Olalekan and Adebayo, 2020). Limited information hinders measures that meet particular needs and constraints. To fully utilize this potential, a more thorough understanding of the driving forces and barriers to diversification. Understanding livelihood diversification is crucial for addressing vulnerabilities and promoting sustainable rural development in Kaduna State and beyond. Understanding the drivers and influences of livelihood diversification among smallholder maize farmers in Kaduna State also holds immense significance for Nigeria's development goals, particularly diversifying income sources. Farmers become less reliant on maize production, reducing vulnerability to yield fluctuations, and ensuring greater food security for their families and communities. This study adds to the limited knowledge about the drivers and impacts of livelihood diversification among smallholder maize farmers in this specific context. Findings will inform policymakers and development practitioners in designing targeted interventions that support sustainable and equitable livelihood diversification for smallholder farmers. This study's findings can be applicable to other regions facing similar challenges, contributing to broader knowledge and improved rural livelihoods across Africa. Thus, filling this knowledge void is essential for supporting smallholder farmers, developing effective policies, and enhancing rural well-being in Kaduna State. This study aims to investigate the socio-economic and institutional drivers of livelihood diversification among smallholder maize farmers in Kaduna State, Nigeria. The particular goals were: describe economic and organizational profile of the smallholder maize farmers; assess the available resource endowments that influence livelihood diversification activities; and determine the economic and organizational elements affecting livelihood diversification activities among smallholder maize farmers.

II. Methodology

This research was conducted in Kaduna State. It consists of 23 LGAs and four agricultural zones viz. Birnin Gwari, Lere, Maigana, and Samaru Kataf. The state lies in the north-western part of Nigeria's agro-ecological zones. It is located between Latitude 9°02N and 11°32 N and Longitude 6° 00'E and 9° 10'E of the prime meridian (Kaduna Agricultural Development Agency, KADA, 2018). The state occupies an area of 48,473.2 square kilometers (KBS, 2022). The state had a total population of 8,789,003 people in 2019 and is projected to have about 9,172,587 people in 2022, at an annual growth rate of 3% (National Bureau of Statistics, NBS, 2022). Crop cultivation such as maize millet, maize, and sorghum and legumes including cowpea, groundnut, and soy bean are mostly rain-fed and practiced in the upland. The main occupation is farming, while trading is very common across both city and countryside. Other income-generating activities and occupations within the research region especially peri-urban and urban centres include civil service, carpentry, building, welding, poultry farming, tailoring, hair plaiting, brick making, automobile mechanics, plumbing, electricians, paint work, commercial motoring, and tricycle driving.

Multistage sampling method was employed to select smallholder maize farmers for the research. The first stage involved the stratification of the state into four (4), based on the Kaduna Agricultural Development Agency (KADA), administrative zones: Birnin Gwari, Lere, Maigana, and Samaru Kataf zones. The justification for the stratification was that the stratified sampling technique allows researchers to achieve a higher level of representativeness, thereby reducing the probable sampling error and according to their level of economic and farming activities (KADA, 2018). The second stage involves the random selection of two (2) Local Government Areas (LGAs) from each of the four agricultural zones of the state through a balloting system to give a total of eight (8) LGAs. The third stage involves a simple random selection of 30% of the villages (the number of villages varies from each of the identified or chosen LGAs) on the basis of size, respondent population, intensity of diversification, and output performance of the rural households. The last stage involves a simple random selection of four hundred and five (405) smallholder maize farmers by card method from a total population of 8,034, smallholder maize diversified farmers, using Yamane (1967), a formula adopted by Abdulrahman *et al.* (2016), to obtain the minimum sample size. The formula is expressed as follows:

$$n_0 = \frac{N}{1+N(e^2)} \quad (1)$$

Where: n_0 is the sample size without considering the finite population correction factor; e = 0.05; N = total number of observations.

