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Effects of livelihood diversification strategies on income security status of women farmers in Niger state, Nigeria

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ABSTRACT

The study analysed the livelihood diversification strategies and its effects on food security status among women farmers in Niger State, Nigeria. A multistage sampling technique was used for this study. A total of 242 registered women farmers were randomly selected as respondents, data were analysed using inferential statistics such as (Simpson Index of Diversity, Foster-Greer-Thorbecke (FGT) and Probit regression model). Results obtained show that majority (67.8%) of the women farmers had moderate livelihood diversification, while 26.4% had low extent of diversification, that is, they depended on less than two sources of income. The results obtained also showed that 52.0% of the respondents were income insecure, while 48% were income secured. However, factors such as, age, level of education, family labour, access to government support, income from crop diversification, income from off-farm diversification and income from on-farm diversification were significant effects of livelihood diversification on income security of the women farmers households. The result conclude that majority of rural women households had moderate extent of livelihood diversification while only few had low extent of diversification with low income security status due to the economic situation of the nation. It was recommended that farm households should diversify their sources of livelihood into non-farm so as to increase their earnings to bridge the poverty gap.

KEY WORDS: *Livelihood*; *Income*; *Women*; Security; Diversification

1. Introduction

Agriculture is an essential sub sector of the economy of developing countries of the world. It contributes significantly to Gross Domestic Product (GDP) and employs large proportion of labour force (Habib *et al.*, 2023). According to World Bank (2018), the sub sector accounted for 4% of global gross domestic product (GDP) in developing countries. Babatunde (2013) stated that, in Nigeria, farming as a sole source of income has failed to generate adequate income for farm households to meet their needs. This can be attributed to the subsistence nature of their farming practices, decline in farm size, low level of produce turnout which characterize agricultural sub sector in developing countries (Asiga, 2013). Todaro and Smith (2015) opined that for growth and development of rural areas to take place, people, including women's living conditions must be elevated through incomes, consumption of adequate and right type of food, access to

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healthcare, education and freedom to choose from a variety of economic activities.

The role of women in agricultural development and agro-allied industries cannot be over emphasized. Their involvement in agriculture varies from country to country. Irrespective of these variations, women are actively involved in various agricultural activities. To this end, women represent a substantial share of the total agricultural labour force, as individual food producers or as agricultural workers, and that about two-third of the female labour force in developing economies is engaged in agriculture and related work (Uzokwe *et al.*, 2017). Rural women are actively engaged in various agricultural activities, including planting, weeding, harvesting, and tending to livestock. Their labour is fundamental to crop cultivation, ensuring a steady food supply for communities and nations (Uzokwe *et al.*, 2017). Despite their significant contributions to agriculture and rural development, rural women are often faced with resource constraints, limited access to productive resources, unequal access to extension services and agricultural training. Amid these challenges, poverty persists as a multifaceted issue in rural areas across the world, with rural women bearing a disproportionate burden. In Nigeria, as in many parts of the world, rural women face multifaceted obstacles that hinder their economic empowerment and overall well-being.

Recognizing these challenges, rural women often turn to livelihood diversification strategies as a means to improve their economic well-being and break free from the cycle of poverty. Livelihood diversification entails engaging in a range of income-generating activities beyond traditional agriculture. According to Uzokwe *et al.* (2017) these activities may include setting up small-scale businesses, participating in non-farm enterprises, exploring opportunities for off-farm employment, and collaborating in community-based initiatives. Diversification has two phases, which is either a shift away from agricultural activities or an increasing mix of income activities. The choice is often influenced by livelihood options available within the rural community (Uzokwe *et al.*, 2017). In Nigeria, rural women diversify their livelihoods by engaging in non-farm activities such as small business ventures, trading, and services (United States Agency for International Development [USAID], 2019). Rural women may start small-scale businesses, by selling food items or goods, provide services such as hair dressing, tailoring, or engage in petty trading in local markets. These activities can provide additional sources of income, which can help them become more self-sufficient and improve their overall well-being.

