An Empirical Analysis of Vulnerability to Poverty in Nigeria: Do Household and Regional Characteristics Matter?

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ABSTRACT

This paper investigates vulnerability to poverty in Nigeria using the revised General Household Post-harvest survey for Nigeria 2010. The results show that female-headed households, living in rural area and large household size have significant positive impact on household vulnerability. Again, compared to household heads aged between 15 and 24 years, vulnerability significantly decreases as age range increases. However, the rate of decrease is higher among the segment of the population in the active labour force. That is, those between 25 and 54 years. The rate of decrease in vulnerability is marginal in all other northern zones relative to north east but large in the southern geopolitical zones. We therefore conclude that extension of government sponsored or support programmes to female headed households may be helpful to protect them, especially for widows in reducing their vulnerability. Youth's involvement in entrepreneurship, skills acquisition and agriculture through proper funding of the sector will be helpful in reducing their vulnerability and make them self-reliance.

Keywords: Empirical, Analysis, Vulnerability, poverty
JEL Classifications: I32, D10

1. INTRODUCTION

Vulnerability to poverty appears to be the major challenges many households face in developing economies especially in the Sub-Saharan Africa. As a result, these issues have become central in the policy agenda owing to rise in food prices due largely to flood and drought in many parts of the world, many households have fallen deep into poverty while many others have become poor (Okosun et al., 2012; and Kolawole et al., 2015).

Poverty in Nigeria worsened since the 1980s and became pervasive in the 1990s. For example, the number of those in poverty increased from 27% in 1980 to 46% in 1985; it declined slightly to 42% in 1992 and increased very sharply to 67% in 1996 (Ogwumike, 2001). This has continued such that every measure of poverty ranks the country at the bottom list of nations. The core welfare indicator questionnaire survey conducted by the National Bureau of Statistics (NBS) 2006 revealed that over 67% or two-thirds of Nigerian's rural population was poor. The human development index (HDI) of 0.423 ranks the country 142 out of 169 countries

in 2010 with estimated gross national income per capita of $2156, life expectancy at birth of 48.4 years, multidimensional poverty index of 0.368 (UNDP, 2010) and more than half (54.4%) of the population below poverty line in 2004 of which 36.6% of the total population are living in extreme poverty (NBS, 2005). The HDI for 2012 ranks the country 153 of 186 countries and the NBS (2013) frightening statistics about 112 million of the 160 million Nigerians live below poverty line. By the figure it means 67% of entire population is finding it hard to eke out bare existence. The HDI value for 2014 and 2015 of 0.514 placed Nigeria in low development category positioning it at 152 out of 188 countries and territories. According to Chaudhuri (2003), poverty is an ex-post measure of a household's well-being. It reflects a current state of deprivation, of lacking the resources or capabilities to satisfy current needs. Vulnerability on the other hand, may be broadly construed as an ex- ante measure of well-being, reflecting not so much how well of a household currently is, but its future prospect are. The fact that the level of future well-being is uncertain, the uncertainty that households face about the future stems from multiple sources of risk – harvest may fail, food prices may rise, the main income earner of the household may become ill etc.

There are growing concerns that poverty is not reducing due to lack of understanding of its dynamic nature and vulnerability to poverty (Adepoju and Yusuf, 2012). This study therefore argues that the inability of previous programmes and strategies to put a commensurate dent on the incidence of poverty in Nigeria suggests that the major issue is not that households are poor but the probability that a household if currently poor, will remain in poverty or if currently non-poor will fall below the poverty line (that is, household vulnerability to poverty). Thus, vulnerability to poverty is one of the factors that explain the ever-increasing level of poverty. Against this background therefore, the objective of this paper is to investigate and analyze how household and community level characteristics impact on vulnerability to poverty in Nigeria.

2. LITERATURE REVIEW

Increasing attention is currently paid to the "concept" of vulnerability. Just as the multi-dimensional nature of poverty is a complex subject to unravel, so vulnerability is also a phenomenon which is extremely hard to capture. For instance, Webb and Harinarayam (1999) assert that "assessing vulnerability is like trying to measure something that is not there. It is an absence of security, basic needs, social protection, political power and coping options." Christiaensen and Boisvert (2000) defined vulnerability as facing uninsurable risks and contrast poverty and vulnerability in the following way. Poverty is concerned with not having enough now, whereas vulnerability is about having a high probability now of suffering a future shortfall.

The essence of vulnerability is the uncertainty of future income streams and the associated loss of welfare caused by this uncertainty. As Ligon and Schechter (2002) put it, the critical issue is that "a household with very low expected consumption expenditures but with no chance of starving may well be poor, but is still might not wish to trade places with a household having a higher expected consumption but greater consumption risk.