Primary data were used for this study. The data were obtained through the implementation of a structured questionnaire and an interview scheduled, which were given to the selected smallholder maize farmers in the research zone with the assistance of trained enumerators under the supervision of the researcher. The collected data comprised farmers' socio-economic characteristics and institutional factors, which are age, household size, level of education, amount of credit received, number of extension contacts, years spent in cooperative associations, and available resource endowments.

Combinations of descriptive and inferential statistics, such as multinomial Logit model, were used for data analysis. Descriptive statistics involve measures of central tendency including frequency distribution, percentage, mean, and standard deviation to describe the socio-economic characteristics and assess the available resource endowments that influence the livelihood diversification activities of maize farmers.

Multinomial Logit Model (MLM)

The Multinomial Logit Model was employed to achieve objective (iv), which involved examining the socio-economic and institutional factors that impact livelihood diversification activities among maize farmers. This model is used to analyze unordered qualitative variables and handles categories that are nominal and mutually exclusive. Assume a dependent variable (DV), y, with m categories, where y = 1, 2, ..., m, and P1, P2, ..., Pm are the associated probabilities such that P1 + P2 + ... + Pm = 1. Typically, one category is designated as the reference category. The probability of being in other categories is then compared to the probability of being in the reference category. Therefore, for a DV with M categories, this involves calculating m-1 equations, each corresponding to a category relative to the reference category, to describe the relationship between the DV and the independent variables (IVs). The selection of the reference category is arbitrary but should be theoretically justified. The general form of probabilities for an outcome variable with M categories is:

$$P_r(Y_i = m1X_i) = Pim\frac{exp(X_i\beta m)}{1 \underset{\leftarrow}{\rightarrow} + \sum_{m=2}^{m} exp(X_i\beta m)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

For m > 1

$$P_r(Y_i = 1X_i) = Pm\frac{1}{\sum_{m=2}^{m} exp\,(X_i\beta m)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

For K covariates, a total of (K+1) * (M-1)
Parameters was estimated
The odds and odds-ratios for a variable with M categories and baseline, M=1:

$$\frac{log(P_m1X_k = 1)(P_1X_k = 1)}{(P_m1X_k)1(P_1X_k = 0)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Specifically, the standard MNLM for model with m = 6 categories become

$$P_r(Y_i = I1X_i) = P_i1 = \frac{1}{1+exp(X_i\beta_2)+exp(X_i\beta_n)} = \frac{n_i1}{n_i1+n_i2+n_i6} \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$P_r(Y_i = 21X_i) = P_i2 = \frac{exp(X_i\beta m)}{1+exp(X_i\beta_2)+exp(X_i\beta_n)} = \frac{n_i2}{n_i1+n_i2+n_i6} \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$$P_r(Y_i = n1X_i) = P_{im} = \frac{exp(X_i\beta m)}{1+exp(X_i\beta_2)+exp(X_i\beta_n)} = \frac{n_i2}{n_i1+n_i2+n_i6} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

The Multinomial Logit Model (MNLM) relies on the independence of irrelevant alternatives (IIA) assumption. The Hausman-McFadden test is used to verify the IIA assumption. The process involves first estimating the full model with M outcomes. Then, a restricted model is estimated by excluding one or more outcomes. The test assesses the difference between the two models, which, if the IIA holds, is asymptotically distributed as a chi-square with degrees of freedom equal to the number of excluded outcomes. Significant $\chi 2$ values indicate a violation of the IIA assumption, meaning that the difference between the two models is not zero (Ojiako et al., 2009).

y_i = Livelihood diversification index (Simpson index)

The Simpson index is specified below:

V = $\frac{(Z-Yj)}{z}$ (Livelihood diversification index).....(7)

Z = number of livelihood diversification activities

Y_j = number of livelihood diversification activities engaged in by jth farmers

X_1= age of the respondents (years), X_2 = Gender (female = 1, male = 0), X_3= educational Level (years of Schooling), X_4 = number of household (household size), X_5 = years of experience, X_6 = marital status (Married =1, Single =0), X_7= farm size (ha), X_8= access to credit (amount of credit obtained), X_9 = membership of cooperative (years of membership of cooperative), X_{10} = extension (number of extension contacts), β = maximum estimates of likelihood vector, and ℓ_i= independently distributed error term

III. Results And Discussion

Socio-Economic and institutional factors Profile of the Smallholder Maize Farmers

Sex refers to the biological characteristics that identify an individual as either male or female. The sex of maize farmers is skewed towards males (93%). This implies that the male folks still play dominant roles in agriculture and related agri-businesses within the research area. This result aligns with that of Adebola *et al.* (2018), who found that 83.0% of the farmers were male while only 17.0% were female.

