Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.5, No.27, 2014

Spatial Decomposition of Poverty in Rural Nigeria: Shapley Decomposition Approach

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Abstract
Poverty is largely a rural phenomenon in sub-Saharan Africa. The contribution of mean income and inequality to spatial variations in rural poverty were investigated in this study using the 2003/04 National Living Standard Survey by the National Bureau of Statistics (NBS). The data were analyzed using descriptive statistics and Shapley Decomposition (SD) techniques. Results showed that across the GPZs, the contribution of mean income to poverty was higher than inequality (Ly) for both P_0 and P_1.The contribution of mean income to severity of poverty (P_2) was higher than Ly in North-East (μ = -0.0530; Ly = -0.0334); North-West (μ = -0.0844; Ly =0.0429); South-East (μ = 0.0505; Ly = 0.0136); South-South (μ=0.0254; Ly=0.0048); South-West (μ = 0.0450; Ly = 0.0201). However, inequality contributed more than mean income in North-Central (μ = -0.0184; Ly = 0.0240). The marginal contribution of within-GPZs inequality to poverty indices were higher than between-GPZs inequality.
Keywords: Poverty, inequality, decomposition, Shapley and rural

Introduction

Nigeria is a country that has experienced a high incidence of poverty and inequality in the last two decades. The majority of the poor, over 70 per cent, are located in the rural areas where most of the people and national resources are located. The incidence of poverty is much higher in the rural areas than in the urban centres (Osinubi, 2003). The country has also not been quite successful in poverty alleviation as available evidences suggest that there are increasing number of poor people in Nigeria– 27.2 per cent in 1980, 46.3 per cent in 1985, 42.8 per cent in 1992 and 65.6 per cent in 1996 (Okojie *et al.*,2001; Canagarajah *et al.*, 1997). These have been largely traced to the adverse macroeconomic performance of the economy that was largely dictated by the effects of negative economic shocks and the adjustment reforms that were initiated in response to these shocks. The spatial distribution of poverty in Nigeria in 1996 as presented by FOS (1999) shows that the North West region had the highest incidence of poverty, with 69.3 per cent of the population in poverty while the South East region had the lowest incidence. The North West region accounted for about 40 per cent of the poor in Nigeria. This was followed by the South West, which contributed 18.7 per cent to the national incidence of poverty. The North East region had the highest depth of poverty while the North Central had the highest severity of poverty. A notable aspect of poverty in Nigeria is that the poor are often concentrated in communities without basic services. These basic services include roads, potable water supply and safe sanitation. They also generally lack access to health and education services. Poor households in Nigeria are characterised by lack of basic education, resides in rural areas and engage in farming, large household size with most adult member, including the household head unemployed (World Bank, 1996). This study therefore assessed the contribution of mean income and inequality to poverty in rural Nigeria.

The Poverty Triangle: Poverty, Inequality and Mean Income Linkage

Poverty in a given country and at a given point of time is fully determined by the rate of change in the mean income of the population and the change in the distribution of income (Bourguignon, 2004). Thus, Bourguignon stressed that the importance of considering increasing average income and income distribution simultaneously and recognising that income distribution matters as much as percentage change in average income for poverty reduction. Poverty is affected not only by economic growth (percentage change in average income) but also by how the fruits of economic growth are distributed. Economic growth is itself affected by the distribution of national income (Compton Bourne, 2008). Economic growth can be defined as the rate at which the average income of a country increases over a period of time, usually a year. It is equal to the per centage change in the economy's output, i.e. the sum of the value added in the different sectors.

The incomes of people working in higher value-added sectors, such as manufacturing, will generally rise faster than those in the lower value-added sectors, such as agriculture. This reasoning was behind Kuznets' (1955) theory that income inequality first increases and then decreases in relation to economic development, i.e., there is an inverted U-shaped relationship between income inequality and the level of economic development. Thus, increased average income is accompanied by a worsening income distribution in the early stages of development. He argued that in these early stages, the majority of a country's population would remain in agriculture, whilst a minority would move into manufacturing and therefore earn higher incomes. The resulting divergence of incomes would not be permanent as most people would eventually move into higher value-added

activities.

Due to the lack of time-series data of sufficient duration to test the hypothesis for an individual country, cross-country data have been adopted. Although there exists data comparability problem, especially when using cross-country data due to differences in the choice of recipient units, income concept, geographic coverage, etc., most studies generally confirmed the Kuznets hypothesis (Akita *et al*., 1999). For instance, the study by Jha (1996), which is based on a large, pooled cross-section and time-series data set from the World Bank, the hypothesis seems to hold even for a sample which included only developing countries. However, based on an empirical investigation of formalized models with six income inequality indices, Anand and Kanbur (1993) pointed out that a population shift from the low-mean income, low-inequality, and traditional (rural) sector to the high-mean income, high inequality, and modern (urban) sector, which is the basis for the Kuznets model, seems to be accompanied by changing sectoral mean income differential and sectoral inequalities. According to Oshima (1994), most Asian countries seem to follow the Kuznets curve in income inequality, but the peak appears to have been reached when the economy was still predominantly agricultural with per capita incomes much lower than in the West.

The modern theoretical approach to understanding poverty considers the income dimension as the core of most poverty-related problems. Poverty may stem from changes in average income or changes in the distributed income. This implies that equitable distribution of income would increase the probability of the poor having access to basic needs (such as food consumption, housing, health, education, et cetera). Thus, the welfarist approach establishes a close positive relationship between per capita income (PCI) and the measures of well-being. However, per capita income does not so much determine capabilities but how it is distributed. The argument for economic growth as a pre-requisite for poverty reduction is because it increases mean income and narrowing of income distribution (Ajakaiye and Adeyeye, 2001).

The poverty triangle proposed by Bourguignon (2004) illustrates how changes in distribution and changes in mean income determine the extent to which a country reduces poverty (Figure 1). If the distribution of income does not change, then poverty reduction is only possible with growth. Without growth in mean income, redistribution of income in favour of the poor is the only way to reduce poverty. In other words, the incomes of the non-poor would have to fall in order for the incomes of the poor to rise. In practice, a change in poverty comes about through some combination of a change in average incomes and a change in the distribution of income. According to Bourguignon, the real challenge to establishing a development strategy for reducing poverty lies in the interaction between distribution and growth, and not in the relationship between poverty and growth on the one hand and poverty and inequality on the other, which are essentially arithmetic.

A change in the distribution of income can be decomposed into two effects. First, there is the effect of a proportional change in all incomes that leaves the distribution of relative income unchanged, i.e. a mean income effect. Second, there is the effect of a change in the distribution of relative incomes which, by definition, is independent of the mean, i.e. a distributional effect (Datt and Ravallion, 1992; and Kakwani, 1993). This movement thus corresponds to the change in the distribution of 'relative' income, or the 'distribution' effect.

