Determinants of Vulnerability to Poverty among Rice Farmers: A Case Study of Nasarawa Rice Hub, Nigeria

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Abstract

The study assessed rice farmer's vulnerability to poverty at household level. The study examined factors influencing rice farmers` vulnerability to poverty, identified coping strategies employed by farmers to manage livelihood shocks that predisposes them to poverty and determined the impact of poverty on rice production in Nasarawa state, Nigeria. The study was carried out in Nasarawa rice hubs Nasarawa state. A two stage sampling technique was employed to select 121 rice farming households across 5 communities. Data was collect using questionnaire and personal interview and the data was analysed using household vulnerability index (HVI), fussy set analysis, regression analysis(ordered probit and OLS) as well as descriptive statistics. HVI analysis reveals that 16.5% of the households has low vulnerability to poverty, 65.3 has moderate vulnerability to poverty while 18.2% has high vulnerability to poverty. Ordered probit regression result reveals that access to information, number of shocks (idiosyncratic and covariate) exposed to by households, and years of farming significantly affect household vulnerability to poverty in the studied area. The study therefore, concludes that majority of the households are moderately vulnerable to poverty which implies majority of the household has been affected so hard that they need rapid-response poverty alleviation strategies to be liberated from poverty. It was also shown that rice farmers in the study area rely majorly on help from friends and relatives, also borrowed food in order to cope with livelihood threats.

1. Introduction

Poverty in the face of abundance is now the world`s greatest challenge and major developmental objective. This center on the achievement of equality in the distribution of income and reduction of poverty. According to Evelyn and David (2015); world Bank (2009), about 2.8 billion persons of the world`s population live on less than $2 a day, and 1.4 billion on less than $1 a day. Poverty has been attributed to be the major limitation of economic development and the scarcity of economic opportunity is seen to increase the poverty level of an individual or household. It is important to state that there are regional variations in poverty incidence and the level of income inequalities in the globe. Sub-Saharan African countries have had the highest levels of poverty and inequality in income in the past years (World Bank, 2009). Furthermore, in Nigeria, the situation of poverty is contradictory, given the large resources (human and physical) that the country is endowed with. The country has increasing rate of poverty (both at the regions and at the national level), high unemployment rate, high income inequality, low quality human capital, high percentage of population on welfare and high out migration in the face of high economic growth measured by GDP. Information from the National Bureau of Statistics, NBS (2006; 2012) and UNDP (2009) showed that about 15% of Nigeria`s population were poor in the 1960s. Poverty rates in Nigeria increased from 27.2 percent in 1980

to 42.7 percent in 2004 and further to 65.6 percent in 2010.While the27.2 percent for 1980 equals 17.7 million persons, in 2010, 112.5million persons were found poor in absolute terms. The trend is very alarming, disturbing and a matter for concern to all.

Developing countries are becoming increasingly vulnerable to shocks that affect their livelihood security. In sub-Sahara Africa, many people living in rural areas are poor and are the most vulnerable to poverty with low resilience capacity to survive disaster risks (Birkmann, 2006). Vulnerability is most often associated with poverty, but it can also arise when people are isolated, apprehensive and helpless in the face of risk, shock or stress (Birkmann, 2006). Vulnerability is a complex an elusive concept.Its definition varies from field to field. Vulnerability is the probability of falling back to poverty with a little shock or distortion or risk. Vulnerability is also described as weakened capacity of an individual or group to anticipate, cope with, resist and recover from the impact of both natural and man-made hazards. The Department for Internal Development (DFID, 2008) defines vulnerability as the susceptibility of individual to become poor or poorer as a result of factors that affects their livelihood system. In development concept, vulnerability assessment has become an important concept used to guide the design, appraisal and targeting of programs.