The distribution of maize farmers' marital status is presented in Figure 1. The result shows that 80.6% of the maize farmers were married. The significance of the high number of married farmers is that it influences the size of households, as married farmers may have a larger household, which will help in the supply of family labour to accomplish different farm operations in order to increase their income and standard of living. This result is consistent with the research by Oladimeji *et al*. (2019) on the livelihood diversification among artisanal fishery households, which posited that 82% of the farmers were married in the study area.

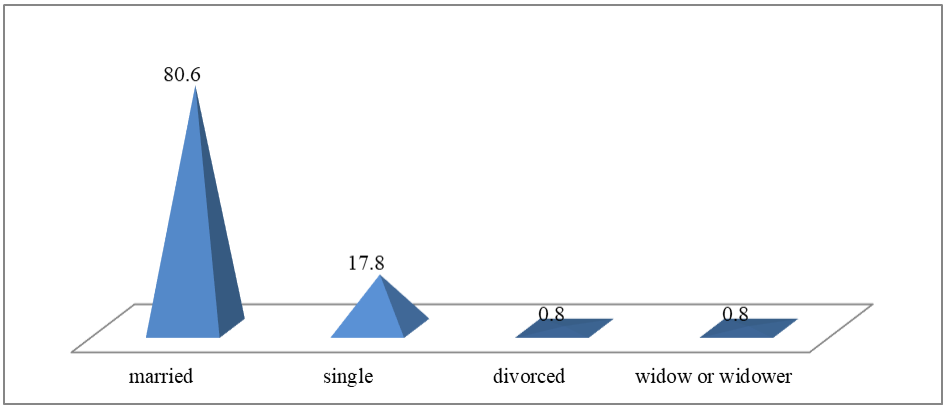

Figure 1: Distribution of Marital Status of the Maize farmers

The findings in Table 1 shows that most of the smallholder maize farmers (72.3%) were in their adulthood. The age distribution implies that the majority of the farmers are within their working-age and, therefore, can engage in multiple income-generating activities. The coefficient of variation of age (CV) was 25.4%, and this indicates a low level of variation in age among the maize farmers in the study area. This implies that maize farming in the study area is embraced predominantly by older individuals who have resided for a relatively long number of years in their community. This could be said to be an advantage to the study, as many of them are mature enough to give reasonable answers to the research questions. The finding is corroborated by the finding of Onasanya *et al*. (2018), who posited that farmers are in their active years while they fall within the age range of 20–50 years.

Table 1: Socioeconomics and institutional characteristics of the maize farmers

Socioeconomics		F	%	Mean±Stdev	CV
Age	Youth (18-34)	98	24.2	42.0±10.7	25.4
	Adult (35-64)	293	72.3		
	Senior citizen (>65)	14	3.5		
Farming experience	1-10	114	28.2	17±10.4	58.6
	11-20	169	41.7		
	21 & above	122	30.1		
Household size	1-6	145	35.9	9±0.7	7.6
	7-12	173	42.7		
	>12	87	21.5		
Cooperative	Non-member	94	23.2	5.1±5.6	110.0
Membership	1-5	164	52.7		
	6-10	111	35.7		
	11 & above	36	11.6		
Extension	No-contact	234	57.8	4.9±5.5	113.0
	1-3	24	10.4		
	4-6	17	7.4		

	7-9	88	38.3		
	10-12	42	18.3		
Credit (NGN)	No credit	322	79.5	28390.1	534.511
	1-100,000	65	16.0	±151748	
	100001-200,000	14	3.5		
	>200,000	4	1.0		

Source: Field Survey, 2021, Note: Stdev = Standard Deviation, CV= Coefficient of Variation & NGN = Nigeria currency (Naira)

The result in Table 1 shows that a larger proportion (64.1%) of the smallholder maize farmers had household sizes above 6 persons, with a typical household size of 9 persons per household. The estimated coefficient of variation for household size is 7.6%, which implies a low level of variation in household size among farmers. The size of the household may enhance labour availability, which can be used for different agricultural activities (Oyewole, 2012).

