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# **Measurement and Sources of Income Inequality in Rural and Urban Nigeria**

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**MEASUREMENT AND SOURCES OF INCOME INEQUALITY IN RURAL  
AND URBAN NIGERIA**

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## **Abstract**

Income inequality and poverty are closely related. This study decomposed the sources of inequality and poverty in Nigeria. Household survey data obtained from the National Bureau of Statistics (NBS) were used. Results show that in 2004, income inequality is higher in rural areas than urban. Employment income is income inequality increasing while agricultural incomes decreases inequality. Inequality between the states, rural-urban areas, and geopolitical zones accounted for the greater portion of observed inequality. Urbanization, residence in the southwest zone, household size, house head's formal education, number of time suffered from illness, engagement in paid job, involvement in non-farm business, formal credit and informal credit increased income inequality. Between 1998 and 2004, income redistribution and income growth increased poverty. It was recommended, that welfare enhancing programs that will benefit urban/rural poor should be identified, while better economic opportunities should be created for those in rural areas.

Keywords: Income inequality, poverty, decomposition, economic opportunities, Nigeria

JEL classification: D3, O15, O55

## **Introduction**

The pattern of income distribution has been a concern to economists for a long time (Clarke *et al*, 2003). Specifically, the 1990s witnessed resurgence in theoretical and empirical attention by development economists to the distribution of income and wealth (Atkinson and Bourguignon, 2000). This is because high level of income inequality produces an unfavorable environment for economic growth and development. In many developing countries, studies have shown that income inequality had risen over the last two decades (Addison and Cornia, 2001; Cornia with Kiiski, 2001; Kanbur and Lustig, 1999). Despite commitments shown by many developing countries towards reducing income inequality and poverty, there is lack of sufficient knowledge of how to design a holistic approach for addressing the issues (Matlon, 1979). The widening dimension of poverty has now aroused serious humanitarian concerns and fears of political instability. It has become evident that in absence of strong foreign markets, the domestic inter-sectoral linkages, local infrastructure and policy environment required for rapid economic growth cannot be provided where inequality and poverty persist (Aigbokhan, 1999; Clarke *et al*, 2003).

In Nigeria, accompany the rapid economic growth that was had between 1965 and 1974 was a serious income disparity that is believed to have widened substantially. Despite past policy interventions to correct this abnormality, income inequality has increased the dimension of poverty. Aigbokhan (1997, 1999) found that income inequality worsened after the Structural Adjustment Program (SAP) of 1986. Similarly, poverty incidences were 28.1, 46.3 and 65.6 percent in 1980, 1985 and 1996, respectively (World Bank, 1996; IMF, 2005). Also, a high level of income inequality exists between Nigeria's rural and urban areas. This is because most rural communities depend on agriculture, while urban engage mostly in paid jobs. However, income inequality results to discontent, violence and corruption, and as part of microeconomic objectives, governments always give equitable distribution of income a priority. This is important because

income inequality is closely related to poverty (Addison and Cornia, 2001; Adams, 1999; Adams and He, 1995; Aboyade, 1983), and a careful study of it gives some insights into the incidence of poverty.

Studies on decomposition of income inequality are desirable for both arithmetic and analytic reasons (Litchfield, 1999). Policy makers may wish to understand the link between the socio-economic characteristics and total income inequality. This sheds light on the structure and dynamics of income within different socio-economic groups in the economy. Estimating the contribution of each income source to total inequality is very helpful. This information helps to understand the effect that changes in household labor force participation can make on income distribution (Fournier, 1999). Recent advances towards understanding of the linkage between poverty and income inequality make it possible to determine the contributions of income redistribution and income growth to poverty change within a period of time. This information is very helpful to economic policy analysts and designers of poverty reduction programs.

This study intends to fulfill four objectives. First is to provide a descriptive analysis of households' income from different sources and determine the level of income inequality. Second is to estimate the contributions of the income sources to overall income inequality and find the within-between contributions. Third is to determine the contributions of some households' socio-economic characteristics to income inequality. Fourth is to analyze the contributions of income growth and income redistribution to poverty change. Objectives one, two and four were extensively analyzed with the DAD 4.4 statistical package by Duclos *et al*, (2005). The working hypothesis is that attainment of formal education does not significantly increase households' per capita real incomes. The remaining parts of the paper contain conceptual framework and literature review, decomposition methods, results and discussions, and policy implications and conclusion.

## Conceptual framework and literature review

Inequality implies dispersion of a distribution, whether one is considering income, consumption or some other welfare indicators or attributes. Although conceptually distinct, income inequality is often studied as part of the broad +analyses covering poverty and welfare. However, inequality is a broader concept than poverty because it is defined over the whole distribution (Litchfield, 1999; Cowell, 1999). Since Atkinson (1970), most questions about the measurement of inequality have been formulated using the explicit logic of social choice theory. In this case, desirable properties are articulated and the indices or methods are judged according to how well they conform to some selected properties. There were debates about the merits and demerits of various subsidiary properties, until reasonable consensus was reached (Morduch and Sicular, 2002).

Pigou (1912) and Dalton (1920) proposed the Pigou-Dalton transfer principle. This stated that inequality increases when there is transfer of income from a poorer to richer person (Atkinson, 1970). Most measures of inequality in literature (Generalized Entropy, Atkinson, Gini coefficient) satisfy this principle. Also, Dalton (1920) proposed the population principle of income inequality measurement, which stated that inequality measures are invariant to replications of the population. This implies that merging two identical distributions will not alter the level of inequality. The anonymity principle (symmetry), proposed that inequality measures are independent of any characteristic of individuals other than their income (Litchfield, 1999).

The work of Kuznets (1955, 1963) on the relationship that exists between development and income inequality inspired development economists to find the major sources of income inequality. The regression analytical approach to inequality decomposition was pioneered by Oaxaca (1973) and Blinder (1973). This effort was set to determine the contributions of some socio-economic variables to income inequality. Fei *et al*, (1978) also proposed a statistical

approach that decomposed income in a way that pinpointed the contributions of each income source to overall inequality. The perceived linkage between income inequality and poverty motivated Datt and Ravallion (1992) to propose a method that decomposed poverty change into the income redistribution, income growth, and a residual components, otherwise known as the black box. Kakwani (1997) used axiomatic approach to decompose poverty change into their growth and redistribution components. This was confirmed by the Shorrocks (1999) method that applied the Shapley (1953) theory to poverty decomposition. This was able to take care of the problematic residual component that was left in the Datt and Ravallion (1992) method.

The relevance of income inequality to economic development efforts can be judged by the spread of researchers that have kept close focus at it since the past few decades. In Nigeria, Adelman and Morris (1971) estimated a Gini coefficient of 0.51. Aboyade (1974) used the 1966/67 household data and estimated a Gini coefficient of 0.58. Etukodo (1978) found that income inequality was higher in urban Lagos than a rural area in Cross Rivers State. In 1996/97, Gini index for Nigeria was 0.506, while it was 0.613 in 1998 (World Bank, 2003).

Matlon (1979) found that non-farm income had negative impact on the distribution of rural income in Nigeria because it was mainly concentrated among large landowners. In Zimbabwe, Piesse *et al* (1998) used Gini decomposition and found that non-farm income decreased income inequality in Chiweshe. In rural Egypt, Adams (1999) analyzed the impact of non-farm income on income inequality. Results showed that although non-farm income represented the most important inequality-decreasing source of income, agricultural income represented the most important inequality-increasing source of income. Ssewanyana *et al* (2004) found that in Uganda, non-farm income was inequality increasing, although not all sources of non-farm income have unfavorable effect on income distribution among the rural population.

Fields and Yoo (2000) proposed a regression-based method for analyzing the contributions of socio-economic characteristics to change in labor income in Korea. It was found that between 1986 and 1993, the job tenure, gender, years of education and occupation explained the level of income inequality, while education, industry, occupation and potential experience accounted for change in income inequality. Morduch and Sicular (2002) also proposed a regression-based approach for decomposing income inequality. The approach provided an efficient and flexible way to quantify the roles of variables like education, age, infrastructure, and social status in a multivariate context. Using data from China, the results illustrated the sharp differences that can result when using decomposition methods with varying properties.

Alayande (2003) decomposed income inequality in Nigeria with the Morduch and Sicular (2002) method. With 1996/1997 data, the Gini decomposition method revealed that primary and post-secondary educational attainments are important in reducing income inequality, while the number of unemployed persons in the households contributed positively to income inequality. Wan and Zhou (2005) applied regression-based approach using a combined Box-Cox and Box-Tidwell income generating function to decompose income inequality in rural China. Results showed that capital input and farming structure were the most significant factors explaining income inequality.

Baye (2005) used the Shapley Value for assigning entitlements in distributive analysis and assessed the within- and between-sector contributions to changes in poverty levels in Cameroon between 1984 and 1996. It was found that the within sector effects disproportionately accounted for increase in poverty, but the between-sector contributions in both rural and semi-urban areas increased poverty. Araar (2006) used the Shapley value to decompose Gini coefficient and generalize it to other inequality indices. It was concluded that, if well interpreted, the analytical approach can give convincing results on the contribution of each component factor. Using data from Cameroon, it was found

that rural areas contribute less than the urban areas to total inequality while about two-third of the total inequality was explained by the nonfood in the expenditure components decomposition.

Kakwani (1990) explored the relation between economic growth and poverty, and developed the methodology to measure separately the impact of changes in average income and income inequality on poverty. This decomposition provides a link between macro-economic adjustment policies and poverty, which is discussed in the context of the adjustment experience of Cote d'Ivoire. Son (2003) proposed a poverty decomposition approach that can be used to analyze changes in poverty over time into such components as the overall growth effect while assuming that inequality in the distribution does not change, the impact of differences in growth rates between the groups, the effect of the change in inequality within the different groups and the impact of changes in the population shares of the various groups.

