# INCOME DIVERSIFICATION: A STRATEGY FOR MANAGING POVERTY AMONG WET SEASON SMALL-HOLDER RICE PRODUCERS IN JIGAWA STATE, NIGERIA

**[1]Mamman, B. Y., [2]Suleiman, A. and [2]Mustapha, A.**
[1]Department of Agricultural Economic and Extension,
Federal University Dutse, Jigawa State Nigeria.
[2]Department of Agricultural Economic and Extension,
Bayero University Kano, Kano State Nigeria.
**Corresponding Author's E-mail:** bymamman@gmail.com **Tel.:** +2348037919656

**ABSTRACT**
This study was conducted to assess income diversification as a strategy for managing poverty among wet season smallholder rice producers in Jigawa State, Nigeria. The justification for the research hinges on the fact that more knowledge about the extent and nature of livelihood diversification and poverty status among rural farming household is required for effective designing and implementation of poverty reduction policy and strategies. Multi-stage sampling techniques consisting purposive and random sampling were used in selecting 292 wet season smallholder rice producers who were interviewed using structured questionnaires by trained enumerators. The analytical tools employed include descriptive statistic, Simpson diversification index, FGT model and Probit regression models. The result shows that the mean age of 40 years and mean household size was 12 persons. Wet season rice production was the major occupation for the farmers with most of them having a farming experience of more than 24 years on the average. However, the average farm size was 2 hectares. The average annual income from rice production is ₦166119, while the average annual income from dry season production was ₦159704. The result of SID of the farming household shows that 51.6% had high income diversity and 48.4% had low-income diversity scores. The FGT model revealed the poverty level of the farming household which shows that 60.3% of the smallholder wet season rice producers were poor while 39.7% were non poor. The poverty depth was -0.35 for the poor and 0.53 for non-poor. The severity of poverty index for the poor is 0.78. Farming household income diversification also significantly influence poverty status. It is therefore recommended that since the study observed that the incidence of poverty had slightly drop from 64.1% to 54% as a result of diversification among the non-poor farming household. Therefore, farmers should be encouraged to diversify their economic activities to earn more income to be able to increase their income base so as to cover their expenditure on consumption and social obligation. This can be achieved through creation of enabling socio-economic environment that will generate employment opportunity for the farming household.

**Keywords:** Employment, Income diversification, Livelihood, Poverty status, Small-holder.

## INTRODUCTION

Rural households in many developing countries have been found to diversify their income sources so as to allow them reduce income related risks and smoothen their consumption (Nazinin *et al*., 2015). This is often necessary in the agriculture-based economies where various types of risks exist such as variability in soil quality, crop diseases, price shock, unpredictable rainfall and other weather-related events which leads to low productivity, low output and invariably low income which continually trap them in the vicious cycle of poverty.

Increasing the sources of income, therefore, has become an important component of livelihood strategies among rural households.

Income diversification is a strategy whereby households allocate their productive assets among different income generating activities (Alobo Loison and Bignebat, 2017). Households may diversify their farm activities by growing different crops, rearing different kinds of livestock, working on other farms or engaging in natural resource related activities (Losch *et al.,* 2012). Diversification is becoming an increasingly important livelihood strategy among rural households in Developing Countries.

