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Livelihood diversification and it's determinants on rice farming households in Ogun State, Nigeria.

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This study assesses the nexus between livelihood diversification, technology adoption and food security status among rice farm households in the Ogun State. A multistage sampling technique was used to select two Agricultural Development Programme zones (Ikenne and Abeokuta zones) in the state. Purposive selection of two blocks per zone based on the concentration of rice farmers was done. Six farming cells were randomly selected from each block making a total of twenty-four (24) farming cells, seven rice farmers were randomly selected from each farming community giving a sample size of 168 rice farmers. A well-structured questionnaire was used to collect data. Out of the 168-questionnaire administered, 158 of it was gotten and used for the study. The data were analyzed using descriptive statistics, Simpson index for livelihood diversification and logit regression model. From the results, the age group 36 – 45 years is the modal category with 32.9% which was followed by 26 – 35 years with 27.9 percent. A large percentage (32.9) of the farmers had no formal education, 40.5 percent had school certificate, 20.3 percent had primary education, while 6.3 percent had tertiary education. Most farmers in the study area had extension agent at least once in every two months. The coefficients of age and education were found to be significant with the age carrying negative sign. It was concluded that rice farmers education in the study area was one of the major factors needed to improve their skills on other form of livelihood in order to enhance their well-being. It was recommended that young people should be encouraged to diversify their livelihood. The farmers should be educated on ways to diversify their livelihood. Credit facilities should be made available for the farm household either by the government or private parastatals to enhance farming activities. Production assets of the rice farmers in the study area should be improved on.

Key words: Rice farmers, livelihood, diversification, determinants, logit regression.

INTRODUCTION

Agriculture is the main source of livelihood in Nigeria, especially in the rural areas and is plagued with various problems (Adepoju and Obayelu, 2013). As a result, most of the rural households are poor and are beginning to diversify their livelihoods into off and non-farming activities as a relevant source of income. The farming

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sector employs about two-thirds of the country's total labour force and provides a livelihood for about 90 percent of the rural population (IFAD, 2009).

Agriculture as a livelihood activity is associated with immense risks and uncertainties which exposes the farming households to low standard of living, poverty and thereby decreasing their food security status. These risks and uncertainties associated with agricultural industry have led farming households to source for alternative sources of livelihood thereby diversifying their livelihood.

Livelihood diversification has received much attention from researchers and policy-makers in the past decades, with high hopes that promoting it can offer a pathway for poverty reduction and economic growth in sub-Saharan Africa (SSA) (World Bank, 2007). The term diversification refers to processes taking place at different levels of the economy, which are usually, but not always directly linked (Start, 2001). Firstly, diversification of the rural economy refers to a sectoral shift of rural activities away from farming to non-farming activities, associated with the expansion of the rural non-farming economy (Start, 2001); normally as part of a broader process of structural transformation (Timmer, 2009). Secondly, individual or household diversification refers to income strategies of rural individuals or households in which they increase their number of activities, regardless of the sector or location. Livelihood diversification is an active social process of individual or household diversification, involving the maintenance and continuous adaptation of a highly diverse portfolio of activities over time in order to secure survival and improve standards of living (Ellis, 2000b).

A number of studies have confirmed the inability of agriculture to fully support livelihood security (Samal, 2006; Shukla and Shukla, 2007; Shylendra, 2002; Unni, 1996). The following set of studies focuses on the issues related with livelihood diversification and highlights that livelihood diversification is the norm among rural households, and different income-generating activities offer alternative pathways out of poverty for households as well as a mechanism for managing risks in an uncertain environment (Davis et al., 2010; Dercon and Krishnan 1996; Ellis, 1998; Ellis and Biggs, 2001; Jodha, Asokan and Ryan, 1977; Nair and Menon, 2007; Papola, 2005 among others).

Various studies have shown that while most rural households are involved in agricultural activities such as livestock, crop, or fish production as their main source of livelihood, they also engage in other income generating activities to augment their main source of income (Adepoju and Obayelu, 2013). Non-farming local activities include all economic activities in rural areas except agriculture, livestock, fishing and hunting. It includes all off-farming activities, processing, marketing, manufacturing, wage and causal local employment in the rural villages (Agu, 2013).