One of the primary reasons why rural women farmers engage in livelihood diversification is financial fluctuations (International Fund for Agricultural Development (IFAD), 2018). Agriculture, especially in developing countries, can be unpredictable and subject to various risks such as weather events, disease outbreaks, and market price fluctuations. Diversifying their income sources will provide women farmers with a more stable financial portfolio, reducing the effect of these risks and assisting them to better manage their finances. Akinwale (2011) classifies reasons of livelihood diversification into pull (favourable conditions which draw farm households into diversification) and push factors (harsh conditions that force households into diversification). Also, Women farmers often have limited access to production resources, which makes their ability to generate sufficient income from agriculture short changed. Diversifying

livelihoods can help women farmers overcome these challenges and increase their income security (USAID, 2019).

Previous studies (Ojikutu, 2018; Shrestha *et al*., 2019; Dia *et al*., 2022) have examined the challenges faced by rural farmers and the broader poverty status of rural communities, shedding light on the impact on food security status among crop farmers in Nigeria. However, these studies have not delved into the specific effects of livelihood diversification strategies on the poverty status of rural women farmers. While Sali (2013) conducted similar studies, focusing solely on women rice processors, there remains a significant gap in empirical evidence regarding the effects of livelihood diversification strategies on the poverty status of women actively engaged in agricultural production in the study area. This identified knowledge gap form the basis for the study. Thus, this study aimed to examine the women farmer's livelihood diversification strategies, estimate the income security status of women farmers in the study area and assess the effect of livelihood diversification strategies on women farmers' income security status.

2. Material and Methods

This study was conducted in Niger State, Nigeria. The State was created in 1976. It is located in Guinea Savannah Region and lies between Latitude 8° 20′ and 11°30′ North and Longitudes 38° 30′ and 8° 20′ East of the equator (Dia *et al.*, 2022). The State covers an estimated land area of 74,244sq km of 7,424 million hectares covering