Increasing income per capita without redistributing part of the wealth created affects the performance of the economy and marginalizes even more the lower per centile of population. This, consequently, has a negative impact on poverty reduction (Molini, 2005). Lopez (2004) asserted that most pro-growth policies do lower poverty in the long-run, but some of these policies yield greater inequality and can result in higher poverty in the short-run. He suggested mitigating these short-run poverty aggravating effects of pro-growth policies with measures such as fiscal policies directed at increasing access to education and infrastructure and monetary policies that reduce inflation. Datt and Ravallion (2002) posited that the extremely variable initial conditions in rural development and human capital development that is obtained in rural India as causes for persistent and often increases in spatial inequality.

Kraay (2006) found that a high rate of average income growth results in a reduction of poverty. In the same vein, Christiansen *et al.,* (2003) found that education and access to land are key private endowments that ensure household access to economic opportunities and promote equitable development. In China, for example, unease with the growing disparity between the living standards in the coastal areas and the inland regions has prompted the Chinese government to launch a campaign to develop the western regions (Kanbur and Zhang, 2003). The problem becomes a more intense political issue when spatial inequality is perceived to be related to discrimination against particular groups of citizens such as rural farmers (compared to urban residents), ethnic minorities concentrated in remote areas, migrants in certain districts, or religious groups in particular regions (e.g. Muslims in Xinjiang Region in China).

Literature Review on Poverty Decomposition

Kakwani and Subbaro (1990) examined trends in the distribution and growth of consumption and assess their relative impacts on the poor and ultra poor, over the period 1972 to 1983 and across the 15 major states of India. Results indicated that the beneficial effect of growth on the incidence of poverty during 1973 to 1977 was

outweighed by the adverse movements in the inequality of consumption. However, during 1977 to 1983 average consumption grew slowly and consumption inequality fell in many states mainly reducing the incidence of ultra poor poverty. This indicates that states differ in needs, capacities, social policy, intervention programmes and performance.

Assadzadeh and Paul (2004) used Datt and Ravallion (1992) method to analyze how growth and redistribution policies affected FGT poverty measures in Iran during 1983, 1988 and 1993. Results showed that the growth component affected negatively the rural but positively the urban sector while the redistribution component was positive implying that deterioration of inequality had contributed to the worsening of poverty in Iran. Olaniyan (2002) investigated the role of household endowments in determining poverty in Nigeria. Based on cross-sectional data collected in 1985, 1992 and 1996, the findings revealed the import of both human and physical capital endowments in determining poverty in Nigeria. The results also show that being a farmer in Nigeria has a high probability of being poor. A right policy option would thus be to increase the access of households to physical and human capital assets to create opportunities for them to alleviate their poverty level. He recommended poverty alleviation policies that would increase the productivity and entrepreneurial skills of household-heads. This may be in the form of credit availability or provision of equipment for the use of the households.

Dhongde (2003) used non-parametric kernel density to estimate poverty levels. The non-parametric method estimates income density directly, without assuming any particular functional form for the true density. He noted that the difference between the state and national levels of poverty in India was largely explained by a difference in the state and national mean income levels. On the whole, differences in the state and all-India distribution of income were less important in explaining differences in poverty levels. However, there were a few exceptions. Especially, in the urban areas, low levels of poverty were results of not only higher income levels but also of "better" distribution of income.

Baye (2005) used the Shapley value for assigning entitlements in distributive analysis and assesses the within- and between-sector contributions to changes in aggregate poverty for Cameroon. The result indicated that between 1984 and 1996 poverty remained a rural phenomenon in Cameroon. It became more widespread, deeper and severer in both rural and urban areas, but more so in urban than rural areas. While the within-sector effects disproportionately accounted for the increase in poverty in the period 1984 to 1996, the between-sector contributions in both rural and semi-urban areas played a mitigating role on the worse effects of the increase in poverty. These findings indicated the potential positive feedback effects of migration and the associated remittances as an effective strategy used by migrants to lift their families and villages out of the worse effects of poverty. Kolenikov and Shorrocks (2003) also applied Shapley method which is based on the value in cooperative game theory, to analyze the deviation in regional poverty levels from the all-Russia average attributed to three proximate sources; mean PCI, inequality and local prices. Contrary to expectation, regional poverty variations turn out to be due more to differences in inequality across regions than to differences in real income per capita. However, when real PCI is split into nominal income and price components, differences in nominal incomes emerge as more important than either inequality or price effects for the majority of regions.

Zhang and Wan (2005) used Shapley decomposition method for poverty decomposition, which combines the data-generating procedure of Shorrocks and Wan (2004) with the Shapley value framework of Shorrocks (1999). They decomposed variations of urban poverty across the Chinese provinces into three components – contributions by the differences in average nominal income, inequality and poverty line. The results foreground average income as the key determinant of poverty incidence but also attached importance to the influence of distribution. The regional pattern of the decomposition suggested that provincial groupings were not based entirely on geographical locations.

Oyekale *et al*., (2006) decomposed change in poverty in Nigeria using Shapley decomposition method, They found that between 1998 and 2004, income redistribution and income growth increased poverty. The study recommended that welfare enhancing programmes that will benefit urban/rural poor should be identified, while better economic opportunities should be created for those in rural areas.

Araar and Awoyemi (2006) used Shapley method to decompose poverty in Nigeria using the 2004 NLSS data. The decomposition of the FGT index by average PCE and inequality components across zones showed that for the headcount index, inequality contributed positively to the total poverty if poverty line was lower than the average standard of living and contributes negatively if the poverty line exceeds this average. The contribution of between- group inequality to total poverty was very low. With respect to the within-group inequality components, one can remark that the northern zones contributed more than the southern zones.

This study deviates from previous studies on poverty in a two ways. First, in the specificity of the study area which is rural Nigeria. Second, this study estimated the marginal contribution of inequality to poverty and assessed the poverty dominance in the six geopolitical zones of rural Nigeria which none of the previous studies in Nigeria had done.

Methodology

The data used for this study were from the 2003/04 Nigeria Living Standard Survey (NLSS) data from the National Bureau of Statistics (formerly known as the Federal Office of Statistics). The sample design was a two-stage stratified sampling. The first stage involved the selection of 120 Enumeration areas (EAs) in each of the 36 states and 60 EAs at the Federal Capital Territory (FCT). The second stage was the random selection of five housing units from each of the selected EAs. A total of 21,900 households were randomly interviewed across the country with 19,158 households having consistent information (NBS, 2005). For the purpose of this study, the secondary data was first stratified into rural and urban sectors. The second stage was the stratification of the rural area based on the six geo-political zones of Nigeria viz: South West, South East, South South, North Central, North East and North West. The next stage involved the selection of all the sampled rural households in each of the geo-political zones. The data set provides detailed records on household expenditure (which was used as a proxy for household income) and household characteristics. However, 14,514 rural households whose responses were consistent were used for analyses in this study.

