Poverty and Vulnerability in Rural South West Nigeria.

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Abstract: The near failure of various programmes and strategies by successive governments in Nigeria has been linked to the improper diagnosis of poverty as a static concept. There are growing concerns that poverty is not reducing due to the lack of understanding of its dynamic nature and vulnerability to poverty. This study investigates poverty and vulnerability to poverty in rural South-West Nigeria (SWN). Primary data were collected from 582 rural households in a two-wave panel survey (harvesting and lean periods) employing a multi-stage sampling technique. Poverty lines of ₦3313.57 and ₦4093.21 were estimated for the two periods respectively. Based on these, the incidence of poverty was 35.0% and 43.6 % for the first and second periods. At the standard vulnerability threshold of 0.5, 55.7% of rural households in SWN were vulnerable to poverty. A unit increase in household size and dependency ratio aggravated vulnerability by 0.05 and 1.28, while attainment of secondary and tertiary education reduced vulnerability by 0.14 and 0.23 respectively (P<0.01). Vulnerability also translated into significantly (P<0.01) higher poverty by increasing the ex-post probability of becoming poor by 0.34. However, there were some factors related with vulnerability but not poverty and some related to poverty but not vulnerability. The study therefore suggests that poverty alleviation programs must focus on those factors which aggravate poverty and vulnerability and employ several specialized approaches to tackle these multifarious problems.
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1. Introduction

In Nigeria, poverty is mainly a rural phenomenon with agriculture accounting for the highest incidence over the years. The food consumed by the populace as well as raw materials for manufacturing activities are provided by the agricultural sector. The sector is also the major employer of labour especially in the rural areas. However, the neglect of the sector and the rural population has increased poverty in oil rich Nigeria. The poverty condition in the country has worsened since the late 1990s, to the extent that every measure of poverty ranks Nigeria at the bottom list of nations. The Human Development Index (HDI) of 0.423 ranks the country 142 out of 169 countries in 2010. With estimated GNI per capita of $2156, life expectancy at birth of 48.4 years, Multidimensional Poverty Index (MPI) of 0.368 (UNDP, 2010) and more than half (54.4%) of the population below poverty line in 2004 out of which 36.6 % of the total population are living in extreme poverty (NBS, 2005), the poverty situation remains an overwhelming challenge. Also, findings of a 2006 Core Welfare Indicator Questionnaire (CWIQ) survey conducted by the National Bureau of Statistics revealed that over 67 per cent or two-thirds of Nigeria's rural population were poor.

This situation poses a major threat to the nation's pursuit to be one of the 20 largest world economies by the year 2020 because the rural sector, from which about 70 percent of the populace derive their livelihoods, remains the country's treasure-house. The inability of previous programmes and strategies to put a commensurate dent on the 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). That vulnerability to poverty is one of the factors that explain the ever-increasing level of poverty. Thus, sustained economic growth and development in Nigeria cannot be achieved without the alleviation of poverty. To reduce poverty sustainably, however, reducing household vulnerability through increased ability of government to identify, assess and respond to potential crisis situations and improve households' ability to recover quickly when exposed to shocks are also necessary. This has become imperative as policy makers only weigh the current poverty status of a household, without taking into cognisance, the possibility that a household not poor now, might fall into poverty in the future. This *ex post* measure of development needs to be replaced by indicators that recognize that anti-poverty policies need to be forward-looking and incorporate the hazards affecting whether individuals or households are in poverty or are likely to fall into poverty, that is their vulnerability (UNU, 2008).

While a number of studies have analyzed the status of poverty in Nigeria (FOS, 1999; Okojie *et al.,* 2000; Aigbokhan, 2000) very few have analyzed its

dynamics (Alayande and Alayande, 2004; Oni and Yusuf, 2006; Oyekale and Oyekale, 2007). However, these studies apart from using cross sectional data which involves the exclusive reliance on the strong assumption of the ability of cross-sectional variability to capture temporal variability, did not investigate which factors were associated with vulnerability and how they compare with the static correlates of poverty. Investigating the factors associated with vulnerability to poverty has not received much attention in the poverty literature in Nigeria, largely due to the lack of nationally representative panel data that track the poverty status of households over time. The attendant cost of collecting such data at the national level and the need to demonstrate the usefulness of panel data justifies the choice of South Western Nigeria. This study will therefore be an immeasurable contribution to the literature on household's vulnerability to poverty in Nigeria which is essential not only for acquiring knowledge, but also for the design of suitable vulnerability mitigating interventions which will in turn assist policymakers in devising better risk-management policies. From the above, a detailed understanding of the characteristics and limitations of the poor and vulnerable is fundamental to devising valuable strategies for poverty alleviation and for designing effective social protection programmes.

