AN ASSESSMENT OF INCOME SHOCKS AND EXPECTED POVERTY DYNAMICS IN RURAL NIGERIA

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Abstract

Assessment of income shock and households' vulnerability provides an excellent way of designing appropriate marginal reforms to tackle welfare problems among some vulnerable groups. This study used the three stage Feasible Generalized Least Square (FGLS) to analyze expected poverty in Nigeria, using the 2004 NLSS data. It was found that high agricultural input price and lack of capital to expand own business 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 households, large family and large number of dependants. It was recommended that to reduce chronic and transient poverty, appropriate marginal reforms targeted at vulnerable groups in rural areas and specific zones of the country should be designed.

Keywords: income shocks, marginal reforms, vulnerable groups, chronic and transient poverty

Introduction

Before being reemphasized as the first Millennium Development Goal (MDG), poverty reduction is a subject that has attracted serious international discussions. Development economists are now of the view that along with economic growth, the goal of poverty reduction can be achieved by appropriately targeting the vulnerable groups, because they lack the required skills and resources to deal with adverse economic conditions in the form of income risks, production uncertainties and consumption shocks (World Bank, 2001). Policy makers are now interested in examining the role of risks towards an understanding of the dynamics and causes of chronic poverty (Dercon, 2004). Emphases are therefore placed on social risk management strategies and programs that will form integral instruments for breaking the chronically poor households out of poverty trap (Holzmann and Jorgensen, 2001).

Previous approaches to analyze poverty typically focus on understanding the levels and distribution of welfare in a specific context, while providing a comprehensive socio-economic/demographic profile of the poor. Such efforts are essentially crude, and are rarely channeled towards informing policy makers about the underlying processes that contribute to poverty dynamics through poverty modeling that takes cognizance of households' exposure to income or consumption risks. Recently, a natural complement to the traditional poverty analysis is an assessment of households' exposure to risks and their associated vulnerability. This adds some values to the processes of policy dialogue by introducing a comprehensive framework to properly understand poverty dynamics or reasons behind those that are chronically poor (Hoogeveen *et al.*, no date).

In Nigeria, poverty is a growing problem which had been paradoxically described as suffering in the midst of plenty (World Bank, 1996). Precisely, 65.6 percent of the population - (about 67.5 million) - was poor in 1996. The proportion reduced to 54.4 percent in 2004 (about 72 million) (FGN, 2005). Suppose that in 2006 poverty remains at its 2004 level, more than 76.16 million people would be poor. These scenarios clearly reveal that in absolute or numerical term, the number of poor people is annually increasing. The Nigerian government has focused on the National Poverty Eradication Programme (NAPEP) that was introduced early in 2001 as one of the foremost poverty alleviation programs. Also, given the multidisciplinary approach that is required for poverty alleviation, some government parastatals have been saddled with the responsibilities of implementing some development programs that are meant for reaching the poor. Thus, achieving the MDG of halving poverty level by 2015, which is a prerequisite for achieving the other seven profoundly attractive goals, is a daunting challenge that Nigerian policy makers must tactically address in just less than a decade.

Previous poverty reduction programs in Nigeria did not fully achieve their objectives and this raises two important issues. First, it is not sure whether the country lacks sufficient capacity to mitigate the social risks faced by households and communities, and second, whether the country has not paid sufficient attention to the issue of risk and uncertainty that are important for the understanding of the dynamics that often lead households to perpetual poverty (Alayande and Alayande, 2004). Therefore, to fully address poverty, Nigerian policy makers need a more comprehensive approach that focuses on the highly vulnerable groups. This becomes important given the diversified nature of risk that households face at the different regions, states and sectors of the economy. For instance, farming households face serious risks from inadequate rains/drought, degraded land, input shortages, disease outbreak and low prices for agricultural products. Also, some rural and urban areas are known for conflict and communal clashes. Similarly, recent petroleum price deregulation by the Federal Government has subjected many households and organizations to price and economic shocks that are able to adversely affect production and consumption decisions.

Furthermore, given the importance of risk and uncertainty, policy makers are beginning to incorporate risk and vulnerability into their economic development strategies for quick reduction of poverty. Essentially, Christiansen and Subbarao (2001) submitted that the need for addressing vulnerability in any human development strategy in conjunction with poverty is two fold. First, not being vulnerable has some intrinsic value. This is because for a person to be considered non-poor, he must not only have enough to live a comfortable life today, but he must also possess some good prospect today that he will have enough to live a comfortable life tomorrow. Second, addressing vulnerability has instrumental value. Because of the many risks household face, they often experience shocks leading to a wide variability in their income. In the absence of sufficient assets or insurance to smoothing consumption, such shocks may lead to irreversible losses, such as distress sale of productive assets, reduced nutrient intake, or interruption of education that permanently reduces human capital, thereby locking their victims in perpetual poverty.

This study is justified because gaining a thorough understanding of the poor and vulnerable groups is important for the formulation of an effective strategy for reducing poverty and for designing social protection programs. Specifically, some studies have attempted to analyze poverty vulnerability in Nigeria. For instance, Alayande and Alayande (2004) assessed poverty vulnerability using the 1996 national data without proper inclusion of covariate/risk variables. Also, Oni and Yusuf (2007) analyzed poverty vulnerability in rural Nigeria by using the 1996 national data and including self imposed risk variables that were obtained from several other secondary sources. This methodology is likely to generate some specification errors because risk factors were uniformly associated to households based on their geographical location, even if they do not pose any serious income or consumption risk to them.

This study attempts to pursue four objectives. First is to describe the different forms of shocks that household experienced across their socio-economic factors. Second, generate the poverty vulnerability indices of the households using expected and variance of consumption expenditures. Third, decompose poverty across socio-economic groups using the actual and expected consumption expenditures. Fourth, analyze the factors that explain households' condition of being expected to be transiently and chronically poor. Expected results from the analyses are judged to be more relevant to poverty policy formulation in Nigeria, not only for using the most recent national survey data (2004), but a detailed and more comprehensive one that retrospectively probed into different risk and shock experiences of the households in relation to their personal assessment of their state of welfare. Also, by decomposing poverty across different socio-economic/demographic groups, using the actual and expected consumption and analysis of factors explaining probability of being vulnerable and chronically poor, our understanding of socio-economic/demographic groups to be considered as vulnerable groups will be broadened for government interventions through design and implementation of pro-poor marginal reforms. In the remaining parts of the paper, section 2 presents the concept and literature review on vulnerability, section 3 describes the adopted methodology, section 4 discusses the results while section 5 presents the recommendations.

Concepts and literature review

Exposure to risks, whether idiosyncratic or covariate, is a major reason for assessing vulnerability of households to poverty. Christiaensen and Subbarao (2004) submitted that it is conceived as the prospect that a person has now of becoming poor in the future if currently not poor, or the prospect of continuing to be poor if currently poor. It is defined independently from the person's current poverty or welfare status, although vulnerability and poverty are conceptually closely related. Poverty concerns the *ex post* realization of a stochastic focal variable (e.g. well being) with respect to a socially determined minimum threshold (poverty line), while vulnerability is the *ex ante* expectation of that focal variable relative to this threshold. In this approach, vulnerability is seen as expected poverty, akin to the safety-first risk measures developed by Fishburn (1977).

Vulnerability as an area of economic research has been widely explored by scholars using panel cross-sectional data in a way that separates the chronically and transitorily poor. However, in many developing countries, serious limitations with respect to availability of reliable panel data have compelled vulnerability analysis from single panel data in a way that utilizes the variance of consumption to estimate the expected poverty of households. Also, some studies have analyzed poverty vulnerability by looking at the poverty incidence, gap and severity among households that are considered to be vulnerable, either due to their geographical location, occupation and socio-economic/demographic characteristics (elderly, orphans, internally displaced populations, landless laborers, rural people, etc. (Hoogeveen *et al.*, no date).

The concept of vulnerable groups explains the risk of labour market marginalization and social exclusion, which is able to subject affected households to chronic poverty. These include people who are long-term unemployed, and also others who are inactive but not registered as unemployed. It includes workers who are in an employment with high risk of losing their jobs (Atkinson, 2000). Once people in vulnerable groups become unemployed, they are at higher risk of long-term unemployment (Watt, 1996). In absence of timely interventions, a vicious circle that may regressively lead to economic destitutions and social exclusion may be formed.

Literature is replete with studies dealing with some particular vulnerable groups like the orphans (Subbarao and Coury, 2003, 2004), the elderly (Case and Deaton, 1998) and HIV/AIDS (Dayton and Ainsworth, 2002). Ravallion (2001) provides an excellent starting point for considering evaluating the impact of interventions on specific vulnerable groups. Dercon and Krishnan (2000b) used retrospective approach to assess income shocks that Ethiopian rural households experienced some 20 years ago. The list of shocks was based on qualitative survey that used some open-ended questions. The questionnaire asked whether various events caused very serious hardship in the last 20 years and to nominate the years in which it occurred. The results revealed that the largest percentage of the households mentioned harvest failure, policy shock and labour shortage due to illness and death.