Poverty Decomposition Framework

The relative poverty line is estimated based on the expenditure profile of respondents on basic needs (food and non-food items). However, the total household per capita expenditure (PCE) is used as proxy of standard of living. This method was applied by several authors (World Bank, 1996; Canagarajah *et al.*, 1997; Olaniyan, 2002). Here, the total PCE is the sum of cash expenditure on consumption of food and non-food items relative to individual household size.

Mean PCE (MPCHHE) = Total PCE
Total number of Households

The non-poor threshold is the region greater than two-thirds of MPCHHE while the moderate poverty line ranges from one-third to two-thirds of MPCHHE; and The core-poor threshold is the region less than one-third of MPCHHE. This study adopted Foster, Greer and Thorbecke (1984) approach to estimate the incidence, depth and severity of poverty in the study area. The FGT indices are calculated by taking the proportional shortfall in expenditure for each poor household and normalising the sum by the population size.

Poverty Decomposition

In this study, poverty rate was calculated by comparing the total expenditure of every household with the corresponding poverty line. Suppose income x of an individual is a random variable with the distribution function F(x). Let z denote the poverty line, the threshold expenditure below which one is considered to be poor. Then F(z) is the proportion of individuals (or families) below the poverty line. This measure, widely used as a poverty measure, is called the headcount ratio. Here, the national poverty level can be thought of as a function of three factors: regional disparities in average level of consumption denotes by μ; intraregional inequalities denotes as L; and the subsistence level for a single adult, denoted by z, which reflects regional price variations. Thus, we have poverty as a function of these three components

$P(\mu, L, z)$. (1)

This indicates that regional poverty levels are largely determined by three factors: income inequalities, as captured by the Lorenz curve, mean income per capita, and poverty line. It is therefore worth exploring the import of each of these proximate sources of poverty if only to confirm or counter, the common presumption that average income is the dominant influence on poverty (Kolenikov and Shorrocks, 2005).

Assuming a fixed poverty line, the poverty level in any region is given by

$$P(\frac{\mu}{z}, L) = P(\alpha_0, L_0) \quad (2)$$

where α_0 (i.e $\frac{\mu}{z}$) is the normalised mean income level of the region and L_0 is the Lorenz curve representing the relative distribution of income in the region. Similarly, the poverty level of the country as a whole is given by

$P(\alpha_1, L_1)$ (3)

where α_1 is the mean income level of the country and L_1 is the Lorenz curve representing the income distribution of the country. We shall employ a decomposition technique based on the Shapley value in cooperative game theory to quantify the explanatory power of these factors to poverty in each region. Let us use the subscript "1" to denote the national income distribution, following Datt and Ravallion (1992) and Zhang and Wan (2005), then the difference between poverty at the national and regional levels is simply:

$$\Delta P = P(\alpha_1, L_1) - P(\alpha_0, L_0) \quad (4)$$

Thus, the total difference between the regional and the national poverty rates arises from the differences in two factors: the average income α and the distribution of income L. To separate the effects of these two factors, Datt and Ravallion (1992) defines the contribution of income differences as:

$$\Delta P_i(\alpha) = P(\alpha_i, L_r) - P(\alpha_0, L_r), \quad (5)$$

and the contribution of inequality differences as

$$\Delta P_i(L) = P(\alpha_r, L_i) - P(\alpha_r, L_0), \quad (6)$$

where: r can be either i or 0 as long as it is consistent across the two equations. The problem with this decomposition is that ΔP_i (α) and $\Delta P_i(L)$ do not add up to ΔP_i. In cases where the discrepancy is large, the decomposition would leave unexplained the bulk of the difference in poverty. Further, the decomposition results vary with the choice of the reference point r, and there is no guidance on how to choose one over the other.

The Shapley decomposition procedure follows Kolenikov and Shorrocks (2005). To find the Shapley value of the contribution to ΔP_i by regional differences in mean income and inequality amounts to considering the four possible sequences of replacing α_0, and L_0 with α_i, and L_i, and averaging the marginal effects of α(L) over the four sequences. $P(\alpha_1, L_0)$ tells us what would have been a region's poverty level if the region's mean had been the national mean, without any change in its distribution of income. On the other hand, $(P(\alpha_0, L_1)$ tells us what would have been a region's poverty level if there had been no change in the region's mean income level but its distribution of income had been the income distribution at the national level.

Thus, we can decompose variation of the FGT index into PCE effect α, and inequality L, effects as follows: $C_1 + C_2$ where C_1 is the expenditure component and C_2 is the inequality component. The expenditure component is expressed as:

$$C_1 = \frac{1}{2}\left(\left[P(\alpha_1, L_0) - P(\alpha_0, L_0)\right] + \left[P(\alpha_1, L_1) - P(\alpha_0, L_1)\right]\right) \quad (7)$$

The first component gives the difference in poverty due to changes in the mean expenditure when distribution of expenditure is held fixed at the regional level. The second component gives the difference in poverty due to changes in the mean income when distribution is held fixed at the national level.

Similarly, the difference between the national and region poverty levels arising purely from the difference between their distributions of expenditure is given by:

$$C_2 = \frac{1}{2}\left(\left[P(\alpha_0, L_1) - P(\alpha_0, L_0)\right] + \left[P(\alpha_1, L_1) - P(\alpha_1, L_0)\right]\right) \quad (8)$$

The first component gives the difference in poverty due to changes in the distribution of expenditure when mean expenditure is held fixed at the regional level. The second component gives the difference in poverty due to changes in the distribution of expenditure, when mean expenditure is held fixed at the national level.

Marginal Contributions of Within and Between GPZs Inequalities

The region is not, of course, the only factor that accounts for differences in living standards: there are typically wide disparities in incomes within, as well as between, regions. Here, the marginal contribution of a given component refers to the variation in poverty index after adding the latter to the complement components set. We follow Araar (2006), to simulate at the margin the impact of the inequalities between the regions on the national poverty and the impact of its corresponding within the region inequality on the national poverty. We again start with the popular decomposable FGT index. In which case we have the total poverty as:

$$P(Y, z, L) = \sum_{g=1}^{G} \varphi_g P_g(Y_g, z, L) \quad (9)$$

where: G is the number of mutually exclusive subgroups in the total population, and g is the population of group g and P_g is the poverty measure for group g, φ_g is the proportion of group g in the population, Yg is the total expenditure of group g, z is the poverty line and L measures parameters of the Lorenz curve. The total poverty is the sum of the contributions of each region or group poverty to the national poverty P.