Ravallion and Chen (2003) introduced the growth incidence curve (GIC) to measure the rate of growth over the relevant time period at each percentile of the distribution (ranked by income or consumption per person). Their rate of pro-poor growth is the mean growth rate of the poor, which gives the change in the Watts index per unit time divided by the headcount index. Ravallion (2004) submitted that the measure of the rate of pro-poor growth proposed by Ravallion and Chen (2003) is the ordinary rate of growth times a "distributional correction" given by the ratio of the actual change in poverty over time to the change that would have been observed under distribution neutrality. If growth is pro-poor, the rate of pro-poor growth will exceed the ordinary rate of growth. If the distributional shifts go against the poor, then it is lower than the ordinary rate of growth.

Son (2004) also proposed a 'poverty growth curve' that measures whether economic growth is pro-poor or not pro-poor. The methodology was developed

based on Atkinson's theorem linking the generalized Lorenz curve and changes in poverty. The approach seemed to give satisfactory results in some statistical investigation and testing with data from Thailand and some other cross-countries data. Duclos and Wodon (2004) also proposed simple graphical methods to test whether distributional changes are pro-poor or not. Based on definition of some terminologies, it was noted that issue of whether pro-poor growth should be absolute or relative is of paramount importance and whether more emphasis should be placed on the impact of growth on the poorest population.

Kalwijl and Verschoor (2005) analyzed the impact of globalization on poverty by quantifying explicitly the responsiveness of poverty to aggregate changes in income in six developing regions between the period 1980-98 using the Shapley method. It was found that differential income growth accounts for most of the diversity in poverty trends, both across regions and over time, but leaves a substantial amount of variation unexplained. The impact of changes on inequality is relatively small, except in Eastern Europe and Central Asia.

## **Data and Analytical Approaches**

### *The Data*

The data used were collected by the Nigeria's National Bureau of Statistics (NBS) {formerly known as the Federal Office of Statistics (FOS)}. They were based on National Living Standard Survey (NLSS) of households that was carried out between September 2003 and August 2004. 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 the FCT, summing up to 22,200 households in all (FOS, 2003). However, some households did not fully complete

the questionnaires. Out of the 22,200 households that were targeted, only 19,158 completed the survey. However, because many did not record their incomes, data for this study comprised of 15141 households from the 36 States and the FCT. These are those whose income sources were fully provided in the data set. Data set from the Household Expenditure Survey of 1998 were also used in order to fulfill the fourth objective. This data comprises of 18977 households.

The concept of income used in the study reckons with income earned both in cash and in kind. Therefore, money values were allocated to receipts of income in kind and household consumption of crops and livestock produced based on prevailing market prices. It was possible to compute profits from farming because the data included issues related to cost of production. Recognition was made of whether incomes recorded were incomes before or after taxation. This study identified the following (9) sources of income: employment (wage income), agricultural income, non-farm businesses, remittances/grants, credits (formal), asset disposal/rental, informal borrowing, government transfers and informal transfers (etc. begging).

*Measurement of income inequality*

In order to achieve the first objective, descriptive statistics like mean, percentage, standard deviation and variability index (mean/standard deviation) were used. In order to calculate Gini coefficient, Morduch and Sicular (2002) noted that where incomes are ordered so that  $Y_1 \leq Y_2 \leq Y_3 \leq \dots \leq Y_n$ , the Gini-coefficient can be computed as:

$$I_{Gini}(Y) = \sum_{i=1}^n a_i(Y)Y_i \quad \text{and} \quad a_i(Y) = \frac{2}{n^2\mu} \left( i - \frac{n+1}{2} \right) \quad \dots\dots 01$$

Where  $n$  is the number of observation,  $\mu$  is the mean of the distribution,  $Y_i$  is the income of  $i$ th household and  $i$  is the corresponding rank of income. This measure of income inequality conforms with the Pigou-Dalton transfer principle, income scale independence, principle of population, and anonymity or symmetry but

fails the decomposability axiom if the sub-vectors of income overlap. However, several authors have shown that Gini-coefficient can be decomposed successfully (Litchfield, 1999).

*Decomposition based on Gini-coefficient*

Decomposition of Gini index was originally developed by Rao (1969). Following Pyatt *et al* (1980), Gini-coefficient can be decomposed given that:

$$I_G(Y) = \frac{\text{Cov}(Y_i, i)}{n\mu} \quad 02$$

The variables are defined in equation 1 and Cov is covariance.

The Gini coefficient of the *ith* source of income,  $I_G(Y_s)$  can be expressed as

$$I_G(Y_s) = \frac{\text{Cov}(Y_s, i)}{n\mu_s} \quad 03$$

Since total income is the sum of source incomes, the covariance between the total income and its rank can be written as the sum of covariances between each source income and rank of total income. The total income Gini can then be expressed as a function of the source Ginis.

$$I_G(Y) = \sum_s \frac{\mu_s}{\mu} R_s I_G(Y_s) \quad 04$$

Where  $R_s$  is the correlation ratio expressed as:

$$R_s = \frac{\text{Cov}(Y, i)}{\text{Cov}(Y_s, i)} \quad 05$$

Similarly,  $\sum_s w_s g_s = 1$  06

$$w_s = \frac{\mu_s}{\mu} \quad 07$$

$$g_s = R_s \frac{I_G(Y_s)}{I_G(Y)} \quad 08$$

where  $w_s g_s$  is the factor income inequality weight of the an income source in overall income inequality or the the relative contribution of source  $s$ ,  $w_s$  is the

source income weight or the income share of source  $s$  and  $g_s$  is the relative concentration coefficient of the  $sth$  source in overall inequality. An income source increases overall income inequality when  $g_s > 1$  and it decreases it when it is  $< 1$ .

*The Within-Between (Intra-Inter) Inequality Decomposition*

In order to achieve part of the second objective, the within-between group contributions to income inequality was decomposed. Litchfield (1999) submitted that given a member of Generalized Entropy class of income inequality represented as:

$$I_{GE}(Y, \alpha) = \frac{1}{\alpha^2 - \alpha} \left[ \frac{1}{n} \sum_{i=1}^n \left( \frac{Y_i}{\mu} \right)^\alpha - 1 \right] \quad 0 \leq I_{GE} \leq \infty \tag{9}$$

$\alpha$  represents any real value capturing the weight given to the distance between incomes at different parts of the income distribution. Lower  $\alpha$  is sensitive to lower tail of the distribution, while higher  $\alpha$  is sensitive to changes in the upper tail. During estimation,  $\alpha$  can be specified as 0, 1 or 2. When  $\alpha$  is 0, more weight is given to the distances between incomes in the lower tail,  $\alpha$  equals gives equal weight across the distribution while  $\alpha$  equal 2 gives proportionately more weight to gaps in the upper tail. In this study,  $\alpha$  was specified as 2. When  $GE(\alpha) = 0$ , there is perfect equality in distribution. The within (intra) group inequality can be expressed as:

$$I_{GE, WITHIN} = \sum_{s=1}^S \lambda_s I_{GE}(Y_s, \alpha) \tag{10}$$

$$\lambda_s = v_s^\alpha f_s^{1-\alpha} \tag{11}$$

Where  $f_s$  is the population share, and  $v_s$  is the income share of each partitions  $s$ ,  $j=1,2,3\dots h$ . Similarly, the between (inter) group inequality can be expressed as:

$$I_{GE, BETWEEN} = \frac{1}{\alpha^2 - \alpha} \left( \sum_{s=1}^S f_s w_s^\alpha - 1 \right) \tag{12}$$

Cowell and Jenkins (1995) have shown that  $I_b + I_w = I_{total}$

### Regression-based decomposition

For the third objective, the regression based decomposition approach proposed by Morduch and Sicular (2002) was used. The per capita real income and per capita adult equivalent income were the measures of welfare, which served for decomposing the sources of income inequality. The decomposition is done by specifying an income function as:

$$Y = X\beta + \varepsilon \quad 13$$

Given that  $\beta$  is an  $M$ -vector of regression coefficients,  $Y$  is the per capita real income ( $\mathbb{R}$ ) and  $X$  is an  $n \times M$  matrix of independent variables. The socio-economic variables included in the regression are contained in table 1 and  $\varepsilon$  is the stochastic error term.

Following the conventional decomposition approach,  $Y_i = \sum_{s=1}^s Y_s$  the contributions of each of the socio-economic factors ( $X_i$ ) to Gini income inequality is decomposed as:

$$s(X^m, Y) = \frac{\sum_{i=1}^n \left( i - \frac{n+1}{2} \right) \hat{\beta}^m X_i^m}{\sum_{i=1}^n \left( i - \frac{n+1}{2} \right) Y_i} \quad 14$$

This inequality decomposition can be applied to several inequality indices like Theil-T, Theil L and coefficient of variation (CV). However, Morduch and Sicular (2002) found that parameters estimated in the different approaches had different signs. It was therefore noted that for proper policy making, a choice must be made between these methods. In this study, we used the CV approach. This was computed as:

$$s_{CV}(X^m, Y) = s_{VAR}(X^m, Y) = \left[ \frac{\sum_i (Y_i - \mu) \hat{\beta}^m X_i^m}{\sum_i (Y_i - \mu) Y_i} \right] = \left[ \frac{Cov(\hat{\beta}^m X^m, Y)}{Var(Y)} \right] \quad 15$$

### *The Datt and Ravallion approach to poverty decomposition*

For the fourth objective, the decomposition approach proposed by Datt and Ravallion (1992) was used to decompose observed change in poverty into growth, redistribution and the residual components. The growth effect measures changes in poverty that will be obtained when Lorenz curves does not change. Redistribution effect evaluates the effect of shift in Lorenz curve, while residual looks at the effect of interaction between growth and redistribution. The decomposition follows by identifying a reference period,  $k$ , the variation in poverty between 2 periods ( $t$  and  $t+n$ ) given a poverty line ( $z$ ) and Lorenz curve ( $L$ ) can be decomposed as:

$$P_{t+n} - P_t = \underbrace{G(t, t+n, k)}_{\text{Growth}} + \underbrace{d(t, t+n, k)}_{\text{Inequality}} + \underbrace{R(k, t+n, k)}_{\text{Residual}} \quad 16$$

