

# Analysis of factors influencing Vulnerability to Poverty among Farming Households in Nigeria

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**Abstract:** - This study estimates vulnerability to poverty in Nigeria, specifically it analyse poverty status, vulnerability to poverty and the determinants of vulnerability to poverty. The study utilized the post-harvest and post planting cross section data from the National living standard Survey (NLSS) wave 2. Twelve (12) States were randomly selected using a multi-Stage sampling technique, 2 each from the six geopolitical zones in the country. Three steps generalized least square (FGLS) estimation procedure was used to estimate vulnerability to poverty and to model the effect of household socio-economic status on expected future consumption and variation in future consumption, and a Logit regression model was used to examine the determinants of poverty. The result revealed that most of the respondents were active and still in their productive age, the average years of schooling of 5.06 revealed a low level of the educational status of the respondents. The mean household size was 6 and exactly half of the population were seen to be poor and lived below the poverty line. The significant determinants of vulnerability to poverty were gender, household size, and credit access, and farm distance, economic and agricultural shocks.

**Keywords:** Expected poverty, shocks, vulnerability, covariate and idiosyncratic

## I. INTRODUCTION

The concept of vulnerability relates to the occurrence of events which negatively impact on something, such as individuals, households, enterprises, communities and countries. Household vulnerability is seen as the inability of a household to secure its living standards in the face of a certain negative event (Luigi, 2004). Vulnerability generally refers to the potential to be adversely affected by an event or change (Kelly and Adger, 2000).

Household vulnerability is therefore the combination of two facts: the exposure to a negative event and the capacity of the household to cope with it (Chambers, 1989). Following this definition, an assessment of vulnerability should examine the nature of the shock, how this is transmitted to the household as well as the coping mechanisms available at the household level (Holzmann2000, Shaffer, 2001). The economics literature generally conceptualizes vulnerability as an outcome of a process of household responses to risks, given a set of underlying conditions. Vulnerable households are those that have moved or are likely to move into a state of poverty or destitution as a result of the cumulative process of risk and response. The outcome (poverty status) is an ex post state that is assumed to be the primary concern of policy makers. This conceptualization has led some economists to use measures of variability in outcomes (e.g. income variance.

especially downsideshocks) as their measure of vulnerability (Alwang et al., 2001)

In economic literature, household vulnerability is defined as an outcome of a process of household responses to risks. This risk-response-outcome framework may be examined in terms of poverty dynamics (poverty status: transition in and out of poverty), food security (probability of not meeting food needs), environment (survival loss), health (malnourishment), disaster management (welfare loss) etc. Thus, vulnerable households are those that are in, or are very close to, a state of destitution as a result of the cumulative process of a particular risk and household response.

Coudouel and Hentschel (2000) stated that vulnerability is a broad concept, encompassing not only income vulnerability but also such risks as those related to health, those resulting from violence, and those resulting from social exclusion – all of which can have dramatic effects on households.

### *Vulnerability as expected poverty*

Taking into account the dynamic dimensions of poverty, the measure of ‘Vulnerability as Expected Poverty’ (VEP), an ex-antemeasure proposed by Chaudhuri *et al.*,(2002) was adopted because of the advantage of the VEP approach especially in terms of its ability to identify households that are exposed to risks but who are not poor. In this approach vulnerability is defined as the probability of being poor in the future and basically can take on two forms. It is either the ex ante risk that a household that is currently not poor will fall below the poverty line or the risk that a household that is currently poor will remain poor. This can be formally expressed as:

$$V_t = \text{Prob} (C_{(t+1)} < Z)$$

Where the vulnerability of a household during the current period  $V_t$  is dependent on the probability that future household consumption  $C_{(t+1)}$  will be less than poverty line( $Z$ ). Empirically, building upon the works of Chaudhuri *et al.*,(2002) and Gaiha *et al.*,(2007), VEP will be obtained by the following procedure: First, the FGT measure of headcount poverty (Foster, *et al.*, 1984) will be estimated from household data. Second, household’s expected consumption and its variance of the error term will be estimated using the 3 stage Feasible Generalized Least Square (FGLS) estimation procedure. Household’s vulnerability to poverty will then be