The starting point in disaggregating vulnerability (Philip and Rayhan, 2004) is the internal/external distinction proposed by Chambers (1989): "Vulnerability thus has two sides: An external side of risks, shocks and stress to which an individual is subject to; and an internal side which is defenseless, meaning a lack of means to cope without damaging loss. Loss can take many forms – becoming or being physically weaker, economically impoverished, socially dependent, humiliated or psychologically harmed."

Moser (1998) also utilizes a two-step model of vulnerability but incorporated the concepts of sensitivity and resilience to significantly change the focus and emphasis of Chamber's internal/external distinction. "Analyzing vulnerability involves identifying not only the threat but also the resilience or responsiveness in exploiting opportunities, and in resisting or recovering from the negative effects of a changing environment. The means of resistance are the assets and entitlements the individuals, households, or communities can mobilize and manage in the face of hardship. Vulnerability is therefore closely linked to asset ownership. The more assets people have, the less vulnerable they are, and the greater the erosion of people's assets, the greater their insecurity."

Identifying who moves in and out of poverty over time has been a growing concern in understanding the dynamics of poverty and its importance for the creation of public policies oriented to the segment of the population. This is essentially true when studying the factors determining movement between socioeconomic levels, because these are the determining factors on which we must build programmes and policies in a way to better target resources (Milad et al., 2011). Poverty dynamics reveal critical information regarding the transition paths the households experience while moving out of or slipping into poverty overtime. Whether household can grow themselves out of poverty or are constrained by their initial conditions has led to a fundamental interest in exploring poverty dynamics with different policy implication (Dillon et al., 2010).

Certain controversy in poverty issues are directly or indirectly concerned with multidimensional nature and dynamics of poverty. Before any development-oriented society can be more successful in designing and implementing poverty-alleviation strategies, within the context of growth, they need to identify and understand better the various dimensions of poverty and how the poverty interact over time and across space (Thorbecke, 2005). Some households are endowed with portfolios of attributes that keep them in poverty trap under which they remain permanently (chronically) poor, while others with somewhat different portfolios move in and out of poverty or can escape altogether falling into a state of poverty. However, as Abufhele and Puentes (2011) argues that public policies aimed at overcoming or reducing poverty should differentiate between the two types of poverty, and identify measure that is most suitable in addressing the incidence of both transitory and chronic poverty.

Poverty encompasses more than low income or consumption alone. Deprivation, often related to income poverty, is when low income prevents people from achieving sufficient nutrition or from obtaining remedies for treatable illnesses. But it is not always that poverty is closely related to income. It may also come from lack of access to public facilities and programmes (such as health or education) or from the denial of political, civil and economic liberties (Sen, 1999; Narayan et al., 2000; World Development Report, 2001). The word poverty translated into other languages carries different connotations. There are many poverties of deprivations, dimensions of the bad life including not only income-poverty and material lack but many others, some of them represented in the web of poverty's disadvantages. For example poverty of time, living and working in bad places – "the places of the poor" and bad social especially gender relations. Others were the body as the main asset of many poor people, indivisible, uninsured, and vulnerable to slipping from assets to liability; many aspect of insecurity, worry and anxiety; and pervasively powerlessness (Chambers, 2006).

The seminal review of poverty and vulnerability by Alwang et al. (2001b) shed substantial light on the vulnerability-poverty issue. By way of summary, poverty and vulnerability to poverty are two sides of a coin. The observed poverty status of a household (defined as whether or not the consumption expenditures are above or below a given poverty line) is the ex-post realization of a state; the ex-ante

probability of which can be taken to be the household's level of vulnerability (Chaudhuri et al., 2002).In this sense, according to Alwang et al. (2001b) poverty and vulnerability are closely interlinked and while poverty is usually defined as economic deprivation (lack of income) vulnerability entails "the relationship between poverty, risk and effort to manage risk. The authors further listed five principles a vulnerability concept should abide by: (1) It is forward-looking and could be defined as the probability of experiencing a future loss relative to some benchmark of welfare; (2) vulnerability is caused by uncertain events; (3) the degree of vulnerability depends on the characteristics of risks involved and household ability to respond to them; (4) vulnerability depends on the time horizon; and (5) both the poor and non-poor could be vulnerable because of their limited access to assets and abilities to respond to risks.