Christiaensen and Subbarao (2004) submitted that empirical estimation of the vulnerability measure requires the definition of the time horizon over which an assessment is to be made, choice of an indicator of well-being, definition of a threshold for well-being, determination of a probability threshold such that a person or household will be considered vulnerable if that person's probability of shortfall exceeds the cut-off point. Using panel data from rural Kenya, it was found that in 1994, rural households faced on average a 40 percent chance of becoming poor in the future. Households in arid areas that experience large rainfall volatility appear more vulnerable than those in non-arid areas, where malaria emerges as a key risk factor. Idiosyncratic shocks also cause non-negligible consumption volatility. Possession of cattle and sheep/goats appears ineffective in protecting consumption against covariant shocks, though sheep/goat help reduce the effect of idiosyncratic shocks, especially in arid zones. Of the policy instruments simulated, interventions directed at reducing the incidence of malaria, promoting adult literacy, and improving market accessibility hold the brightest promise to reduce vulnerability.

Oluwatayo (2004) analyzed the impact of income risk on the level of well-being of rural households in Ekiti state, Nigeria. Income risk was defined as the risks associated with variability in income well-being. It was found that household heads' age, years of formal education, household size, size of land cultivated and total expenditure (on food and non-food items) are major determinants of income risks among rural households, while income risk impacts negatively on the well-being of households.

Alayande and Alayande (2004) applied the Chaudhuri (2000) methodology to assess the level of vulnerability to poverty in Nigeria using national data of 1996. The findings of the study show that 87 percent of Nigerians are vulnerable to poverty. The study further shows that while 41.2 percent of the population fall into chronic poverty, only 18.1 percent of the population are vulnerable to chronic poverty. The study also shows that 68.5 percent of the population is highly vulnerable, whereas only 31.5 percent of the population has low mean vulnerability. It was recommended that to reduce vulnerability, pro-poor growth driven by macroeconomic policy environment is required.

Oni and Yusuf (2007) also analyzed the idiosyncratic and covariate factors that explain expected poverty in rural Nigeria using 1996 national data. Results show that the over-all expected poverty for the country at 0.535 is 1.02 times the observed poverty in 1996. Higher expected poverty is synonymous with north east, no formal education, farming, older head of household, large household size and male headed household.

Materials and methods

The data

This study used the data that were collected during the National Living Standard Survey (NLSS) of households that was carried out between September 2003 and August 2004. That was the latest national data collected by the Federal Republic of Nigeria on different aspects of households' activities. The sample design was two-stage stratified sampling. At the first stage, from each State and the Federal Capital Territory (FCT, Abuja), clusters of 120 housing units called Enumeration Area (EA) were randomly selected. The second stage involved random selection of 5 housing units from the selected EAs. A total of 600 households were randomly chosen in each of the States and 300 from the FCT, summing up to 21,900 households in all (FOS, 2003). However, some households did not fully complete the questionnaires. Therefore, data were available only on 19,158 households comprising of 75,187 people. Households were appropriately weighted, and this was included in the analysis in order to avoid biased estimates of the parameters (Duclos and Araar, 2006).

Data Reduction Using Principal Component Analysis

Principal Component Analysis (PCA) method was used to reduce some variables to a single one, especially those related to shocks and education. This method has the advantage of reducing multicollinearity among variables, reduce some dummy variables to single continuous and bring down the number of variables to that that can be easily handled by most of the available statistical softwares. PCA works by extracting a variable that captures all the variability in the original variables thus making it a linear combination of all the variables.

Estimation of expected consumption expenditures

In order to determine the effect of some idiosyncratic and covariate variables on households' consumption expenditures, the approach of Chaudhuri (2000) that had been widely used to generate vulnerability indices when single point consumption data are available will be used. Suppose that the stochastic process for generating per capita consumption expenditure (C_h) of *h* household is specified as:

$$\ln C_h = X_h \beta + e_h \qquad 1$$

where X_h represents a group of explanatory variables with X_1 to X_{29} being clearly presented in table 1, β is a vector of estimated parameters and e_h is the error term that captures unobserved factors (shocks) that would have affected households' consumption.

The variables that were included as covariate are to capture some level of shocks that households might have gone through. The survey instrument for data collection retrospectively probed into the primary problem that might resulted into poverty among the households. We used this as a kind of shock that households experienced with consequential loss of welfare. We first presented each of them as dummy variables before reducing them to single variable using PCA. The covariate variable are X_{30} specified as composite agricultural input shock variable reduced from households that experienced high agricultural input prices, lack of input and any other input problem, X_{31} as agricultural production shock reduced from low yield, drought, lack of adequate land (possibly due to land degradation) and disease outbreaks leading to livestock death (like bird flu), X_{32} as agricultural marketing shock derived from low agricultural price and poor agricultural marketing, X_{33} as credit shock derived from households who indicated no capital for agricultural and own business expansion and no credit for agricultural or own business expansion, X_{34} as employment shock derived from having no job and earning low salary, X_{35} as economic shock derived from high inflation leading to increase in commodity prices and experience of hard economic times, X_{36} as business shock derived from households who indicated that business not doing well, low profit and high competition, X_{37} as conflict shock derived from households that indicated loss of properties due to conflict and becoming handicapped due to conflict, and X_{38} is a dummy for experience of robbery.

Suppose we assume that variance of e_h is given by:

$$\sigma^2_{e,h} = X_h \theta \qquad 2$$

Following Amemiya (1977), the parameters of β and θ are to be estimated by using a three-stage feasible generalized least square (FGLS) procedure. In the first stage, equation 1 is to be estimated with ordinary least square (OLS) method and the square of the generated error terms are to be regressed against the explanatory variable in equation 3 below:

$$\hat{e}^2_{OLS,h} = X_h \theta + \eta_h \qquad 3$$

The predicted values of the error terms in equation 3 will be used to transform the same equation in a manner specified below:

$$\frac{\hat{e}^2_{OLS,h}}{X_h \hat{\theta}_{OLS}} = \left(\frac{X_h}{X_h \hat{\theta}_{OLS}} \right) \theta + \left(\frac{\eta_h}{X_h \hat{\theta}_{OLS}} \right) \qquad 4$$

Equation 4 will be estimated using OLS method to obtain an asymptotically efficient FGLS estimate denoted as $\hat{\theta}_{FGLS}$. In this case, $X_h \hat{\theta}_{FGLS}$ is a consistent estimate of $\sigma^2_{e,h}$, the variance of the idiosyncratic component of households' consumption expenditures. Therefore, equation 1 is to be transformed with

$$\hat{\sigma}_{e,h} = \sqrt{X_h \hat{\theta}_{FGLS}} \qquad 5$$

to obtain

$$\frac{\ln C_h}{\sqrt{X_h \hat{\theta}_{FGLS}}} = \frac{X_h \beta}{\sqrt{X_h \hat{\theta}_{FGLS}}} + \frac{e_h}{\sqrt{X_h \hat{\theta}_{FGLS}}} \qquad 6$$

Equation 6 is to be estimated using OLS method, and it yields a consistent and asymptotically efficient estimate of β. The expected log consumption can be estimated by using the estimates of $\hat{\beta}$ and $\hat{\theta}$. In this case, it can be noted that

$$\hat{E}[\ln C_h \mid \mathrm{X_h}] = X_h \hat{\beta} \qquad 7$$

and the variance of log consumption expenditure for each of the *h*th household is given as:

$$\hat{V}[\ln C_h \mid \mathrm{X_h}] = \hat{\sigma}^2_{e,h} = X_h \hat{\theta} \qquad 8$$

The vulnerability level of h household, which is the probability that household *h* with characteristics X_h will be poor in the future can be estimated by assuming that households' consumption expenditures are log normally distributed. Therefore, suppose $\Phi(.)$ denotes the cumulative density of the standard normal distribution, vulnerability probability can be computed as:

$$\hat{v}_h = \hat{\Pr}(\ln C_h < \ln \quad z \mid \mathrm{X_h}) = \Phi\left(\frac{\ln \quad z - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}}\right) \qquad 9$$

Poverty decomposition across some demographic groups

For the third objective, households' poverty level can be decomposed based on the demographic groups that the individuals belong to using the actual and expected expenditures. Duclos and Araar (2006) submitted that the Foster-Greer-Thorbecke (FGT) poverty indices can be easily decomposed without violating basic theoretical assumptions. Given that the poverty line is denoted as *z*, the normalized form of FGT, which presents headcount ratio when α is 0, poverty depth when it is 1 and severity when it is 2 can be expressed as:

$$\bar{P}(z;\alpha) = \int_0^1 \frac{g(p;z)^{\alpha}}{z} \, dp \qquad 10$$

where *p* is the proportion of income in a given percentile. Suppose the population can be divided in an ordinal manner into *s* groups based on some socio-economic/demographic factors where $\phi(s)$ is the share of population of subgroup s. FGT is can be decomposed as:

$$P(z;\alpha) = \sum_s^S \varphi(s) P(s;z;\alpha) \qquad 11$$

where $P(s;z;\alpha)$ is the FGT poverty index of sub-group *s*.