In order to simulate at the margin the impact of the within region disparity on total poverty we examine the situation where the total inequality is removed from the total poverty. This corresponds to the situation where each household has the average expenditure of its region, denoted by μ_g. Formally we have:

$$P^*(Y^*,z,L)=\sum_{g=1}^{G}\varphi_g P_g(\mu_g,z,L) \quad (10)$$

It follows that at the margin the difference between (3.11) and (3.12) gives the total contribution of the regional disparities (CRD) to the national poverty which equals to:

$$CRD = P - P^* \quad (11)$$

The contribution of group/region g to the national disparity also equals to:

$$CRDg = \varphi_g (P - P^*) \quad (12)$$

where φ_g is the proportion of region g in the total population

Further, to eliminate the inter region inequality and to calculate the contribution at the margin of the intra-region inequality on poverty, we will use a vector of expenditure where each household has its income multiplied by the ratio μ/μ_g. With this new expenditure vector, the average of the expenditure of each region equals to μ. Thus, the FGT index of within group is denoted by:

$$P^{**}(Y^{**},z,L)=\sum_{g=1}^{G}\varphi_g P_g(\frac{\mu}{\mu_g},z,L) \quad (13)$$

Therefore, the contribution of the within regional disparities equals to:

$$WRD = P - P^{**} \quad (14)$$

It is to be noted that if this procedure gives us an idea on the contribution of each of the two factors, this approach overestimates their contributions such that:

$$C_p < C_W + C_B \quad (15)$$

To avoid this flaw, we use the Shapley approach by keeping the same rules for eliminating each of the between and within group factors. Similarly, the contribution of the group g to the within group disparities equals to:

$$WRDg_i = \varphi_g (P - P^{**}) \quad (16)$$

The use of the Shapley approach to estimate the expected marginal contributions of the within and between regional inequalities to the total poverty is given as:

$$C_w^s = \frac{1}{2}\left[P(W,B) - P(B) + P(W) - P(\mu,z,L)\right]$$

$$C_B^s = \frac{1}{2}\left[P(W,B) - P(W) + P(B) - P(\mu,z,L)\right]$$

$$yields: where P(W,B) = P(Y,z,L) and$$

$$P(B) = \sum \varphi_g P_g(\mu_g z,L) and$$

$$P(W) = \sum \varphi_g P_g(z, Y_g \frac{\mu}{\mu_g}, L) \quad (17)$$

C_W^S and C_B^S are the expected contributions of within and between groups inequalities to national poverty respectively.

The decomposition facility in the DAD Software developed by Duclos and Araar, (2006) provides opportunity to decompose these factors.

Results

Distribution of Household Per Capita Expenditure by Percentile

Results in Table 1 show that the mean of the topmost percentile was about 12 times greater than the lowest percentile. This indicates a high gap in income level in rural area. The results further reveal that at the lowest percentile (5 percentile) of expenditure distribution, South West had the highest (₦10695.6183) PCE while North Central zone had the least (₦4492.7473). This reveals inequitable in income distribution in rural Nigeria. Among the middle income earners (50 percentile), South West had the highest (₦48, 498.1948) mean PCE while

North East had the least (₦15920.9774). At the topmost percentile (95 percentile), South East had the highest mean PCE (₦98616.7637), closely followed by South West (₦97117.3451); while North West had the least (₦ 45647.7249). This indicates that standard of living in South West is the best of all the zones while it is worst in North Central.

The estimation of the poverty line presented in Table 2 shows that the mean PCE for Nigeria was ₦31, 764.00 and the moderate poverty line was adopted in this study was estimated as ₦21, 176.03. The result shows that about half (51 per cent) of the rural households were poor and an average poor household would need to attain a per capita income level of about N1, 974 to get out of poverty. There is also a fairly large (P_2 = 01030 inequality in income distribution of the rural households.

Spatial Profile of Incidence of Poverty in Rural Nigeria

Figures in Table 3 reveal that North West had the highest incidence of rural poverty (P_0 = 0.6925). This was closely followed by the North East (P_0 =0.6069) and the North Central (P_0 =0.5598). These zones contributed 29.5 percent, 22.6 per cent and 21 per cent respectively to overall incidence of rural poverty. This indicates that together, the North West, North East and North Central contributed 73.1 per cent to overall poverty incidence. This corroborates the findings of Minot *et.al*, (2003) that poverty is more pronounced in remote and dry regions of Vietnam. Further, South West had the lowest incidence of poverty (P_0 =0.2699) and the lowest relative contribution of 4.4 per cent to overall poverty. This was followed by the South East with poverty incidence and relative contribution of 28 per cent and 8 per cent respectively. This shows that the proportion of the poor in North West is about thrice that of South West. The implication of this is that majority of the rural poor reside in the northern GPZs of Nigeria, which is a savannah belt. Thus, poverty may be as a result of returns to variations in natural assets and geo-climatic endowments.

Of the thirty-six states, the proportion of rural poor was highest (in a descending order) in Kwara, Kogi, Jigawa, Lagos and Kebbi states with the poverty incidences of 88.4 per cent, 83.6 per cent, 83 per cent, 81.8 per cent and 80.2 per cent of the rural population respectively. The least incidence of rural poverty was observed in Oyo, Osun and Imo representing 12.7 per cent, 15.2 per cent and 19.4 per cent of rural population respectively. Thus, the proportion of the poor in Kwara was about seven times that of Oyo. This suggests variations due to spatial differences and level of economic development.

Spatial Profile of Depth of Poverty in Rural Nigeria

Spatial variations of depth of poverty across GPZs and states in rural Nigeria are presented in Table 4. As expected, rural poverty gap index was highest (P_1 =0.2781) in North West and lowest (P_1 =0.0835) in South West. This indicates that a typical poor rural household in the North West would require about thrice the amount of resources required by their counterparts in the SouthWest to get out of poverty. This further confirms that the rural South West not only had the lowest proportion of the poor but is also were more developed economically than other zones. This could be because past South Western governments, through various policies, had emphasised more on investment in formation of capital assets than other zones. Leading among such policies are free education, free health services, agricultural credits, formation of cooperative societies as well as community and rural development.

Further, the relative contribution of the zones to poverty in a descending order were 0.3030, 0.2390, 0.2295, 0.1229, 0.0709 and 0.0348 for North West, North Central, North East, South South, South East and South West respectively. This indicates the while the North West had the highest (30 per cent) contribution to depth of rural poverty in Nigeria, the South West had the least (3.5 per cent).