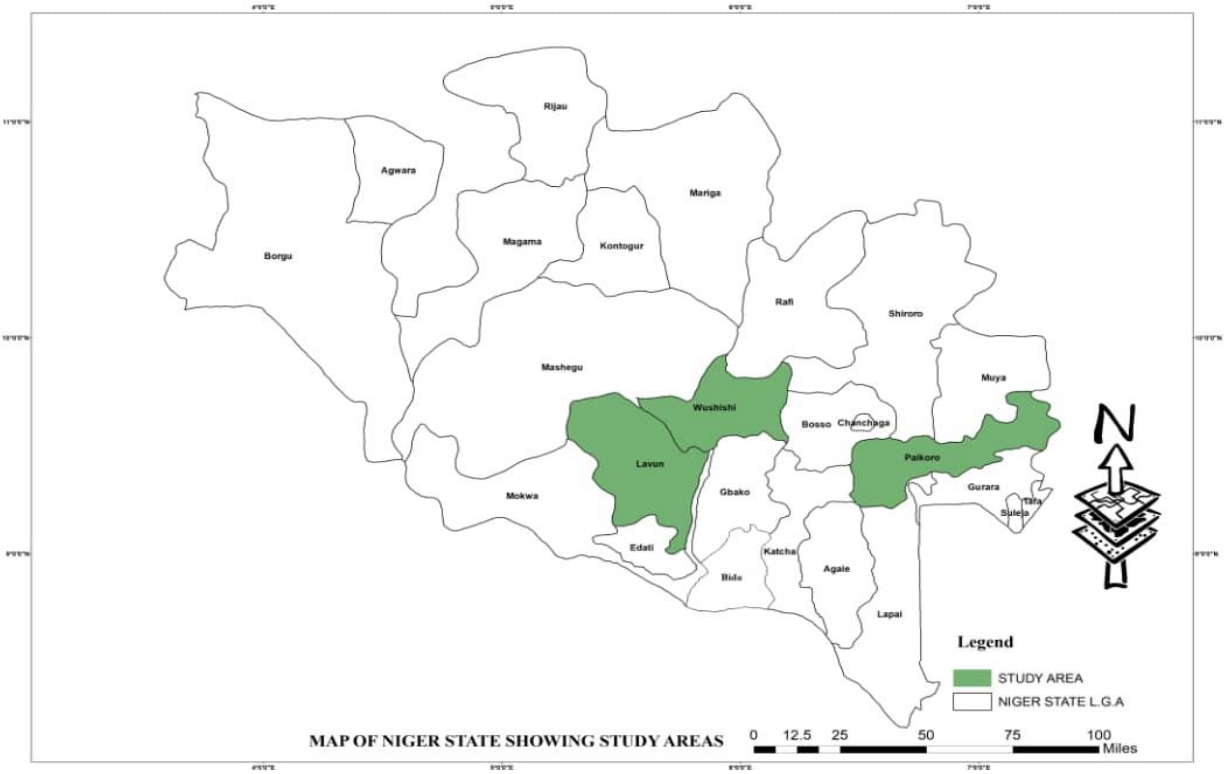

Fig. 1: Map of Niger State showing the selected LGAs

8% of the land area of the country. As at 2006 census the state has human population of about 3,950,249 people with Male population of 2,032,725 and female population of 1,917,524 (National Population Commission (NPC), 2006). The projected population as at 2021 using 3.2% growth rate was 6,139,477 with male population of 3,159,261 and female population of 2,980,216 (National Bureau of Statistics (NBS), 2021). An overview of the study area is shown in Fig. 1.

Three stage sampling technique was used in this study to select the respondents. In the first stage, one (1) Local Government Area (LGA) was randomly selected from each zone namely: Lavun LGA from zone I, Paikoro LGA from zone II and Wushishi LGA from zone III. In the second stage, three (3) villages were randomly selected from each of the three selected LGAs. The list of registered women farmers from each of the village selected was obtained from Niger State Agricultural and Mechanization Development Authority (NAMDA) as sample frame (that is 1832 women farmers). The sample outlay of the respondents in the study area is given in Table 1. The third stage involved selection of 242 respondents using the Taro Yammane sample size determination formula as used by Schuler and Boender (2012).

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

Where
n = Sample size required
N = Sampling frame
1 = constant
e^2 = level of precision (6%)

Simpson Index of Diversity was used to analyse the women farmers's livelihood diversification strategies, Foster Greer and Thorbek (FGT) index was used to evaluate income security status of women farmers and binary probit regression model was used to estimate the effects of livelihood diversification strategies on women farmers' income security status.

Table 1: Sample outlay of the respondents in the study area

LGAs/Zone	Villages	Sample Frame	Sample Size
Lavun I	Batati	289	38
	Kutigi	367	48
	Busu/Kuchi	68	9
Paikoro II	Kafinkoro	218	29
	Nikuchi	124	16
	Paiko	52	7
Wushishi III	Kodo	194	26
	Lokogoma	202	27
	Zungeru	318	42
Total	9	1832	242

Source: Niger State Agricultural Mechanization and Development Authority

2.1 Simpson index of diversity

The Simpson Index of Diversity as used by De Haan and Zoomers (2017) and is expressed as in equation (2):

$$D = 1 - \left(\frac{\sum n(n-1)}{N(N-1)}\right) \text{ ----------(2)}$$

Where:
n = number of livelihood diversification strategies employed by the rural woman
N = total number of livelihood diversification strategies available

The values of *SID* ranges between zero (0) and one (1). The index 1 represents high diversification, while 0 implies low diversification.