The farmers' farming experience is shown in Table 1, and it found the average farming experience of household heads to be 18 years, with a variation coefficient of 58.6% for maize farmers. This indicates a significant variation in farming experience among maize farmers in the study area. Judging from farmers' age, it implies that the majority of the farmers were experienced in crop production; therefore, this depicts a rural farming-based community whose major source of livelihood activities is crop production, which is practiced at an early age.

The result in Figure 2 indicated that most of the farmers were educated, as 75% had at least formal education, suggesting the potential for higher maize production since literate household heads have better ability and knowledge to access and absorb new information, which in turn influences the decision to adopt new technology. Cooker *et al*. (2018) noted that the education level is anticipated to impact farmers' adoption of new agricultural methods. He maintained that education is highly important for long-term agricultural progress and development.

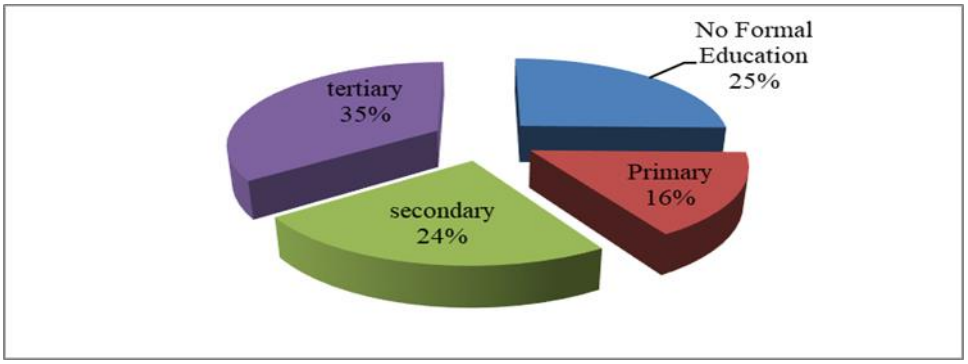

Figure 2: Distribution of educational level of the smallholder maize farmers

The result in Table 1 further revealed that 57% of the maize farmers had no access to extension contact. The average extension contact was 5 contacts per season. In many rural settings, access to adequate knowledge, improved technology, financial services, and other relevant social services (e.g., drinking water, education, and health services) remains a critical issue (Oladimeji and Abdulsalam 2013). Considerable obstacles remain in delivering extension and advisory services (EAS) in these regions (IFPRI-World Bank 2010).

The result of the distribution of maize farmer's credit access shown in Table 1 showed that the most farmers (79.5%) in the study area lacked credit access, while 20.5% obtained credit from various sources, averaging ₦28,390. This suggests that the output of maize production will be smaller and other inputs will be affected since capital is not available to enhance production. It is also consistent with the findings of Okwoche *et al*. (2012), who observed that microcredit access could potentially enhance farmers' productivity and improve the livelihoods of disadvantaged rural communities.

Available Resource Endowments that Permit Livelihood Diversification

The distribution of livelihood strategies in Figure 3 revealed that crop production, particularly food crops such as maize, rice, sorghum, and vegetables, accounted for approximately 45% of farmers' income. However, it also shows that non-farm activities (activities that relate to all other activities that are not related to crops and livestock production, e.g., education, petty trading, barbing) play a significant role in the livelihood strategies and income generation of maize farmers. Approximately 38% of farm households are engaged in various non-farm

activities to meet household needs, ensure food security, pay school fees, and address risks associated with farming. This implies that diversification into non-farm activities provides additional sources of income for maize farmers, reducing their reliance solely on agriculture, which contributes to poverty reduction and reduces the vulnerability associated with relying solely on farming. This finding is consistent with a study by Abdulrahman *et al.* (2018), who reported that non-farm employment helps households diversify income sources and provide economic stability.