Determinants of expected transient and chronic poverty

For the fourth objective, households that move in or out of poverty will be classified as transient poor, while a chronically poor household will be defined as one that is poor now, but expected to remain poor. Two equations are to be estimated using Probit model. The general form of the model is specified as:

$$C_h = \gamma + \alpha_i \sum_{i=1}^{38} X_h + v_h \qquad 12$$

where C_h is 1 when household h is chronically poor and 0 otherwise (or 1 when household is transiently poor and 0 otherwise), γ, and α_i are the estimated parameters, v_h is the error term. X_h are the explanatory variables already described and defined in equation1.

Results and discussions

Table 1 presents some weighted descriptive statistics of some of the variables included as determinants of consumption expenditures. It shows that average consumption expenditure is ₦28,829.60,. With this mean consumption expenditure, an average Nigerian spends about $0.64 per day. This portrays a very low standard of living. Also, 44.1 percent of the households were from urban areas. This is a reflection of the fact that a larger proportion of the Nigerian population dwells in the rural areas (FGN, 2005). Also, as expected, 89.61 percent of the households were headed by males, while average family size is 6.54 persons. Average household head age is 48.98 years.

Furthermore, the proportion that is employed in the agricultural sector is 50.79 percent and this confirms the fact that the agricultural sector provides employment to majority of households in Nigeria (FGN, 2005). Formal education was attained by 62.27 percent. The largest share of the population (25.65 percent) is from the North West geopolitical zone, while South East zone records the least (12.08 percent). The average number of household members that were ill within 2 weeks before data collection is 5.27, while an average of 0.73 was injured.

On housing conditions and facilities, 75.27 percent of the households were occupying single rooms, while average number of rooms per households is 2.51. About 73.18 percent claimed to be living in their personally owned houses. Only 39.46 percent have access to safe drinking water with 37.91 of these people having the water in their houses. Only 1.63 percent use electricity for cooking, while 11.99 percent use flush toilet.

The shocks that households experienced were derived from a section of the questionnaire, where households were asked to provide reasons that could have accounted for their poverty. Reduction of these shock variables has the advantage of reducing the level of multicollinearity among the dummy variables. Precisely, the distribution of households across the different forms of shock can be described as follows: high agricultural inputs price (21.54 percent), lack of agric input (4.64 percent), agric input problem (1.10 percent), low agricultural production (5.31 percent), drought (0.26 percent), no adequate land (1.85 percent), low agricultural prices (2.32 percent), poor agricultural marketing (0.56 percent), Livestock death (0.14 percent), agricultural capital problem (5.65 percent), no credit to expand agricultural production (1.06 percent), no capital to expand own business (7.55 percent), no credit for own business expansion (4.83 percent), no job opportunities (1.50 percent), low salaries (5.14 percent), commodity prices too high (3.36 percent), hard economic times (4.12 percent), business not doing well (1.21 percent), low business profit (1.22 percent), too much competition (0.11 percent), loss due to conflict (0.14 percent), job loss from conflict (0.08 percent), loss of limbs due to conflict (0.02 percent) and no form of income shock was experienced (26.31 percent).

Table 2 shows the average values of some socio-economic variables of the households across the different forms of shocks that were experienced. In this case, the different forms of shocks experienced by the households were divided into six groups based on the proportion of the population that experienced them, while the seventh group comprises of people who did not experience any form of shock. The group of households classified as other categories of shock were those whose weighted population share is low. The means were analyzed for significant difference using the single way Analysis of Variance (ANOVA). The results show that the mean differences across each of the socio-economic groups are statistically significant ($p<0.01$), except for the average number of injuries secured by the household members. The highest and lowest values across each of the variables are also denoted by h and l respectively. The results show that groups with agricultural input and no capital shocks dominate as having either the highest or lowest mean values across the groups.

Computation of poverty vulnerability indices

In order to compute the indices of poverty vulnerability, we used the methods proposed in equations 1 to 9. The first stage involves OLS regression with log of per capita expenditure as the dependent variable and some socio-economic and composite shock variables as independent variables. The essence of the analysis, whose results are presented in Appendix 1 is to compute the values of the residuals (error terms), which will be used to generate the variance of consumption expenditures.

Appendix 2 shows the results of the regression with the square of the error terms computed in Appendix 1 as the dependent variable. The essence of this analysis is to generate the estimated values of the error squared dependent variable and the parameters of the variables that are to be used to transform the variables that were used in the analysis of the results presented as Appendix 2. The transformed data, as contained in equation 4 were analyzed with OLS to get some asymptotically efficient Feasible Generalized Least Square estimates and presented in Appendix 3. In this appendix, we have the coefficients that were used to determine the variance of log consumption expenditures, which was used to transform equation 1 in the final stage of the analysis.

Table 3 presents the determinants of log consumptions expenditures estimated using the FGLS method. These results were used to compute the expected expenditures, which was later used to assess the level of vulnerability of the households. The results show good performance of the model, with F value being statistically significant ($p < 0.01$). Also, the adjusted coefficient of determination reveals that 53.1 percent of the variations in the values of the log consumption expenditures were accounted for or explained by the included explanatory variables. Most of the included variables show statistical significance ($p < 0.01$).

Although many of composite shock variables did not have the expected negative sign, they do show statistical significance ($p < 0.01$). Urban dwellers have significantly higher consumption expenditures than those in rural areas. Similarly, households headed by educated house heads have significantly higher expenditures. Among the variables that significantly influence consumption (though negatively) are male house headship, household size, nursery/primary education composite variable, tertiary education composite variable, total dependency ratio (child and aged), retiree house headship, agriculture occupation house headship, residence in south-south, southeast, north east and north west, frequency of illness, living in single rooms, living in owned houses, and using firewood for lighting. Also, conflict, robbery, age, attainment of secondary school education, residence in the south west, number of house members that were ill, number of the household members that were injured, number of rooms occupied, safe drinking water in residence, access to safe drinking water, use of electricity for cooking and not having toilet positively influence consumption.

The expected log consumption expenditures that were generated were used to generate the probability of vulnerability of the households. The chosen poverty line, following Chaudhuri (2000) is the probability of 0.5 which is equivalent to annual consumption expenditure of ₦23,155.79. This is higher than ₦22,700.00 that was computed as the two-thirds mean per capita consumption expenditure for the original data.

Expected poverty decomposition

Table 4 shows the poverty dynamics across rural/urban, geopolitical zones and states in Nigeria. Because our data were appropriately weighted, our estimates will not be biased and they would represent that of the entire population. Our results show that in the combination of rural and urban areas (CRUA), poverty analysis with price-index deflated consumption expenditures reveals that 54.16 percent were poor in 2004 and the value is close to the 54.4 percent that FRN (2006) reported using the non-deflated expenditures. Poverty level is expected to decline to 48.48 percent. However, 29.50 percent of the population was never poor, while 22.02 percent of the initially poor household escaped poverty in the expected poverty analysis. Similarly, 16.34 percent of the non-poor households will be poor in the nearest future, while 32.14 percent was chronically poor.

Although aggregate poverty is expected to decline by 10.49 percent, at the rural-urban level of analysis, rural areas display more vulnerability because while poverty is expected to decline by 44.90 percent in the urban areas, it will increase by 7.71 percent in the rural areas. Also, more people were never poor and escaped poverty in the urban areas, while the larger portion of rural population is either chronically poor or expected to be poor.

At the geo-political zones, poverty is expected to decline in all zones except south east and south south. The south west zone records the lowest level of poverty vulnerability, contributing the highest proportion of 9.21 percent to the never poor and the lowest proportion (1.79 percent) to the always poor groups of households. The zones in the northern part of the country present the highest vulnerability, with highest proportion of the households experiencing chronic poverty.

At the state level, Ekiti, Oyo, Ogun and Osun states have the highest proportions of their populations being never poor with 60.90, 58.55, 55.73 and 54.55 percents, respectively. Also, 64.94, 62.87, 45.63, and 38.35 percents of the total population in Kwara, Lagos, Kogi and Ekiti states, respectively, are expected to escape poverty. The chronically poor households were largely concentrated in Kebbi, Yobe, Zamfara and Sokoto states with 76.72, 71.33, 69.91 and 68.27 percents, respectively, of their populations were affected. The analysis therefore reveals that the most vulnerable states, with both highest chronic poverty and lowest percentage of never expected to be poor are Jigawa, Kebbi, Zamfara, Yobe, Kogi, Taraba and Sokoto.

Table 5 shows the descriptive analysis of poverty dynamics based on the sex of the house heads, age groups, family size, and experience of some forms of income shocks. The results show that poverty level is expected to decline from 55.78 percent among male house heads to 50.13 percent, while it will decline from 4.66 percent to 3.97 percent among the females. Also, the 27.93 percent of the male house heads were never poor, as against 42.93 percent for female headed households. Similarly, 55.79 percent of the male headed households and 4.66 percent of the female headed households were expected to be chronically poor.

Actual and expected poverty are highest among house heads whose ages range between 40 and 59 years. Expected poverty movement among different age groups reveals that 50.00, 39.22 and 31.86 percents of the 15-19, 20-29 and 60 years and above age groups, respectively are expected never poor. Also, 11,75, 8.70 and 7.45 percents of the house heads in the range of ages of 40-49, 50-59 and 30-39 years, respectively, were chronically poor. Based on the household size grouping, households with members in the range of 1-3 and 4-6 records the highest percentage of their members never expected to be poor with 57.52 and 30.02 percents, respectively. However, expected chronic poverty is highest among households with 4-6 members, while it is lowest among 1-3 members. Analysis of poverty among households that experienced different forms of shock will be best perceived by identifying the groups that escaped poverty most. It should be noted that impact of shock on the households in a function of ability to mitigate it through several survival strategies. The table shows that expected poverty escape is highest among households that did not experience any form of income shock (6.47 percent) and those that experienced high agricultural input prices. Surprisingly too, these group constitute the highest with chronic poverty.