2.2 Foster-Greer-Thorbecke (FGT)

The mathematical formulation of income security status as derived from Foster, Greer and Thorbecke as used by De Haan and Zoomers (2017) is estimated as in equation (3) to (7):

$$P_{ai} = \frac{1}{n}\sum_{i-1}^{q}\left[{}^{(z-y)}/_{z}\right]^{a} \text{----------(3)}$$

Where;

a=0, $P_o=\frac{1}{n}\sum_{i-1}^{q}\left[{}^{(z-y)}/_{z}\right]^{0} = \frac{q}{n}$ → Income security incidence ----------(4)

a=1, $P_1=\frac{1}{n}\sum_{i-1}^{q}\left[{}^{(z-y)}/_{z}\right]^{1}$ → Income security depth ----------(5)

a=2, $P_2=\frac{1}{n}\sum_{i-1}^{q}\left[{}^{(z-y)}/_{z}\right]^{2}$ → Income security severity ----------(6)

Where;
a = degree of income security
n = number of households in a group
q = the number of income insecure households
y = y the per capita income (PCI) of the ith household
z = income security line
Total per-capita income TPCI = Summation of PCI
Mean TPCI = TPCI/ Total number of households
Income security line PL = x MTPC

2.3 Binary Probit regression model

The Probit regression model is express explicitly as in equation (7):

$$Z = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots + \beta_n X_n + U \text{ ----------(7)}$$

Where;

X_1…….X_n are the explanatory variables.
Z= Income security status (Income secured = 1, 0 if otherwise).
X_1 = Age of the respondents (in years)
X_2 = Household size (numbers)
X_3 = Education (years)
X_4 = Access to local markets (access = 1, 0 if otherwise)
X_5= Farm size (Ha)
X_6 = Family occupation (Faming=1, otherwise=0)
X_7 = Extension contact (number)
X_8=Access to credit facility (amount received in ₦)
X_9 = Income from crop diversification (₦)
X_{10} = Income from Livestock diversification (₦)
X_{11} = Income from off-farm diversification (such as inputs supply and processing) (₦)
X_{12} = Income from Non-farm diversification (such as Handcrafts and white-collar job) (₦)
X_{13}= Access to Government support and palliative (value in ₦)
U= error term

3. Results and Discussion

3.1 Livelihood diversification strategies among the rural households

Simpson index was used to determine the livelihood diversification of women farmers in the study area. The value of Simpson index ranges between 0 and 1. Simpson index of 0 implies not diversify, while 1 means perfect diversification. The closer the value is to unity, the greater the degree of diversification. Results in Table 2 presents' the different livelihood activities in the study area. The participation was calculated by dividing the number of respondents that are engaged in a particular livelihood activity with the total number of respondents, and then multiply by 100. The results revealed that on-farm livelihood activities in the study area are land leasing, agro-processing, seed collection, input supply and farm

labour. While off-farm livelihood activities are marketing, photo/video coverage, food vendor, soap making/selling, shoe making, private consultant, hair plaiting, tailoring and civil service amongst others.

Table 2: Livelihood diversification strategies

Variables	Yes (%)	No (%)
Farm activities		
Arable crop farming	231(95.5)	11(4.5)
Tree crop farming	59(24.4)	183(75.6)
Livestock farming	131(54.1)	111(45.9)
Vegetables farming	131(54.1)	111(45.9)
Fish farming	38(15.7)	204(84.3)
Poultry farming	153(63.2)	89(36.8)
On-farm activities		
Land leasing	96(39.7)	146(60.3)
Agro-processing	191(78.9)	51(21.1)
Seed collection	38(15.7)	204(84.3)
Input supplier	56(23.1)	186(76.9)
Farm labour	179(74.0)	63(26.0)
Off-farm activities		
Marketing	167(69.0)	75(31.0)
Photo/video coverage	10(4.1)	232(95.9)
Food vendor	161(66.5)	81(33.5)
Soap making/selling	197(81.4)	45(18.6)
Shoe making	61(25.2)	181(74.8)
Extension services	59(24.4)	183(75.6)
Hair plaiting	211(87.2)	31(12.8)
Tailoring	165(68.2)	77(31.8)
Civil servant	36(14.9)	206(85.1)

Source: Field survey, 2024

Based on farm activities, the result shows that arable crop farming (95.5%), livestock and vegetable farming (54.1%) and poultry farming (63.2%) have higher livelihood diversification among the women farmers in the study area. Agro-processing (78.9%) and farm labour (74.0%) are the on-farm livelihood activities with high diversification. Moreover, with regards to the off-farm activities, marketing, food vendor, soap making/selling, hair plaiting and tailoring had high level of participation amongst the rural crop farmers.