derived as the conditional probability of the household falling into poverty in the next period or the probability that a household’s consumption will lie below the predetermined poverty line in the near future

$$V\hat{E}P_i \equiv \hat{v}_i = \hat{P}r(\ln c_i < \ln z | X_i) = \Phi\left(\frac{\ln z - X_i\hat{\beta}}{\sqrt{X_i\hat{\theta}}}\right)$$

The standard vulnerability threshold of 0.5 will be adopted following (Gahia *et al.*, 2007; Imai *et al.*, 2009; Oniand Yusuf, 2006) where households were classified into their vulnerability status. Hence, those with a 50 per cent or more chance of falling into poverty in the future will be identified as vulnerable.

## II. METHODOLOGY

The study area is the Federal Republic of Nigeria. According to the population census of 2006, the population of the country is 140,431,790, with an area of 923,769 square kilometers (made up of 909,890 square kilometers of land area and 13,879 square kilometers of water area), is situated between 3° and 14° East Longitude and 4° and 14° North Latitude. The longest distance from East to West is about 767 kilometers, and from North to South 1,605 kilometers.

The study utilized the post-harvest and post planting cross section data from the National living standard Survey (NLSS) wave 2. A multi-Stage sampling technique was used for this study. The first stage is random selection of two states from each six Geo-political zones we have in Nigeria; Plateau and Nasarawa from North central, Borno, Katsina, Adamawa, Zamfara, Imo and Anambra from South east zone, Bayelsa and Delta from South-south zone, Osun and Lagos from South west zone would be selected. The second stage involve the selection of 102 Enumeration Areas (EAs). The third stage is the random selection of ten (10) households in each Enumeration Area.

### Method of data analysis

Three steps generalized least square (FGLS) estimation procedure was used to estimate vulnerability to poverty and to model the effect of household socio-economic status on expected future consumption and variation in future consumption, and a Logit regression model was used to examine the determinants of poverty. Vulnerability as expected poverty (VEP) approach was adopted in measuring vulnerability.

### Poverty measure

The poverty measure that was used in this analysis is the class of decomposable poverty measures by Foster, Greer and Thorbecke (FGT). They are widely used because they are consistent and additively decomposable (Foster *et al.*, 1984).

The FGT index is given by :

$$P_\alpha = \frac{1}{n} \sum_{i=1}^q \left(\frac{z-y_i}{z}\right)^\alpha$$

Where; Z is the poverty line defined as 2/3 of the mean per capita household expenditure,  $y_i$  is the value of poverty indicator/welfare index per capita in this case per capita expenditure in increasing order for all households; q is the number of poor people in the population of size n, and  $\alpha$  is the poverty a version parameter that takes values of zero, one or two. By setting the value of  $\alpha$  to zero, one, two respectively, the FGT poverty measure formula delivers a set of poverty indices.

### Determinants of vulnerability to poverty

#### Logit Regression Model

The Logit regression model that was used to analyse the determinants of vulnerability to poverty in the study. The explicit form of the model can be stated as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \mu$$

Where, Y is the vulnerability to poverty status of the respondents. It takes binary value i.e non-vulnerable = 0, vulnerable = 1. And the explanatory variables that used in the regression analysis are and measured as;

$X_1$  = Age (years)

$X_2$  = Sex (1= male, 0=female)

$X_3$  = Household size (number of person per household),

$X_4$  = Years of education (years),

$X_5$  = Credit access (Yes = 1, Otherwise = 0)

$X_6$  = Farm distance (Kilometers)

$X_7$  = Farm size (hectares)