Where

$$G(t, t+n, k) = P\left(\frac{z}{\mu_{t+n}}, L_k\right) - P\left(\frac{z}{\mu_t}, L_k\right) \quad 17$$

$$D(t, t+n, k) = P\left(\frac{z}{\mu_k}, L_{t+n}\right) - P\left(\frac{z}{\mu_k}, L_t\right) \quad 18$$

$$R(t, t+n, t) = G(t, t+n, t+n) - G(t, t+n, t) = D(t, t+n, t+n) + D(t, t+n, t)$$

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### *The Shapley Approach to poverty decomposition*

The Shapley decomposition method proposed by Shorrocks (1999) from the concept introduced by Shapley (1953) was also used for the fourth objective (see Shorrocks, 1999 for some details). The proposed framework is for decomposition analysis, whether static or dynamic and whether it concerns poverty or inequality in the distribution of living standards. It also has the advantage of eliminating the “black box” that remained unexplained in many conventional decomposition techniques. Given a fixed poverty line  $z$ , the poverty level at time  $t$  may be expressed as a function  $P(\mu_t, L_t)$  of mean income  $\mu_t$  and the

Lorenz curve  $L_t$ . The growth factor in the change in poverty between period  $t$  and  $t+n$  is denoted by  $G = \frac{\mu_{t+n}}{\mu_t} - 1$  and the redistribution factor by  $D = L_{t+n} - L_t$ .

The exercise becomes one of identifying the contribution of growth,  $G$ , and redistribution,  $D$ , in the decomposition of changes in any poverty measure that is additively decomposable. The  $P_\alpha$  class of poverty measures (Foster *et al.*, 1984) was used and it addresses poverty incidence ( $\alpha = 0$ ), poverty depth ( $\alpha = 1$ ) and poverty severity ( $\alpha = 2$ ). The aggregate change in the  $P_\alpha$  class of poverty measures is given as:

$$\Delta P = P(\mu_{t+n}, L_{t+n}, z) - P(\mu_t, L_t, z), \quad 20$$

This is an expression of the change in poverty,  $\Delta P_\alpha$  which was decomposed into the growth ( $G$ ) and redistribution ( $D$ ) components are given as:

$$G = P(\mu_{t+n}, L_t, z) - P(\mu_t, L_t, z) \quad 21$$

$$D = P(\mu_{t+n}, L_{t+n}, z) - P(\mu_{t+1}, L_t, z) \quad 22$$

According to Kolenikov and Shorrocks (2003), equation 21 indicates the marginal effect of the change in mean income with distribution held constant while equation 22 computes the marginal impact of redistribution when mean income is held constant. This two effects should be averaged and further expressed as:

$$G = \frac{1}{2}[P(\mu_{t+n}, L_t, z) - P(\mu_t, L_t, z)] + \frac{1}{2}[P(\mu_{t+n}, L_{t+n}, z) - P(\mu_t, L_t, z)] \quad 23$$

$$D = \frac{1}{2}[P(\mu_t, L_{t+n}, z) - P(\mu_t, L_t, z)] - \frac{1}{2}[P(\mu_{t+n}, L_{t+n}, z) - P(\mu_{t+n}, L_{t+n}, z)] \quad 24$$

## Results and Discussions

### *Description of Data*

Table 1 shows the descriptive statistics of some variables in the data set. The arithmetic and weighted means were computed for each of the variables. The total sampling weight is 104,353,742. The male house heads constituted 86.85 percent of the respondents with a weighted mean of 87.68 percent. Average age

of the house heads is 47.11 years with weighted mean of 47.59 years. Average family size is 4.97 with weighted mean of 6.40. Similarly, the adult equivalent household size is 3.89 with weighted mean of 5.20. Those who were currently married (monogamy or polygamy) constitute 91.10 percent with weighted mean of 93.18 percent. Formal education was attained by 62.22 percent of the house heads, although the highest proportion (18.25) percent had primary leaving certificate.

The income data were deflated with price index in each of the enumeration area (see appendix 1). It should be noted that while average consumer price indices is 1.0539 for the respondents, Rivers State, Delta State, Bauchi State, Edo States and FCT have the highest values of 1.4592, 1.3796, 1.3628, 1.347 and 1.3603, respectively. Average total annual real income of the households is ₦108,848.41 with weighted mean of ₦150,242.15. Its variability index is 74.63 percent. The undeflated total income (nominal income) has a mean of ₦114,632.72, with weighted mean of ₦159,864.78. The variability index is 73.82 percent.

The average per capita adult equivalent real income is ₦ 34,909.00 (about \$268.53) with weighted mean of ₦33,785.84. This translates into average of ₦2,903.08 per month. However, average per capita nominal income is ₦27,472.16 with weighted mean of ₦27,634.55. Average real income from employment income is ₦ 34818.00 with weighted mean and variability index of ₦53,006.87 and 34.13 percent, respectively. Average real agricultural income is ₦35204.93 with variability index of 58.36 percent. Incomes from non-farm businesses has a variability index of 39.10 percent.

#### *Gini-inequality indices*

Inequality indices of the rural and urban households in different States and geopolitical zones (GPZ) in Nigeria are presented in tables 2. In the combined analysis for all the sectors (henceforth CAS), Gini inequality index for

the total income is 0.5802, which implies that income inequality is high in Nigeria. Among the income sources, agricultural income source has the lowest Gini (0.6987), while incomes realized from government transfers records the highest inequality (0.9944). Gini inequality index of total income is higher in rural areas (0.5808) than urban (0.5278). At the GPZ, Gini inequality index for total income is highest in South East (0.6198), while South West records the lowest (0.5217). It should be noted that among the income sources, agricultural incomes from the north east and north west have the lowest Gini indices of 0.6316 and 0.6410, respectively. At the state level, inequality of total income is lowest in Bauchi, Lagos, Ondo and Ekiti States with 0.4012, 0.4508, 0.4854 and 0.4901, respectively. Also, Adamawa, Taraba, Imo and Bayelsa states have the highest Gini indices with 0.7021, 0.6519, 0.6268 and 0.6046, respectively. Among the income sources, agricultural income source has the lowest inequality in many of the States with Yobe and Gombe States having the lowest Gini indices of 0.5021 and 0.5147, respectively.

#### *Contribution of income sources to overall income inequality*

The analyses of the contributions of income sources were done based on GPZ, sector of the economy (rural and urban) and for the CAS. Table 3 presents the results for the GPZ. It shows that in North West and North East, agricultural income accounts for the highest proportion of total income with 47.11 and 41.48 percents, respectively. However, employment income accounts for the highest proportion of total income in the North Central (34.82 percent), South South (40.57 percent) and South East (33.37 percent). In South West, income from non-farm business accounted for the highest proportion of total income with 36.47 percent.

Table 3 further shows that in all the GPZ, employment income is income inequality increasing. This is because, its share of total income is lower than its relative contributions to total income inequality. For instance, in North East, it

accounts for 35.13 percent of total income and contributes 48.15 percent. It should be noted that in all the GPZ, agricultural income's share of total income is less than its relative contribution to income inequality. This implies that it is income inequality decreasing. Also, in all the GPZ (except South South), the share of income realized from non-farm business in total income is lower than its relative contribution to income inequality. However, the margin is not too wide for zones like North East, North Central, South West and South East. This implies that promotion of non-farm businesses has the potentials of boosting the incomes of the poor and reducing inequality. Government transfer has high coefficient of concentration, showing it is income inequality increasing in all the GPZ.

Table 4 shows the contribution of the income sources to overall income inequality in urban areas. It reveals that incomes from paid employment accounts for the largest share of total income with 41.06 percent and contributes 48.12 percent to total income inequality. Given the importance that public and private salaried jobs take in Nigerian urban centers, the proportional contribution of this income source to overall income inequality is not too much. Incomes from non-farm businesses accounts for 40.28 percent of the total incomes, but contributes 37.38 percent to total income inequality. Similarly, agricultural incomes contributes 10.63 percent to total income from urban areas but accounts for 7.39 percent of the total income inequality. This reveals that urban agricultural production in the form of livestock husbandry, fisheries, and crop production may deliver more income in the hands of the urban poor. Incomes from disposal of assets, informal borrowing and informal transfers also have the lowest contributions to total urban income, although they are inequality decreasing.

For the rural areas, the contributions of the income sources to overall income inequality are presented in table 5. It reveals that employment income contributes 25.82 percent of the total incomes and accounted for 34.70 percent of total inequality. Therefore, increasing the incomes from employment increases

income inequality in rural areas since the rich among them will further benefit. Agricultural incomes contributes 47.10 percent of total incomes, but accounts for 36.91 percent of total inequality. This shows that increasing incomes from agricultural sources will reduce inequality in the rural areas. This is expected because inducement for increased agricultural production in the rural areas is a direct effort to raise the incomes of the poor. Incomes from non-farm private businesses contributes 19.85 percent of the total incomes, but accounts for 21.98 percent of inequality. This shows that major opportunities for non-farm business in the rural areas are concentrated among the rich although the proportional contribution to income inequality is not too much. This is expected because the poor lacks the financial means for participating in profitable business ventures in the rural areas. Similarly, while incomes from remittances/grants, assets, informal borrowing and informal transfers contribute 2.04, 1.21, 1.22, 0.60 percent to total rural income, they accounted for 1.75, 0.97, 1.03 and 0.40 percent, respectively, of total inequality. All these income sources will reduce income inequality.