Among the states, Kwara had the highest (P_1 = 0.5322) depth of rural poverty index while Oyo had the least (P_1 = 0.0379). This indicates that poor rural households in Kwara would need fourteen fold of increase in per capita income their counterparts in Oyo State need to alleviate their poverty. Notably, the depth of rural poverty in Kogi, Lagos and Jigawa were also on the high side representing 0.4940, 0.4247 and 0.3894 respectively. The highest relative contribution of the states in a descending order were Kogi (8.4 per cent), Jigawa (7.1 per cent), Kebbi (5.6 per cent), Zamfara (5.4 per cent) and Kwara (5.3per cent) and Bauchi (5.1 per cent). As expected, the least relative contributions came from Oyo and Osun representing 0.22 per cent and 0.28 per cent respectively. However, contrary to expectation, Lagos contributed only 0.4 per cent. This is explained by the low proportion of the overall rural households residing in Lagos resulting from increasing rural-urban drift as well as urbanisation. This is verified by the highest absolute and relative contributions of Lagos to urban poverty (Appendix II-IV). Urban Lagos is the commercial centre in Nigeria with a seaport, an international airport and highest concentration of both micro- and macro-enterprises. This corroborates the findings of Minot *et al.,* 2003.

Spatial Profile of Severity of Poverty in Rural Nigeria

Results in Table 5 show that although the North West had the highest incidence and depth of rural poverty,

North Central zone had the highest level of severity of rural poverty (P_2 = 0.1454), followed by the North West (P_2 = 0.1446) and North East (P_2 = 0.1226). This shows that although the North West had the highest proportion of the rural poor and required more investment of wealth to alleviate poverty, inequality in income distribution of households was highest in North Central. However, South West had the least (P_2 = 0.0379) severity of poverty index. This indicates that disparity in income distribution among the rural poor in North Central was about four times that of South West. Thus, South West consistently had the least values of all the poverty indices, indicating the least poverty levels (in terms of proportion of the poor, poverty gap and severity of poverty) among the GPZs. This shows that of all the zones, the South West governments have shown distinctive ability in the formulation, administration and implementation of rural development policies.

The North West had the highest absolute contribution of 0.302 per cent to overall poverty severity in rural Nigeria. The lowest absolute contribution of 0.0031 came from the South West representing about 3 per cent relative contribution to overall poverty in rural Nigeria. Thus, North West contributed 10 times the contribution of South West to overall poverty severity in rural Nigeria.

Among the states, Kwara had the highest index of severity of poverty (P_2 = 0.3629), and closely followed by Kogi (P_2 = 0.3301). Thus, poverty indices (incidence, depth and severity) within Kwara and Kogi were consistently highest. However, Osun had the lowest index of severity of poverty (P_2 = 0.0150), closely followed by Oyo (P_2 = 0.0169). Lagos had the highest index in the South West (P_2 = 0.2780) and Jigawa (P_2 = 0.2226) in the North West. The result indicates that rural poverty intensity within rural Kwara was 21 and 24 times higher than that of Oyo and Osun respectively.

The result observed among the states was consistent with the observation under depth of poverty. Kogi had the highest absolute contribution of 0.0111 representing 10.8 per cent relative contribution to overall poverty. This was followed by Jigawa (0.0080) and Kwara (0.0071) with relative contribution of 7.8 per cent and 6.9 per cent respectively. Oyo had the lowest relative contribution closely followed by Osun representing 0.19 per cent and 0.20 per cent respectively. Thus, Kogi relatively contributed about 56 times over what Oyo State relatively contributed to overall disparity in income distribution in rural Nigeria.

Shapley Decomposition of Poverty into Mean Income and Inequality

The Shapley decomposition procedure following Kolenikov and Shorrocks (2005) was applied to the three FGT index, namely; incidence (P_0), depth (P_1) and severity (P_2). The results of spatial decomposition of change in poverty into the mean income and inequality components, using Shapley method are presented in Table 6. Higher than average mean income levels implied lower than average poverty levels and vice versa. The result shows that zones with low PCE, namely North West, North East and North Central had negative change in spatial poverty level. This indicates that the rural poverty headcount in these GPZs were higher than national headcount. The fall in the proportion of poor people in rural Nigeria was highest in South West and lowest in South South. In the savannah region, the increase in the proportion of the poor people in rural Nigeria was highest in North West but lowest in North Central. In all the GPZs, the mean income accounted for a major contribution to spatial differences in proportion of the poor people in rural Nigeria. The result corroborates the findings of Dhongde (2003) which found that spatial differences in poverty headcount were largely explained by spatial differences in mean income levels rather than by differences in the distribution of income in India. The result further shows that inequality contributions were higher than corresponding mean income contributions to change in the proportion of poor people in Taraba and Kaduna states. The result shows that inequality is not a threat in rural areas if only the headcount is considered for poverty assessment.

In order to make useful and relevant policy recommendations, it is expedient to decompose higher FGT levels. This is because policy interventions revolve around income, that is, it involves either increasing PCI or redistribution of wealth. The result of shapley decomposition of change in poverty gap in rural Nigeria is also presented in Table 6. In all the GPZs, the mean income had a major contribution to spatial differences in the amount of PCI needed to bring a typical rural household out of poverty. The result further shows that 25 per cent of the states (nine states) including the FCT had higher inequality contribution to change in poverty gap than mean income contribution to poverty gap. The states are Kaduna, Taraba, Borno, Plateau, Niger, Nassarawa, Ebonyi, Edo and Delta. Thus, rural poverty alleviation policy should shift from increasing mean income to redistribution of income in these states.

The results further reveal that all the three northern zones made negative mean income contributions to spatial change in severity of poverty. About 53 per cent representing nineteen states made negative mean income contributions to spatial change in severity of poverty. Fifteen of these states are in the northern zones (North Central, North East and North West). The result further shows that only in North Central and about 25 per cent of the states (10 states) and the FCT was inequality contribution higher than mean income contribution to poverty. The states are Delta, Edo, Nassarawa, Niger, Plateau, Borno, Taraba, Jigawa, Kaduna and Kano. This suggests that inequality is more responsible for spatial severity of poverty than mean income in these states. Thus, rural poverty alleviation policy should be directed towards income redistribution in these states. However,

in the other states, rural poverty alleviation policies should be channeled towards increasing mean income.

Marginal Contribution of Within- and Between-GPZs Inequalities to Poverty

The study further simulated the marginal contribution of within-region and between-region disparity in income distribution on the overall rural poverty in order to inform policy. This also establishes direct linkage of poverty and inequality. Results in Table 7 indicate that the marginal contribution of the within-group (intra-group) inequality to the overall rural poverty level was higher than the between–group (inter-group) inequality component for all poverty indices (Headcount, depth and severity). The marginal contribution was highest for incidence of poverty and lowest for severity of poverty. The implication of this is that at the national level, rural poverty reduction policy should focus on other factors (such as improving infrastructure, education, credit facilities, gender equity, social protection et cetera) within each zone other than evening mean income across the GPZs.

CONCLUSION AND RECOMMENDATION

This study has shown that the degrees of poverty differ across the GPZs and states. This implies that poverty reduction strategies should be geographically targeted. Thus, different poverty reduction interventions are needed to reduce poverty in the short-run across the different geopolitical zones. Where inequality is greater than mean income component, the policy should focus on inequality reduction (redistribution of income) through appropriate fiscal policies.