Table 6 shows the dynamics of poverty across occupational and educational groups that house heads belong. The agricultural/forestry occupational group accounts for more than 50 percent of the population and it only in this group that poverty is expected to increase from the present 65.86 percent to 69.52 percent. The professional/technical workers have the highest percentage (49.97) of their population never being poor, and this is followed by sales and related occupations (46.27 percent). Only 14.90 percent of the house heads who were into agriculture related occupations are expected never to be poor. The highest proportions of house heads that are expected to escape poverty come from the administration occupational group (48.26 percent), which does have any member being expected to be chronically poor. Agriculture related occupation also has the highest proportion of their population (50.28 percent) being expected to be chronically poor. These findings go to show that agricultural households are more vulnerable to poverty than any other groups.

The table further shows the expected dynamics of poverty across different educational groups. It shows that households whose heads were illiterate display more poverty, with 66.79 percent being poor and 72.54 percent expected to be poor. Similarly, the highest of the households that are expected never to be poor are those whose heads possessed first degree (51.88 percent) and higher degree (67.40 percent). Also, while 53.56 percent of the house heads with no education are expected to be chronically poor, only 4.62 percent of those with higher degrees will fall into chronic poverty. The analysis also shows that poverty is most concentrated among house heads with little or no education.

Determinants of expected transient and chronic poverty

Table 7 presents the results of Probit regression of the determinants of expected transient and chronic poverty. The transiently poor are those who are expected to either fall into poverty or escape poverty, while the chronically poor are expected to be perpetually poor. The results show that the models produced a good fits of the data as revealed by the statistical significance of the pseudo coefficient of determinations and Wald Chi-square parameters. The results show that households in urban areas have significantly lower probability[1] of being chronically poor. Urban variable is not statistically significant for model estimated for transient poverty and it is with positive sign. Households that were headed by males have significantly higher probability of being chronically poor. Also, as household size increases, the probability of being chronically poor significantly increases. Increasing aged/child dependency ratio will significantly increase the probability of chronic and transient poverty. However, while house head age significantly increases the probability of being transiently poor, it reduces probability of chronic poverty.

Furthermore, the house heads that were educated have significantly higher probability of being transiently poor, but significantly lower probability of being chronically poor. This is also expected since education is expected to increase capacity for escaping poverty. However, the parameter of tertiary education variable for chronic poverty model does not have the expected sign (being positively signed). The results also indicate that attainment of secondary education and tertiary education significantly reduces the probability of chronic and transient poverty, respectively.

House heads who had retired or were students have significantly lower probability of being transiently poor, but higher probability of chronic poverty. The same interpretation applies for those households whose heads were employed in agricultural enterprises. All the parameters of the geopolitical zone variables in the transient poverty model have negative sign that are statistically significant (except for south west). However, in the model for chronic poverty, residence in south south, north east and north west significantly increases the probability of chronic poverty, while it significantly reduces it in the south west and south east.

The health variables that were included in the models have opposite signs in the model. Precisely, high frequency of illness significantly reduces probability of transient poverty, while it increases probability of chronic poverty. Also, number of house members that were recently ill significantly increases the probability of being transiently poor, while it

[1] Except otherwise stated, the level of significance is $p<0.01$.

significantly reduces the probability of chronic poverty. Number of house members that were recently injured significantly reduces the probability of chronic poverty.

Residence in single room reduces the probability of transient poverty, but significantly increases the probability of chronic poverty. Residence in flat or duplex and number of rooms occupied by the households significantly reduce probability of transient poverty. These variables do not show statistical significance for the model estimated for chronic poverty. Moreover, access to safe drinking water and presence of safe water at home significantly reduces the probability of chronic poverty. Use of electricity for cooking significantly reduces the probability for being chronically ($p<0.05$) or transiently poor. Use of flush toilet also significantly reduces the probability of transient poverty.

The shock variables have different signs for the estimated models. While majority are positively signed in the transient poverty model, chronic poverty parameters have negative signs. The results show that probability of being chronically poor reduces with experience of shocks. This may be as a result of the fact that rich people mostly feel the impact of these estimated shocks. Therefore, as they affect the income and consumption of the non-poor, poverty line seems to decline thus reducing the probability of being chronically poor. However, transient poverty significantly increases with experience of production shock ($p<0.05$), market shock and robbery ($p<0.05$). These problems are able to affect the income generation ability of the households, thereby subjecting them to transient poverty.

Recommendations

This study provides and assessment of income shocks as affecting households' welfare in Nigeria. It was found that the largest share of the population experienced problems in the form of high agricultural inputs price (21.54 percent), lack of agric input (4.64 percent), low agricultural production (5.31 percent), agricultural capital problem (5.65 percent), no capital to expand own business (7.55 percent), no credit for own business expansion (4.83 percent), low salaries (5.14 percent), commodity prices too high (3.36 percent) and hard economic times (4.12 percent). No doubt, the reform programs of the previous government had brought along with it some economic hardship. It behooves the government to ensure that these problems are addressed within the framework of their economic reforms.

A clear observation in our analysis is that poverty is still concentrated in Nigeria's rural areas. Efforts to therefore design specific poverty alleviation programs judging from the form of risks that households reported will be a step in the right direction. It should be stressed that most of the top reported shocks affect rural areas. Also, rural areas display more vulnerability because while poverty is expected to decline by 44.90 percent in the urban areas, it will increase by 7.71 percent in the rural areas.

This study found that poverty is expected to increase in some some geopolitical zones (south east and south south) and states. Precisely, addressing the economic deprivation in the Niger Delta, where several forms of conflicts have been recorded will be a step in the right direction. Also, focusing some marginal reforms on some most vulnerable states like Jigawa, Kebbi, Zamfara, Yobe, Kogi, Taraba and Sokoto will reduce expected vulnerability. It is therefore recommended that just as Nigerian constitution allows ecological fund for some ecologically fragile states, a special fund should be earmarked for zones and states that display highest poverty and vulnerability in order to ensure equitable growth and development.

Households that were headed by males, have large family size and high number of dependants have significantly higher probability of being chronically poor. The need to ensure appropriate implementation of family planning and appropriate social program programs for the elderly and children cannot be over-emphasized. Also education programs should be brought to the reach of all categories of people because this holds promise for reducing chronic poverty.

Households whose heads had retired or being students have higher probability of chronic poverty. Prompt payment of retirement benefits and implementation of national bursary programs for students, especially at tertiary level will address the problem. Provision of appropriate health facilities should be the priority of government because frequency of illness significantly increases probability of chronic poverty. Also, design of low cost housing with modern sanitation and water facilities will help to reduce chronic and transient poverty.

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Table 1: Descriptive statistics of the variables included in regression analysis

Variable name	Variable estimation method	Actual variable	
		Mean	Std Dev
Per capita expenditure	₦	28829.603	42021.483
Urban residence	Yes =1, 0 otherwise	0.441	0.4965
Male house headship	Yes =1, 0 otherwise	0.8961	0.3052
Household size	Number of people	6.5398	3.3626
Age of house head	Years	48.9823	13.2776
Educated house head dummy	Number of people	0.6227	0.4847
Nursery/primary education	PCA	-1.05E-02	1.0431
Secondary education	PCA	1.15E-02	1.0512
Tertiary education	PCA	-1.84E-03	0.9937
Aged/child dependency ratio	≤14 or ≥70/active adult	0.431129	0.225841
Retired/student	Yes =1, 0 otherwise	4.64E-02	0.2103
Agriculture employment	Yes =1, 0 otherwise	0.5079	0.4999
South-south	Yes =1, 0 otherwise	0.1498	0.3569
South-east	Yes =1, 0 otherwise	0.1208	0.3259
Southwest	Yes =1, 0 otherwise	0.1955	0.3966
North-east	Yes =1, 0 otherwise	0.1336	0.3402
North-west	Yes =1, 0 otherwise	0.2565	0.4367
Frequency of illness	Frequently =1, 0 otherwise	1.7396	1.7696
Number of house member ill	Number	5.2739	3.6976
Number of house member injured	Number	0.1354	0.498
Single room	Yes =1, 0 otherwise	0.7527	0.4314
Flat/duplex	Yes =1, 0 otherwise	6.44E-02	0.2454
Number of rooms	Number	2.512	1.5576
Landlord	Yes =1, 0 otherwise	0.7318	0.443
Access to safe drinking water	Yes =1, 0 otherwise	0.3946	0.4888
Safe water in residence	Yes =1, 0 otherwise	0.3791	0.4852
Fuel wood for light	Yes =1, 0 otherwise	4.37E-02	0.2477
Electricity for cooking	Yes =1, 0 otherwise	1.63E-02	0.1267
No toilet	Yes =1, 0 otherwise	7.13E-02	0.2574
Flush toilet	Yes =1, 0 otherwise	0.1199	0.3248
Composite input shocks	PCA	1.49E-02	0.8928
Composite production shock	PCA	-2.29E-02	0.9602
Composite market shock	PCA	-8.78E-03	0.8839
Composite credit shock	PCA	2.12E-02	0.9852
Composite employment shock	PCA	-5.07E-02	1.0259

Composite economic shock	PCA	4.14E-03	1.0479
Composite business shock	PCA	1.21E-02	1.0919
Composite conflict shock	PCA	1.00E-02	1.2608
Experience of robbery	Yes =1, 0 otherwise	2.75E-02	0.1634

Source: Authors' computation.