The contributions of the income sources to overall inequality in the CAS are presented in table 6. It shows that agricultural incomes contributes the highest proportion of 32.34 percent to total incomes and accounts for 21.70 percent to total inequality. This shows that increasing incomes from agriculture for the CAS would make more income to be given to the poor and income inequality will decrease. Income realized through paid employment contributes 31.99 percent of total income and accounts for 40.98 percent of total inequality. This shows that efforts to increase employment income will not lead to reduction in income inequality, as more income will be concentrated in the hands of the rich. Incomes from non-farm business contributes 28.11 percent of total incomes and accounts for 30.51 percent of total income inequality. This source is inequality increasing. Also, incomes from remittances/grants, credit (formal), assets, informal borrowing and informal transfers accounted for 2.44, 1.96, 1.04,

1.10, 0.72 percents of total incomes and contributed 2.00, 1.94, 0.80, 0.84 and 0.57 percents of total inequality respectively. These sources are inequality decreasing.

#### *Between and Within Group Inequality Decomposition*

Tables 7 shows the decomposition of the computed income source Gini into the between and within group inequality components across the Nigeria's 36 states and the FCT. It shows that inequality between the states accounts for the greater portion of observed inequality. Specifically, in the total incomes, 97.23 percent of the estimated Gini is accounted for by differences between the incomes from the states. It should be noted that Oyo, Lagos and Osun have the largest share of the real total incomes with 5.70, 5.47 and 5.34 percents, respectively. States with lowest shares are Ebonyi (0.86 percent), Cross Rivers (0.70 percent) and Benue (0.46 percent) (see appendix 1).

Similarly, table 8 shows the contribution to the inequality components based on sector of the economy (urban and rural). It shows that inequality among the income sources from rural areas accounted for the higher proportion of the Gini computed for each income source. Specifically, contribution of rural areas to inequality in total income is 0.2522 (43.46 percent) while the differences between rural and urban incomes accounted for 0.2702 (46.57 percent). The inter- and intra-group analysis also shows that differences in incomes within each of the sectors accounted for greater portion of the computed Gini for all the income sources and total income. It should be noted that while rural sector constitutes 72.94 percent of the population share, it accounts for 59.54 percent of total real income while urban areas accounts for 40.46 percent real total income, although accounting for 27.06 of the samples (see appendix 1).

Based on differences in GPZ, table 9 presents the results of the between-within decomposition of the income sources. Between group inequality also accounts for the highest portion of income Gini coefficient in all the income sources and total income. It accounts for 82.75 percent, 83.16 percent, 82.15

percent and 82.79 percent in total income, employment income, agricultural income, and non-farm business income, respectively. It further shows that in many of the income sources, North West and South West zones contributes most to within income inequality.

#### *Regression Based Decomposition*

Tables 10a, 10b and 10c present the results of the regression-based decomposition using the CV inequality index. In order to remove collinear variables, the tolerance levels of the variables were computed using the SPSS 10.0 statistical package. The results of the analyses are presented for the CAS (table 10a), urban sector (table 10b) and rural sector (table 10c). The analyses were done with per capita household income and per capita household adult equivalent income. The former was computed with the household size, while the latter was computed with the adult equivalent of each household, as presented in the data set. However, except where noticeable contradictions are found, interpretations were made based on per capita household income.

In table 10a, the parameter of urbanization for the CAS reveals that those from urban centers have significantly higher per capita income ( $p < 0.01$ ). This is expected because averagely, Nigeria's urban centers offer more opportunities for income generation than rural areas. DFID (2004) submitted that poverty is higher in rural Nigeria than the urban and per capita incomes in urban areas are roughly a third higher than in rural areas. Also, residing in urban areas will increase income inequality by 1.53 percent. Households that were living where the house heads were born do not have significant influence on per capita real income. Similarly, those house heads that always live in the town/village where they are presently resident do not have significantly lower/higher per capita real income.

Regional dummies, representing the South West and South East/South South geopolitical zones were included. Results showed that those households

from the South West zone have significantly higher per capita income in all the analyses ( $p < 0.05$ ). This factor also increased income inequality. The reason is that south west seems to be better developed than other GPZ in Nigeria in terms of industrial establishments, agricultural opportunities, education and social infrastructure. However, households from South East/South South zones have significantly lower per capita income in the results in tables 10 a, 10b and 10c . This factor increase rural and urban income inequality. The South South region have significantly lower per capita income in the CAS and rural sector ( $p < 0.01$ ). This factor also increased inequality in the CAS and urban sector and decreased it in the rural. Poverty and inequality problem in the south east and south south emanates mainly from environmental degradation that is affecting the land and water resources due to activities of oil companies. This is further compounded by government neglect of the area after the civil war.

Tables 10a, 10b and 10c also show that increase in household size significantly decreases real per capita incomes in all analyses ( $p < 0.01$ ). It increases inequality by 5.64 percent, 7.68 percent and 5.05 percent in the CAS, urban and rural areas, respectively. Omideyi (2004) noted that in rural Nigeria, the net effect of high family size is lower income, little savings, and increased poverty. Demand for more children will increase income inequality, because desire for large family size lies mostly among the poor.

The working hypothesis has to be rejected because house heads with formal education have significantly higher per capita real income ( $p < 0.01$ ). This is also expected because education increases skill for being gainfully employed (Rosenzweig and Schultz, 1989, Aromolaran, 2004). However, education will increase income inequality. This can be explained from the prevailing situation in Nigeria. First, it is the rich that will largely benefit from education programs either at the primary, secondary and tertiary levels. Second, the return to education is somehow low in Nigeria because of scarce job opportunities. Third, is that in this study, the largest proportion (18.25 percent) had primary education

which is not sufficient for securing a well paid job in the private or public sector. However, house heads whose fathers or mothers are formally educated does not have significantly higher per capita real income in all the results.

Male house headship does not significantly increase per capita real income in all the analyses. This factor does not contribute to inequality. The age of househead does not significantly influence per capita real income. This factor also marginally reduced inequality in urban areas (table 10b). Also, being married significantly reduced per capita real income in the CAS and rural areas ( $p < 0.01$ ). With this factor, income inequality increased. Christianity as a religion significantly reduced per capita income in the CAS ( $p < 0.05$ ). This factor also increased income inequality. The presence of the parents of either couple at home does not significantly reduced per capita real income in all the results. This contributes marginally to income inequality. However, the number of time the house head suffered from illness significantly reduced per capita real income in the CAS and urban areas ( $p < 0.05$ ). This is expected because serious illness incapacitates the households from involvement in productive economic activities. This factor increased income inequality.

Engagement in paid job significantly increased per capita real income in the results ( $p < 0.01$ ). This factor increased income inequality by 6.73 percent, 4.81 percent, and 6.51 percent in the CAS, urban and rural sectors, respectively. Involvement in farming significantly reduced per capita real income in the CAS and rural areas ( $p < 0.05$ ). This factor does not contribute much to inequality. Also, involvement in non-farm business significantly increased per capita real income ( $p < 0.01$ ). This factor contributes 1.40 percent, 0.051 percent and 1.21percent to income inequality in the CAS, urban and rural sectors, respectively. This shows that creation of opportunities for participating in non-farm business be a good avenue for poverty alleviation in the urban areas.

Money received through remittances/grants increased per capita real income significantly in all the results ( $p < 0.01$ ), but increased income inequality.

This is also because it is the rich people that can get such grants. Access to formal credit increases per capita real income significantly ( $p < 0.01$ ), but leads to increase income inequality. This is expected because the poor are rarely benefiting from formal credits due to lack of appropriate collaterals. Also, informal lending from friends significantly increased per capita income ( $p < 0.01$ ), but lead to increased income inequality. Income realized from disposal of assets significantly increased per capita real income in all cases ( $p < 0.01$ ), but leads to increase income inequality. This is expected because the poor rarely have assets that can be disposed for income generation.

### **Income redistribution/growth and Poverty Change**

The data set for 1998 household survey was used to analyze the contribution of income redistribution and income growth to poverty change in Nigeria. The poverty line based on per capita households income in 2004 is ₦1217.76, while that for 1998 is ₦618.63. The data set for 1998 were deflated in order to put them on the same poverty line, and its Gini coefficient is 0.4643 as against the 0.5765 computed for 2004.

Table 11 contains the results of decomposition of poverty incidence into its growth and redistribution components. It shows that for CAS, poverty head count in 1998 is 40.51 percent, and this increased to 51.59 percent in 2004. An increase of 11.08 percent was therefore had while per capita real income and Gini increased by 13.09 percent and 0.1121 unit, respectively. The Datt and Ravallion approach (henceforth DR) shows that for the CAS, income growth increases poverty head count by 5.95 percent, while redistribution increases it by 6.82 percent. The residual component accounts for 1.68 percent reduction in poverty incidence. Similarly, the Shapley decomposition revealed that growth in income accounts for 5.11 percent increase in the poverty head count, while redistribution of income accounts for 5.97 percent increase.

In urban areas, per capita real income increases by 16.21 percent, while Gini increases by 0.1041. Also, poverty head count was 29.68 percent in 1998. This increased to 31.61 percent in 2004. The DR decomposition revealed that out of the 1.93 percent increase in urban poverty, income growth accounts for 5.35 percent reduction while income redistribution increases it by 5.57 percent. Similarly, the Shapley approach showed that income growth reduces urban poverty by 4.49 percent, while redistribution increases it by 6.42 percent.

In rural areas, real per capita income grew by -26.31 percent, while Gini inequality indices increased by 0.0982. However, rural poverty incidence increased from 44.52 percent in 1998 to 59.00 percent in 2004. Of the 14.48 percent increase, DR approach showed that income growth and redistribution account for 13.94 and 4.22 percents, respectively. Similarly, the Shapley method revealed that income growth and redistribution increased rural poverty by 12.10 percent and 2.38 percent, respectively. These findings are in line with several findings that show that in recent time, poverty had increased in Nigeria with rural areas being worse affected.