The study has four implications for policy measures aimed at alleviating rural poverty in Nigeria. First, there is a geographical dimension to the explanation of the variation of poverty rates across geopolitical zones. Policy measures with region-specific focus are thus advisable. For the coastal zone (South South), the significant influence of low standard of living calls for attention to the havoc that inflation may cause on the poor; for the northern GPZs, the emphasis should be placed on raising PCE; for the North Central zone, efforts to increase mean income should be supplemented by redistribution policy. Second, the GPZs are still quite heterogeneous, suggesting that geographical features such as distance to the sea, climate, topography of the terrain, and so on, are not the sole determinants of spatial inequality and poverty. Much of the similarity and dissimilarity among the GPZs can be traced to their industrial structures and the past and recent economic policies (Kanbur and Zhang 2003).

Third, in GPZs and states where mean income level poses much problem to poverty alleviation, the efforts of the state and local government should focus on the formation of capital assets (human, social, financial and physical capitals). Finally, poverty alleviation strategies have implication for national budget allocation and government expenditure for the whole country. This means that the share of Federal Government capital expenditure for poverty alleviation should be equitable across the GPZs and states.

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Table 1: Distribution of Geopolitical Zones by income percentiles

ZONES	*PERCENTILES*						
	5	10	25	50	75	90	95
South South	8036.69	10059.35	15087.96	25205.83	41177.29	63786.35	85589.14
South East	10203.09	13101.47	20070.14	31146.43	47973.66	73864.53	98616.76
South West	10695.62	13338.46	20273.82	31325.75	48498.20	71074.73	97117.35
North Central	4492.75	6004.73	10740.80	18750.06	30846.54	48668.67	66803.43
North East	6055.64	7940.11	11596.22	17399.71	26794.43	40072.98	51723.09
North West	5869.44	7425.36	10731.81	15920.98	23052.38	34496.53	45647.73
National	6183.43	8263.99	12925.29	20877.98	34385.82	54488.47	73869.52

Table 2: Estimation of National Poverty Line

Variables	***Estimates***
Mean PCEXPDR	₦ 31, 764.06
Core Poverty Line	₦ 10, 588.02
Moderate Poverty Line	₦ 21, 176.03
Poverty incidence (Rural)	0.5053
Poverty depth (Rural)	0.1974
Poverty severity (Rural)	0.1030

Table 3: Spatial Analysis of Incidence of Poverty (Headcount) in Rural Nigeria

GPZs/States	*Estimate*	*Proportion*	*Absolute Contribution*	*Relative Contribution*
ALL	0.5053			
South South	**0.4198**	**0.1628**	**0.0684**	**0.1353**
AkwaIbom	0.3755	0.0316	0.0119	0.0235
Bayelsa	0.2236	0.0327	0.0073	0.0145
CrossRiver	0.4943	0.0303	0.0150	0.0296
Delta	0.5362	0.0238	0.0128	0.0252
Edo	0.5297	0.0243	0.0129	0.0255
Rivers	0.4252	0.0203	0.0086	0.0170
South East	**0.2803**	**0.1620**	**0.0454**	**0.0899**
Abia	0.2500	0.0278	0.0070	0.0138
Anambra	0.2076	0.0325	0.0066	0.0134
Ebonyi	0.4506	0.0349	0.0157	0.0311
Enugu	0.2845	0.0334	0.0095	0.0188
Imo	0.1942	0.0337	0.0065	0.0128
South West	**0.2699**	**0.0822**	**0.0222**	**0.0439**
Ekiti	0.2891	0.0145	0.0042	0.0083
Lagos	0.8182	0.0023	0.0019	0.0037
Ogun	0.2735	0.0154	0.0042	0.0083
Ondo	0.3370	0.0249	0.0084	0.0166
Osun	0.1515	0.0136	0.0021	0.0041
Oyo	0.1265	0.0114	0.0014	0.0029
North Central	**0.5598**	**0.1896**	**0.1061**	**0.2100**
Benue	0.3957	0.0291	0.0115	0.0228
Kogi	0.8361	0.0336	0.0281	0.0556
Kwara	0.8842	0.0196	0.0174	0.0344
Nassarawa	0.4143	0.0309	0.0128	0.0254
Niger	0.5107	0.0322	0.0165	0.0326
Plateau	0.4651	0.0316	0.0147	0.0290
FCT	0.4144	0.0125	0.0052	0.0102
North East	**0.6069**	**0.1883**	**0.1143**	**0.2261**
Adamawa	0.6336	0.0320	0.0203	0.0401
Bauchi	0.7251	0.0354	0.0256	0.0507
Borno	0.5479	0.0230	0.0126	0.0250
Gombe	0.6536	0.0298	0.0195	0.0386
Taraba	0.4027	0.0354	0.0143	0.0282
Yobe	0.6730	0.0327	0.0220	0.0435
North West	**0.6925**	**0.2151**	**0.1490**	**0.2948**
Jigawa	0.8302	0.0361	0.0300	0.0593
Kaduna	0.4354	0.0245	0.0107	0.0211
Kano	0.5487	0.0234	0.0128	0.0254
Katsina	0.6099	0.0320	0.0195	0.0386
Kebbi	0.8024	0.0345	0.0277	0.0548
Sokoto	0.7530	0.0287	0.0216	0.0428
Zamfara	0.7428	0.0359	0.0267	0.0528