Poverty is a global phenomenon, which affects continents, nations and peoples differently. It afflicts people in various depths and levels, at different times and phases of existence. In Nigeria, despite a plethora of poverty reduction strategies that have been adopted, poverty incident particularly in the rural areas is still very high. It was observed that higher incidence of poverty in rural areas has been traced to some environmental problems associated with Agricultural production, high vulnerability to health hazards, lack of access to improve farm inputs and poorly developed infrastructural facilities (Okunmandewa, 2002). Poverty reduction remains one of the greatest challenges facing the Nigerian government today. Empirical report confirms that 86.9 million Nigerians now living in extreme poverty represent nearly 50% of its 180 million population (World Poverty Clock, 2018). The increasing poverty incidence, both within and among locations, persisted, in spite of various resources and efforts exerted on poverty-related programme and schemes in the country. Jigawa State is an Agrarian community and among the North Western State in Nigeria that has the Highers percentage of Dollar per day Poverty rate of 89.54% (JICA, 2011). Majority of the populace live in rural area which are characterised by inadequate infrastructure, weak marketing facility, absence of sufficient income source and low standard of living. The farming household of this region are more vulnerable to joblessness because without agriculture and agriculture related activities, there is no sufficient employment opportunity in rural areas. Dry season farming, Livestock rearing and fish culture are the new income source in rural household but mostly run by few individual. However, these occupations are mostly for supplementing family nutrition and cash requirement, and are performed at a low productivity state. Low level of education, lack of skills and proper training force most of the rural households to be engaged in single income source and they have no ability and opportunity to switch to other economic activities. This causes them to migrate from rural subsistence sector to urban based low skill sectors leading to a deteriorating state of the well-being of these rural people. Thus, it is implied that poverty in Jigawa is widespread, particularly in the rural areas. A strategy that succeeds in generating a reasonable rate of growth in real per capita income can shift large number of households above the poverty line. In this connection, diversification of income sources can play a vital role to reduce poverty and increase the level of household well-being in the study area. Therefore, information on Diversifying economy capacities of small-scale farmers is important in order to check if the flow of income and investment from rain-fed to dry season, livestock production, and other income generating activities can be reliable vehicle of economic development. It is in view of this that the study is aimed at examine the income diversification as a strategy for managing poverty among wet season smallholder rice producers in Jigawa state Nigeria. Specifically, the study described the socio-economic characteristics of small-holders farming households; Evaluate the level of Income diversification and poverty status, and determine the effects of income diversification on poverty status of wet season smallholders rice producers.

## MATERIALS AND METHOD

### The Study Area

The study area for this research was Jigawa State. Based on the 2006 National Population figures, the state had a population of 4,361,002 of which 50.4% were males and 49.6% females. However, the current population estimate put the population of the State at 5,828,200 million people (NBS, 2016) with about 628,010 farm families (VLS, 2016). Eighty-five percent (85%) of this population resides in rural areas and 90% of the population is predominantly engaged subsistence agriculture. Agricultural production in the state is heavily reliant upon rainfall and the use of traditional (local) implements. Out of the 2.24 million hectares of land area of the state, about 1.6 million hectares are estimated to be cultivated during the raining season while about 308,000 hectares of the land mass is potentially conducive for dry season farming but with barely 54,000 hectares of farm land being put under irrigation. The state is also blessed with large expanse of agricultural land, rivers and flood plains, suitable for crops, livestock and fish production. Based on these facts, over 80% of the state's total land mass is considered arable, which makes it one of the most agriculturally endowed states in Nigeria.

### Sampling Procedure

Multi stage sampling procedure was used to draw a representative sample of Farming Household in this study area. The first stage involved the purposive selection of Zones 1, 3&4 based on the high concentration of rice farmers in the zone. The second stage also involved purposive selection of two Local Government Areas (LGA's) each, from each zone based on high concentration of rice farmers. Birnin kudu, Jahun, Auyo, Kiri Kassama, Kazaure and Roni LGAs were identified. Third Stage involved random selection of two (2) villages from each of the selected local government which gave a total of 12 villages. The villages selected are Yalwan dame, Kafin Gana in Birnin Kudu LGA, Harbo Sabuwa, Harbo Sohuwa in Jahun LGAs, Arawa, Gatafawa in Auyo LGAs, Marawaje, Iwo in Kirikasamma LGAs, Gada, Wawan Rafi in Kazaure LGAs and Gumama, Gora in Roni LGAs. The study used scientific sample size calculator to generate the appropriate number of respondents for the study. The RAO-SOFT requires inclusion of sample frame and specifying the confidence level to generate acceptable statistical number of respondents. Using RAO-SOFT sample size calculator, proportionate random sampling was used to draw the estimated population of the farming househld from each of the selected villages make up a total sample size of 292 respondents.

### Analytical Tools

A combination of different analytical tools was employed for the study. Descriptive statistics in the form of frequencies, means, and percentage was used to describe the socio-economic characteristic of the faming Household. Simpson diversification index and FGT index was used to evaluate the level of Income diversification and poverty status, respectively and probit regression model was used to determine the effects of income diversification on poverty status of wet season smallholders rice producers.