2. Materials and Methods

South West of Nigeria falls on latitude 6^0 to the North and latitude 4° to the south. It is marked by longitude 4^0 to the West and 6^0 to the East. It is bounded in the North by Kogi and Kwara states, in the East by Edo and Delta states, in the South by Atlantic Ocean and in the West by Republic of Benin. The zone comprises of six states namely Oyo, Osun, Ondo, Ogun, Ekiti and Lagos and is characterized by a typically equatorial climate with distinct dry and wet seasons. The mean annual rainfall is 1480mm with a mean monthly temperature range of 18^0 -24^0C during the rainy season and 30^0-35^0C during the dry season. The geographical location of South West Nigeria covers about 114, 271 kilometer square that is, approximately 12 percent of Nigeria's total land mass and the vegetation is typically rainforest. The total population is 27,581,992 and predominantly agrarian. Notable food crops cultivated include cassava, maize, yam, cowpea and cash crops such as cocoa, kolanut, coffee and oil palm (NPC, 2006).

Primary data used in this study were collected from a two-wave panel survey undertaken at 5-months interval to allow measurement of seasonal variation in behaviour and outcome and to balance both the cross-sectional and time series requirements of panel data. The two periods corresponds to the lean and harvesting seasons of 2009.

The frame for the study was the demarcated Enumeration Area (EA) maps produced by National Population Commission for the 2006 Housing and Population Census. A multi-stage sampling technique was adopted for this study in selecting 600 representative households in the first period but only 582 households could be re-interviewed in the second round. Data from these 582 households' were used for analysis in this study. Further, all the sample data were weighted using the inverse of the overall selection probabilities which were called Design Weights (DW).The design weights were obtained for each of the sixty EAs canvassed for the study and applied accordingly to all the study units.

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

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

Where; Z is the poverty line defined as 2/3 of the Mean Per Capita Household Expenditure (MPCHHE) 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 α is the poverty aversion parameter that takes values of zero, one or two. By setting the value of α to zero, one, two respectively, the FGT poverty measure formula delivers a set of poverty indices.

Taking into account the dynamic dimensions of poverty, the measure of 'Vulnerability as Expected Poverty' (VEP), an *ex ante* measure 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 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:

$V_t = \text{Prob} (C_{(t+1)} < Z)$ \qquad (2)

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 was obtained by the following procedure: First, the FGT measure of headcount poverty (Foster, et al.,

1984) was estimated from household data. Second, household's expected consumption and its variance of the error term were estimated using the 3 stage Feasible Generalised Least Square (FGLS) estimation procedure. Household's vulnerability to poverty was then 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 (please see details in Chaudhuri *et al.,*2002)

$$V\hat{E}P_i \equiv \hat{v}_i = \hat{P}r\left(\ln c_i < \ln z \mid X_i\right) = \Phi\left(\frac{\ln z - X_i\hat{\beta}}{\sqrt{X_i\hat{\theta}}}\right)$$
(3)

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

A probit model was employed to estimate whether a household's per capita consumption was below the poverty line in the two periods, conditioned on a vector of determinants of per capita consumption, X*i (*Gahia *et al.*, 2007 and Imai *et al.,* 2009).

$$Pr\left(Y_i = 1\right) = \Phi\left(X_i\gamma'\right)$$
(4)

Where $Y_i = 1$ if $\ln c_{t+1} < \ln z$ and $Y_i = 0$ Otherwise.

The association between vulnerability in the first survey period and the probability of being poor in the second period was then analyzed by including VEPi in the first period as one of the explanatory variables in the second period. The independent variables which are the socio-economic variables and demographic variables that influence poverty were included in the model following Omonona (2001), Imai *et al.* (2009) and Gaiha *et al.* (2007).