Figure 3: Distribution of Livelihood strategies
Source: Field Survey, 2021

Socio-Economic and Institutional Factors Influencing Livelihood Diversification Activities among Maize Farmers

The estimates of the multinomial logistic regression analysis results are shown in Table 2. Variance inflation factors were used to test the assumption that multicollinearity was absent. Variance Inflation Factors (VIFs) were calculated to detect the presence of multicollinearity between predictors. All predictors in the regression model had VIFs below 10, indicating no multicollinearity in the data set (Table 2). The model was assessed using a 0.05 alpha level. The multinomial logistic regression model results were significant, $\chi 2$ (40) = 103.29, p<0.001, indicating that education, experience, extension contact, sex, marital status, cooperative membership, farm size, age, household size, significantly influenced the likelihood of observing at least one diversity response category compared to no diversification. McFadden's R-squared of 0.9 indicates excellent model fit.

The coefficient for education was positively and significantly associated with maize farmers diversifying into off-farm income activities at the 5% significance level (B = 0.43, $\chi 2$ = 6.08, p =.014). The positive sign means education has an effect on off-farm work decisions, implying that better-educated households are more likely to pursue off-farm employment in rural areas. It is understandable that where the education of house workers is higher, they are reluctant to work in the farm sector as they have better prospects elsewhere. The findings also confirmed that, if farmers were educated, the likelihood of choosing off-farm income activities increased by 43% relative to maize farming alone. In support of this result, the educational attainments of household and family members are considered one of the key determinants of non-farm earnings. The result indicated that improvement in the education level increased the possibility of engagement in non-farm activities. This result agrees with studies done by Dilruba and Roy (2012) and Eneyew (2012). As expected, the numbers of non- and off-farm activities have a beneficial and meaningful impact on livelihood diversification at less than 1% level of significance.

Farming experience increases the marginal value of farm work relative to the marginal value of on- and off-farm work. The probability of maize farmers participating in on-farm and off-farm work is expected to increase by 2% and 5% for on-farm and off-farm, respectively. In this study, farming experience is positively related to diversification and is significant at 1%. B = -0.05, $\chi 2$ = 7.48, p =.006, indicating that a unit increase in experience would increase the odds of observing diversification into two activities (off-farm and on-farm) activities. This implies that earnings from livelihood diversification will motivate farmers to purchase fertiliser and improved seed and relieve credit constraints on agricultural intensification among small farm holders. These non-farm income sources might generate employment prospects for large families in the households in the study area. These outcomes concur with the findings of Tran Nguyen (2010), and Babatunde and Matin (2009).

Extension contact was negative and significant for OONF income strategies at the 5% level of probability, indicating an inverse relationship with maize farmers who are into on- and off-farm income-

generating activities. This implies that families with advisory contact have a higher likelihood to decline into OONF income strategies. The coefficient for extension B = -0.15, $\chi 2$ = 4.41, p =.036, suggests that a one-unit increase in extension contact would decrease the odds of observing the diversify to four activities category of the diversify ordinal relative to the no diversification category by 13.84%.

The coefficient for sex, B = 0.51, $\chi 2$ = 3.39, p =.066, was significant at the 5% level of probability. The odds ratio for males compared to females is 0.51 units lower for being in the on-farm diversification category relative to "maize only," assuming all other variables remain unchanged. What this means is that male maize farmers were more inclined to choose the OF diversification strategy compared to their female counterparts, as male farmers are rather are prone to engage in agricultural-related activities as their diversification strategy. This assertion is confirmed by the fact that males were rather 71% more likely to take up other on-farm activities in addition to their maize farming (that is, adopt OF diversification strategy) than their female counterparts. This finding aligns with Hjelm and Dasori (2012), who also found that women are more prone to participate in non-farm activities than males.