The Simpson index diversification were used in this study to estimate the degree of income diversification among individual farmers. Simpson Index is subtracted from 1 to give Simpson's Index of Diversity. The value of this index ranges between 0 and 1 where 0 signifies no diversity while 1 shows infinite diversity. SID measures the probability that any Naira taken, at random, from a household's income would have come from two different sources. Thus, a value of SID closer to 1 would indicate higher diversification while a value of 0 would signify deriving income from one source only i.e. specialization. The Simpson index of diversity is estimated as:

$$SDI = 1 - \sum_i^n Q_i{}^2 \qquad \qquad \text{…(1)}$$
$$Q_i = \frac{K_i}{\sum K_i} \qquad \qquad \text{…(2)}$$

where;

Q  = the proportion of income generated from income source I in the total farmers income

SDI = Simpson diversification index

$K_i$  = Income generated from income source i

The model for this study will be express as

$$SID = 1 - \sum_{i=1}^{n}\left[\left(\frac{IFR}{Y}\right)^2 + \left(\frac{IFD}{Y}\right)^2 + \left(\frac{IFL}{Y}\right)^2 + \left(\frac{IFOF}{Y}\right)^2 + \left(\frac{IFRP}{Y}\right)^2\right] \qquad \text{…(3)}$$

where;

SID = Simpson diversification index

IFR = Income from rice production

IFD = Income from dry season production

IFL = Income from livestock production and its by product

IFOF = Income from off-farm activities

IFRP = Income from rice processing

The Foster, Greer, and Thorbecke (FGT) modelas used to determine the poverty status of the rice farming household in the study area. The FGT approach of based on the mathematical formula which explains poverty indices anchored upon the existence of farming household's classification according to consumption expenditure. As adopted by (Halliru, 2019, Olaleye, 2016; Adekoye, 2014). The poverty line was developed, using the mean per capital household expenditure, below which a farming household were classified as being poor and above which a farming household were classified as being non-poor (Omonona, 2001; Okunmadewa *et al*., 2010; Awoyemi, 2011; Awotide *et al*., 2012). The Mathematical formulation is derived as:

$$P\alpha = \frac{1}{N}\sum_{i=1}^{q}\frac{(Z-y_1)^\alpha}{z} \qquad \qquad \text{… (4)}$$

where;

P = Poverty index of the rice farming household

n = Total population of rice farming in the sample

q = number of individual rice farming household below the poverty line

Z = poverty line

Yi = per capital expenditure of the rice farming household

α = the degree of concern for the depth of poverty, it takes on the values of 0, 1 and 2 for poverty incidence, poverty gap and poverty severity respectively. The indices are then derived as follows

$$P_0 = \frac{1}{N}\sum_{i=1}^{q}\frac{(Z-y_1)^0}{z} \qquad \qquad \text{… (5)}$$

This is the head count ratio which is the number of people in a population who are poor. This index measures the incidence of poverty. If the degree of aversion to poverty is increased, so that α = 1 the index becomes:

$$P_1 = \frac{1}{N}\sum_{i=1}^{q}\frac{(Z-y_1)^1}{z} \qquad \qquad \text{… (6)}$$

Here, the head-count ratio is multiplied by the expenditure gap between the average poor person and the line. This index measures the depth of poverty; it is also referred as "expenditure gap" or "poverty gap" measure.

Although superiority to $P_0$, $P_1$ still implies uniform concern about the depth of poverty, in that it weights the various expenditure gaps of the poor equally. $P_2$ or expenditure gap squared index allows for concerned about the poorest of the poor by attaching greater weight to the poverty of the poorest than that of those just below the line. This is done by squiring the expenditure gap index to capture poverty severity index:

$$P_2 = \frac{1}{N} \sum_{i=1}^{q} \frac{(Z - y_1)^2}{z} \qquad \qquad \text{… (7)}$$

By obtaining the poverty status and Income diversification index of the famer from FGT model and Simpson diversification index, respectively. The Probit regression model were also used to determine the influence of income diversification on poverty status of the farming households. Similar model was also used by Amoa, Ayantayo and Fadahhunsi,(2013). A probit model is a popular specification for a binary response model. The implicit form of the probit regression model is given as

$Y_{ij} = X\beta + U$ $\qquad \qquad$ … (8)