Rice (oryza sativa) as a crop has received widespread attention from International and regional bodies due to its importance. It is a preferred food in urban centers of many countries including Nigeria (Igbokwe, 2001) and in institutions, because of the relative ease of preparation in catering for large numbers of people (Akande, 2002). In Nigeria, its importance is seen in the fact that it is accepted amongst all cultures (Okeke et al., 2008; Onimawo, 2012), and is normally preferably prepared in social functions. The major rice ecosystems in Nigeria are lowland upland rain-fed, lowland rain-fed, upland rain-fed and supplementation of precipitation by irrigated production systems which together account for 97% of rice produced in Nigeria (Daramola, 2005). Rice is processed simply by removal of husk and bran. Fat and protein content are low (Erhabor and Ojogho, 2011), so it can store well in a hot and damp climate. It has been noted that rice is the leading food in parts of the world with high population density and in areas where dietary levels are not adequate (Bouman et al., 2007; Huke, 1976). In terms of consumption in Nigeria, rice is the fourth most important staple crop after rising from a fifth position in the 1960's (Akande, 2002; Cadoni and Angelucci, 2013; Osifo, 1971). It is thus not surprising to note that rice production in Nigeria has been increasing over the decades. Despite the increase in it production, the demand for rice still exceeds the supply.

METHODOLOGY

Study area

This study was carried out in Ogun State, southwest of Nigeria. Ogun State lies between latitude 6° 54' 35.4" N of the equator and longitude 3° 15' 30.11" E of the Greenwich meridian (Tawan, 2006). Ogun State is made up of four Agricultural Development Programme zones, namely; Ilaro zone, Ikenne zone, Abeokuta zone and Ijebu ode zone. The state has a land area of 16,980 sq. km, a population of 3,751,140 people (National Population Commission, 2006). The state has twenty local government areas, and the vegetation is evergreen forests and savanna. The major crops grown in the state are cocoa, oil palm, rice, cassava, cotton and vegetables.

Sampling technique

A multistage random sampling technique was used for this study. The first stage involved the random selection of two Agricultural Development Programme zones (Ikenne and Abeokuta). The second stage random selection of two local government areas per zone based on the concentration of rice farmers. Thirdly, six farming communities were randomly selected from each local government area making a total of twenty-four (24) farming community. Lastly, seven rice farmers were randomly selected from each farming community giving a sample size of 168 rice farmers.

Sources and types of data

Primary data was used for this study. Data collected were households' demographic and socioeconomic characteristics such as age, educational level, marital status, sex, income, household

size, as well as access to credit, and also, livelihood diversification strategies were collected through a cross-sectional survey of rice farmers in the study area with the use of a well-structured questionnaire.

Methods of data analysis

The analytical tools employed in this study were descriptive and inferential statistics. The descriptive statistical tools used were frequency, percentages, Simpson index for livelihood diversification and means, while Tobit regression model was used to capture determinants of rice farmers' livelihood.

Estimating the degree of income diversification (Simpsons Index of Diversity)

The Simpsons Index of Diversity (SID) was used in this study to estimate the degree of income diversification among rice farmers in Ogun State. The SID takes into consideration both the number of income sources as well as how evenly the distributions of the income between the different sources are (Minot et al., 2006; Joshi et al., 2003). This reason justifies the choice of the SID as applied in this study over other measures of diversification such as the Herfindahl, Shannon etc. The SID ranges between zero (0) and one (1). Thus, 0 denotes specialization and 1 the extremity of diversification. The more the SID value is closer to one, the more diversified the household is.

$$SID = 1 - \sum_{i}^{N} (P_i)^2 \quad (1)$$

SID = Simpsons Index of Diversity, n = number of income sources, Pi = proportion of income coming from the source i, the value of SID ranges from zero (0) to one (1); however, if there is only one source of income, Pi = 1, then SID = 0.