The coefficient for marital status in the response category diversify to on-farm activity was significant (B = 0.69, $\chi 2$ = 7.31, p =.007), suggesting that married farmers would raise the likelihood of seeing the diversify into on-farm activity to their unmarried counterpart by 69%. The significance of the high number of married farmers is that it may influence the size of households, as married farmers may have a larger household, which will help in the supply of family labour to accomplish different farm operations in order to increase their income and standard of living. This result confirms the findings of Oluwatusin and Shittu (2014), who posited that it is expected that family labour would be more available where the household heads are married.

The coefficient for cooperative membership in the response category diversify to NF and OONF was significant and negative, B = -0.07, $\chi 2$ = 5.48, p =.019, suggesting that a one-unit increase in the years spent as a member of a cooperative would decrease the odds of observing the diversify to NF and OONF income activities relative to the no diversification category by 7 and 8%, respectively. The impact of farm size was positive and statistically significant at the 10% level (B = -0.10, $\chi 2$ = 3.01, p =.083), indicating that an increase in maize farm size increased the probability that the maize farmer would add on cultivation of other crops by 10%. It is relatively easier for the typical maize farmer to go into crop diversification than to combine the maize production with an entirely new non-farm activity, hence the observation.

The age of the maize farmers was found to be positively and significantly affecting maize farmers' decision-making for OONF income diversification strategies. This implies a year-long increase in the age of maize farmers will likely shift choices of farmers' livelihood options by a probability of 6% compared to those who cultivated maize only for economic factors as sources of livelihoods. This suggests that younger farmers are motivated to engage more in OONF strategies than only one option. This is also proved by the research done by Abdulrahman *et al.* (2016), who explained that younger farmers diversify more to cope with risk.

Adoption of non-farm diversification activities conforms to our a priori expectation of an increase in the probability of income diversification as one's household size increases. For each person added to the household, the likelihood that the maize farmer will adopt the NF diversification strategy increases by 3%. This observation is so because bigger household sizes imply more mouths to feed and also more needs to be met. It therefore makes sense that the maize farmer responds to this additional responsibility by participating in more income-generating ventures, which will lead to an increase in his income. This outcome is consistent with the observations of Abdulrahman *et al.* (2016), who opined that larger households are associated with income diversification.

The coefficient B = -0.00001, $\chi 2$ = 6.51, p =.011 of credit access was negative and significant at the 5% level, implies that a one-unit increase in credit access would decrease the odds of observing the diversify to NF income activities relative to the no diversification category by 0.001%. Access to credit is expected to compel a farmer into income diversification. Consequently, this present study found that access to maize farm credit was likely to lead to a 0.005% decrease in the probability that a farmer would choose the NF diversification strategy. Access to maize farm credit was rather likely to reduce the chances that a farmer would choose NF income diversification strategies by 0.005%. This result ties with the finding of Asfaw *et al.* (2015), who reported credit access to have a negative relationship with income diversification strategy.

IV. Conclusion And Recommendations

The study concludes that livelihood diversification is influenced by a combination of socio-economic and institutional factors such as education, experience, extension contact, sex, marital status, cooperative membership, farm size, age, household size, and credit, which highlights the complex interplay between institutional support and individual choices in livelihood diversification. While both cooperatives and extension services play crucial roles in supporting farmers in facilitating diversification and enhancing livelihood resilience, based on the findings of the study, it is recommended that the creation of enabling environments for off-farm and non-farm businesses and the provision of reasonable credit facilities go a long way towards stimulating

smallholder maize farmers' entrepreneurial interests. More so, the encouragement of social capital, training, and extension services should be effectively considered to improve their skills and techniques.