Table 2: Mean values of some house heads socio-economic characteristics across different shocks experienced in Nigeria

Variables	No shock (26.31%)		High agric input price 21.54%)		Lack of agricultural inputs (4.64%)		No capital for business (7.55%)		Low agricultural production (5.31%)		Lack of capital for agriculture (5.65%)		Other categories of shocks (29.00%)		AVOVA F Value
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
Urban	0.3020	0.4592	0.0712	0.2572	0.0705^{l}	0.2561	0.4342^{h}	0.4958	0.1019	0.3027	0.1562	0.3631	0.4061	0.4912	423.32***
Head sex	0.8835	0.3209	0.8914	0.3112	0.9001^{h}	0.3000	0.7796^{l}	0.4147	0.8599	0.3473	0.8300	0.3758	0.8093	0.3929	42.990***
House size	5.1115	3.1054	5.1238^{h}	2.8914	5.0366	2.8375	4.2732^{l}	2.6044	4.7986	2.7998	4.6946	2.7859	4.4504	2.8447	39.760***
Age	47.5881	14.8342	46.9978	14.2192	47.5995	14.6142	46.9960^{l}	14.5731	48.4538	14.4385	48.8762^{h}	14.5296	47.1526	14.8000	4.502***
Education	0.5938	0.4912	0.3862^{l}	0.4869	0.4228	0.4942	0.6253	0.4842	0.3965	0.4894	0.5254	0.4995	0.6640^{h}	0.4724	180.209***
Dep ratio	0.3849	0.2578	0.3970	0.2440	0.3993^{h}	0.2452	0.3510^{l}	0.2760	0.3877	0.2590	0.3659	0.2629	0.3542	0.2739	16.360***
Retired	0.0792^{h}	0.2701	0.0247^{l}	0.1552	0.0178	0.1324	0.0708	0.2566	0.0239	0.1528	0.0369	0.1886	0.0722	0.2588	40.220***
Agriculture	0.5320	0.4990	0.8895	0.3135	0.9099^{h}	0.2865	0.3380^{l}	0.4732	0.8861	0.3178	0.7300	0.4441	0.3610	0.4804	953.947***
South South	0.1403	0.3473	0.0773^{l}	0.2671	0.1008	0.3012	0.1937	0.3953	0.1680	0.3740	0.1846	0.3881	0.2196	0.4140^{h}	76.613***
South East	0.1256	0.3314	0.1418	0.3489	0.1401	0.3472	0.1176^{l}	0.3222	0.1409	0.3481	0.1969^{h}	0.3978	0.1452	0.3523	8.253***
South West	0.1722	0.3776	0.0651^{l}	0.2468	0.0937	0.2915	0.2605^{h}	0.4391	0.1338	0.3405	0.1531	0.3602	0.2372	0.4254	122.471***
North East	0.1398	0.3469	0.2335	0.4231	0.2614^{h}	0.4396	0.1035^{l}	0.3048	0.2126	0.4093	0.1738	0.3791	0.1098	0.3127	72.530***
North West	0.2552	0.4360	0.2731^{h}	0.4456	0.2150	0.4110	0.1430	0.3501	0.1704	0.3761	0.1354	0.3423	0.1156^{l}	0.3198	91.483***
Number ill	4.0147	3.2804	4.0836^{h}	3.0535	4.0607	3.0077	3.4937^{l}	2.7798	3.8304	2.9979	3.9138	2.8931	3.7291	2.9089	11.699***
Number injured	0.1029	0.4438	0.1147	0.4311	0.1271^{l}	0.4238	0.0957	0.3773	0.1310	0.4659	0.1317^{h}	0.4670	0.1118	0.4187	1.772
Single room	0.7144	0.4518	0.7572	0.4288	0.7583^{h}	0.4283	0.7869	0.4096	0.7834	0.4121	0.7092^{l}	0.4543	0.7825	0.4126	14.372***
Flat/duplex	0.0704^{h}	0.2558	0.0285	0.1665	0.0152^{l}	0.1223	0.0401	0.1962	0.0334	0.1799	0.0400	0.1960	0.0521	0.2223	21.640***
Number of rooms	2.4856	1.5143	2.4172	1.4626	2.5558^{h}	1.5144	2.1643	1.3680	2.3177	1.3916	2.3638	1.4221	2.0701^{l}	1.3524	45.673***
Landlord	0.7512	0.4323	0.9169^{h}	0.2761	0.9046	0.2940	0.6086	0.4882	0.8774	0.3281	0.8215	0.3830	0.5957^{l}	0.4908	340.931***
Safe drinking water	0.3738	0.4839	0.2062	0.4046	0.1900^{l}	0.3925	0.4142^{h}	0.4927	0.2006	0.4006	0.2415	0.4282	0.3919	0.4882	127.145***
Safe water at home	0.3864^{h}	0.4870	0.2695	0.4437	0.2409^{l}	0.4278	0.3500	0.4771	0.2548	0.4359	0.2638	0.4409	0.3424	0.4746	39.934***
Fuel wood for light	0.0440	0.2557	0.0734	0.3059	0.0776^{h}	0.3080	0.0361	0.2313	0.0661	0.2927	0.0608	0.2693	0.0281^{l}	0.2065	16.201***
Electricity for cooking	0.0209^{h}	0.1432	0.0079	0.0885	0.0018^{l}	0.0422	0.0107	0.1029	0.0056	0.0745	0.0054	0.0732	0.0095	0.0971	10.177***
No toilet	0.0713^{l}	0.2574	0.1303	0.3367	0.1463^{h}	0.3536	0.0875	0.2827	0.1314	0.3379	0.0923	0.2896	0.0817	0.2739	25.261***
Flush toilet	0.1182	0.3229	0.0095	0.0971	0.0080^{l}	0.0893	0.0822	0.2747	0.0111	0.1050	0.0254	0.1574	0.1206^{h}	0.3256	141.367***

Note: *** = statistical significance at 1% level, ^{h} = highest value, ^{l} = lowest value.

Table 3: FGLS regression of transformed log consumption expenditure against the transformed socio-economic and shock variables

Variables	Coefficient	Standard error	T values	Significance level	Tolerance level	Variance inflating factor
(Constant)	10.0430	0.0320	312.4820	0.0000		
urban	0.2760	0.0150	18.2110	0.0000	0.5540	1.8050
Composite input shocks	0.0323	0.0050	6.3640	0.0000	0.9910	1.0090
Composite production shock	0.0583	0.0050	11.7640	0.0000	0.9940	1.0060
Composite market shock	0.0527	0.0050	10.2960	0.0000	0.9870	1.0130
Composite credit shock	0.0294	0.0050	5.9470	0.0000	0.9960	1.0040
Composite employment shock	0.0170	0.0050	3.3630	0.0010	0.9630	1.0380
Composite economic shock	0.0208	0.0050	4.2000	0.0000	0.9930	1.0070
Composite business shock	-0.0004	0.0050	-0.0790	0.9370	0.9960	1.0040
Composite conflict shock	0.0098	0.0050	2.0660	0.0390	0.9970	1.0030
Experience of robbery	0.8880	0.0310	28.5920	0.0000	0.9710	1.0300
Male house headship	-0.0788	0.0160	-5.0220	0.0000	0.8030	1.2460
Household size	-0.2520	0.0030	-76.3770	0.0000	0.2590	3.8590
Age of house head	0.0090	0.0000	23.2550	0.0000	0.7250	1.3790
Educated house head dummy	0.4090	0.0120	34.1070	0.0000	0.6860	1.4580
Nursery/primary education	-0.0183	0.0050	-3.6400	0.0000	0.9980	1.0020
Secondary education	0.0355	0.0050	6.8420	0.0000	0.9110	1.0970
Tertiary education	-0.0692	0.0050	-13.6270	0.0000	0.9960	1.0040
Aged/child dependency ratio	-0.7520	0.0220	-34.9060	0.0000	0.8040	1.2440
Retired/student	-0.1810	0.0240	-7.3890	0.0000	0.8420	1.1870
Agriculture employment	-0.1130	0.0140	-7.9860	0.0000	0.5440	1.8400
South-south	-0.2330	0.0190	-12.2040	0.0000	0.5600	1.7840
South-east	-0.1060	0.0200	-5.3100	0.0000	0.5490	1.8200
Southwest	0.5690	0.0180	31.3760	0.0000	0.5230	1.9100
North-east	-0.0366	0.0180	-2.0410	0.0410	0.5710	1.7530
North-west	-0.1420	0.0180	-8.0950	0.0000	0.5170	1.9360
Frequency of illness	-0.0596	0.0040	-14.2990	0.0000	0.6770	1.4770
Number of house member ill	0.2460	0.0030	78.7990	0.0000	0.2470	4.0410
Number of house member injured	0.1020	0.0120	8.8480	0.0000	0.9460	1.0570
Single room	-0.1360	0.0130	-10.1210	0.0000	0.7400	1.3520
Flat/duplex	0.0052	0.0270	0.1920	0.8470	0.7740	1.2910
Number of rooms	0.0117	0.0040	3.0850	0.0020	0.8260	1.2100
Landlord	-0.0851	0.0150	-5.8370	0.0000	0.6590	1.5160
Access to safe drinking water	0.1530	0.0120	13.0660	0.0000	0.8260	1.2110
Safe water in residence	0.2450	0.0110	21.8340	0.0000	0.8900	1.1240
Fuel wood for light	-0.0496	0.0190	-2.5830	0.0100	0.9880	1.0130
Electricity for cooking	0.4810	0.0480	10.0850	0.0000	0.9600	1.0410
No toilet	0.0896	0.0170	5.2060	0.0000	0.9270	1.0790
Flush toilet	0.0060	0.0220	0.2750	0.7830	0.7780	1.2850
Adj R2	0.531					
F Value	571.473***					