Nigerian farmers produce wide range of staple food crops principal among them is rice (Orysa sativa).Rice has a become national commodity because of its relevance in the diet of Nigerian. Much of the people depend on rice for daily consumption. In places where rice is produced in large capacity, over 80% of the residents are employed because of the production activities that take place along the distribution chain from cultivation to consumption (Ogundele and Okoruwa, 2006).In spite of the efforts made by government at various level to combat and reduce the incidence of poverty in North Central Nigeria, Nasarawa State particularly is yet predisposed to high level of poverty, food insecurity, and perpetual conflict hence the need to investigate the vulnerability of rural household to poverty among rice farmers in Nasarawa rice hub. Over the years there has been less empirical evidence on the study of vulnerability to livelihood insecurity in the study area.

Several methods have been adopted to measure vulnerability at different locations of the world such as Household Economic Approach (HEA); The approach measures vulnerability in terms of livelihood-based analytical framework established by save the children. UKin the early 90ˢ designed to obtain information about people access to food,

health and cash based on multi-level analysis (Lawrence et. al., 2008). HEA is primarily used to predict the impact of National level shock and disasters across different wealth group. There are some limitations of the HEA in terms of analysis, unless disaggregated, does not reach to the individual or household level (Petty and Seaman, 2004).Vulnerability has also been studied at macro-level through different methods such as expected poverty (VEP), vulnerability as low expected utility (VEU) and vulnerability as uninsured exposure to risk (Hoddinott and Quisumbing, 2003). This study attempt to bridge the gap in knowledge by providing a multidimensional approach to understanding individual household vulnerability to poverty among rice farmers in the study area using the Household Vulnerability Index(HVI) developed by the Food, Agriculture and Natural Resources Policy Analysis Network(FANRPAN, 2007).

The overall objective of this study is to examine the determinants of vulnerability to poverty among rice farmers in Nasarawa rice hub,the specific objectives are to;

i. assess rural household vulnerability to poverty in Nassarawa State;

ii. examine the factors that affect vulnerability to poverty in the study area;

iii. identify the copping strategies to livelihood threats by rice farmers in the study area; and

iv. examine the impact of rural household vulnerability to poverty on agricultural production in the study are

2. Materials and methods
Study Area

The study was conducted in Nasarawa rice hub, Nasarawa state. Nasarawa State has a land area of approximately 27,117 square kilometers, with an estimated population of over 1.8 million. It is located on latitude 70 - 90 N and longitude 70 - 100 E. It lies within the Guinea Savannah region with a tropical climate and rainfall of 1311.75 cm annually. There are plain lands and hills measuring up to 300 metres above sea level at some points. Nasarawa State is predominantly an agrarian state .The major crops grown include, yam, cassava, sesame, rice, groundnut and cowpea. The state is situated in the Middle Belt region of Nigeria otherwise referred to as North-central Nigeria. Nasarawa State was created on October 1st, 1996. It was severed from the old Plateau State. Nasarawa State is composed of thirteen (13) Local Government Areas. Its capital is Lafia, a fast-urbanizing town along the Northern Benue valley. The state is among the North Central states of Nigeria and is highly agrarian with a large percentage

of their populace engaged in rice farming and other agricultural activities.

Rice Sector Development Hubs or 'Rice Hubs' are regions where research products and services and local innovations are integrated across the rice value chain to achieve development outcomes and impact and Nasarawa State is one of such states in Nigeria. Nasarawa State was chosen for the study because food insecurity and poverty is highly prevalent in the state, also the State predominantly consists of large numbers of rice farmers and there had been little or no empirical study conducted to assess the vulnerability to livelihood insecurity in the study area.

Method of Data collection

Both primary and secondary data were used for the study. Livelihood data of rice farmers for the study was collected with the aid of structured questionnaire and face-to-face interview.

Sampling technique and Sample Size

A two stage sampling technique was employed for this study, the first stage was a purposive selection of 5 major rice hubs in Lafia, the second stage was a random selection of 30 rice farmers` households from each of the major hubs-bukansidi, Bukanfadama, Igigbi, Bad, Lanbaga, making a total of 150 respondents used for this study.

Method of Data Analysis

Descriptive Statistics was used to investigate the socio-economic characteristics of the heads of rice farming household.   Individual household vulnerability to poverty among rice farmers in the study area was determined using the Household Vulnerability Index (HVI) developed by the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN, 2003). Ordered Probit regression analysis was used to examine factors influencing rural household vulnerability to poverty. Descriptive statistics was used to ascertain household coping strategies, and to examine the effect of rice production on household vulnerability in the study area, multiple regression analysis was used.