Gunther and Harttgen (2006; 2009) studied two issues of impact of idiosyncratic and covariate shocks on households vulnerability in Madagascar by extending the proposed method by Chaudhuri et al. (2002) and introducing multilevel analysis (Goldstein et al., 1993) which allows a differentiation between the unexplained variance of the household level and unexplained variance of the community level and also corrects for inefficient estimators, which might occur whenever variables from various levels (e.g., from the household and community level) are introduced in the regression. They used available living standard measurement surveys data and cross sectional or short panel data in another study. Both results showed that whereas covariate and idiosyncratic shocks have both a substantial impact on rural household vulnerability, urban household vulnerability is largely determined by idiosyncratic shocks. Furthermore, covariate shocks have a relatively higher impact on rural households, whereas idiosyncratic shocks have a relatively higher impact on urban household vulnerability.

The importance of analyzing vulnerability to poverty in Nigeria has continued to gain interest. For instance, Alayande and Alayande (2004) studied "a quantitative and qualitative assessment of vulnerability to poverty in Nigeria," viewing week government structure in the form of absence of law, lack of political efficiency and insecurity as major sources of vulnerability to poverty and that the macroeconomic environment especially in terms of sluggish growth, low capacity utilization in the manufacturing sector and high rates of unemployment has increased vulnerability to poverty in Nigeria in qualitative terms. In quantitative terms, the study applied the Chaudhuri (2003) methodology to assess the level of vulnerability to poverty in Nigeria. The findings showed that 87% of Nigerians were vulnerable to poverty and that 68.5% of the population was highly vulnerable, whereas only 31.5% of the population had low mean vulnerability. The study, while noting that building a strong and virile governance structure can help reduce vulnerability in Nigeria.

Oni and Yusuf (2008) examined the determinants of expected poverty (a measure of vulnerability) among rural household in Nigeria. The data for the study were obtained from the merged general household survey and the national consumer survey of 1996. They found that both idiosyncratic and covariate factors affect the expected log per capita consumption of rural Nigerians, and overall expected poverty for the country at 53.5% is 1.02 times the observed poverty in 1996 and that higher expected poverty is synonymous with north east, no formal education, farming, older head of household, large household size and male headed household.

Oyekale and Oyekale, (2008) in their part assessed income and expected poverty dynamics in Nigeria also used similar methodology as Oni and Yusuf (2008) by introducing the (3FGLS) using 2004 Nigerian living standard survey data, made similar findings but their result are somewhat different. Their result showed that agricultural input price and lack of capital to expand own businesses were experienced by the largest proportion of the households. Also, high vulnerability was displayed by rural areas, states like Jigawa, Kebbi, Zamfara, Yobe, Kogi, Taraba, Sokoto, male headed household, large family and large number of dependant were also inclusive.

Adepoju and Yusuf (2012) in their concern that poverty is not reducing, investigated poverty and vulnerability in rural south-west Nigeria using regional panel data in a two-wave (harvesting and lean periods) and employing a multi-stage sampling techniques and analyzed data using Foster, Greer and Thorbeche poverty measure. Findings showed that the standard vulnerability threshold of 0.5, 55.7% of rural households in south-west Nigeria were vulnerable to poverty. A unit increase in household size and dependency ratio aggravated vulnerability by 0.05 and 1.25 while attainment of secondary and tertiary education reduced vulnerability by 0.14 and 0.23 respectively.

From the studies reviewed above, it is clear that none has really analyzed how household and community level characteristics impact on vulnerability to poverty in Nigeria. This is the gap this current study wants to fill.

3. METHODOLOGY

The methodology developed by Chaudhuri et al. (2002), vulnerability as expected poverty (VEP) which defined vulnerability as the probability that a household will fall into poverty in the future is adopted for this study. In order to ascertain how vulnerability, poverty and household characteristics are correlated, we specify the following regression models.

3.1. Model One
This model is used to ascertain how various household characteristics determine the household's vulnerability to poverty. The model is specified as:

$$vuln = \beta_0 + \beta_1 gender\_head + \beta_2 marr + \beta_3 hhsize + \beta_4 rural + \psi age\_dummy + \varphi regional\_dummy + \mu \qquad (1)$$

3.2. Model Two
This model is used to ascertain how various kinds of household characteristics impact on the likelihood that the household will fall into poverty:

$$vuln = \beta_0 + \beta_1 marr + \beta_2 hhsize + \beta_3 rural + \varphi regional\_dummy + \mu \qquad (2)$$

Where gender_head=1 if the household head is female and 0 otherwise

Marr = marital status, this shows the effect of different kinds of marital status on household vulnerability. The coefficient ψ is a vector of parameters to be estimate minus the base dummy.