The explicit form of the logistic model can be expressed in the following model:

$Y_{ij} = \beta_0 + \beta_1 X_1 + \beta_k X_k + U$ $\qquad \qquad$ … (9)

where;

$Y_{ij}$ = Dependent variable, poverty incidence of the farmers (1 = non poor & 0 = poor household)

$X_1$ = Simpson diversification index (Numbers)

$\beta_0$ = Constant

$\beta_1$ = vector of unknown parameters

U = independently distributed error term

## RESULTS AND DISCUSSION
### Socio-economic Characteristics of Wet Season Small-holder Rice Producers

A socio-economic characteristic result in Table 1 indicated that the population of the wet season rice producers in the study area fall within their active age. This was testified by the statistical distribution of age especially the minimum, mean and standard deviation which was found to be 20, 39.6 and 13.2, respectively. These findings go in line with the findings of Haliru (2019). The age of the population is relevant to this study in that physical ability and productivity depend on age and this may have influence on diversification on economic activities which may also result in reducing poverty in the study Area. the mean farming experience of the farmers is 24 years. The minimum farming experience is 1 years with up to maximum of 45 years. Years of experience in agricultural production activities are important because management skills of farmers improve over the years, experience farmers are expected to have more awareness and better understanding in terms of procurement and used of agricultural production inputs. The implication of this finding is that, the wet season rice producers may use the experience to improve the strategy of investment which might lead to production efficiency in rice production and other Agricultural economic activities. The analysis shows that the mean total household farm size was 2 ha. The minimum and maximum farm size was found to be 0.5 ha and 4 ha respectively. This finding implied that the study area was dominated by small-holder farmers inherited their farm lands. From findings as shown in Table 1, it was reported that the households have a minimum, maximum and mean number of 2, 40 and 12 of household size with standard deviation of 4.8 respectively. Classification of family size is relevant to the study of income diversification and poverty status. Income and expenditure depend on the number and type of people in the family who are economically active. The result implies that majority of the households in the study area have reasonable number of individuals who share household resources. Orifah *et al.* (2020) also reported similar

findings with respect to household size of smallholder rice farmers. Household dependency as estimated in this study was considered household members aged less than 15 and over 64 years old as dependent. Findings of the study indicated that the mean and maximum household dependent is 4 and 17, respectively. Households with many dependents put heavy responsibility on active members in taking care of household welfare; hence more assured income sources are needed for poverty reduction.

Wet season rice production as a major source of income of the farming households contributing an average annual income ₦166,119 which may be significantly important towards improving level of diversification and reduction in poverty. The dry season income generating activities such as production of tomato, Onion, and pepper. Findings of the study revealed an average income from the dry season to be ₦159,704 and also the maximum dry season income was ₦950,000 with minimum of zero. Furthermore, Farming households are expected to involve in other farm income generating activities such as livestock production like sheep, goat, cattle, poultry production and postharvest operational engagement. The result shows that the average income from other farm income was ₦22660.96 and maximum other farm income was ₦ 650,000 with minimum of zero. This implies that some farming household they only generate solely income from wet season rice enterprise. Lastly the mean farming household non-farm income based on the findings was ₦ 97,250 which is lower than average wet season rice income, dry season income and other farm income. This result is in conformity with the findings of Nasiru (2017) who reported that rural farming household earn their livelihood from agriculture, petty trading and daily wage working.

**Table 1:** Socioeconomic Characteristics of Smallholder Wets season Rice Producers (n = 292)

| Variable | Min | Max | Mean | S. D |
|---|---|---|---|---|
| Age (years) | 20 | 70 | 40 | 13.2 |
| Farming Experience (years) | 1 | 45 | 24 | 8.3 |
| Total Household Farm Size (ha) | 0.5 | 4 | 2 | 1.4 |
| Household Size (number) | 2 | 40 | 12 | 4.8 |
| Number of Dependent (No.) | 0 | 17 | 4 | 2.4 |
| Wet Season Rice Income (₦) | 24000 | 400000 | 166119 | 605888 |
| Dry season Income | 0 | 950000 | 159704 | 115863 |
| Other Farm Income (₦) | 0 | 650000 | 226600.96 | 77115.11 |
| Non-farm income | 0 | 375000 | 97250.79 | 28624.02 |