This implies that apart from farming, majority of the farm households are engaged in non-farm activities so as to increase their total earning. This is consistent with the findings of Afridi (2017) who found out that farming was the primary occupation of most households in the study area and that they also engaged mostly in non-farm activities such as petty trading, matting, tailoring, barbing, telecommunication services, and construction work as a means of livelihood diversification.

3.2 Extent of livelihood diversification

Results in Table 3, presents the extent of livelihood diversification of rural farming households in the study area. The measure of livelihood diversification, which takes into account the variations in the livelihood activities, was estimated using the Simpson diversification index. The higher the number of activities, the higher the value of Simpson diversification index. Results in Table 3 shows that all women farmers diversify their livelihood. Majority of farming households (67.8%) had moderate extent of livelihood diversification, while 26.4% had low extent of diversification. This is in line with findings of Afridi (2017) which shows that rural farming households do not rely only on farm incomes to sustain their livelihoods, but they also diversify their income sources into the non-farm sector driven by various motives.

Table 3: Simpson diversification class

Class Livelihood diversification	Simpson index	Frequency	Percentage
Low livelihood diversification	0.25-0.50	64	26.4
Moderate livelihood diversification	0.51-0.75	164	67.8
High livelihood diversification	0.76-1.00	14	5.8
Total	1.00	242	100

Source: Field survey, 2024

3.3 The income security status of the rural households

An income secure household is that whose per capita monthly earnings are at least two- third of the mean per capita monthly earnings on food expenditure. On the other hand, an income insecure household is that whose per capita monthly earnings are less than two-third of the mean monthly per capita earnings on food expenditure. Table 4 shows that the mean per capita earnings per month was estimated to be ₦35,522 and this value was used as income security index. That is, any respondent whose per capita monthly mean earnings is less than ₦35,522.0 (income security index) was regarded as being income insecure.

Table 4: Income security status of the rural households

Variable	Frequency	Percentage
Income secure	117	48
Income insecure	125	52
Total	242	100
Income security line / month	₦35,522	
Income security line / day	₦1,184.07	
Income security incidence	0.484	
Income security gap	0.137	
Severity of income insecurity	0.062	

Source: Field survey, 2024.

The distribution of the respondents by income security status in Table 4 reveals that majority (52.0%) of the respondents were income insecure, while 48% were income secure. This might be as a result of relatively low level of livelihood diversification among the women farmers in the study area. This corresponds with UN who stated that majority of the Nigeria live below $1 per day. This finding is in disagreement with Fakayode and Yusuf (2015) who found that 66.39% of the household were income secure while the remaining 33.61% were income insecure.

3.4 Effects of livelihood diversification on income security of the rural households

Probit regression model was used to examine the effects of livelihood diversification on income security of the women farmer's households in the study area. Thus, the result from Table 5 shows the Pseudo R^2 of (0.4159), implying that about (42%) of variations that occur in the income security of women farmers' were explained by the independent variables included in the models. while the remaining (58%) were due to error in measurement of some variables. The Prob chi-square is significant at 1% level of probability. This implies the model is fit for the objectives.