Analysis at the GPZ level revealed that between 1998 and 2004, South West and North East had the highest real per capita income growth rates of 9.01 and 2.50 percent, respectively, while South East and North Central have the lowest values of -42.98 and -27.25 percents, respectively. Furthermore, while Gini inequality indices increased in all the GPZ between 1998 and 2004, South South and South East had the highest increase of 0.2384 and 0.2068, respectively. Poverty incidence in 1998 was highest in the North West and North East with 63.94 and 53.79 percents, respectively. The South West GPZ had the least poverty incidence of 15.80 percent in 1998. In 2004, the North West and South East GPZ have the highest poverty incidence of 66.23 and 65.10 percents, respectively, while South West also had the lowest (23.92 percent).

It is only in the North West GPZ that income redistribution had negative effect on poverty change with -0.14 and -0.54 percents with the DR and Shapley

approaches, respectively. It should be noted that this zone had the least increase in Gini coefficient. Also, income growth in the North East and south west GPZ resulted into 1.59 and 3.15 percents reduction in the DR decomposition of poverty level, respectively. It should be noted that in South East, South South, and North Central GPZ, where there were reductions in the growth of real per capita income between 1998 and 2004, the DR approach showed that poverty increased by 24.33, 14.48 and 15.22 percent, respectively, due to income growth.

At the state level, among the 17 states that recorded positive growth rates in real per capita income between 1998 and 2004, Bayelsa, Yobe, Borno and Ondo had the highest values with 130.86 percent, 81.24 percent, 45.04 percent and 41.15 percent, respectively. Out of the other states that recorded negative growth rates, Benue (-73.28 percent), Anambra (-60.78 percent), Ebonyi (-60.49), Adamawa (-57.00 percent) and Jigawa (-49.58 percent) have the lowest values. Similarly, Gini inequality increased in all the states (except in Kano) between 1998 and 2004, while Bayelsa, Akwa Ibom, Abia and Imo States have the highest values of 0.3956, 0.3762, 0.3313 and 0.3273 units, respectively.

Furthermore, Kebbi, Yobe, Jigawa and Katsina had one of the highest poverty incidence in 1998 with 81.51 percent, 78.71 percent, 69.67 percent and 66.73 percent, respectively. States with lowest incidence were Anambra, Benue, Lagos, Osun and Delta States with 0.82, 1.33, 2.61, 7.81 and 8.85 percents, respectively. In 2004, moreover, states with one of the highest poverty incidence were Ebonyi (90.24 percent), Jigawa (86.95 percent), Kebbi (83.66 percent), Adamawa (78.38 percent), Sokoto (66.52 percent), Enugu (65.22 percent) and Katsina (65.57 percent). It should be noted that between 1998 and 2004, states with highest increase in poverty incidence were Benue (56.00 percent), Abia (45.74 percent), Anambra (41.39 percent), Delta (39.58 percent), Adamawa (35.15 percent) and Nasarawa (34.47 percent) while those with reductions were Yobe (-20.93 percent), Bayelsa (-20.74 percent), Kano (-10.86 percent), Zamfara (-8.53 percent), Ondo (-4.81 percent) and Rivers State (-2.51 percent).

The DR decomposition approach showed that income growth reduced poverty by 42.96 percent in Bayelsa State, 24.69 percent in Yobe State, 18.97 percent in Borno State, 15.63 percent in Ondo State, 12.60 percent in Zamfara State and 10.89 percent in Rivers State. However, States like Cross River, Delta, Edo, Imo, Jigawa, Kogi, Nasarawa, Plateau, Akwa Ibom and FCT showed high contributions of income growth to poverty incidence with 48.20 percent, 44.79 percent, 18.85 percent, 17.10 percent, 24.57 percent, 23.03 percent, 23.06 percent, 20.88 percent, 21.71 percent and 25.52 percent, respectively. Similar results were obtained in the Shapley decomposition approach where income growth reduced poverty incidence by 28.52 percent in Bayelsa State, 22.99 percent in Yobe State, 12.39 percent in Borno State, 12.22 percent in Ondo State, 8.82 percent in Zamfara State and 7.40 percent in Rivers State.

Also, DR decomposition revealed that income redistribution reduced poverty by 12.47 percent in Kebbi, 11.88 percent in Kogi, 8.61 percent in Kano, 3.07 percent in Jigawa and 3.49 percent in Zamfara. States where redistribution contributed the most to poverty incidence were Edo (26.19 percent), Ekiti (11.83 percent), Imo (29.27 percent), Nasarawa (20.09 percent), Ogun (18.07 percent), and Oyo (13.79 percent). In the Shapley approach, income redistribution reduced poverty by 9.35 percent in Kebbi, 12.25 percent in Kogi, 7.21 percent in Kano, 5.18 percent in Jigawa and 8.99 percent in Cross Rivers. However, redistribution increased poverty incidence by 24.12 percent in Imo State, 20.54 percent in Edo State, 13.27 percent in Oyo State, 18.58 percent in Ogun State and 15.75 percent in Nasarawa State.

Table 12 presents the results of the DR and Shapley decomposition of poverty depth in Nigeria. It shows that in the CAS, poverty depth increased from ₦199.51 to ₦ 358.08 in 1998 and 2004, respectively. In 1998 and 2004, the rural sector recorded a higher poverty depth than urban sector. Specifically, poverty depth increased by 88.02 percent and 43.97 percent in the rural and urban sectors, respectively.

Moreover, the DR approach showed that income growth and redistribution increased poverty depth in CAS by ₦ 43.29 and ₦ 121.57, respectively. The residual component accounted for reduction of poverty depth by ₦ 6.29. Similarly, the Shapley method revealed that income growth and redistribution accounted for ₦ 40.15 and ₦ 118.42 increase in poverty depth, respectively. In urban areas, growth in income resulted in reduction of poverty depth by ₦ 30.55 and ₦ 29.29 in the DR and Shapley approaches, respectively. Income redistribution in urban areas increased poverty depth by ₦ 90.87 and ₦ 92.10 in the DR and Shapley approaches, respectively. In the rural areas, income growth and redistribution both increased poverty depth with almost the same contributions in the two approaches.

On the basis of GPZ, North West and North East had the highest poverty depth of ₦ 337.82 and ₦ 294.03, respectively in 1998, while the south west recorded the least (₦ 52.09). In 2004, poverty depth was highest in South East (₦ 505.08) and North West (₦ 467.75). Between 1998 and 2004, the depth of poverty increased by ₦ 321.17 in South East and ₦ 237.49 in South South. In all the GPZ, income redistribution increased poverty depth. Specifically, in South East, the DR decomposition showed that poverty depth increased by ₦ 180.39 due to income growth, while redistribution contributed N166.06. Similar results are obtained with Shapley decomposition with income growth accounting for ₦ 167.75 increase in poverty depth, while redistribution increased it by ₦ 153.42. However, in the DR approach, income growth resulted into reduction in poverty depth only in the North East (-8.81) and South West (-11.03). The Shapley approach gave similar results.

At the state level, in 1998, the depth of poverty was highest in Bayelsa (₦ 550.21), Kebbi (₦ 532.72), Yobe (₦ 519.16) and Kano (₦ 390.46). In 2004, Ebonyi, Jigawa, Kebbi and Bayelsa have the highest poverty depth with ₦ 752.71, ₦ 702.39, ₦ 630.43, and ₦ 507.83, respectively. Between 1998 and 2004, the increases in poverty depth in Nigerian states are highest in Benue (₦ 435.62),

Ebonyi (₦ 414.08), Imo (₦ 374.81) and Jigawa (₦ 371.42). States with lowest increase in poverty depth are Yobe (-₦ 166.56), Bayelsa (-₦ 42.38) and Kano (-₦ 30.76). Incidentally, these 3 states are among those with highest poverty depth in 1998 but have undergone a kind of growth that resulted into reduction in poverty depth.

The DR decomposition approach showed that income growth resulted into decline of poverty depth in Kano (-₦ 30.89), Katsina (-₦ 14.20), Zamfara (-₦ 86.93), Bauchi (-₦ 56.73), Borno (-₦ 66.18), Gombe (-₦ 13.63), Yobe (-₦ 264.72), Kwara (-₦ 3.72), Niger (-₦ 48.71), Ekiti (-₦ 7.73), Ogun (-₦ 16.98), Ondo (-₦ 59.66), Osun (-₦ 13.37), Oyo (-₦ 11.61), Bayelsa (-₦ 360.54), Rivers (-₦ 47.52) and Enugu (-₦ 53.51), while redistribution resulted into decline in poverty depth only in Kano (-₦ 8.26) and Kebbi (-₦ 57.41). The Shapley approach gave similar results for the effect of income growth, but has Kogi state added to the list of states where redistribution resulted into poverty depth reduction. It should be noted that in both approaches, income growth contributed the most to increase in poverty depth in Jigawa, Kebbi, Adamawa, Benue, Kogi, Cross Rivers, Delta, and Ebonyi, while redistribution increased poverty depth the most in Adamawa, Nasarawa, Akwa Ibom, Edo, Abia, Enugu and Imo.

### **Recommendations and conclusion**

The analyses presented in this study have shown that income inequality in Nigeria is still high with rural areas worse affected. Specifically, differences in the rural income accounted for the highest portion of inequality. Efforts to ensure a more equitable distribution of income should therefore be made with focus on development of essential social infrastructures for easier access to education, health, transportation, telecommunication and financial transactions. These will lead to reduction in rural-urban migration, which this study found to hold some negative consequences for income inequality reduction in Nigeria.

In urban and rural areas, incomes from paid employment increased income inequality. The significance of this source of income for urban and rural livelihood demands that more job opportunities should be provided but that public and private sector policies that concentrate the wealth of the country in the hands of some few top officials should be revised. Welfare package for low income earners should be revised in the public and private sector. The current minimum wage of ₦7,500 (about \$57) is grossly inadequate far below what obtains in international settings.

The contributions of urban non-farm and rural/urban agricultural income to income inequality are lower than their proportion in total income. This shows that they are inequality decreasing. These suggest the need to promote small scale enterprises that are agricultural and non-agricultural based in urban and rural Nigeria. The activities of National Directorate of Employment should not be concentrated in the urban areas alone. Skills in agricultural enterprises that can be managed within the socio-economic structure of the rural areas should be promoted. Rural and urban agricultural activities focusing on livestock, fish and crop production should be encouraged. However, notable problems militating against agricultural development in Nigeria like inefficient pricing system and natural resource degradation must be addressed.