Source: Estimated from NLSS,2003/2004

Table 4: Spatial Analysis of Poverty Depth (Gap) in Nigeria

GPZs/States	*Estimate*	*Proportion*	*Absolute Contribution*	*Relative Contribution*
All	0.1974			
South South	**0.1490**	**0.1628**	**0.0243**	**0.1229**
AkwaIbom	0.1198	0.0316	0.0038	0.0191
Bayelsa	0.0832	0.0327	0.0027	0.0138
CrossRiver	0.1775	0.0303	0.0054	0.0272
Delta	0.1913	0.0238	0.0045	0.0230
Edo	0.1930	0.0243	0.0047	0.0238
Rivers	0.1557	0.0203	0.0032	0.0160
South East	**0.0864**	**0.1620**	**0.0140**	**0.0709**
Abia	0.0753	0.0278	0.0021	0.0106
Anambra	0.0515	0.0325	0.0017	0.0085
Ebonyi	0.1598	0.0349	0.0056	0.0282
Enugu	0.0852	0.0334	0.0028	0.0144
Imo	0.0541	0.0337	0.0018	0.0091
South West	**0.0835**	**0.0822**	**0.0069**	**0.0348**
Ekiti	0.0793	0.0145	0.0012	0.0058
Lagos	0.4247	0.0023	0.0010	0.0049
Ogun	0.0700	0.0154	0.0011	0.0054
Ondo	0.1071	0.0249	0.0027	0.0135
Osun	0.0412	0.0136	0.0006	0.0028
Oyo	0.0379	0.0114	0.0004	0.0022
North Central	**0.2489**	**0.1896**	**0.0472**	**0.2390**
Benue	0.1204	0.0291	0.0035	0.0177
Kogi	0.4940	0.0336	0.0166	0.0841
Kwara	0.5322	0.0196	0.0105	0.0529
Nassarawa	0.1240	0.0309	0.0038	0.0194
Niger	0.1695	0.0322	0.0055	0.0277
Plateau	0.1787	0.0316	0.0056	0.0286
FCT	0.1345	0.0125	0.0017	0.0085
North East	**0.2407**	**0.1883**	**0.0453**	**0.2295**
Adamawa	0.2699	0.0320	0.0086	0.0437
Bauchi	0.2826	0.0354	0.0100	0.0506
Borno	0.1955	0.0230	0.0045	0.0228
Gombe	0.2575	0.0298	0.0077	0.0389
Taraba	0.1415	0.0354	0.0050	0.0254
Yobe	0.2907	0.0327	0.0095	0.0481
North West	**0.2781**	**0.2151**	**0.0598**	**0.3030**
Jigawa	0.3894	0.0361	0.0141	0.0712
Kaduna	0.1188	0.0245	0.0029	0.0148
Kano	0.1935	0.0234	0.0045	0.0229
Katsina	0.2217	0.0320	0.0071	0.0359
Kebbi	0.3251	0.0345	0.0112	0.0568
Sokoto	0.3249	0.0287	0.0093	0.0473
Zamfara	0.2977	0.0359	0.0107	0.0541

Source: Estimated from NLSS,2003/2004

Table 5: Spatial Analysis of Poverty Severity (Intensity) in Rural Nigeria

GPZs/States	*Estimate*	*Proportion*	*Absolute Contribution*	*Relative Contribution*
All	0.1030			
South South	**0.0728**	**0.1628**	**0.0119**	**0.1150**
AkwaIbom	0.0584	0.0316	0.0018	0.0179
Bayelsa	0.0456	0.0327	0.0015	0.0144
CrossRiver	0.0847	0.0303	0.0026	0.0249
Delta	0.0906	0.0238	0.0022	0.0209
Edo	0.0918	0.0243	0.0022	0.0217
Rivers	0.0775	0.0203	0.0016	0.0152
South East	**0.0389**	**0.1620**	**0.0063**	**0.0612**
Abia	0.0317	0.0278	0.0009	0.0086
Anambra	0.0185	0.0325	0.0006	0.0058
Ebonyi	0.0798	0.0349	0.0028	0.0270
Enugu	0.0376	0.0334	0.0013	0.0122
Imo	0.0235	0.0334	0.0008	0.0076
South West	**0.0379**	**0.0822**	**0.0031**	**0.0302**
Ekiti	0.0312	0.0145	0.0005	0.0044
Lagos	0.2780	0.0023	0.0006	0.0061
Ogun	0.0266	0.0154	0.0004	0.0040
Ondo	0.0491	0.0249	0.0012	0.0119
Osun	0.0150	0.0136	0.0002	0.0020
Oyo	0.0169	0.0114	0.0002	0.0019
North Central	**0.1454**	**0.1896**	**0.0276**	**0.2676**
Benue	0.0525	0.0291	0.0015	0.0148
Kogi	0.3301	0.0336	0.0111	0.1078
Kwara	0.3629	0.0196	0.0071	0.0692
Nassarawa	0.0533	0.0309	0.0017	0.0160
Niger	0.0768	0.0322	0.0025	0.0241
Plateau	0.0918	0.0316	0.0029	0.0281
FCT	0.0631	0.0125	0.0008	0.0076
North East	**0.1226**	**0.1883**	**0.0231**	**0.2240**
Adamawa	0.1474	0.0320	0.0047	0.0457
Bauchi	0.1404	0.0354	0.0050	0.0482
Borno	0.0916	0.0230	0.0021	0.0205
Gombe	0.1282	0.0298	0.0038	0.0371
Taraba	0.0644	0.0354	0.0023	0.0221
Yobe	0.1589	0.0327	0.0052	0.0504
North West	**0.1446**	**0.2151**	**0.0311**	**0.3019**
Jigawa	0.2226	0.0361	0.0080	0.0780
Kaduna	0.0524	0.0245	0.0013	0.0125
Kano	0.0916	0.0234	0.0021	0.0208
Katsina	0.1035	0.0320	0.0033	0.0321
Kebbi	0.1676	0.0345	0.0058	0.0562
Sokoto	0.1738	0.0287	0.0050	0.0485
Zamfara	0.1544	0.0359	0.0055	0.0538

Source: Estimated from NLSS,2003/2004

Table 6: Shapley Decomposition of Change in Poverty into Mean Income and Inequality