*** = Statistical significance at 1 percent level

Table 4: Poverty dynamics across sectors, states and geopolitical zones in Nigeria

Socio-economic group	Weighted proportion	Never poor	Escaped poverty	Entered poverty	Always poor	Actual Poverty	Expected poverty	% Change
All	100	29.50	22.02	16.34	32.14	54.16	48.48	-10.49
Urban	44.10	46.46	30.16	11.07	12.34	42.47	23.40	-44.90
Rural	55.90	16.12	15.62	20.50	47.76	63.38	68.26	7.71
South south	14.98	28.37	20.16	21.96	29.57	49.73	51.54	3.62
Southeast	12.08	44.95	17.80	21.27	15.98	33.77	37.33	10.54
Southwest	19.55	47.11	33.40	10.33	9.16	42.56	19.54	-54.09
North central	14.37	18.51	24.43	19.90	37.23	61.66	57.06	-7.45
Northeast	13.35	17.30	19.25	14.76	48.69	67.94	63.45	-6.62
North west	25.65	21.99	16.57	14.15	47.29	63.86	61.44	-3.79
Abia	2.62	18.32	20.23	12.98	10.31	30.53	56.49	85.00
Adamawa	2.36	18.22	26.69	11.02	44.07	70.34	55.08	-21.69
Akwa Ibom	2.70	27.78	22.22	23.70	26.30	48.89	50.00	2.27
Anambra	3.14	43.63	17.83	24.20	14.33	32.17	38.54	19.80
Bayelsa	3.21	10.59	26.48	9.97	52.96	79.44	62.93	-20.78
Bauchi	1.08	35.19	10.19	36.11	18.52	29.63	54.63	84.38
Benue	3.09	33.66	22.33	18.12	25.89	48.22	43.69	-9.40
Borno	2.86	33.92	15.38	15.03	35.31	50.70	50.70	0.00
Cross river	2.14	28.04	14.95	17.76	39.25	54.21	57.01	5.17
Delta	2.91	25.09	35.40	10.31	29.21	64.60	39.52	-38.83
Ebonyi	1.25	23.20	16.00	27.20	33.60	49.60	60.80	22.58
Edo	2.44	45.08	25.41	8.20	21.31	46.72	29.51	-36.84
Ekiti	1.33	60.90	38.35	0.00	0.75	39.10	0.75	-98.08
Enugu	2.29	41.48	15.72	21.40	21.40	37.12	42.79	15.29
Gombe	1.67	19.16	25.75	10.18	45.51	70.66	55.69	-21.19
Imo	2.79	48.39	17.56	22.94	10.75	28.67	33.69	17.50
Jigawa	3.22	4.04	22.98	5.28	67.70	90.68	73.29	-19.18
Kaduna	4.41	42.18	22.68	16.10	19.27	41.95	35.37	-15.68
Kano	6.52	36.20	21.78	15.18	26.84	48.47	42.02	-13.29
Katsina	4.21	17.10	13.06	18.76	51.07	64.13	69.83	8.89
Kebbi	2.32	6.03	12.50	4.74	76.72	89.22	81.47	-8.70
Kogi	2.41	7.88	45.64	4.15	42.32	87.97	46.89	-46.70
Kwara	1.74	18.97	64.94	1.15	14.37	79.31	15.52	-80.43
Lagos	6.41	34.48	62.87	0.00	2.50	65.52	2.50	-96.19
Nasarawa	1.44	22.22	18.75	25.69	34.03	52.78	59.03	11.84
Niger	2.72	11.76	4.41	29.78	54.41	58.46	83.82	43.40
Ogun	2.62	55.73	18.70	11.83	13.74	32.44	25.19	-22.35
Ondo	2.92	39.38	25.34	15.07	20.21	45.55	35.27	-22.56
Osun	2.42	54.55	13.22	19.42	12.81	26.03	31.82	22.22
Oyo	3.86	58.55	10.88	21.24	9.59	20.47	30.57	49.37
Plateau	2.27	13.66	4.41	35.24	46.70	51.10	81.94	60.34
Rivers	3.71	18.87	8.89	37.20	35.31	44.20	72.51	64.02
Sokoto	2.71	10.33	4.43	16.97	68.27	72.69	85.24	17.26
Taraba	1.69	8.88	7.10	33.14	51.48	58.58	84.62	44.44
Yobe	1.57	7.01	7.01	14.65	71.34	78.98	85.99	8.87
Zamfara	2.26	6.64	5.75	17.70	69.91	75.66	87.17	15.20
FCT	0.71	21.13	14.08	29.58	35.21	49.30	63.38	28.57

Table 5: Poverty dynamics across age groups, household size and income shocks in Nigeria

Socio-economic group	Weighted proportion	Never poor	Escaped poverty	Entered poverty	Always poor	Actual Poverty	Expected poverty	% Change
Male	89.61	27.93	21.93	16.27	33.85	55.79	50.13	-10.14
Female	10.39	42.93	22.81	16.94	17.42	40.23	34.26	-14.83
15-19 years	0.06	50.00	0.00	16.67	33.33	33.33	33.33	0.00
20-29 years	4.36	39.22	16.06	20.41	24.31	40.37	44.72	10.80
30-39 years	18.74	27.59	16.76	20.06	35.65	52.35	55.71	6.42
40-49 years	30.62	27.56	20.74	17.31	34.39	55.13	51.70	-6.22
50-59 years	23.26	29.32	23.82	13.33	33.53	57.35	46.86	-18.29
60 years and above	22.97	31.87	27.38	14.32	26.38	53.77	40.71	-24.29
1-3 members	15.37	57.51	15.88	15.48	11.13	27.00	26.61	-1.45
4-6 members	42.37	30.02	23.20	17.06	29.71	52.91	46.78	-11.60
7-9 members	25.96	22.07	22.15	16.37	39.41	61.56	55.82	-9.32
10-12 members	9.67	14.27	23.89	16.65	45.19	69.08	61.84	-10.48
13 members and above	6.63	12.67	25.49	13.12	48.87	74.36	61.99	-16.63
High agric. inputs price	21.54	13.87	13.66	20.53	51.93	65.59	72.46	10.47
Lack of agric input	4.64	18.24	21.30	16.71	43.75	65.05	60.46	-7.06
Agric input problem	1.10	16.30	13.06	18.90	51.73	64.80	70.63	9.01
Low agric. production	5.31	18.95	19.80	18.47	42.77	62.57	61.25	-2.12
Drought	0.26	34.82	49.36	5.85	9.98	59.34	15.82	-73.34
No adequate land	1.85	18.47	15.87	24.07	41.59	57.46	65.66	14.27
Low agric. prices	2.32	24.48	31.68	14.70	29.14	60.82	43.84	-27.92
Poor agric. marketing	0.56	10.71	1.51	25.56	62.22	63.73	87.78	37.74
Livestock death	0.14	26.84	61.33	0.00	11.83	73.16	11.83	-83.83
Agric capital problem	5.65	25.12	18.65	18.97	37.26	55.91	56.23	0.57
No credit to expand agric.	1.06	27.83	39.18	7.60	25.38	64.57	32.99	-48.91
No capital to expand own business	7.55	41.36	30.21	14.01	14.42	44.63	28.42	-36.31
No credit for own business expansion	4.83	44.20	31.06	11.16	13.59	44.64	24.74	-44.58
No jobs	1.50	52.07	18.53	13.53	15.88	34.41	29.41	-14.53
Low salaries	5.14	47.79	26.21	12.86	13.14	39.35	26.00	-33.92
Commodity prices high	3.36	49.25	31.32	9.92	9.51	40.83	19.43	-52.41
Hard economic times	4.12	35.84	26.55	13.46	24.14	50.69	37.61	-25.82
Business not doing well	1.21	45.85	26.27	11.22	16.66	42.93	27.87	-35.08
Low business profit	1.22	41.20	27.19	8.92	22.69	49.88	31.61	-36.63
Too much competition	0.11	42.82	46.37	2.80	8.01	54.38	10.80	-80.13
Loss due to conflict	0.14	9.21	48.06	30.11	12.61	60.67	42.73	-29.58
Job loss from conflict	0.08	39.34	60.66	0.00	0.00	60.66	0.00	-100.00
Loss of limbs due to conflict	0.02	13.13	29.65	12.84	44.37	74.02	57.21	-22.71
None	26.31	33.79	22.05	16.03	28.13	50.18	44.16	-12.00