Increasing household size reduces per capita income and increases income inequality. This underscores the need to intensify campaign against large family size. Women should be advised on proper way of birth control. This is necessary because increasing household size will reduce per capita income if there is no corresponding increase in the contributions of these members to income. In most cases, it is the poor that have high propensity for large family size.

Attainment of formal education increased per capita income and income inequality. This finding implies that the poor should have access to education in order to increase their incomes. This will reduce inequality as their skill for income generation rapidly increases. In most cases, educated people are well

placed to utilize available resources for increased incomes. To ensure adequate returns to investment in education, vocational trainings and skill development programs should be integrated. It is suggested that the Universal Basic Education (UBE) program being implemented by the Federal Government of Nigeria should go beyond nine years of compulsory education to twelve.

This study found that poverty incidence and depth in Nigeria increased between 1998 and 2004. However, it was found that South East and South South experienced the highest increase in poverty. This reveals that government should address the development agenda for these zones, which are poverty stricken despite their enormous contributions to Gross Domestic Products (GDP) through oil resources. Moreover, it was found that income growth reduced poverty where growth rates of the real income was positive. This shows that policies to be pursued by the government should take cognizance of inflation rates if the effect on poverty alleviation will be desirable. Also income inequality worsened between 1998 and 2004 in most of the states and this increased poverty incidence and depth. Development of programs that will boost the income levels of the poor is desirable for both redistribution and poverty alleviation purposes.

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Table 1: Descriptive Statistics of Some Variables in the Data Set

Description of variables	Arithmetic Mean	Standard Error	Standard Deviation	Weighted mean
<sup>a</sup> Per capita real households' adult equivalent income (N)	34909.0000	411.9880	50694.6179	33785.8433
<sup>a</sup> Deflated per capita income (N)	27472.1577	322.6387	39700.3015	27634.5471
<i>Regional and sector variables</i>				
<sup>a</sup> Sector (urban =1, 0 otherwise)	0.2706	0.0036	0.4443	0.4818
<sup>a</sup> Born here (yes =1, 0 otherwise)	0.7962	0.0033	0.4028	0.7887
<sup>a</sup> Always lived here (yes =1, 0 otherwise)	0.9285	0.0021	0.2577	0.9318
<sup>a</sup> South west (yes =1, 0 otherwise)	0.1864	0.0032	0.3894	0.2212
<sup>a</sup> South east and south south (yes =1, 0 otherwise)	0.2300	0.0034	0.4208	0.2410
<i>Socio-economic characteristics</i>				
<sup>a</sup> Household size	4.9658	0.0240	2.9566	6.3950
<sup>a</sup> Adult equivalent size	3.8857	0.0186	2.2897	5.2037
<sup>a</sup> Head's formal education (yes =1, 0 otherwise)	0.6222	0.0039	0.4849	0.6257
<sup>a</sup> Father's educational level (yes =1, 0 otherwise)	0.9888	0.0009	0.1054	0.9893
<sup>a</sup> Mother's educational level (yes =1, 0 otherwise)	0.9475	0.0018	0.2231	0.9434
<sup>a</sup> Sex (male =1, 0 otherwise)	0.8685	0.0027	0.3380	0.8768
<sup>a</sup> Age (years)	47.1149	0.1151	14.1670	47.5890
<sup>a</sup> Marital status (married =1, 0 otherwise)	0.9110	0.0023	0.2848	0.9318
<sup>a</sup> Religion (Christianity = 1, 0 otherwise)	0.4806	0.0041	0.4996	0.4664
<sup>a</sup> Father live in the home (yes =1, 0 otherwise)	0.0273	0.0013	0.1629	0.0306
<sup>a</sup> Mother live at home (yes =1, 0 otherwise)	0.0513	0.0018	0.2207	0.0625
<sup>a</sup> Number of days suffered illness	0.9908	0.0225	2.7702	0.9981
<i>Occupation and Capital variables</i>				
<sup>a</sup> Paid job (yes =1, 0 otherwise)	0.2729	0.0036	0.4455	0.3493
<sup>a</sup> Farming (yes =1, 0 otherwise)	0.6490	0.0039	0.4773	0.5604
<sup>a</sup> Non-farm business (yes =1, 0 otherwise)	0.3932	0.0040	0.4885	0.4923
<sup>a</sup> Grants (N)	2568.6395	131.8783	16227.4589	3281.3445
<sup>a</sup> Formal credit (N)	2125.0683	104.1541	12816.0376	3129.7853
<sup>a</sup> Asset (N)	1060.8777	88.3455	10870.8042	1748.9551
<sup>a</sup> Informal credit (N)	1163.1259	65.6742	8081.1235	1685.2990
<i>Other variables</i>				
Employment income (N)	34818.0021	828.9916	102006.4019	53006.8714
Agricultural income (N)	35204.9260	490.2724	60327.4123	34995.6944
Non farm income (N)	30600.5040	635.9576	78253.7986	50379.9520
Government transfer (N)	821.5380	97.9660	12054.5913	1283.6605
Informal transfer (N)	718.4082	57.4482	7068.9350	1093.4772
Total income (N)	108848.4129	1185.2994	145849.6300	150242.1495
Average price index	1.0539	0.0014	0.1678	1.0559
Total income (Nominal)	114632.7163	1262.0355	155291.9150	159864.7847
Sampling weight	6892.1301	54.0223	6647.3792	13303.0265

<sup>a</sup> = variables included in the regression

Table 2: Gini-Inequality Indices By Income Sources in Nigeria

State	Freq	Total	Employment	Agriculture	Non farm	Grants	Credit	Assets	Borrowed Govt	Begging	
All (CAS)	15141	0.5802	0.8858	0.6987	0.8450	0.9514	0.9591	0.9755	0.9580	0.9944	0.9782
Urban	4097	0.5278	0.7999	0.8704	0.7221	0.9396	0.9496	0.9902	0.9688	0.9888	0.9836
Rural	11044	0.5808	0.9168	0.6345	0.8837	0.9526	0.9607	0.9678	0.9527	0.9962	0.9714
North West	3497	0.5749	0.9317	0.6410	0.8869	0.9430	0.9798	0.9465	0.9281	0.9931	0.9428
Jigawa	521	0.5768	0.9529	0.5478	0.8920	0.9453	0.9870	0.9370	0.9362	0.9943	0.9166
Kaduna	502	0.5049	0.8580	0.7200	0.8561	0.9868	0.9932	0.9742	0.9617	0.9877	0.9792
Kano	534	0.5004	0.9237	0.6880	0.7734	0.9880	0.9897	0.9713	0.9069	0.9856	0.9497
Katsina	517	0.5189	0.9490	0.5686	0.8293	0.8947	0.9861	0.9034	0.9052	0.9919	0.9500
Kebbi	465	0.5502	0.9668	0.5701	0.9704	0.9384	0.9880	0.9196	0.9596	0.9940	0.9000
Sokoto	442	0.6198	0.9427	0.6481	0.9152	0.9002	0.9399	0.9122	0.8360	0.9859	0.8877
Zamfara	516	0.6052	0.9224	0.6090	0.9133	0.8985	0.9321	0.9150	0.8664	0.9951	0.9662
North East	2521	0.5889	0.9013	0.6316	0.8937	0.9758	0.9601	0.9713	0.9678	0.9913	0.9844
Adamawa	421	0.7021	0.9441	0.6986	0.9493	0.9712	0.9859	0.9557	0.9295	0.9942	0.9902
Bauchi	373	0.4012	0.8463	0.6506	0.8056	0.9850	0.9798	0.9951	0.9829	0.9886	0.9854
Borno	174	0.5283	0.7324	0.9306	0.7459	0.9517	0.9888	0.9874	0.9832	0.9896	0.9921
Gombe	461	0.4986	0.9574	0.5147	0.9410	0.9943	0.9880	0.9821	0.9792	0.9941	0.9840
Taraba	534	0.6519	0.8915	0.6468	0.8975	0.9539	0.8663	0.9524	0.9539	0.9901	0.9824
Yobe	559	0.5332	0.8936	0.5021	0.8915	0.9657	0.9715	0.9594	0.9323	0.9837	0.9662
North Central	2818	0.5716	0.8781	0.6930	0.8501	0.9578	0.9616	0.9802	0.9669	0.9945	0.9829
Benue	75	0.5871	0.7215	0.9047	0.8144	0.9785	0.8896	0.9867	0.9321	0.9783	0.9751
Kogi	547	0.5709	0.9035	0.7497	0.8050	0.9531	0.9515	0.9920	0.9718	0.9956	0.9894
Kwara	507	0.5464	0.8598	0.7983	0.7117	0.9300	0.9308	0.9942	0.9856	0.9816	0.9843
Nasarawa	438	0.6130	0.9089	0.6480	0.8934	0.9404	0.9759	0.9867	0.9493	0.9954	0.9825
Niger	533	0.5658	0.8528	0.6471	0.9059	0.9513	0.9639	0.9845	0.9604	0.9933	0.9601
Plateau	479	0.5353	0.8860	0.5746	0.8759	0.9693	0.9743	0.9161	0.9375	0.9950	0.9686
FCT	239	0.5806	0.8593	0.6032	0.9325	0.9387	0.9658	0.9871	0.9804	0.9940	0.9919
South West	2822	0.5217	0.8405	0.7455	0.7531	0.9264	0.9201	0.9897	0.9628	0.9923	0.9827
Ekiti	431	0.4901	0.8580	0.7002	0.8363	0.9166	0.8807	0.9868	0.9214	0.9911	0.9471
Lagos	422	0.4508	0.7289	0.9793	0.6668	0.9504	0.9263	0.9908	0.9599	0.9874	0.9868
Ogun	487	0.5446	0.8688	0.7721	0.7510	0.9367	0.9566	0.9921	0.9819	0.9893	0.9840
Ondo	499	0.4854	0.8696	0.5835	0.8097	0.9626	0.9011	0.9833	0.9588	0.9934	0.9865
Osun	497	0.5086	0.8455	0.7370	0.6660	0.8795	0.9160	0.9904	0.9659	0.9905	0.9757
Oyo	486	0.5186	0.8474	0.7122	0.7095	0.8844	0.9116	0.9819	0.9641	0.9903	0.9735
South South	1609	0.5819	0.8222	0.8077	0.7828	0.9417	0.9610	0.9847	0.9657	0.9913	0.9912
Akwa Ibom	281	0.5732	0.8501	0.8334	0.7003	0.9675	0.9414	0.9845	0.9844	0.9935	0.9954
Bayelsa	135	0.6214	0.7672	0.8791	0.7989	0.9720	0.9731	0.9737	0.9640	0.9910	0.9138
Cross Rivers	139	0.5409	0.6950	0.9312	0.7620	0.9614	0.9632	0.0000	0.9443	0.9909	0.9820
Delta	192	0.5653	0.8641	0.8611	0.7440	0.9702	0.9688	0.9910	0.9829	0.9910	0.9902
Edo	504	0.5899	0.8554	0.7682	0.8597	0.9084	0.9630	0.9845	0.9623	0.9862	0.9913
Rivers	358	0.5042	0.7875	0.6655	0.7320	0.9226	0.9336	0.9718	0.9422	0.9924	0.9797
South East	1874	0.6198	0.9041	0.7026	0.8738	0.9526	0.9536	0.9916	0.9675	0.9969	0.9884
Abia	258	0.5589	0.8281	0.9039	0.7378	0.9586	0.9453	0.9919	0.9878	0.9958	0.9880
Anambra	244	0.5600	0.8181	0.8668	0.7031	0.9287	0.9750	0.9914	0.9778	0.9959	0.9740
Ebonyi	461	0.5179	0.9866	0.5431	0.9655	0.9559	0.8944	0.9935	0.9477	0.9968	0.9849
Enugu	483	0.6046	0.9048	0.6522	0.8927	0.9277	0.9736	0.9889	0.9685	0.9939	0.9915
Imo	427	0.6268	0.8990	0.6814	0.8947	0.9465	0.9224	0.9851	0.9373	0.9947	0.9741