The SID model is expressed as:

$$SID = 1 - \sum_{i-l}^{8} \left(\left(\frac{fci}{thi}\right)^2 + \left(\frac{cci}{thi}\right)^2 + \left(\frac{nri}{thi}\right)^2 + \left(\frac{livsti}{thi}\right)^2 + \left(\frac{fwi}{thi}\right)^2 + \left(\frac{nfwi}{thi}\right)^2 + \left(\frac{sei}{thi}\right)^2 + \left(\frac{rei}{thi}\right)^2 \right) \quad (2)$$

Where: fci = food crops income, cci = cash crops income, nri = natural resource income, Livsti = livestock income, fwi = farm wage income, nfwi = non-farm wage income, sei = self-employment income, rei = remittance income, othersi = other income sources. SID = Simpson Index of Diversification (always falls between 0 and 1). N = number of farming households. The value of the index is zero when there is a complete specialization and approaches one as the level of diversification increases.

To determine factors influencing decision of livelihood diversification

The Tobit regression model was used to identify the factors which determine rice farming household engagement in livelihood diversification using SID. Schwarze and Zeller (2005), Babatunde and Qaim (2009) and Davendra et al. (2005) used this method to analyse the determinants of income diversification. The presence of zeros in the dependent variable, SID for some respondents (thus showing no diversification) demands the use of the censored (Tobit) regression model.

The general formulation for model specification is given as:

$$y_i^* = x_i \beta + \varepsilon_i \quad (3)$$

$$y_i = 0 \text{ if } y_i^* \leq 0 \quad (4)$$

$$y_i = y_i^* \text{ if } y_i^* > 0 \quad (5)$$

Where y_i^* is a censored variable of the SID, β is a parameter vector to be estimated, x is a vector of explanatory variables and ε_i is the error term.

Determinants of income diversification:

$$SID = \beta_0 + \beta_1 age + \beta_2 sex + \beta_3 numyrsedu + \beta_4 marstatus + \beta_5 hhs + \beta_6 accelectric + \beta_7 distmkt + \beta_8 tfarsize + \beta_9 extvisit + \beta_{10} prodassets + \beta_{11} acccredit + \varepsilon_i \quad (6)$$

SID = Simpsons Index of Diversification, ε_i = random term.

Table 1 shows the various livelihood diversification variables, their meaning, their sources and the a priori expectation of the various variables.

RESULTS AND DISCUSSION

Socio-economic characteristics of rice farming households

Table 2 shows the socioeconomic characteristics of the rice farming households in the study area. The age group 36 – 45 years is the modal category with 32.9% which was followed by 26 – 35 years with 27.9 percent. The least was the age group above 56 years which had 13.3 percent of the respondents. These imply that majority of the rice farmers in the study area are still in their active age. Some 60.8 percent of the farmers were male while 39.2 percent of them were female. This is in accordance with the work by Babalola et al. (2011), which opined that male are more involved in farming work compared to their female counterpart. This may be due to labour intensiveness of farm work. Majority (52.5%) of the farmers had household size of between 5 – 8, 31 percent had household size of 1 – 4, while households with 9 persons and above had the least being 16% of the respondents.

Education is an investment in human capital which may raise the qualities of skills of a man, narrow his

Table 1. Description of the variables specified in the livelihood diversification model.