Source: Field Survey, 2021

**Degree of Income Diversification Among Smallholder Wet Season Rice Producers**

In order to estimate the degree of diversification of smallholder wet season rice producers as shown in Table 2 Simpson diversification index (SDI) which runs from 0 – 1 as adopted by Agyeman *et al.* (2014) and Batool *et al.* (2017). A cut off value < 0.5 and ≥ 0.5 are categorised as low and high diversity scores, respectively, as used by Umar, Malami and Suleiman (2020) were set for the study. The result in Table 2 provides details level of diversification in the study area. The estimated result shows that 51.6% had high income diversity and 48.4% had low-income diversity scores with minimum, maximum and mean degree of diversification of -0.99, 1.74 and 0.58. This agrees with the findings of Sekumade and Osundere (2014) who conducted a study on determinant and effects of livelihood diversification on farm households in Nigeria where it was reported that majority of the respondents had high income diversity. The high-income diversity score among smallholder

wet season rice producers in the study area may be connected to available income diversification option in the study area. However, the mean degree of diversification 0.58 is higher than that of observed by Umar *et al*. (2020) of 0.33 in their study of Dynamic of income diversification strategy among smallholder farmers in Jigawa State Nigeria.

**Table 2:** Degree of Income Diversification of Smallholder Wet season Rice Producers

| Zone/ Degree of Diversification | Frequency | Percentage (%) |
|---|---|---|
| High Diversity (≥0.5) | 150 | 51.4 |
| Low Diversity (<0.5) | 142 | 48.6 |
| Total | 292 | 100 |
| Mean | 0.58 | |
| S.E | 0.31 | |
| S.D | 0.53 | |
| Minimum | -0.99 | |
| Maximum | 1.74 | |

Source: Field survey, 2021

**Comparison of Poverty Status by Level of Degree of Income Diversification**

The decomposition of poverty among the smallholder wet season rice producers by level of degree of diversification as presented in Table 3 shows that 54% farming household with high level of divarication were poor while 46% were not poor. With poverty depth of -0.12 and 0.99 for the poor and non-poor respectively. The result also revealed the prevalence of poverty among farming household with low level of divarication score were 64.1% are poor while 35.9% were not-poor. With poverty depth of -0.55 and 0.62 for the poor and non-poor respectively. This implies that, there is poverty in the study area despite extend of the level of diversification among the farming household. The reason is that poverty variables are beyond income diversification requirement as they comprised food security, Schooling, healthcare, transport, energy and housing among others. Although the incidence of poverty had slightly drop from 64.1% to 54% as a result of diversification among the farming household. This implies that diversification contribute to the reduction in poverty with 10.1%.

**Table 3:** Decomposition of poverty status by degree of income diversification

| Degree of Diversification/Variables | Non-poor | Poor | Total |
|---|---|---|---|
| **High Diversified** | | | |
| Poverty Incidence ($P_o$) | 69 | 81 | 150 |
| Percentage Incidence (%) | 46.0 | 54.0 | 100 |
| Poverty Depth ($P_1$) | 0.99 | -0.12 | |
| Poverty Severity ($P_2$) | 0.16 | 0.50 | |
| MPCHHE | 14110.85 | 5476.93 | |
| Poverty Line | | | 12160.53 |
| **Low Diversified** | | | |
| Poverty Incidence ($P_o$) | 51 | 91 | 142 |
| Percentage Incidence (%) | 35.9 | 64.1 | 100 |
| Poverty Depth ($P_1$) | 0.62 | -0.55 | |
| Poverty Severity ($P_2$) | 0.21 | 0.38 | |
| MPCHHE | 14869.65 | 5988.63 | |
| Poverty Line | | | 9178.30 |

Source: Field survey, 2021

The result (Table 3) further revealed the severity of poverty index among the farming house hold which shows that the severity poverty index of high diversified farming household was 0.5 and 0.16 for poor and noon poor, respectively. The severity poverty index of low diversified farming household was also 0.38 and 0.21 for poor and noon poor. This implies that poverty is severe in among the farming household but more severe among the farming household with low level of diversification. This finding is in conformity with the assertion of Barrett *et al.* (2001) who asserted that exploiting income generating activities could offer a pathway out poverty for the rural farming households.