Table 3: Contribution of Income Sources to Overall Income Inequality in Geopolitical Zones (GPZ) in Nigeria

GPZ	Source	Employment	Agricultural	Non-Farm Business	Grants	Credits (Formal)	Assets	Informal Borrowing	Government	Informal Transfers
North West	Coeff. of Concentration	0.7439	0.4497	0.7111	0.4553	0.6050	0.5130	0.4674	0.7606	0.3390
	Share	0.1820	0.4711	0.2573	0.0177	0.0090	0.0268	0.0186	0.0066	0.0107
	Relative Contribution	0.2355	0.3685	0.3183	0.0141	0.0095	0.0240	0.0152	0.0087	0.0063
	Absolute Contribution	0.1354	0.2119	0.1830	0.0081	0.0054	0.0138	0.0087	0.0050	0.0036
North East	Coeff. of Concentration	0.8071	0.3857	0.6424	0.6428	0.4724	0.3849	0.5778	0.5985	0.4963
	Share	0.3513	0.4148	0.1875	0.0130	0.0094	0.0074	0.0100	0.0020	0.0046
	Relative Contribution	0.4815	0.2717	0.2046	0.0142	0.0075	0.0048	0.0098	0.0020	0.0039
	Absolute Contribution	0.2835	0.1600	0.1205	0.0083	0.0044	0.0028	0.0058	0.0012	0.0023
North Central	Coeff. of Concentration	0.7384	0.3826	0.5928	0.4596	0.5043	0.6037	0.5830	0.8243	0.4671
	Share	0.3482	0.3355	0.2447	0.0190	0.0159	0.0113	0.0090	0.0128	0.0036
	Relative Contribution	0.4499	0.2245	0.2538	0.0153	0.0141	0.0120	0.0091	0.0185	0.0029
	Absolute Contribution	0.2571	0.1283	0.1450	0.0087	0.0080	0.0068	0.0052	0.0106	0.0017
South West	Coeff. of Concentration	0.6731	0.2955	0.5323	0.3705	0.4660	0.4982	0.3811	0.6377	0.4344
	Share	0.3392	0.2118	0.3647	0.0299	0.0306	0.0030	0.0079	0.0059	0.0070
	Relative Contribution	0.4377	0.1200	0.3721	0.0212	0.0273	0.0028	0.0058	0.0073	0.0058
	Absolute Contribution	0.2283	0.0626	0.1941	0.0111	0.0143	0.0015	0.0030	0.0038	0.0030
South South	Coeff. of Concentration	0.6710	0.4943	0.5371	0.3773	0.6190	0.2120	0.4464	0.7416	0.6122
	Share	0.4057	0.2172	0.3034	0.0219	0.0225	0.0036	0.0063	0.0132	0.0061
	Relative Contribution	0.4679	0.1845	0.2800	0.0142	0.0239	0.0013	0.0048	0.0169	0.0065
	Absolute Contribution	0.2723	0.1073	0.1630	0.0083	0.0139	0.0008	0.0028	0.0098	0.0038
South East	Coeff. of Concentration	0.7785	0.3745	0.6947	0.5684	0.4614	0.4539	0.4442	0.7790	0.6094
	Share	0.3337	0.2816	0.3024	0.0369	0.0185	0.0034	0.0112	0.0055	0.0070
	Relative Contribution	0.4191	0.1701	0.3389	0.0338	0.0138	0.0025	0.0080	0.0070	0.0068
	Absolute Contribution	0.2598	0.1054	0.2101	0.0210	0.0085	0.0015	0.0050	0.0043	0.0042

Table 4: Contributions of Income Sources to Overall Income Inequality in Urban Nigeria

Source	Coeff. of Concentration	Share	Relative Contribution	Absolute Contribution
Employment	0.6184	0.4106	0.4812	0.2539
Agricultural	0.3669	0.1063	0.0739	0.0390
Non-Farm Business	0.4899	0.4028	0.3738	0.1973
Grants	0.3480	0.0257	0.0169	0.0089
Credits (Formal)	0.4842	0.0207	0.0190	0.0100
Assets	0.5949	0.0067	0.0075	0.0040
Informal Borrowing	0.4435	0.0081	0.0068	0.0036
Government	0.6578	0.0116	0.0144	0.0076
Informal Transfers	0.4472	0.0075	0.0064	0.0034

Table 5: Contributions of Income Sources to Overall Income Inequality in Rural Nigeria

Source	Coeff. of Concentration	Share	Relative Contribution	Absolute Contribution
Employment	0.7806	0.2582	0.3470	0.2015
Agricultural	0.4551	0.4710	0.3691	0.2143
Non-Farm Business	0.6433	0.1985	0.2198	0.1277
Grants	0.4996	0.0204	0.0175	0.0102
Credits (Formal)	0.5586	0.0168	0.0162	0.0094
Assets	0.4664	0.0121	0.0097	0.0057
Informal Borrowing	0.4878	0.0122	0.0103	0.0060
Government	0.7697	0.0048	0.0064	0.0037
Informal Transfers	0.3909	0.0060	0.0040	0.0023

Table 6: Contributions of Income Sources to Overall Income Inequality in Urban and Rural Nigeria

Source	Coeff. of Concentration	Share	Relative Contribution	Absolute Contribution
Employment	0.7434	0.3199	0.4098	0.2378
Agricultural	0.3893	0.3234	0.2170	0.1259
Non-Farm				
Business	0.6297	0.2811	0.3051	0.1770
Grants	0.4806	0.0225	0.0187	0.0108
Credits				
(Formal)	0.5593	0.0184	0.0177	0.0103
Assets	0.4726	0.0099	0.0081	0.0047
Informal				
Borrowing	0.4671	0.0106	0.0085	0.0049
Government	0.7589	0.0075	0.0099	0.0057
Informal				
Transfers	0.4528	0.0066	0.0052	0.0030

Table 7: Contributions of State Between- and Within-Group Differences to Sources Income Inequality in Nigeria

Income group	Between-group	Within-group
Total	0.5641	0.0161
Employment	0.8616	0.0243
Agricultural	0.6788	0.0199
Non-Farm Business	0.8221	0.0229
Grants	0.9234	0.0280
Credits (Formal)	0.9315	0.0276
Assets	0.9455	0.0299
Informal Borrowing	0.9293	0.0287
Government	0.9653	0.0291
Informal Transfers	0.9485	0.0297

Table 8: Urban-Rural Between- and Within-Group Sources of Inequality in Income in Nigeria

	Rural	Urban	Between-Group	Within-group
Total	0.2522	0.0578	0.2702	0.3100
Employment	0.3214	0.1124	0.4520	0.4338
Agricultural	0.4013	0.0313	0.2661	0.4326
Non-Farm Business	0.2709	0.1133	0.4608	0.3842
Grants	0.3744	0.1173	0.4597	0.4916
Credits (Formal)	0.3818	0.1169	0.4604	0.4987
Assets	0.5139	0.0729	0.3887	0.5868
Informal Borrowing	0.4787	0.0816	0.3977	0.5603
Government	0.2754	0.1662	0.5529	0.4415
Informal Transfers	0.3809	0.1231	0.4742	0.5040

Table 9: Between- and Within-Group Inequality in Income Sources in Geopolitical Zones in Nigeria