Model Specification

In order to ascertain the effect of certain factors on the vulnerability of households to poverty, a probit model was used. The probit model assumes that while we observe the values of 0 and 1 for the variable Y1 there is a latent, unobserved continuous variable Y* that determines the value of Y, we assume that Y* can be specified as follows:

$Y^* = Bo + B1\ Xii + B2\ X2i + … BkXki + Ui……(1)$

And that: Yi = 1 if Y* > 0

Yi = 0 otherwise

Where Yi = poverty level (poor = 1, 0 = non poor)

X1i …. Xki = Vector of Independent variables

Bo = constant

B1 = coefficient estimates

Ui = random disturbance term

$Pr\ (Yi = 1) = (Bo + B1\ X1i + B2\ X2i ….. BkXki + Ui > 0…………………. (2)$

$Pr\ (Yi=1) = Pr\ [Ui>-(Bo + B1X1i + B2\ X2i + …. Bk + Ki)]$

$= 1 – Pr\ [Ui< - (Bo + B1X1i + B2X2i + ….. Bk + Ki]……………………..(3)$

X1 = vector of independent variables

B's = estimates of coefficients which give the impact of the independent variables on the latent variable Y*.

The model is stated explicitly as:-

$Y = f (X1, X2, X3, X4, X5, X6, X7, X8) ……. (4)$

Where

Y = 1 low vulnerable

 = 2 moderately vulnerable

 = 3 high vulnerable

X1 = Age of household head (years)

X2 = Marital status of household head

X3=Educational qualification of household head

X4 = Household size

X5=Years of farming

X6 = Household size (number)

X7= Number of shocks exposed to by household(idiosyncratic shock)

X8 = Access to farming information (extension services)

To examine the effect of rice production on household vulnerability to poverty in the study area, multiple regression analysis was used;

$Y^* = Bo + B1Xii + B2\ X\ 2i + … BkXki + Ui… (1)$

Y* = output of rice in grain equivalent

X1i …. Xki = Vector of Independent variables

Bo = constant

B1 = coefficient estimates

Ui = Error term

$Y=f(X1, X2, X3, X4, X5)………(2)$

X1= Household vulnerability index (HVI)

   Which can take three values that is

   0= low vulnerability

   1= moderate vulnerability

   2= high vulnerability

   X2 =farm size

   X3 = labor input

   X4 =agrochemical & seeds used

   X5 =fertilizer used in kg

3. Results and discussion

Socioeconomic characteristics described in the study include; age of household head, gender distribution, marital status, educational level distribution of household head, and source of income.

From Table 1, it can be seen that majority (36.36%) of the household are above 50 years,

33.88% are within the age range of 40-49 years while only 20.67% are less than 40years of age. The analysis of the prominent age group involved in farming shows that both youth and old persons are involved, however, most of the farmers were adults, as only 20.67% of the respondents are less than 40 years.

Respondents of these agricultural communities were mostly male. Result reveals that majority (64.46%) of the households are headed by male. This is because of the predominant nature of farming as an activity associated with males and their predisposition to respond to interviews. Only 35.54% of households are female headed this implies that majority of the households are still agile as they are male headed.

The result of the distribution of the marital status of the household heads, reveals that 87.78% (105) of the household heads are married which shows that majority of the household are married and living with their spouse. This analysis also depicts that the respondents were adults and matured, a fact which could play an important role in their farming occupation.4.13% of the respondents are widow and also 4.13% are widower. 4.96% and 4.96% are singles. Level of education of people may influence how they reason or behave, embrace new ideas.

The analysis of the educational status of the respondents shows that those with no formal education and those who completed primary education represent 28.10% and 7.44% respectively. Majority 47.11% of the household had secondary education; similarly, 8.26% of the household head had tertiary education. Educational attainment is very crucial for knowledge-based decisions and choices in the context of agricultural technology adoption.