Variable acronym	Variable meaning	Type of measure	A priori expectation with respect to livelihood diversification	Source
Marital status (Marstat)	Whether respondent is married or not married	Dummy variable (married = 1, otherwise 0)	+	Oni et al. (2011)
Age of household head (Age)	Age of the household head	In year	±	Oni et al. (2011)
Educational status (Edu)	Educational level of household head	Number of year of formal education	+	Sultana and Kiani (2011)
Household size (Hhsz)	Number of adults and children who are resident member	Number	+	Oni et al. (2011), Adebayo (2012), Shaikh (2007)
Sex	Sex of the household head	Dummy (male=, otherwise =0)	±	Babatunde et al. (2007)
Access to electricity (accelectric)	-	Dummy variable (having access = 1, otherwise 0)	+	-
Remittances (Rem)	Cash received from migrant members of family, friends and other groups	Amount in naira	+	Babatunde et al. (2007) Bamire (2010), Sultana and Kiani (2011)
Access to credit (Acrd)	Privilege of getting credit for household food consumption	Dummy variable (having access = 1, otherwise 0)	+	Arene and Anyaeji (2010)
Access to market (distmkt)	It is expected that households that have poor access to market are less diverse in income sources.	Dummy variable (having access = 1, otherwise 0)	±	Hoddinott and Yohannes 2002)
Agricultural land holding (Land)	Size of agricultural land held by household head	ha	+	Pankomera et al (2009), Bemire (2009)
Productive assets (prodassets)	Productive assets are those that are used as inputs into production processes.	Naira	+	-

information gaps and increase his allocative efficiency that leads to more productive performance. A large percentage (32.9) of the farmers had no formal education, 40.5 percent had primary school education, 20.3 percent had secondary education while 6.3 percent had tertiary education.

Livelihood activities engage in apart from rice farming

Out of the 158 rice farming households engaged in two or more livelihoods, the most preferred activity is livestock production (32.9%), followed by other food crops (17.7%) (Table 3). Other activities undertaken to complement rice farming include cash crops (15.2%), natural resources such as fishing (12.7%), agricultural wage (10.8%), non-agricultural wage (8.9%) and others (1.8%). It was observed that most of the rice farmers keep some livestock in abides to diversify their livelihood. 8.9 percent of the rice farming households earn income from non-agricultural employments. This finding is in line with the findings of Warren (2002) perspective on rural

Table 2. Distribution of respondents by socio-economic characteristics.

Characteristic		Frequency	Percent	Mean	Min.	Max.	Std.
Age (in years)	26 – 35	44	27.8	-	-	-	-
	36 – 45	52	32.9	-	-	-	-
	46 – 55	41	25.9	-	-	-	-
	56 and above	21	13.3	-	-	-	-
	Total	158	100.0	43.43	28.0	61.0	9.63
Sex	Male	96	60.8	-	-	-	-
	Female	62	39.2	-	-	-	-
	Total	158	100.0	-	-	-	-
Household size (in numbers)	1 – 4	49	31.0	-	-	-	-
	5 – 8	83	52.5	-	-	-	-
	>9	26	16.5	-	-	-	-
	Total	158	100.0	6.28	1.0	12.0	2.61
Educational status (in years)	No primary education	52	32.9	-	-	-	-
	Primary education	32	20.3	-	-	-	-
	Secondary education	64	40.5	-	-	-	-
	Tertiary education	10	6.3	-	-	-	-
	Total	158	100.0	6.73	0.0	18.0	5.80

Source: Field survey (2019).

Table 3. Distribution of respondents by livelihood activities engage in apart from rice farming.

Activity	Frequency	Percent
Livestock keeping	52	32.9
Other food crops	28	17.7
Cash crops	24	15.2
Natural resources	20	12.7
Agricultural wage	17	10.8
Non-agricultural wage	14	8.9
Others	3	1.8
Total	158	100.0

Source: Field survey (2019).

diversification alternatives.

The result of the Tobit regression estimates of the factors influencing livelihood diversification (SID) is presented in Table 4.

Table 4 show Age was found to be negative and significant at 5% probability level. The negative sign indicates that as the rice farm household grows older, the less diversified their livelihood. This is in line with the findings of Bernard et al. (2014) in Ghana which finds that as heads of farm households increases in age, the less they diversify their income sources. This is because they lack the physical strength and financial resources to add on to their farming or non-farming activities, since a majority of these activities are found to be labour intensive.

The coefficient of educational status of the farmers was found to be positive and significant at 5% level of probability which implies that the more educated the rice farming households are, the more they diversify their livelihood. This is in accordance with the work of Yunez-naude and Taylor (2001) which opined that having some educational level of attainment facilitates entry into high paying jobs such as teaching, produce purchasing clerks, masters of transport stations, lottery vending as well as improving farmers understanding of farming practices and related issues.