The coefficient of age of the respondents was found to be negative and significant at 10% level of probability. This implies that increase in the

Table 5: Probit regression on effects of livelihood diversification on income security status

Variables	Coefficient	Standard error	Z-value	p>|T|
Age	-0.0269	0.0149	-1.80*	0.072
Household size	0.00003	0.0003	0.09	0.931
Level of education	0.2008	0.0627	3.20***	0.001
Marital status	0.0612	0.0805	0.76	0.447
Farm size	-0.0467	0.0731	-0.64	0.523
Access to extension agent	-0.1719	0.2166	-0.79	0.428
Family labour	-0.5840	0.1978	-2.95***	0.003
Income from livestock diversification	0.0795	0.0604	1.32	0.188
Access to government support	0.0342	0.0170	2.01**	0.045
Income from crop diversification	0.0777	0.0155	5.01***	0.000
Access to local market	0.2814	0.1750	1.61	0.108
Income from off-farm diversification	0.7094	0.2169	3.27***	0.001
Income from on-farm diversification	0.1602	0.0485	3.30***	0.001
Constant	-2.2176	0.8849	-2.51***	0.012
Number	242			
LR $chi^2(13)$	91.03			
Prob > chi^2	0.0000***			
Pseudo R^2	0.4159			

Source: field survey, 2024

age of the farmers lead to decrease in the likelihood of income security of the farmers. As it may affect the tendency of diversification in various livelihood activities thereby reducing the earning capacity of the women farmers in the study area. This is in consonance with the findings of Shrestha *et al.* (2019) who reported that age of farmers has a positive influence on their income security status.

The finding also reveals that the coefficient of level of education of the women farmers is positive and significant at 1% level of probability. This implies that as the respondent's educational attainment increases, the level of the farmers' income security and livelihood diversification also increases. This might be as a result that education is a function of exposure of the respondents, which also enable the farmers easily understand the use and benefit of diversifying in various livelihood activities in the study area. This agrees with Uzokwe *et al.* (2017) who reported that level of education influences farmers decision to adopt a given technology or innovations. More so, the coefficient of family labour is negatively significant at 1% level of probability. This implies that the use of family labour limit the level of livelihood diversification thereby reducing the income security of the women farmers among the farming households in the study area.

The finding also reveals that the coefficient of access to government support is positive and significant at 5% level of probability. This implies that an increase in farmers' access to government support will lead to increase in the likelihood of the farmers' livelihood diversification and income security of women farmers in the study area. This agrees with Wepnes (2019) which showed that increase in farmers' access to government support

alleviate the food security status of the rural households in the study area.

The finding reveals that the coefficient of income from crop diversification of the women farmers is positive and significant at 1% level of probability. This implies that as the respondents income increases the likelihood of the farmers' income security will also increases. This might be as a result level of status attained, which make the farmers to focus on one field of livelihood sustenance. This agrees with Uzokwe *et al*. (2017) which showed that increase in farmers income lead to proportionate increase in livelihood activities of the farming households in the study area. The finding also reveals that the coefficient of income from on-farm and off-farm diversification is positive and significant at 1% level of probability respectively. This implies that an increase in the additional sources of income of the women farmers from on-farm and off-farm sources will lead to increase in the likelihood of the farmers' income security status among the farming households in the study area. This agrees with Omondi (2018) who reported that increase in farmers income from various sources increase the farmers food security status among the farming households in the study area.

4. Conclusion

The study concluded that majority of women farmers had moderate extent of livelihood diversification while only few had low extent of diversification. It was also concluded that majority of the respondents were income insecure. However, age, level of education, family labour, access to government support, income from crop diversification, income from off-farm diversification and income from on-farm diversification were significant effects of livelihood diversification on income security of the women farmers households. Based on the findings of the study, the following recommendations have been advanced:

i. Farmers should explore opportunities to diversify their income sources beyond traditional agricultural activities. This could include engaging in off-farm activities such as small-scale businesses, livestock rearing, or agro-processing ventures.

ii. The State Government should invest in education and training programmes tailored towards improving the needs of women farmers, focusing on building skills relevant to diversified livelihoods. These programs could cover areas such as entrepreneurship, vocational training, agricultural practices, and financial literacy to empower women farmers to engage in diverse economic activities effectively.

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