**Effect of Income Diversification on Poverty Status of Smallholder Wet Season Rice Producers**

The probit regression result in Table 4 attempts to link the relationship or influence of Simpson Diversification Index (SID) to poverty status in the study area. The results indicated that the Pseudo $R^2$ was 0.0125. The fitness of the model was further confirmed by the chi-square ($x^2$) value of 3.11 with a degree of freedom (df) 1 which was significant at 10% level. The dependent variable is poverty status while the explanatory variables is Simpson diversification Index.

The coefficient of Simpson diversification index was negative and significant at 10% level of significant. This result implies that a farming household who engage in a number of activities in the study area has a lower likelihood of been poor that is the high the level of farming household income diversification the lower the poverty intensity. The coefficient of Simpson diversification index was -0.153 which indicate that poverty intensity among smallholder wet season rice producers in the study area would decrease by 0.153 with a unit increase in diversification index and vice versa. In addition, diversification of income sources provides an additional income that enable farming household to spend more on their basic needs, include food consumption, education, clothing, and health care. This result is in line with the findings of Oyinbo and Olaleye (2016) in their studies on farm household's livelihood diversification and poverty alleviation in Kaduna State Nigeria. Similarly, Adepoju and Obayelu (2013) in their studies on farm household's livelihood diversification and welfare of rural household in Ondo State Nigeria. They also reported that income diversification was negative and statistically significant.

**Table 4:** Influence of Income diversification on poverty status of smallholder rice producers

| Variables | Coefficient | Std. Err. | z-value | P>\|z\| |
|---|---|---|---|---|
| Constant | 1.105519 | 0.1053305 | 10.50 | 0.000 |
| Samson Index of Diversification (SID) | -0.1537271 | 0.0855103 | - 1.80* | 0.072 |
| **Sigma** | | | | |
| Loglikelihood | -123.2633 | | | |
| Number of Observation | 288 | | | |
| LR chi-square (6) | 3.5 | | | |
| Prob >chi-square | 0.0778 | | | |
| Pseudo $R^2$ | 0.0125 | | | |

***p<0.01, **p<0.05 *p<0.1
Source: Field Survey, 2020

## CONCLUSION AND RECOMMENDATIONS

Based on the findings, the study revealed that most of the Smallholder wet season rice producers are diversified in income generation. Even though rainfed farming constitutes their major occupation, more income was also generated from livestock production, dry season farming and non-agricultural related activities. It was also concluded that despite the level of diversification the poverty incident is slightly high in the study area and this could be as a result of poor farming household have limited access to physical and financial asset, little level of education and often suffer from crop shock and livestock shock. Finally, the study also observed that diversifying income portfolio among smallholder farming household is an effective strategy to improve household income thereby reducing poverty level. Based on the findings of this study, the following policy measures aimed in improving the living standard among the smallholder farming household in the study area were suggested for recommendations. The study observed that the incidence of poverty had slightly drop from 64.1% to 54% as a result of diversification among the non-poor farming household. Therefore, farmers should be encouraged to diversify their economic activities to earn more income to be able to increase their income base so as to cover their expenditure on consumption and social obligation. This can be achieved through creation of enabling socio-economic environment that will generate employment opportunity for the farming household.

## REFERENCES

Adekoya, O. A. (2014). Analysis of Farm Households Poverty Status in Ogun State Nigeria, *Asian Economic and Social Society Journal*, 4(3): 325-340.

Adepoju, A. O. and Obayelu, O. A. (2013). Livelihood diversification and Welfare of rural households in ondo State Nigeria. *Journal of Development and Agricultural Economics*, 5(12): 482-489.

Adepoju, A. O. and Oyewole, O. O. (2014). Rural livelihood diversification and income inequality in local government area Akinyele, Ibadan, Oyo State, Nigeria. *Journal of Agricultural Sciences*, 59(2): 175-186.

Agyeman, B. A. S. (2014). Determinants of income diversification of farm households in Western Region of Ghana. *Quarterly Journal of International Agriculture*, 53(1): 55-72.