$X_8$  = Economic shocks

$X_9$  = Covariate shocks

$X_{10}$  = Health shocks

$X_{11}$  = Idiosyncratic shocks

$X_{12}$  = Agricultural shocks

$\beta$  = Regression parameters,  $\mu_i$  = Error term

## III. RESULTS AND DISCUSSION

The result presented in Table 1 shows that 36.61% of the respondents were between 41 and 50 years and 2.71% were not more than 30 years old. The mean age was 48 years this implies that most of the respondents were active and still in their productive age. Most (92.2%) of the respondents were male and female constitute only 7.8%. The table equally showed that 96.01% were married and only 0.6% has never married (single). The table further revealed 54.1% of the respondents have not more 5 households’ members; about 41.6% have between 6-10 households’ members while only 4.3% of the farmers have more than 10 households’ members. Furthermore, about 56.7% of the farmers have no formal education while 43.3% had formal education from primary to

tertiary level. The findings signified that the farmers have adequate educational background that is relevant for adoption of innovations and skills in entrepreneurship development. It is expected that the higher level of education will contribute significantly to decision making of different households.

Table 1: Socioeconomic Characteristics of the respondents

Variables	Frequency	Percentage
<b>Age</b>		
<=30	19	2.71
31-40	75	10.68
41-50	257	36.61
51-60	227	32.34
Above 60	124	17.66
Mean	= 50.67	
<b>Gender</b>		
Female	55	7.83
Male	647	92.17
<b>Marital status</b>		
Married	674	96.01
Never married	4	0.57
Separated	12	1.71
Widowed	12	1.71
<b>Household size</b>		
<=5	380	54.13
6-10	292	41.60
Above 10	30	4.27
Mean	= 5.48	
<b>Education</b>		
First degree	1071	1.25
Higher degree	30	4.27
No formal education	398	56.70
Primary school	55	7.69
Qur'anic	42	3.85
Secondary school	70	9.97
<b>Source: Authors computation, 2017</b>		

*FGT poverty estimates for the farming households*

The poverty line was computed as 2/3 of the mean per capita expenditure of the household which are ₦38907.27. However, any household expenditure below the poverty line was described as being poor while any household expenditure above or exact amount in the poverty line is described as non-poor.

The headcount ratio or poverty incidence (P<sub>0</sub>) was 0.50. This implies that 50% of the respondents in the study area were below the poverty line and were relatively poor. The poverty depth or gap (P<sub>1</sub>) was 0.22. This value indicated that 22% of the respondents were below the poverty line and

therefore required an improvement in their income to reach the poverty line. The poverty severity or intensity (P<sub>2</sub>) was 0.13. This value indicated that 13% of the respondents in the study were severely poor.

Table 2: FGT poverty index

FGT Index	Estimate
Poverty incidence (P <sub>0</sub> )	0.50
Poverty depth/gap (P <sub>1</sub> )	0.22
Poverty severity(P <sub>2</sub> )	0.13
<b>Source: Authors computation, 2017</b>	

*Vulnerability to Poverty status*

The result presented on Table 3 revealed that 53.28% of the households remain non-poor and were non-vulnerable to poverty, while 46.72% were poor and vulnerable to poverty. The result showed that large number of households in Nigeria were poor and are vulnerable to expected poverty.

Table 3: Household’s Vulnerability to Poverty

Vulnerability	Non-poor	Poor	Total
Non-vulnerable	374(53.28% )	0	374
Vulnerable	0	328(46.72%)	328
Total	374	328	702
<b>Source: Authors computation, 2017</b>			

*Logit Regression Analysis of factors driving vulnerability to poverty*

The results of the estimated regression analysis are presented in Table 4. The results of the regression model showed gender, household size, credit access, farm distance, economic and agriculture to be significant drivers of farming households’ vulnerability to poverty. It shows that being a male headed household; it reduces their vulnerability to poverty by 0.14. Meanwhile for household size, a unit increase in the size of the household (an additional non-working member to the household) increased vulnerability to poverty by 0.20. The increase in vulnerability with household size could be attributed to the fact that as household size increases with stable households’ income it in turn increases their vulnerability to poverty. Also, access to credit, farm distance and agriculture have positive coefficients and implies a unit increase in farmers access to credit, long distance to farm and agriculture would bring about 0.21, 0.002 and 0.83 vulnerability to poverty. Lastly, for economic factor, a unit increase in this factor reduces vulnerability by -0.84. This result is significant at 1%, 5% and 10% probability levels.