Table 6: Poverty dynamics across occupational and educational groups in Nigeria

Socio-economic group	Weighted proportion	Never poor	Escaped poverty	Entered poverty	Alway s poor	Actual Poverty	Expected poverty	% change
Student, retired, unemployed or inactive	4.64	43.75	25.41	11.79	19.05	44.46	30.84	-30.63
Professional or technical	8.57	49.97	23.83	14.51	11.70	35.52	26.21	-26.22
Administration	0.44	37.44	48.26	14.31	0.00	48.26	14.31	-70.35
Clerical	7.11	43.61	28.10	15.52	12.77	40.87	28.29	-30.77
Sales and related	13.58	46.27	28.52	10.71	14.50	43.02	25.20	-41.42
Services and related	4.83	39.59	31.66	14.97	13.78	45.45	28.75	-36.74
Agricultural and forestry	50.08	14.90	15.58	19.24	50.28	65.86	69.52	5.55
Production and transport	3.20	44.24	28.72	13.12	13.91	42.64	27.04	-36.59
Manufacturing and processing	2.42	36.97	31.21	20.06	11.76	42.97	31.82	-25.95
Others	5.12	38.04	33.31	12.94	15.71	49.02	28.66	-41.54
None	37.73	14.26	13.23	18.95	53.56	66.79	72.54	8.61
Nursery 1	0.8	21.25	36.25	15.00	27.50	63.75	43.75	-31.37
Nursery 2	0.23	26.09	56.52	0.00	17.39	73.91	17.39	-76.47
Primary 1	0.13	15.38	30.77	0.00	46.15	76.92	46.15	-40.00
Primary2	0.32	37.50	37.50	6.25	18.75	56.25	25.00	-55.56
Primary3	0.54	27.78	27.78	22.22	22.22	50.00	42.59	-14.81
Primary4	1.11	32.43	28.83	17.12	21.62	50.45	38.74	-23.21
Primary5	1.2	36.67	27.50	16.67	19.17	46.67	35.83	-23.21
Primary6	0.85	31.76	18.82	21.18	29.41	47.06	50.59	7.50
Junior 1	20.05	34.76	29.23	15.41	20.60	49.83	36.01	-27.73
Junior	0.22	36.36	9.09	31.82	22.73	31.82	54.55	71.43
Junior 3	0.61	36.07	39.34	13.11	11.48	50.82	24.59	-51.61
Senior1	1.9	38.42	26.32	14.74	20.53	46.84	35.26	-24.72
Senior2	0.46	34.78	30.43	17.39	17.39	47.83	32.61	-31.82
Senior3	0.47	48.94	23.40	8.51	19.15	42.55	27.66	-35.00
Lower Six	12.78	44.44	27.62	12.99	14.95	42.49	27.93	-34.25
Upper Six	0.52	46.15	26.92	3.85	23.08	50.00	26.92	-46.15
Teacher Training	0.47	44.68	21.28	27.66	6.38	27.66	36.17	30.77
Vocational	2.08	37.98	26.44	18.75	17.31	43.75	35.58	-18.68
Koranic	0.35	48.57	34.29	8.57	8.57	42.86	14.29	-66.67
Technical	7.63	21.10	29.88	12.84	36.04	66.06	49.02	-25.79
Modern School	0.72	41.67	36.11	6.94	15.28	51.39	22.22	-56.76
Poly/Profess.	0.48	37.50	39.58	12.50	10.42	50.00	22.92	-54.17
First Degree	4.26	51.88	21.83	18.54	7.98	29.58	26.53	-10.32
Higher Degree	4.11	67.40	12.90	14.84	4.62	17.76	19.71	10.96

Table 7: Probit regression results of the determinants of transient and chronic poverty

Variables	Transient poor		Chronic poor	
	Coefficient	T-statistics	Coefficient	T-statistics
Constant	-0.4478***	-6.617	-1.2191***	-13.146
urban	0.0481*	1.828	-0.7183***	-21.150
Composite input shocks	0.0162	1.539	-0.0614***	-5.062
Composite production shock	0.0224***	2.329	-0.1075***	-8.320
Composite market shock	0.0341***	3.137	-0.0960***	-7.552
Composite credit shock	0.0161*	1.716	-0.0503***	-4.110
Composite employment shock	-0.0748	-0.817	-0.0204	-1.452
Composite economic shock	0.0033	0.375	-0.0887***	-6.549
Composite business shock	-0.0079	-0.926	0.0205	1.639
Composite conflict shock	-0.0051**	-0.727	-0.0009	-0.074
Experience of robbery	0.1240**	2.183	-1.3335***	-14.164
Male house headship	-0.0136	-0.423	0.2776***	6.073
Household size	0.0019	0.445	0.2124***	37.554
Age of house head	0.0045***	5.584	-0.0152***	-14.624
Educated house head dummy	0.2495***	10.759	-0.9019***	-31.859
Nursery/primary education	0.0015	0.170	0.0284**	2.326
Secondary education	0.0111	1.190	-0.0690***	-5.315
Tertiary education	-0.0276***	-2.942	0.0829***	6.454
Aged/child dependency ratio	0.1426***	3.240	1.8291***	28.543
Retired/student	-0.1571***	-3.310	0.4259***	6.142
Agriculture employment	-0.0966***	-3.718	0.4688***	14.184
South-south	-0.1237***	-3.473	0.2517***	5.650
South-east	-0.1925***	-4.999	-0.3600***	-7.064
Southwest	-0.0473	-1.356	-0.4377***	-8.571
North-east	-0.3052***	-8.252	0.1719***	3.889
North-west	-0.4301***	-13.039	0.3309***	8.272
Frequency of illness	-0.0544***	-8.693	0.0931***	11.973
Number of house member ill	0.0345***	8.816	-0.1703***	-34.272
Number of house member injured	0.0185	0.975	-0.2383***	-8.515
Single room	-0.1375***	-5.442	.3259***	9.991
Flat/duplex	-0.3136***	-6.846	-0.0150	-0.204
Number of rooms	-0.0215***	-3.288	-0.0088	-1.072
Landlord	0.0352	1.336	0.2255***	5.862
Access to safe drinking water	0.0137	0.648	-0.2457***	-8.642
Safe water in residence	0.0600***	2.938	-0.4709***	-17.123
Fuel wood for light	0.0340	0.896	0.0195	0.438
Electricity for cooking	-0.3915***	-4.874	-0.2996**	-1.964
No toilet	0.0196	0.523	-0.2058***	-4.529
Flush toilet	-0.2348***	-7.027	0.0765	1.272
Wald Chi-square	451***		2720***	
Pseudo R^2	0.034***		0.4168***	

Note *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent

Appendix 1: OLS Regression of expenditures versus socio-economic and shock variables

Variables	Coefficient	Standard error	T values	Significance level	Tolerance level	Variance inflating factor
(Constant)	10.242	0.03	338.022	0.0000	-	-
urban	0.168	0.014	11.659	0.0000	0.57	1.756
Composite input shocks	9.49E-03	0.005	2.024	0.0430	0.991	1.009
Composite production shock	6.08E-03	0.005	1.299	0.1940	0.995	1.005
Composite market shock	8.91E-03	0.005	1.899	0.0580	0.99	1.01
Composite credit shock	2.19E-03	0.005	0.468	0.6400	0.996	1.004
Composite employment shock	1.07E-02	0.005	2.25	0.0240	0.963	1.038
Composite economic shock	2.88E-03	0.005	0.616	0.5380	0.993	1.007
Composite business shock	-5.40E-03	0.005	-1.156	0.2480	0.996	1.004
Composite conflict shock	-5.81E-03	0.005	-1.243	0.2140	0.998	1.002
Experience of robbery	0.229	0.03	7.534	0.0000	0.978	1.023
Male house headship	-2.64E-03	0.015	-0.181	0.8560	0.823	1.215
Household size	-8.40E-02	0.003	-29.997	0.0000	0.328	3.049
Age of house head	1.52E-03	0	4.11	0.0000	0.743	1.345
Educated house head dummy	0.181	0.011	15.986	0.0000	0.682	1.467
Nursery/primary education	2.21E-03	0.005	0.474	0.6350	0.998	1.002
Secondary education	3.29E-03	0.005	0.672	0.5010	0.908	1.101
Tertiary education	6.61E-03	0.005	1.414	0.1570	0.996	1.004
Aged/child dependency ratio	-0.41	0.02	-20.58	0.0000	0.808	1.237
Retired/student	-2.49E-03	0.023	-0.109	0.9130	0.838	1.194
Agriculture employment	-0.127	0.013	-9.596	0.0000	0.53	1.888
South-south	0.236	0.017	13.707	0.0000	0.575	1.739
South-east	0.467	0.018	26.066	0.0000	0.562	1.78
Southwest	0.258	0.017	14.757	0.0000	0.532	1.881
North-east	0.136	0.017	8.202	0.0000	0.571	1.752
North-west	9.97E-02	0.016	6.159	0.0000	0.52	1.925
Frequency of illness	3.66E-02	0.004	9.422	0.0000	0.677	1.478
Number of house member ill	-1.39E-02	0.003	-5.426	0.0000	0.36	2.776
Number of house member injured	1.88E-02	0.011	1.69	0.0910	0.95	1.053
Single room	-1.19E-02	0.012	-0.961	0.3370	0.763	1.311
Flat/duplex	0.191	0.025	7.52	0.0000	0.786	1.272
Number of rooms	4.90E-03	0.004	1.388	0.1650	0.837	1.194
Landlord	2.87E-02	0.014	2.1	0.0360	0.648	1.544
Access to safe drinking water	-1.73E-02	0.011	-1.561	0.1190	0.835	1.197
Safe water in residence	5.35E-02	0.011	5.06	0.0000	0.899	1.112
Fuel wood for light	-5.24E-02	0.018	-2.951	0.0030	0.987	1.013
Electricity for cooking	0.198	0.046	4.285	0.0000	0.963	1.038
No toilet	1.26E-02	0.016	0.778	0.4370	0.928	1.078
Flush toilet	0.115	0.021	5.502	0.0000	0.783	1.277
Adj R2	0.296***					