A Tobit model below was used to examine the determinants of vulnerability to poverty in rural South West Nigeria using the value of VEP estimated for each household (equation 3) as the dependent variable. The dependent variable has zero values for households

below the vulnerability threshold which is indicative of censoring of an underlying variable and therefore requires Tobit estimators (Blundell and Mhegur, 2002; Wen *et al.,* 2001). The Tobit Model developed by Tobin (1958) and as adopted by Haddad and Ahmed (2003) and Omonona (2001) is expressed as:

$$Y_{ij} = \beta X_i + e_i$$
(5)

$$Y_{ij} = \overline{V}h_t = \hat{P}_r\left(\ln c_{t+1} < \ln Z / X_i\right) = \frac{\emptyset[z - xh\hat{\beta}]}{\sqrt{Xh\hat{\sigma}}} = VEP$$

Where $Y_{ij} = 0$ for $\overline{V}h_t < v$.

$Y_{ij} > 0$ for $\overline{V}h_t\ vh \geq v.$

Where:
X_i = Vector of explanatory variables
B = Vector of respective parameters
e_i = Independently distributed error term
Y_{ij} = Estimated Vulnerability as expected poverty indices
v = Vulnerability threshold
Z = Poverty line

$Xh\hat{\beta}$ = Expected log of consumption

$Xh\hat{\sigma}$ = Expected variance of log consumption

3. Results and Discussion

The poverty lines constructed for the harvesting and lean seasons were ₦3313.57 and ₦4093.21 respectively. Hence households were classified as being moderately poor if their per capita expenditure was below ₦3313.57 or ₦4093.21 for the first and second survey rounds respectively. The head count poverty indices of the respondents in the 2 periods showed that respondents were poorer off-season as the incidence of poverty was 35% in the first round indicating that 204 households were below the poverty threshold and 44 % in the on-season indicating that 254 were moderately poor (Table 1).

Table 1: Average Monthly Expenditure of Respondents on Food and some Basic Needs

Item	Average Monthly Expenditure ₦(1st round)	Share in total expenditure	Average Monthly Expenditure ₦(2nd)round	Share in total expenditure
Total(Non-food)	6928.42	37.02	7987.87	36.78
Total Expenditure(food+non-food)	18,716.50	100	21,717.98	100
Mean per Capita household Expenditure(MPCHHE)	4970.36		6140.43	
2/3 MPCHHE(Poverty line) Poverty incidence	3313.25 35.0 percent		4093.21 43.6 percent	

Field Survey, 2009

The estimates from the FGLS regression reported in table 2 were used to generate an index of household vulnerability as specified in equation 3. Adopting the standard vulnerability threshold of 0.5, the summary statistics for the vulnerability distribution of households is shown in Table 3.

Table 2: Generalized Least Squares Regression Results (stage 3)

Variable	Coefficient	Z
Sex	0.604	11.69***
Age	0.011	2.71***
Age squared	-0.00008	-1.97**
Household size	0.058	10.58***
Dependency burden	1.283	20.64***
Household type	-0.052	-1.61
Primary Education	0.017	0.59
Secondary Education	-0.142	-3.72***
Tertiary Education	-0.231	-4.01***
Primary Occupation	0.098	2.44**
Years of Experience	-0.001	-0.86
Land size	-0.052	-5.84***
Membership of Local group	-0.718	-2.55**
Access to credit	-0.087	-3.06***
Access to remittances	-0.511	-13.73***
Malaria	0.014	1.92*
Distance to public Health	0.009	1.91*
Mud	0.08	2.68***
Room ratio	-0.273	-5.86***
Access to Sanitary	-0.068	-1.96**
Access to potable water	-0.107	-2.19
Access to Electricity	-0.113	-3.55***

*** Significant at 1%, ** Significant at 5%, * Significant at 10%
Observations -582;   R. Squared- 0.8598;   Adj R. Squared-0.8542

A total of 324 (55.7%) households were vulnerable using the relative poverty line of ₦3313.57 estimated for the study. This result indicates that vulnerable households were higher than the proportion actually poor in South Western Nigeria. This finding is in line with findings from other studies (Chaudhuri *et al.,* 2002; Kasirye, 2007) in which the proportion of vulnerable was greater than the proportion of households actually poor.