Furthermore, 62.81% of the household heads had above 20 years farming experience (years), 24.79% of the household heads had (11-20) years of experience. Only 12.40% had 1-10 years of farming experience. Years of farming experience is useful in assessing local knowledge and experience with serious implications for knowledge of farming.

Majority (77.69%) of the respondents had farm size between 0.1-5 hectares, 14.88% had farm size between 6-10 hectares. Only 7.43% had farm size greater than 10 hectares. Farm size is one of the major factors determining labour requirement. Past studies have shown that the larger the farm size, the more the household output (Olawuyiet al., 2013).

Types of occupation in the study area show the livelihood systems which include farming, trading, and labour hiring activities. Table 1 shows the distribution of the respondents based on their sources of income revealed that majority 102 (84.30%) had farming as their major sources of income. The analysis of the types of occupation in the study area definitely suggests that farming is the most popular.8.27% was involved in trading and 7.44% labour hiring activities. This agrees with the findings of Ifeanyi-obi et.al., (2011); Ekong (2010); Ozor, (2010); Mgbada, (2010); Akpabio, (2006) , which noted that majority of rural dwellers has farming as a major livelihood activity.

Table 2 revealed the result of the HVI score indicating that 16.5% of the household had low vulnerability level and at a coping level. This category of households is vulnerable to poverty but still have the resilience to cope without any external assistance. This category of household has lower probability of becoming poor in any event of shock.

Also 65.3% of the households fall in the moderate vulnerable category. The vulnerability level of these households is acute. These are households that have been hit so hard by disasters like flood situation, pest infestation on their farmlands or heath challenges that it need assistance, they need rapid response to be able to be liberated from a situation of poverty. They are households that have recorded high level of disasters in the past one year. With some rapid response-type of assistance the family may be liberated from poverty.18.2% of the household are highly vulnerable to poverty at emergency vulnerability level the equivalent of an intensive care situation –almost a point of no return – but could be resuscitated only with the best possible expertise and robust welfare packages both from governmental agencies and NGOs. The result shows majority of the rice farming households in Lafia, Nasarawa state which is the heart of rice production in Nasarawa state are at moderate level of vulnerability needing assistance while only few of the households in the studied area has low vulnerability to poverty. Table 3 show the result of ordered probit regression between household vulnerability index (HVI) for the households and some household socio-economic characteristics such as age of household head, marital status of household head, educational qualifications of household head, household size, number of shocks exposed to a household and access to agricultural information. Only years of farming, number of shocks exposed to by household and the access to agricultural information in the form of extension services were found to be significant at 0.05 significant levels. The ordered probit regression result indicates that having access to information services is associated with lowering household vulnerability level. The coefficient of regression shows negative coefficient value which suggests that as access to agricultural information increases the probability of becoming poor decreases there is therefore higher chance of falling to low vulnerability category.

Table 1. Social Economic Characteristics of the Respondents

Variables	Frequency	Percentage
Age (Years)		
20-29	3	2.48
30-39	25	20.67
40-49	41	33.88
50-59	44	36.36
≥60	8	6.61
Gender		
Male	78	64.46
Female	43	35.54
Marital Status		
Single	6	4.96
Married	105	86.78
Widowed	5	4.13
Widower	5	4.13
Educational Level		
No formal education	34	28.10
Primary Education	9	7.44
Junior Secondary	11	9.10
Senior Secondary Sch.	57	47.11
Tertiary Education	10	8.26
Farming Experience (Years)		
1-10	15	12.40
11-20	30	24.79
>20	76	62.81
Farm Size		
0.1-5	94	77.69
6-10	18	14.88
>10	9	7.43
Sources of Income		
Farming	102	84.30
Trading	10	8.27
Labour hiring	9	7.44
Total	121	100.0

Source: (Field Survey, 2017)

Table 2. Household Vulnerability Index Score

Vulnerability category	Vulnerability level	Criteria	Frequency	percent
Low vulnerable	Coping level	13.18	20	16.5
Moderate vulnerable	Acute level	34.84	79	65.3
High vulnerable	Emergency level	34.84	22	18.2