Hhsize = household size: Nigeria is characterised by large household size with average ranging between 4 and 5 especially among the poorest segment of the population. Large households also characterize polygamous marriage in most part of the Northern Nigeria. What we did in this paper is to regroup the household size to reflect characteristics of both the poor and rich.

Rural =1, if rural, 0 if urban. This is a dummy variable that captures the differential between rural and urban areas in terms of vulnerability to poverty.

age_dummy = age dummy variable used to capture whether there is age specific effect on vulnerability to poverty.

regional_dummy = regional dummy that captures the vulnerability characteristics of the six geopolitical zones of Nigeria. Even though the geopolitical zones are defined in terms of the political environmental, it is now being used to form economic demarcation as well by many researchers in Nigeria. Coefficient φ is vector of parameters minus the base dummy.

Following Chaudhuri et al. (2002) vulnerability can be calculated using the formula below:

$$V_h = \Pr(\ln Con_h < \ln z \mid X_h) = \Phi\left(\frac{\ln z - X_h \hat{\beta}}{\sqrt{X \hat{\theta}}}\right) \quad (3)$$

Where Φ is the cumulative density function of the standard normal distribution and In z is natural log of poverty line. The poverty line for this study is N54, 401.16. This follows closely with the poverty line provided by the NBS for 2010 and V_h lies between 0 and 1. Following Günther and Harttgen 2006, vulnerable households are households which have a 50% or higher probability to fall below the poverty line. That is, vulnerability (V_h) equals to or greater than 0.5. This can be summarized as follows:

1. $\hat{V}_h \geq 0.5$, implies highly vulnerable group.

2. $\hat{V}_h < 0.5$, relatively vulnerable group.

In order to ascertain how various types of risks, as well as household and community characteristics affects vulnerability to poverty, the following probit model is specified:

$$Pr_i(Y = 1 \mid X) = F(X_i^T b) \quad (4)$$

Where Pr denotes probability of the *ith* household being vulnerable to poverty, *Y* is the response variable denoting 1, if vulnerable and 0 otherwise, *X* are the vectors of the independent variables of interest explaining vulnerability, *β* are the parameters to be estimated, ϕ is the cumulative distribution function of the (CDF) of the standard normal distribution, while ε_i is the error term.

This model is used to ascertain how various kinds of exposure to risk, alongside household and community characteristics, determine household's vulnerability to poverty.

3.3. Sources of Data
The dataset is from the revised general household post-harvest survey for Nigeria conducted by the NBS in 2010.

4. RESULTS

Table 1 reports average household per capita expenditure and mean vulnerability decomposed by various household characteristics. The table shows that high vulnerability by household characteristics is higher in urban than rural areas. It shows that lower household size is associated with low vulnerability. When the household size is above 6, the household becomes highly vulnerable to poverty especially in the rural areas. Also, female-headed households are highly vulnerable while male-headed households have low vulnerability to poverty.

Table 1: Decomposition of vulnerability (Mean estimates)

Household characteristics	Urban		Rural	
	Percap	Vulnerability	Percap	Vulnerability
Household size				
1-2	258038.7	0.084	133866.2	0.281
3-5	136617.6	0.138	85325.8	0.392
6-10	91958.68	0.218	60614.43	0.507
above 10	107433.4	0.382	51816.41	0.686
Gender of head				
Male	126542.9	0.197	70442.75	0.485
Female	116347.4	0.196	68528.76	0.509
National	121194.6	0.196	69438.1	0.498
Geopolitical zone				
North central	100482.4	0.278	63884.17	0.562
North east	113034.6	0.227	53588.73	0.571
North west	110035.5	0.245	67044.27	0.511
South east	144036.6	0.149	65761.81	0.406
South south	123595.9	0.190	101163.6	0.418
South west	122213.2	0.154	78798.4	0.376
Severity of shock				
Most severe	117859	0.188	71187.1	0.494
Second most severe	122659.2	0.210	65588.33	0.506
Third most severe	152217.6	0.209	74263.1	0.490
Status of residence				
Owned	112652.1	0.219	66985.59	0.507
Employer provide	133263.6	0.216	80370.27	0.479
Free, authorized	125207.1	0.154	84069.36	0.401
Free, not author	85538.33	0.216	47830.88	0.461
Rented	137640.5	0.165	111753.2	0.444
Roofing material				
Grass	139705.4	0.237	51950.47	0.515
Mud	84580.65	0.236	61737.01	0.511
Compacted earth	108317.1	0.204	65167.84	0.457
Mud brick	100748.6	0.295	60664.64	0.528
Burnt bricks	118865.4	0.175	109134.1	0.551
Concrete	126752.4	0.184	88909.99	0.460
Wood	155077.4	0.159	95998.8	0.359
iron sheets	186611.8	0.176	109293.9	0.503
Overall	121102.3	0.196	69679.44	0.497