Table 3: Vulnerabilty Estimates

Vulnerability Status of the Household	Frequency	Percent
Not Vulnerable	258	44.3
Vulnerable	324	55.7
Total	582	100

Source: Field Survey, 2009

The results of the Tobit model (marginal effects) in table 4 show that being a male headed household and a year increase in the age of the household head increased vulnerability to poverty by 0.60 and 0.011 respectively. The increase in vulnerability with age could be attributed to the fact that as household heads get older, they become economically inactive which in turn affects their productivity, income and subsequently increase their vulnerability. Consistent with lifecycle effects, the coefficient of age squared had a negative effect on vulnerability implying that the positive association of age with vulnerability will weaken over time. Also, a unit increase in household size, an additional non-working member to the household and an increase in the incidence of malaria in the household increased vulnerability by .059 and 1.28 and 0.014 respectively. The impact of large family size is such that it reduces the per capita expenditure of the family. Increased household size is also synonymous with more dependants who do not contribute to household income, thereby aggravating vulnerability to poverty in the household. Increased malaria incidence could result into productivity losses, directly through reduced work time because of illness or indirectly through time spent caring for the sick.

Table 4: Determinants of Vulnerability

Variable	Coefficient	Z
Sex	0.604	11.69***
Age	0.011	2.71***
Age squared	-0.00008	-1.97**
Household size	0.058	10.58***
Dependency burden	1.283	20.64***
Household type	-0.052	-1.61
Primary Education	0.017	0.59
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Land size	-0.052	-5.84***
Member. assoc	-0.718	-2.55**
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Access to Sanitary	-0.068	-1.96**
Access to potable water	-0.107	-2.19
Access to Electricity	-0.113	-3.55***

Source: Field Survey, 2009
Observations   582 *** Significant at 1%, ** at 5%, * at 10%
Pseudo R. Squared   0.9177 LR Chi^2 (22) = 861.79 Prob > Chi^2 = 0.000

On the other hand, vulnerability decreased with increase in educational attainment although the coefficient of primary education was not significant and was positively correlated with vulnerability. Specifically, secondary and tertiary education reduced vulnerability by 0.142 and 0.231. This is an indication that increased educational attainment of the household head strongly affects vulnerability by assisting household heads in getting good jobs and taking opportunities which otherwise would not have been possible. The overall effect of this is increased income which translates to increased per capita expenditure and consequently improved welfare and standard of living of household members. The negative coefficient of membership of association, access to credit and access to remittances indicates that being a member of a local group or association, having access to credit and remittances reduced vulnerability by 0.718, 0.087 and 0.511 respectively. Further, a hectare increase in land size decreased vulnerability by .0527 that is; households with smaller land sizes or the landless are more vulnerable to poverty then households with larger sized land. The other characteristics that reduced vulnerability in the study area - room ratio, access to sanitary means of excreta disposal and access to potable water give a strong indication that sanitary living conditions and access to infrastructure are good indicators of welfare measurement.

Table 5 shows the factors associated with a household's poverty status in the two periods. The statistically significant value of chi-square of 313.82 and 317.87 for the first and second periods respectively is an indication that the data set fits the model in the two periods. In the first period, sex of household head, household size, years of experience in primary occupation, malaria incidence, distance to public health facility, membership of association of the household head, dependency burden, primary occupation of household head, number of rooms per person (room ratio), access to potable water, secondary education household head, tertiary education of household head and access to credit of the household head were the major determinants of poverty. In the second period, the estimated VEP indices was included as part of the explanatory variables in the probit model to test whether vulnerability in the first period influence poverty status in the second period. The coefficient of vulnerability (VEP) was 0.342 and significant thus implying that vulnerability results considerably into higher poverty. That is, a unit increase of the *ex-ante*

probability of becoming poor will increase the *ex- post* probability of becoming poor by 0.342. This finding corroborates the findings of Gaiha *et al.,* 2007. The signs of the coefficients of the determinants of poverty and their significance are alike in both periods.