Source: (Field Survey, 2107)

Table 3. Ordered Probit Regression Result on the Factors Influencing Household Vulnerability To Poverty

Variables	Coefficients	t-statistics
Age of household head	0.019	0.998
Marital status	-0.014	0.557
Educational status of HHH	-0.125	0.139
Household size	-0.044	0.759
Years of farming Experience	-0.029*	1.910
No. of shocks	-0.044*	4.030
Access to information	-0.519*	3.234

Source: (Field Survey, 2107), * Significant level 0.05, prob ch^2 =0.0004, LR chi^2 =26.36, Pseudo R^2 =0.1230

This is clear; households with access to extension services are more likely to have higher yields as compared to households that do not have access to extension services. Hassan et al (2013) support this view by indicating that extension services increase productivity by providing the communities with the following: arouses farmer's awareness, increasing farmer's knowledge of farming techniques; farmer adoption of climate-smart technologies or practices hence, changes in farmers' productivity.

The regression result also show that the number of shocks exposed to by farmers have effect on household vulnerability to poverty. This suggests those households that have been exposed to more shocks in the past are likely to be less vulnerable to poverty in the future than the household who has been exposed to less shocks. This is because the household with exposure to more shocks will have developed ex ante strategies to mitigating poverty risk in future and will develop more effective coping strategies to poverty. The is a factor of the level of preparedness to mitigating future disaster which will reduces probability of falling into the high and moderately vulnerable categories. This is one of the benefits of household vulnerability index. It has the potency to predict future probability of falling to poverty.

From the regression result, years of farming is significant and with a of coefficient negative value which indicates that with rice farmers` extra 1 year of rice farming experience, the probability of falling into high vulnerable and moderately vulnerable categories will be less. The more farming experience the less probability of falling to poverty. Farmers with higher farming experience will be less vulnerability to poverty. This is against the view of Cherotichet al,(2012), who indicated that a farmer who has experienced more shocks is more susceptible to poverty than farmers who have experienced fewer shocks. He probably ignored the effect of government and NGO social intervention on shock mitigation.

From the result of the regression analysis showed on Table 4 above, farm size and quantity of fertilizer used were found to be significant. The positive coefficient of farm size indicates that as farmer increases the size of his farmland his output increases.

Also quantity of fertilizer used is also significant with a positive coefficient value which indicates that as farmer increases his level of fertilizer input his output increases.

However, Household rice production has inverse relationship with Vulnerability (HVI) to poverty though not statistically significantly. This is likely as a result of social intervention programs from African Rice Center, Benin Republic on improved rice technology which has reduced vulnerability to poverty that it has no effect on output of rice production in the studied area.

Table 4. Effect of Rural Household rice production on Vulnerability to Poverty on Rice

Variables	Coefficient	t-value
Farm size	0.365*	2.12
Labour input	-0.035	-1.04
Agrochemical used	-0.990	-0.74
Amount of fertilizer	0.166*	2.47
HVI	-0.316	1.38
Constant	5.698	4.25

Source: (Field Survey, 2107), * Significant level 0.05, No of observation =121, prob F=0.0315, R-square =0.0998
Adj R-square= 0.0607. Root MSE=1.0651,

Table 5. Household Coping Strategies to Livelihood Shocks

Coping strategies	Percentage (%)	Mean	Rank
Rely on less preferred food	54.0	1.012	4th
Borrowed food	60.0	1.734	2nd
Help from friends and relative	62.0	2.261	1st
Limit portion of food	51.0	0.783	5th
Restrict consumption by adult	55.0	1.213	3rd

Source: (Field Survey, 2107)

4. Conclusion and recommendations

Poverty incidence is very high in the study area; this is because the state has been faced with several challenges which negatively impacted on their livelihood security hence their increased vulnerability to poverty in recent years. Majority of the households are moderately poor which means these households has been hit so hard and need rapid response intervention program from external agencies to be able to be liberated from situation of poverty. They are household that have recorded high level of disasters in the past one year. With some rapid response-type of assistance the household may be liberated from poverty.

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