With respect to the national estimates, vulnerability to poverty is higher in the rural areas than in the urban areas as expected. In terms of geopolitical zones, households that are located in the northern zones are highly vulnerable to poverty while households in the southern zones face moderate to low vulnerability to poverty. This may be due to the fact that average household size tends to be higher in the northern zones because of prevalence of polygamous marriages and the fact that women in most cases are not allowed to participate openly in economic activities. This limits income earning opportunities available to such households and thus makes them highly vulnerable to poverty. This again, is more severe in rural than in urban areas. Other household characteristics indicate poverty status and all are associated with high vulnerability especially in the rural areas.

Table 2 shows the regression estimates from the probit model specified in equation 4. The result shows that having an additional member of household reduces vulnerability to poverty by 3.46%, on the average, holding all other covariates constant. This may be because an extra member of household, especially a working-class household member, could help to get extra income for the family. On the average and ceteris paribus, having a female as household head increases vulnerability to poverty by 1.62% points. This suggests that male household might be in a better position to work more and provide for the family than their female counterpart. No significant effect is observed in vulnerability to poverty between rural and urban areas. Even after controlling for other covariates, strong regional effect is still observed in vulnerability to poverty. For example, on the average, living in the South-South region of Nigeria reduces household vulnerability to poverty by 9.39% points compared to a household that lives in the North Central (the reference region). Similarly, household that resides in the South-West are 2.71% points less likely to be vulnerable to poverty when compared to their counterparts that lives in the North Central. Also, living in the South-Eastern part of Nigeria reduces vulnerability to poverty by 1.94% points on the average, when compared to the North Central. The same advantageous position is observed

for the North East and North West relative to the North Central. Among all geopolitical zones in Nigeria, South- South has the lowest level of vulnerability to poverty, while the North Central has the highest level of vulnerability.

The age groups variables reveal that household whose head falls into the working class age group are less likely to be vulnerable to poverty. This is quite understandable. The more a household head is able to work, the more such head is able to provide for the family, and reduces the chances of falling into poverty. Specifically, having a household head within the 25-34 age groups reduces vulnerability to poverty by 2.24% points on the average compared to a household head that falls into the retirement age group of 65 and above. Household heads that falls into the 35-44 age groups are 2.10% points less likely to be vulnerable to poverty in relation to household heads in the 65 and above age group. This age group advantage is 1.59 parentage points for household in the 45-54 group and 1.16% points in the 55-64 age group. This shows a consistent decrease in the age group advantage as household head approaches the retirement age (65 and above).

5. CONCLUSION AND POLICY IMPLICATIONS

The study findings underscore the significance of future poverty and confirmed the notion that poverty and vulnerability to poverty are different concepts. The main findings emerging from this study indicate that household size, marital status and rural location affects vulnerability to poverty and their welfare outcome. However, at the regional level, the study found that north-east region is most vulnerable whilst south-west region is least vulnerable to poverty which may be attributed to the issues of insurgencies such as Boko Haram (western education is sin) and herder/farmers clashes.

For further studies, the availability of data could allow the extension of the empirical investigation to include some other poverty issues such as risk of exclusion from some informal support programmes.

Based on foregoing discussion, the following policy measure should be adhered to:

Extension of government sponsored or support programmes to female headed households maybe helpful to protect them, especially for widows in reducing their vulnerability. Youth's involvement in entrepreneurship, skills acquisition and agriculture through proper funding of the sector will be helpful in reducing their vulnerability and make them self-reliance. And finally, household size can be reduced through public enlightenment programme on family planning since our finding confirmed the negative effect of increased family size on household's vulnerability.

Table 2: Effect of household characteristics on vulnerability to poverty

Variables	Marginal and Impact effect (dF/dx)
Household size	−0.0346***
Gender of household head (male)	0.0162***
Rural (urban)	−0.00388
Region (North Central)	
North-East	−0.0662***
North-West	0.0271***
South-East	−0.0194***
South-South	−0.0939***
South-West	−0.0286***
Age group (65 and above)	
25-34	−0.0224***
35-44	−0.0210***
45-54	−0.0159***
55-64	−0.0116***
Pseudo R^2	0.7646
Observation	7882

Entries shown in parentheses refer to the reference category for dummy variables.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level

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