Table 2: Socio-Economic, and institutional factors influencing livelihood diversification activities among maize farmers in the study area

	On farm (OF)			Off-farm (OFF)			Non-farm (NF)			Pooled			
Variable	**B**	**SE**	**P**	**B**	**SE**	**P**	**B**	**SE**	**P**	**β**	**SE**	**P**	**VIF**
Intercept	1.22	0.82	0.16	2.51	1.07	0.02	-0.95	1.11	0.392	-0.28	1.61	0.86	
Education	-0.19	0.13	0.131	0.43**	0.17	0.014	-0.28	0.18	0.118	-0.42	0.28	0.133	1.3
Experience	0.02*	0.01	0.079	0.05***	0.02	0.006	0.02	0.02	0.182	-0.02	0.02	0.326	1.49
Extension	0.005	0.02	0.829	-0.01	0.03	0.734	0.05	0.03	0.128	-0.15**	0.07	0.036	1.03
Sex	0.71*	0.39	0.066	-0.6	-0.51**	0.045	-0.74	0.53	0.165	-0.92	0.77	0.23	1.14
Marital Status	0.69***	0.25	0.007	0.1	0.34	0.777	0.49	0.38	0.192	-0.39	0.55	0.478	1.06
Cooperative	0.03	0.02	0.115	0.03	0.02	0.209	0.07**	0.03	0.019	0.08*	0.04	0.057	1.27
Farm size	0.1*	0.06	0.083	-0.02	0.07	0.78	-0.001	0.06	0.985	-0.03	0.1	0.758	1.03
Age	0.002	0.01	0.898	-0.02	0.02	0.423	0.003	0.02	0.893	0.06**	0.03	0.012	1.69
Household size	2E-04	0.01	0.984	-0.02	0.02	0.262	0.03**	0.01	0.021	0.001	0.03	0.962	1.23
Credit	-9E-07	3 E-06	0.753	1 E-06	5 E-06	0.831	-1 E-05**	5 E-06	0.011	-5E-06	7 E-06	0.49	1.27
Chi^2 (40)	103.29												
P -value	0.001												
McFadden's Rsquare	0.9												

*Note *** = significant at 1%, ** = significant at 5%, and * = significant at 10%, β= coefficient, SE= standard error P= probability value, VIF= variance inflation factor, Source: Field Survey, 2021*

References

[1] Abdulai, A., & Huffman, S. L. (2021). Livelihood Diversification And Income Inequality Among Rural Households In Ghana. Journal Of Development Studies, 57(8), 1443-1461.

[2] Abdulrahman, S., David, A. I, Yusuf, O. Abdulazeez, R.O. Binuyo, G. (2016). Analysis Of Livelihood Diversification By Farming Households In Kaduna State, Nigeria. 2nd International Conference On Dryland Agriculture, Centre For Dryland Agriculture, Bayero University, Kano. 12th -16th December, 2016. Pp45-49.

[3] Adebola, P. O., Awoyemi, T. T., & Oladele, O. I. (2018). Determinants Of Technical Efficiency In Rice Production In Oyo State, Nigeria. Int. J. Of Agric. Res. Inn. And Techn., 8(1), 1-12.

[4] Ameh, J., & Oladime, J. (2020). Assessment Of Households' Food Security And Production Constraints Of Maize Farmers In Kaduna State, Nigeria. Agripreneurship And Sustainable Development (Jasd), 3(3), 1-10.

[5] Asfaw, S., Mccarthy, N., Paolantonio, A., Cavatassi, R., Amare, M., & Lipper, L. (2015). Livelihood Diversification And Vulnerability To Poverty In Rural Malawi (Esa Working Paper No. 15-02). Rome: Fao.

[6] Babatunde, R. O., & Matin, M. A. (2009). Diversification And Livelihood Sustainability In A Semi-Arid Environment: A Case Study Of Southwestern Nigeria. J. Of Hum. Eco, 26(1), 49-56.

[7] Coker, A. A. A., Ibrahim, F. D. & Ibeziako, U. N. (2018). Effect Of Household Demographics On The Technical Efficiency Of Cowpea Farmers: Evidence From Stochastic Frontier Analysis In Nigeria. Rjoas, 1(73), 179 – 186.