The result from the regression table also revealed that the coefficient of farm size was found to be negative but

Table 4. Factors influencing livelihood diversification (SID) of rice farm households in the Ogun State.

Variable	Coefficient	Std. error	t-value
(Constant)	0.985***	0.212	4.65
Age	-0.068**	0.029	2.34
Sex	0.002	0.002	-
Hhs	-0.006	0.006	-
Edu	0.0035**	0.0012	2.92
Farm size	-0.025***	0.006	4.17
Remittance	0.084**	0.035	2.40
Access to cre	0.036***	0.010	3.60
Marital	-0.013	0.015	-
Access to elec.	-0.018	0.019	-
Ext. Visit	0.003	0.007	-
Dist to mkt	-0.009**	0.004	2.25
Prod. Asset	2.956**	1.22	2.42

Source: Field survey (2019). *** significant at 1%, **significant at 5%, *significant at 10%. Number of observations = 158. Pseudo R^2 = 0.681. df = 12.

significant at 1% probability level. This implies that a unit increase in farm size will lead to 3% decrease in livelihood diversification.

Access to credit facility was positive and significant at 5% probability level implying that a unit increase in access to credit will lead to an increase in livelihood diversification.

Distance to market was observed to be negative and significant, which means that the closer the rice farmers are to the market the more diversified their livelihood.

The Tobit regression results show that remittance was found to have positive and significantly affected rice farming household's livelihood diversification strategy at 5% level of significance. If other factors are held constant, a unit increase in remittance will increase the opportunity of the rice farming households to diversify their livelihood by 8.4%. Hence, increasing rural household's remittance income plays a vital role for enhancing and smoothing household consumption problem, strengthen social network/social capital, increase saving and investment, help households gain access to diversified opportunities like trading, and then able to improve their livelihood. The result of this study is consistent with the findings obtained by Gebru et al. (2012) and Mohammed and Tolossa (2016).

Productive asset was found to be positive and significant. The ownership of such assets therefore facilitates entry of the farmers into businesses (farming and non-farming) thereby diversifying their livelihood. This finding is similar to that of Babatunde and Qaim (2009).

SUMMARY

The determinants of income diversification strategies pursued by farming households in the study area were the age, sex, household size, extension visits, education, remittance, farm size, marital status, access to credit, access to electricity, value of productive assets owned and distance to market. The study observed that the older household heads were less diversified in the sources of livelihood they pursue. This study revealed that efforts should be made to build the capacity of the youth to engage in farming and livelihood diversification by the government and other parastatals to enable youth en masse income for investment and also to sustain the farm industry and also diversify their livelihood.

The infrastructure status (such as road and electricity) of the farm economy in the study area should be improved. This may limit entry barriers into both farming and non-farming activities to enable households put their full capabilities into use.

Education was found to be one of the key determinants for livelihood diversification; this is because when the rice farmers are educated, they will be exposed to opportunities outside the rice farming activities.

The distance to market was another factor affecting the rice farming household's ability to diversify, since the closer the rice farmers are to the market the more diversified their livelihood.

Rice farming household's remittance income plays a vital role for enhancing and smoothing household consumption problem, strengthen social network/social capital, increase saving and investment, help households gain access to diversified opportunities like trading, and then able to improve their livelihood.

Conclusions

The study revealed that income from non-farming

activities such as self-employment in non-agricultural activities play a huge role in the livelihood diversification of the rice farmers. The rice farmers education in the study area was one of the major factors needed to improve their skills on other form of livelihood in order to enhance their well-being.

RECOMMENDATION

The following recommendations were made from the study:

i. Young people should be encouraged to diversify their livelihood.
ii. The farmers should be educated on ways to diversify their livelihood
iii. Credit facilities should be made available for the farm household either by the government or private parastatals to enhance farming activities.
iv. Production assets of the rice farmers in the study area should be improved on.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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