Table 5: Regression Results of the Determinants of Poverty

Variable	Poverty (1st period)			Poverty (2nd period)		
	df/dx	Std,Err.	z-value	df/dx	Std.Err.	z-value
VEP	-		-	0.342	0.121	2.85***
Sex	-0.188	0.081	-2.45**	-0.377	0.062	-4.34***
Age	0.001	0.009	0.19	-0.005	0.009	-0.61
Age squared	0.00001	0.00008	0.17	0.00003	8.81E-05	0.34
Household size	0.116	0.016	7.89***	0.085	0.02	3.99***
Dep.burd.	0.163	0.091	1.75*	0.724	0.213	3.43***
Household type	-0.051	0.058	-0.85	-0.038	0.842	-0.49
Primary Educ.	-0.08	0.056	-1.38	-0.073	0.071	-1.03
Sec. Educ.	-0.158	0.06	-2.29**	-0.153	0.087	-1.71*
Tertiary Educ.	-0.283	0.032	-3.88***	-0.402	0.11	-3.19***
POccup.	0.164	0.082	1.92*	0.209	0.096	2.13***
YexpOccup.	-0.012	0.004	-2.90***	-0.007	0.004	-1.72*
Land size	0.013	0.019	0.69	0.028	0.022	1.24
Member.Assoc.	-0.113	0.058	-1.99**	-0.071	0.058	-1.19
Access to credit	-0.135	0.047	-2.63***	-0.196	0.061	-3.08***
Access remitt.	-0.029	0.062	-0.48	-0.244	0.097	-2.52**
Malaria	0.047	0.015	3.05***	0.053	0.02	2.69***
Dist.pub.Health	0.026	0.01	2.65***	0.039	0.011	3.32***
Mud	-0.52	0.058	-0.9	0.194	0.063	2.98***
Room ratio	-0.231	0.094	-2.35**	-0.098	0.072	-1.36
Sanexcre	-0.042	0.059	-0.7	-0.128	0.069	-1.86*
Pwater.	-0.098	0.048	-1.98**	-0.011	0.054	-0.2
Electricity	0.07	0.06	1.19	-0.078	0.044	-1.71*

Observations   582   *** Significant at 1%, ** at 5%, * at 10%

Pseudo R. Squared		0.4193	0.4050
LR Chi^2 (22) =		313.82 LR Chi^2 (23)	317.87
Prob > Chi^2 =		0.0000	0.0000

In contrasting the determinants of poverty and vulnerability in the study, while household size, dependency burden, primary occupation of household head, malaria incidence, and distance to health facility aggravated both vulnerability and poverty, factors such as gender of household head, age and construction material of outside wall also had significant positive effects on vulnerability but not poverty. On the other hand, factors that mitigated both vulnerability and poverty were secondary and tertiary education, membership of association, room ratio, access to potable water and access to credit. However, there were a few factors such as; land size, age of household head, access to remittances, access to sanitary means of excreta disposal and access to electricity that reduced vulnerability but not poverty in the study area. The results obtained above confirm findings from earlier studies (Gahia *et al.,* 2007; Imai *et al.,* 2009) that while poverty is closely linked with vulnerability, they are to some extent distinct as there were some factors associated with vulnerability only and not with poverty and there were also factors related to poverty only and not vulnerability. This is an indication that examining poverty as a static situation could lead to ineffective policy prescriptions whereas examining the dynamics (vulnerability) might lead to potent policy prescriptions. Based on the following premise, poverty reduction policies should not only take into account those currently poor but should also give concern to those at risk of future poverty. This is because targeting anti-poverty interventions towards the currently poor will neglect a considerable percentage of those whose welfare decline sharply in the event of a shock especially if the characteristics of the currently poor differ from those at risk of becoming poor. Hence, in the long run, poverty alleviation may only be possible by reducing the probability of being poor.

The fact that there are more vulnerable households' is an indication that government should give priority to policy interventions that reduce consumption variability through reducing exposure to risk or improving the *ex post* coping mechanisms of the vulnerable. Therefore, all efforts at reducing poverty should take into account those factors which exacerbate the vulnerability of the poor. Although there is a close association among the factors affecting both poverty and vulnerability, the distinction between a few of the factors suggests that such factors are crucial to reducing poverty and vulnerability in the study area. The close association also suggests that the various programmes and strategies targeted at alleviating poverty must be multifaceted in nature.

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