[8] Dilruba, N., & Roy, B. C. (2012). Determinants Of Rural Nonfarm Employment: Evidences From A Village Study In Bangladesh. Asian Journal Of Social Sciences & Humanities, 1(2), 5-20.

[9] Eneyew, A. & Bekele, W. (2012). Determinants Of Livelihood Strategies In Wolaita, Southern.

[10] Hjelm, L., & Dasori, E. K. (2012). Socio-Economic Factors Affecting Non-Farm Employment Among Rural Farm Households In Northern Ghana. J. Of Dev. And Agric. Econs, 4(13), 378-387.

[11] International Food Policy Research Institute (Ifpri)–World Bank. (2010): Gender And Governance In Rural Services: Insights From India, Ghana, And Ethiopia. Agriculture And Rural Development. Washington, Dc, Usa: The World Bank.

[12] Kaduna Agricultural Development Agency. (2018). Agricultural Production Survey In Kaduna State, Nigeria.

[13] Kaduna Bureau Of Statistics. (2022). Kaduna State Statistical Year Book (Syb).

[14] Nkomoki, M. A., Ajisegiri, J. O., & Adebayo, A. A. (2019). Determinants Of Food Security Among Maize Farming Households In Kaduna State, Nigeria. International Journal Of Agricultural Economics And Rural Development, 11(3), 1388-1397.

[15] Nyau, T., Ayele, S. Y., & Asfaw, S. (2023). Livelihood Diversification And Dietary Diversity Among Smallholder Farmers In Ethiopia. Food Security, 31(1), 15-32.

[16] Ogundari, K., Adetunji, M., & Ajayi, A. O. (2015). Micro-Credit Utilization And Its Impact On Farmers' Maize Output And Household Food Security In Kaduna State, Nigeria. African Journal Of Environmental Agriculture Research, 9(1), 15-22.

[17] Ojiako, I. A., Egwu, O. J., & Asiegbu, J. E. (2009). Determinants Of Farm Size And Resource Use Efficiency In Rice Production In Anambra State, Nigeria. Journal Of Agriculture And Social Sciences, 5(4), 146-152.

[18] Oladimeji, Y. U. & Abdulsalam, Z. (2013). Analysis Of Technical Efficiency And Its Determinants Among Small Scale Rice Farmers In Patigi L.G.A. Of Kwara State, Nigeria. Iqsr Journal Of Agriculture And Veterinary Science, 3(3), 34 - 39.

[19] Oladimeji, Y. U., Abdulrahman, S., Egwuma, H., Ojeleye, O. A., Idi, A. S., Hassan, A. A., Sani, A. A. And Galadima, S. A. (2019). Unlocking The Potential Of Nigeria Rivers Towards Achieving Improved Rural Livelihood And Poverty Alleviation. Nigeria Journal Of Agricultural Extension, 20(1).

[20] Olalekan, I. A., & Adebayo, A. A. (2020). Livelihood Diversification, Risk Management, And Household Food Security In Nigeria. Int. J. Of Agric. Mangt. And Dev., 10(1), 17-28.
[21] Oluwatusin, F. & Shittu, G. (2014). Effect Of Socio-Economic Characteristics On The Farm Productivity Performance Of Yam Farmers In Nigeria. Research On Humanities And Social Sciences, 4(6), 31 – 37.
[22] Onasanya, S. O., Awoyemi, T. T., & Oladele, O. I. (2018). Economic Analysis Of Yam Production In Oyo State, Nigeria. Int. J. Of Agric. Res. Innovation And Techn, 8(2), 1-11.
[23] Oyewole, P. B. (2012). Factors Influencing The Choice Of Agricultural Enterprises By Small-Scale Farmers In Oyo State, Nigeria. J. Of Agric. Ext. And Rur Dev, 4(11), 204-212.
[24] Tran Nguyen, T. (2010). Non-Farm Employment, Poverty And Income Distribution: A Case Study In Rural Vietnam. Journal Of Asian Economics, 21(5), 466-474.
[25] Yamane, Taro. 1967. Statistics: An Introductory Analysis, 2nd Ed., New York: Harper And Row