Alobo, L., S. and Bignebat, C. (2017). Pattern and Determinant of household income diversification in rural Senegal and Kenya. *Journal of poverty Alleviation and international Development*. 8(1) 94-126

Awotide, B. A., Awoyemi, T. T., Diagne, A., Kinkinginhoun, F. M. and Ojehomone, V. (2012). Effects of Income diversification on poverty reduction and income inequality in rural Nigeria. Evidence from Rice farming Households.*OIDA International journal of suistainable Development*, 5(10): 65-78.

Awoyemi, T. T (2004). Rural Non-farm Income and Poverty reduction in Nigeria. A report submitted to AERC, Nairobi, Kenya.

Batool, S., Babar, A., Nasir, F. and Iqbal, Z. S. (2017). Income Diversification of Rural Households in Pakistan. International *Journal of Economics and Management Science* vol 6 (6) 466. doi: 10.4172/21626359.1000466

Barrett, C. B., Reardon, T. and Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics and policy implications. *Food Policy*, 26: 315–331.

Halliru, M. (2019) *Econometric Analysis of Food security and Poverty Status of Smallholder Maize farmers in the Savannahs of Northern Nigeria.* An Unpublished Ph.D.

Dissertation Department of Agricultural Economic and Extension Bayero University Kano, Kano State Nigeria Pp. 3

JFSLS (2013). Jarda Fadama Site Listing Survey Ducument Jigawa State Nigeria

Jigawa State Agricultural and Rural Development Authority (JARDA), (2006). Internal implementation report: prepared by planning and evaluation Department, Jigawa. P10.

Jigawa State (2004). Jigawa State Government Official Dairy Directorate of Information, Jigawa, Nigeria.

JICA (2011). Japan International Cooperation Agency Final Report on Federal Republic of Nigeria Poverty Profile (Africa). Published Mitsubishi UFJ Research and Consulting CO Ltd. March, 2011 Pp 25

Losch, B., Freguin-Gresh, S. & White, E. T. (2012). Structural Transformation and Rural Change Revisited: Challenges for Late Developing Countries in a Globalizing World. World Bank Publications. Retrieved from

Nasiru, A., Mamman, B. Y., Atala, T. K., Omokore, D. F. and Hussaini, A. (2017). Socio-economic Factors Influencing the Adoption of improve Rice Processing Tecnnologies by Woment in Jigawa State, Nigeria. *Dutse Journal of Agriculture and Food Security*. Vol 4(2)138-145.

NBS (2016). The Nigerian poverty profile 2016.

Okunmadewa, F. (2002). "Poverty and Agricultural Sector in Nigeria: Poverty Reduction and the Nigeria Agricultural Sector". Elshaddai Global Ventures Ltd

Omonona, B. T. (2009). Quantitative Analysis of Rural Poverty in Nigeria, Nigeria Strategy Support Program (NSSP) Report of International Food Policy Research Institude Washinton D.C.

Orifah, M. O., Sani, M. H., Murtala, N. and Ibrahim, A. A. (2020). Analysis of Rice farmers awareness of the effect of climate change in Kebbi State Nigeria: *FUDMA Journal of Agriculture and Agricultural Tecnology.* Vol 6(1) Pp 226-239.

Oyekale, A. S., Adeoti, A. I. and Oyekale, T. O. (2012). Measurement and sources of income inequality in rural and urban Nigeria. A paper presented during the 5th poverty and economic policy research network general meeting. Addis Ababa, Ethiopia;

Oyinbo, O. and Olaleye, K. T. (2016). Farm Households Livelihood Diversification and poverty alleviation in Giwa Local Government Area of Kaduna State Nigeria. *The Journal of Sustainable Development,* 15(1): 219-232.

Sekumande, A. B. and Osundare, F. O. (2014). Determinant and Effects of Livelihood Diversification on Farm households in Ekity State Nigeria. *Journal of Economics and Sustainable Development*, 5(5): 1-2.

Umar. S., Malami, A. and Suleaman, I. (2020): Dynamics of Income Diversification Strategies among Smallholder Wheat Farmers in Jigawa State Nigeria. *Journal of Agricultural Economics Environment and Social Science*, 6(1): 40-50.

VLS (2016). Jigawa State Village Listing Survey JARDA Document 2016.

World Poverty Clock (2019). Federal Ministry for economic cooperation and Development World Data Lab Report www.worldpoverty.io