	Incidence			*Depth*			*Severity*		
GPZs/States	*Change in Poverty*	*Mean Income*	*Inequality*	*Change in Poverty*	*Mean Income*	*Inequality*	*Change in Poverty*	*Mean Income*	*Inequality*
South South	**-0.0855**	**-0.0755**	**-0.0100**	**-0.0485**	**-0.0426**	**-0.0059**	**-0.0302**	**-0.0254**	**-0.0048**
Akwalbom	-0.1298	-0.1170	-0.0127	-0.0777	-0.0651	-0.0126	-0.0446	-0.0370	-0.0076
Bayelsa	-0.2817	-0.2012	-0.0805	-0.1142	-0.0866	-0.0277	-0.0575	-0.0484	-0.0091
CrossRiver	-0.0675	-0.0623	-0.0051	-0.0200	-0.0358	0.0158	-0.0183	-0.0217	0.0034
Delta	0.0309	0.0642	-0.0333	-0.0062	0.0339	-0.0401	-0.0125	0.0205	-0.0329
Edo	0.0244	0.0315	-0.0071	-0.0045	0.0174	-0.0219	-0.0112	0.0105	-0.0217
Rivers	-0.0801	-0.0577	-0.0225	-0.0418	-0.0322	-0.0096	-0.0255	-0.0195	-0.0060
South East	**-0.2250**	**-0.1970**	**-0.0280**	**-0.1111**	**-0.0911**	**-0.0200**	**-0.0641**	**-0.0505**	**-0.0136**
Abia	-0.2553	-0.1929	-0.0624	-0.1221	-0.0900	-0.0321	-0.0714	-0.0504	-0.0209
Anambra	-0.2977	-0.2305	-0.0672	-0.1459	-0.1014	-0.0445	-0.0845	-0.0540	-0.0305
Ebonyi	-0.0547	0.0048	-0.0595	-0.0377	0.0034	-0.0411	-0.0232	0.0020	-0.0252
Enugu	-0.2208	-0.1700	-0.0508	-0.1122	-0.0743	-0.0379	-0.0654	-0.0399	-0.0255
Imo	-0.3111	-0.3215	0.0104	-0.1434	-0.1418	-0.0016	-0.0795	-0.0768	-0.0027
South West	**-0.2354**	**-0.1844**	**-0.0510**	**-0.1140**	**-0.0822**	**-0.0318**	**-0.0651**	**-0.0450**	**-0.0201**
Ekiti	-0.2162	-0.1613	-0.0549	-0.1181	-0.0724	-0.0457	-0.0718	-0.0392	-0.0326
Lagos	0.3129	0.2890	0.0239	0.2273	0.1934	0.0339	0.1750	0.1379	0.0371
Ogun	-0.2318	-0.2217	-0.0101	-0.1275	-0.1040	-0.0235	-0.0764	-0.0557	-0.0207
Ondo	-0.1683	-0.1258	-0.0425	-0.0903	-0.0571	-0.0332	-0.0540	-0.0320	-0.0220
Osun	-0.3538	-0.2765	-0.0773	-0.1563	-0.1097	-0.0466	-0.0880	-0.0561	-0.0320
Oyo	-0.3788	-0.2620	-0.1168	-0.1595	-0.0930	-0.0665	-0.0861	-0.0480	-0.0381
North Central	**0.0545**	**-0.0509**	**0.0036**	**0.0514**	**0.0288**	**0.0226**	**0.0424**	**0.0184**	**0.0240**
Benue	-0.1096	-0.1782	0.0686	-0.0771	-0.0881	0.0110	-0.0505	-0.0496	-0.0009
Kogi	0.3308	0.2920	0.0387	0.2965	0.2568	0.0398	0.2271	0.1991	0.0280
Kwara	0.3265	0.3206	0.0058	0.3348	0.2799	0.0549	0.2599	0.2206	0.0393
Nassarawa	0.0911	0.0473	0.0437	-0.0735	-0.0228	-0.0507	-0.0497	-0.0126	-0.0370
Niger	0.0054	0.0324	-0.0270	-0.0279	0.0199	-0.0478	-0.0262	0.0113	-0.0375
Plateau	-0.0402	0.0143	-0.0546	-0.0188	-0.0103	-0.0291	-0.0112	0.0063	-0.0175
FCT	-0.0909	-0.0633	-0.0276	-0.0630	-0.0313	-0.0317	-0.0399	-0.0176	-0.0223
North East	**0.1016**	**0.1421**	**-0.0405**	**0.0432**	**0.0853**	**-0.0421**	**0.0196**	**0.0530**	**-0.0334**
Adamawa	0.1283	0.1766	-0.0483	0.0725	0.1052	-0.0328	0.0444	0.0685	-0.0242
Bauchi	0.2198	0.2761	-0.0562	0.2400	-0.1626	-0.0774	0.0374	0.1005	-0.0631
Borno	0.0426	0.1297	-0.0871	0.0019	0.0732	-0.0751	-0.0094	0.0430	-0.0524
Gombe	0.1483	0.1819	-0.0336	0.0601	0.1149	-0.0549	0.0252	0.0710	-0.0458
Taraba	-0.1026	-0.0492	-0.0534	-0.0560	-0.0257	-0.0303	-0.0387	-0.0155	-0.0232
Yobe	0.1677	0.2259	-0.0582	0.0933	0.1419	-0.0487	0.0558	0.0921	-0.0362
North West	**0.1872**	**0.2286**	**-0.0414**	**0.0807**	**0.1341**	**-0.0534**	**0.0415**	**0.0844**	**-0.0429**
Jigawa	0.3248	0.3660	-0.0412	0.1919	0.2491	-0.0572	0.1196	0.1569	-0.0637
Kaduna	-0.0699	-0.0012	-0.0687	-0.0787	-0.0011	-0.0775	-0.0507	-0.0006	-0.0501
Kano	0.0434	0.0918	-0.0484	-0.0040	0.0496	-0.0536	-0.0114	0.0296	-0.0410
Katsina	0.1046	0.1279	-0.0233	0.0243	0.0757	-0.0514	0.0005	0.0452	-0.0446
Kebbi	0.2971	0.3639	-0.0668	0.1277	0.2138	-0.0861	0.0646	0.1348	-0.0701
Sokoto	0.2477	0.3118	-0.0641	0.1275	0.1974	-0.0699	0.0708	0.1288	-0.0580
Zamfara	0.2375	0.2920	-0.0545	0.1003	0.1753	-0.0750	0.0514	0.1107	-0.0593

Source: Estimated from NLSS,2003/2004

Table 7: Contributions of Within- and Between- GPZs Inequalities Rural Nigeria to National Poverty

Estimates	P_0	P_1	P_2
C_B^s	**-0.1389**	**-0.3923**	**-0.4476**
C_w^s	**0.6460**	**0.5904**	**0.5510**

C_w^s = Contributions of within-GPZ inequality to national poverty

C_B^s = Contributions of between-GPZ inequality to national poverty

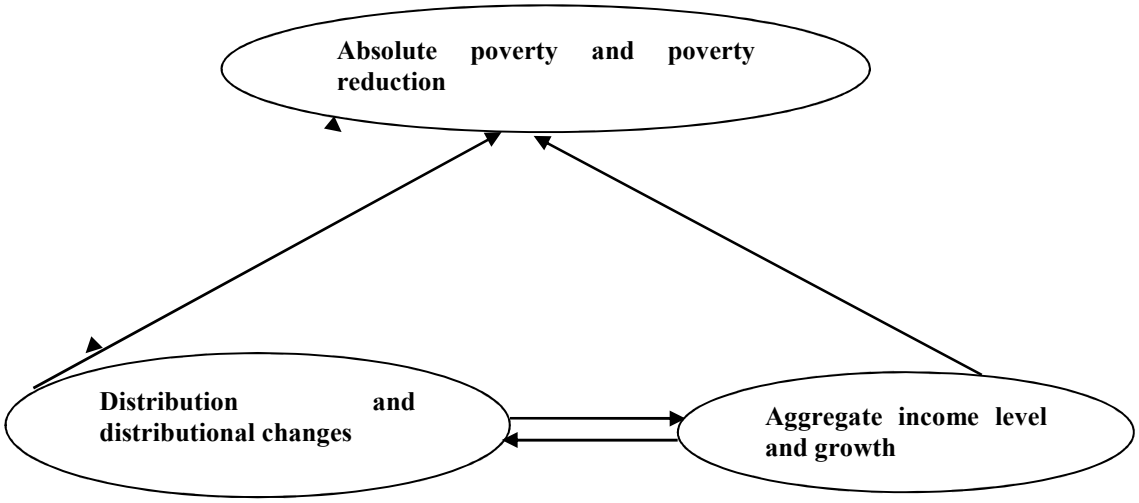

Figure 1: The Poverty Triangle (Bourguignon, 2004).

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