The predicted probability of being poor is 0.478 for the farming households at the average age of 50.67 years, with 5.08 years of education, 12.74 kilometers of farm distance, 2.92 hectares of farmland, about 6 members in the households.

Table 4: Parameter estimates of the determinants of vulnerability to poverty

Vulnerability	Coefficient	dy/dx	Std. Err.	z	P> z	x
Age	0.0073292	0.0018288	0.0024	0.76	0.446	50.6714
Gender	-0.5772033	-0.1424651	0.08099	-1.76	0.079*	0.92109
Household size	0.7836104	0.1955254	0.01696	11.53	0.000***	5.4835
Years of education	-0.0011315	-0.0002823	0.00363	-0.08	0.938	5.08178
Credit access	0.8607564	0.2067784	0.115	1.80	0.072*	0.02439
Farm distance	0.0115486	0.0028816	0.00167	1.73	0.084*	12.7418
Farmsize	-0.0051564	-0.0012866	0.00521	-0.25	0.805	2.92181
Economic	-13.98719	-0.8393049	0.02478	-33.87	0.000***	0.888092
Health	-0.9448787	-0.2211276	0.21483	-1.03	0.303	0.116212
Covariate	0.8092857	0.1973184	0.23052	0.86	0.392	0.120516
Idiosyncratic	-0.1257548	-0.0314155	0.07595	-0.41	0.679	0.876614
Agriculture	14.51883	0.8260335	0.02714	30.44	0.000***	0.886657
<b>Diagnostic</b>						
Predictive probability y = 0.47805982						
Number of obs = 696						
Wald chi2(12) = 310.83						
Prob > chi2 = 0.0000						
Log pseudo likelihood = -327.7713						
Pseudo R <sup>2</sup> = 0.3184						
<b>Source: Authors computation, 2017</b>						

The odd ratio was presented on Table 5. The result revealed that, additional age of the household head is more likely to decrease the relative probability of being poor compare to non-poor by 0.7%. Also, the relative probability of households being poor will decrease as the household size, credit access and farm distance increases.

Table 5: Odd-ratio of the determinants of vulnerability to poverty

Vulnerability	Odd-ratio	Std. Err.	z	P> z
Age	1.007339	0.0096902	0.76	0.447
Gender	0.5607365	0.1898095	-1.71	0.087
Household size	2.186309	0.146902	11.64	0.000
Schooling	0.9986341	0.0145493	-0.09	0.925
Credit access	2.369488	1.243962	1.64	0.100
Economic shock	8.42e-07	1.19e-06	-9.90	0.000
Health shock	0.3882086	0.399686	-0.92	0.358
Covariate shock	0.252432	2.26115	0.81	0.419
Idiosyncratic shock	0.8800895	0.267257	-0.42	0.674
Agricultural shocks	2016128	2836263	10.32	0.000
Farm distance	1.011674	0.0067532	1.74	0.082
Farm size	0.9946398	0.0207711	-0.26	0.797
Constant	0.0092119	0.0080093	-5.39	0.000
<b>Source: Authors computation, 2017</b>				

#### IV. CONCLUSION

This paper had set out to estimate vulnerability to poverty in Nigeria. The result revealed that most of the respondents were still active and in their productive age with less educational status. Exactly half of the populace were poverty in which most of them were vulnerable to future poverty. The major drivers of vulnerability to poverty were gender, household size, and credit access, and farm distance, economic and agricultural shocks.

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