*** = Statistical significance at 1 percent level

Appendix 2: OLS Regression of residual squared against the socio-economic and shock variables

Variables	Coefficient	Standard error	T values	Significance level	Tolerance level	Variance inflating factor
(Constant)	0.5550	0.0340	16.4630	0.0000		
urban	-0.0048	0.0160	-0.2980	0.7650	0.5700	1.7560
Composite input shocks	0.0053	0.0050	1.0090	0.3130	0.9910	1.0090
Composite production shock	0.0022	0.0050	0.4150	0.6780	0.9950	1.0050
Composite market shock	-0.0045	0.0050	-0.8590	0.3910	0.9900	1.0100
Composite credit shock	-0.0090	0.0050	-1.7250	0.0840	0.9960	1.0040
Composite employment shock	0.0009	0.0050	0.1760	0.8600	0.9630	1.0380
Composite economic shock	-0.0030	0.0050	-0.5720	0.5670	0.9930	1.0070
Composite business shock	-0.0018	0.0050	-0.3540	0.7230	0.9960	1.0040
Composite conflict shock	0.0025	0.0050	0.4740	0.6350	0.9980	1.0020
Experience of robbery	0.0803	0.0340	2.3720	0.0180	0.9780	1.0230
Male house headship	-0.0010	0.0160	-0.0650	0.9480	0.8230	1.2150
Household size	0.0004	0.0030	0.1310	0.8960	0.3280	3.0490
Age of house head	0.0023	0.0000	5.5990	0.0000	0.7430	1.3450
Educated house head dummy	0.0364	0.0130	2.8940	0.0040	0.6820	1.4670
Nursery/primary education	-0.0038	0.0050	-0.7240	0.4690	0.9980	1.0020
Secondary education	0.0049	0.0050	0.9060	0.3650	0.9080	1.1010
Tertiary education	-0.0008	0.0050	-0.1540	0.8780	0.9960	1.0040
Aged/child dependency ratio	-0.0465	0.0220	-2.0960	0.0360	0.8080	1.2370
Retired/student	-0.0115	0.0250	-0.4530	0.6500	0.8380	1.1940
Agriculture employment	-0.0450	0.0150	-3.0600	0.0020	0.5300	1.8880
South-south	-0.2440	0.0190	-12.7690	0.0000	0.5750	1.7390
South-east	-0.2640	0.0200	-13.2730	0.0000	0.5620	1.7800
Southwest	-0.1470	0.0190	-7.5880	0.0000	0.5320	1.8810
North-east	-0.2640	0.0180	-14.3780	0.0000	0.5710	1.7520
North-west	-0.2490	0.0180	-13.8090	0.0000	0.5200	1.9250
Frequency of illness	-0.0127	0.0040	-2.9320	0.0030	0.6770	1.4780
Number of house member ill	0.0091	0.0030	3.2000	0.0010	0.3600	2.7760
Number of house member injured	0.0287	0.0120	2.3290	0.0200	0.9500	1.0530
Single room	-0.0447	0.0140	-3.2330	0.0010	0.7630	1.3110
Flat/duplex	-0.0483	0.0280	-1.7100	0.0870	0.7860	1.2720
Number of rooms	0.0052	0.0040	1.3290	0.1840	0.8370	1.1940
Landlord	-0.0646	0.0150	-4.2480	0.0000	0.6480	1.5440
Access to safe drinking water	0.0134	0.0120	1.0910	0.2750	0.8350	1.1970
Safe water in residence	0.0129	0.0120	1.0940	0.2740	0.8990	1.1120
Fuel wood for light	0.0105	0.0200	0.5310	0.5950	0.9870	1.0130
Electricity for cooking	0.1180	0.0510	2.3070	0.0210	0.9630	1.0380
No toilet	-0.0096	0.0180	-0.5370	0.5920	0.9280	1.0780
Flush toilet	0.1730	0.0230	7.4230	0.0000	0.7830	1.2770
Adj R2	0.033					

*** = Statistical significance at 1 percent level

Appendix 3: FGLS regression of transformed residual squared against the transformed socio-economic and shock variables

Variables	Coefficient	Standard error	T values	Significance level	Tolerance level	Variance inflating factor
(Constant)	0.9900	0.0600	16.4330	0.0000		
urban	-1.9950	3.1980	-0.6240	0.5330	0.6910	1.4470
Composite input shocks	-0.3100	0.7770	-0.3980	0.6900	0.9820	1.0190
Composite production shock	-1.7060	1.9680	-0.8670	0.3860	0.9930	1.0070
Composite market shock	0.7510	0.9660	0.7770	0.4370	0.9810	1.0190
Composite credit shock	0.2220	0.4250	0.5230	0.6010	0.9750	1.0260
Composite employment shock	-0.6220	5.4500	-0.1140	0.9090	0.9690	1.0320
Composite economic shock	0.4470	1.7300	0.2580	0.7960	0.9920	1.0080
Composite business shock	0.1500	3.0080	0.0500	0.9600	0.9960	1.0040
Composite conflict shock	-0.5890	2.0460	-0.2880	0.7740	0.9960	1.0040
Experience of robbery	-0.6920	0.4160	-1.6630	0.0960	0.9600	1.0420
Male house headship	-8.3570	13.9080	-0.6010	0.5480	0.4560	2.1950
Household size	34.3850	6.5030	5.2870	0.0000	0.2940	3.4030
Age of house head	-0.1930	0.1880	-1.0310	0.3030	0.3820	2.6200
Educated house head dummy	-0.3980	0.3070	-1.2950	0.1950	0.6880	1.4540
Nursery/primary education	-0.4550	1.1970	-0.3800	0.7040	0.9930	1.0070
Secondary education	-0.4800	0.9820	-0.4890	0.6250	0.8860	1.1280
Tertiary education	-8.1400	6.2310	-1.3060	0.1910	0.9960	1.0040
Aged/child dependency ratio	-0.6040	0.4220	-1.4310	0.1530	0.5900	1.6950
Retired/student	-1.4400	2.2650	-0.6350	0.5250	0.8430	1.1860
Agriculture employment	0.0016	0.2970	0.0050	0.9960	0.3330	3.0040
South-south	-0.1700	0.0790	-2.1550	0.0310	0.4050	2.4680
South-east	-0.1830	0.0780	-2.3620	0.0180	0.3550	2.8140
Southwest	0.1770	0.1470	1.2000	0.2300	0.5310	1.8820
North-east	-0.0575	0.0740	-0.7810	0.4350	0.2220	4.5010
North-west	-0.0857	0.0800	-1.0730	0.2830	0.2190	4.5570
Frequency of illness	-0.5780	0.2870	-2.0130	0.0440	0.5690	1.7570
Number of house member ill	-2.3120	0.2630	-8.7740	0.0000	0.3740	2.6740
Number of house member injured	-0.2790	0.4440	-0.6280	0.5300	0.9430	1.0600
Single room	-0.2400	0.2700	-0.8890	0.3740	0.5200	1.9230
Flat/duplex	-0.2770	0.5270	-0.5250	0.5990	0.8280	1.2080
Number of rooms	-0.4700	0.6700	-0.7020	0.4830	0.7040	1.4210
Landlord	-0.1910	0.2270	-0.8410	0.4000	0.3450	2.8990
Access to safe drinking water	-1.0090	0.8270	-1.2190	0.2230	0.9100	1.0990
Safe water in residence	-1.1040	0.8040	-1.3730	0.1700	0.9030	1.1070
Fuel wood for light	0.0688	1.5770	0.0440	0.9650	0.9750	1.0260
Electricity for cooking	-0.2910	0.5790	-0.5020	0.6160	0.9790	1.0220
No toilet	0.5300	1.5920	0.3330	0.7390	0.9490	1.0540
Flush toilet	0.0054	0.1970	0.0280	0.9780	0.8150	1.2280
Adj R2	0.005					