Income Source/GPZ	North West	North East	North Central	South West	South South	South East	Between-Group	Within-group
Total	0.0254	0.0154	0.0202	0.0254	0.0071	0.0066	0.4801	0.1001
Employment	0.0234	0.0259	0.0338	0.0434	0.0127	0.0100	0.7366	0.1492
Agricultural	0.0413	0.0212	0.0254	0.0238	0.0066	0.0065	0.5740	0.1247
Non-Farm Business	0.0359	0.0156	0.0261	0.0475	0.0103	0.0100	0.6995	0.1454
Grants	0.0328	0.0147	0.0285	0.0599	0.0112	0.0166	0.7877	0.1636
Credits (Formal)	0.0212	0.0128	0.0295	0.0746	0.0143	0.0102	0.7965	0.1626
Assets	0.1131	0.0189	0.0395	0.0144	0.0044	0.0036	0.7816	0.1939
Informal Borrowing	0.0723	0.0239	0.0290	0.0350	0.0070	0.0109	0.7800	0.1780
Government	0.0382	0.0069	0.0596	0.0380	0.0212	0.0078	0.8227	0.1717
Informal Transfers	0.0678	0.0181	0.0189	0.0508	0.0112	0.0111	0.8002	0.1780

Table 10a: Regression Based Decomposition of Sources of Income Inequality in Urban and Rural Nigeria

Variables	Per capita household income				Per capita household adult equivalent income			
	Coefficient	T statistics	Tolerance	Contribution	Coefficient	T statistics	Tolerance	Contribution
Constant	27042.0320	8.0850			30117.2920	6.9240		
Regional and sector								
Sector	6030.7330	7.7300	0.6760	0.0153	6370.5090	6.2780	0.6760	0.0122
Born here	342.8750	0.4580	0.8950	-0.0001	433.3910	0.4450	0.8950	-0.0001
Always live here	345.1740	0.3000	0.9220	0.0000	-64.6770	-0.0430	0.9220	0.0000
South west	10007.1580	11.8580	0.7530	0.0233	13819.6620	12.5910	0.7530	0.0242
South east and south south	-3083.0430	-4.2010	0.8510	0.0012	-5336.4220	-5.5900	0.8510	0.0022
Socio-economic								
Household size	-3224.3040	-30.9210	0.8530	0.0564	-2496.3180	-18.4070	0.8530	0.0204
Education	2288.1420	3.5790	0.8450	0.0011	2960.3160	3.5600	0.8450	0.0011
Father's education	257.1200	0.0980	0.9780	0.0000	-2243.1070	-0.6600	0.9780	0.0000
Mother education	4060.3830	3.1590	0.9680	0.0010	5577.1180	3.3360	0.9680	0.0010
Sex	1058.3820	1.1880	0.8870	0.0000	-641.4720	-0.5530	0.8870	0.0000
Age	12.9690	0.6000	0.8570	-0.0001	5.4920	0.1950	0.8570	0.0000
Marital status	-3542.7420	-3.2770	0.8510	0.0008	-4051.9530	-2.8820	0.8510	0.0004
Religion	-1434.9830	-2.3240	0.8510	0.0001	-1765.4070	-2.1980	0.8510	0.0001
Father at home	-1923.8890	-1.0830	0.9710	0.0000	-1499.8980	-0.6490	0.9710	0.0000
Mother at home	-1140.8690	-0.8640	0.9570	0.0002	-1067.5750	-0.6220	0.9570	0.0001
Times of illness	-219.8140	-2.1110	0.9770	0.0002	-341.5070	-2.5220	0.9770	0.0003
Occupation and capital								
Paid job	22515.8010	31.7830	0.8140	0.0673	28668.0080	31.1150	0.8140	0.0671
Farming	-1978.6540	-2.6340	0.6320	0.0055	-2091.4580	-2.1400	0.6320	0.0042
Non farm business	8889.1510	13.5670	0.7920	0.0140	13183.5730	15.4710	0.7920	0.0190
Grants	0.2760	15.6180	0.9890	0.0156	0.3720	16.2120	0.9890	0.0174
Formal Credit	0.2940	13.0200	0.9710	0.0126	0.3950	13.4550	0.9710	0.0143
Asset	0.1670	6.3470	0.9920	0.0012	0.2070	6.0510	0.9920	0.0014
Informal Credit	0.3330	9.4620	0.9820	0.0049	0.4580	10.0120	0.9820	0.0062
Residual				0.7793				0.8084

Table 10b: Regression Based Decomposition of Sources of Income Inequality in Urban Nigeria

Variables	Per capita household income				Per capita household adult equivalent income			
	Coefficient	T statistics	Tolerance	Contribution	Coefficient	T Statistics	Tolerance	Contribution
Constant	42778.8730	4.8860			60005.3310	5.3890		
Regional factors								
Born here	671.8350	0.3770	0.8640	0.0000	1152.8760	0.5090	0.8640	0.0000
Always live here	2290.4230	0.8200	0.9120	0.0001	-964.3340	-0.2710	0.9120	0.0000
South west	4292.9980	2.5870	0.7450	0.0062	4413.8340	2.1030	0.7540	0.0050
South east and south south	-6063.3680	-2.9020	0.7870	0.0026	-11195.9390	-4.2160	0.7880	0.0050
Socio-economic								
Household size	-4686.0600	-18.3480	0.8270	0.0768	-7417.0960	-18.3680	0.8540	0.0717
Education	4626.4200	2.9040	0.8350	0.0018	7252.4770	3.5790	0.8350	0.0024
Father's education	-5560.5670	-0.8410	0.9790	0.0001	-16863.5600	-2.0040	0.9790	0.0008
Mother education	5438.9750	1.6330	0.9680	0.0011	6029.5410	1.4250	0.9700	0.0008
Sex	-313.6790	-0.1450	0.8920	0.0000	-2498.7930	-0.9060	0.8920	0.0000
Age	34.8630	0.6540	0.8530	-0.0003	130.0150	1.9180	0.8520	-0.0002
Marital status	-4736.0880	-1.6900	0.8390	0.0008	-4594.2850	-1.2900	0.8400	0.0004
Religion	-2821.4180	-1.8020	0.8150	0.0005	-3459.0660	-1.7370	0.8150	0.0003
Father at home	-1074.7550	-0.2460	0.9470	0.0000	2750.0700	0.4960	0.9470	0.0001
Mother at home	-1623.8550	-0.4430	0.9410	0.0002	163.8780	0.0350	0.9420	0.0000
Times of illness	-691.7320	-2.6870	0.9710	0.0017	-953.4310	-2.9120	0.9710	0.0018
Occupation and capital								
Paid job	26014.3950	15.6860	0.7320	0.0481	34495.0250	16.3980	0.7360	0.0484
Farming	-1662.7570	-0.9930	0.8750	0.0015	-210.6260	-0.1000	0.8870	0.0001
Non farm business	12356.7360	7.2760	0.7220	0.0005	18612.3120	8.6730	0.7320	0.0044
Grants	0.2550	7.7070	0.9900	0.0126	0.3940	9.3740	0.9900	0.0184
Formal Credit	0.2590	6.4860	0.9680	0.0097	0.3780	7.4410	0.9680	0.0131
Asset	0.1570	3.2850	0.9930	0.0011	0.1960	3.2240	0.9940	0.0011
Informal Credit	0.2530	3.9000	0.9810	0.0025	0.4840	5.8680	0.9830	0.0066
Residual				0.8323				0.8196

Table 10c: Regression Based Decomposition of Sources of Income Inequality in Rural Nigeria

Variables	Per capita household income				Per capita household adult equivalent income			
	Coefficient	T statistics	Tolerance	Contribution	Coefficient	T statistics	Tolerance	Contribution
(Constant)	25143.3920	6.9190			30128.4600	6.4990		
Regional factors								
Born here	142.9230	0.1840	0.8980	0.0000	92.8750	0.0940	0.8980	0.0000
Always live here	-255.6410	-0.2170	0.9200	0.0000	395.5330	0.2630	0.9200	0.0000
South west	13940.9920	13.8770	0.8910	0.0249	15286.1000	11.9690	0.8960	0.0198
South east and south south	-2281.7920	-3.1660	0.8560	0.0000	-4070.7700	-4.4350	0.8580	0.0007
Socio-economic								
Household size	-2665.0980	-25.1000	0.8650	0.0505	-4567.0400	-26.2400	0.8880	0.0525
Education	1605.7680	2.4780	0.8440	0.0009	1569.0890	1.8990	0.8440	0.0007
Father's education	948.1800	0.3410	0.9890	0.0000	1862.4970	0.5260	0.9890	0.0000
Mother education	3070.7120	2.3700	0.9730	0.0009	3372.6990	2.0410	0.9730	0.0008
Sex	1112.4340	1.2130	0.8800	0.0000	329.1760	0.2820	0.8800	0.0000
Age	1.5760	0.0710	0.8590	0.0000	-18.8080	-0.6670	0.8580	0.0002
Marital status	-3375.2950	-3.1120	0.8520	0.0012	-1707.0400	-1.2340	0.8520	0.0003
Religion	-967.4360	-1.5520	0.8600	-0.0001	-1330.4300	-1.6740	0.8600	0.0000
Father at home	-2487.4490	-1.3760	0.9760	0.0001	-3419.0700	-1.4830	0.9760	0.0002
Mother at home	-1219.7050	-0.9440	0.9590	0.0002	157.2220	0.0960	0.9620	0.0000
Times of illness	-44.3970	-0.4210	0.9770	0.0000	-102.7500	-0.7630	0.9770	0.0000
Occupational and capital								
Paid job	21159.1380	27.8090	0.8670	0.0651	28247.5800	29.2080	0.8730	0.0695
Farming	-1729.2050	-2.1480	0.7640	0.0036	-277.1410	-0.2710	0.7710	0.0004
Non farm business	7902.0420	11.8110	0.8660	0.0121	12600.5500	14.8370	0.8740	0.0183
Grants	0.2960	14.0550	0.9910	0.0165	0.3570	13.2670	0.9920	0.0151
Formal Credit	0.3510	12.2610	0.9730	0.0148	0.4620	12.6520	0.9730	0.0157
Asset	0.1830	5.6650	0.9880	0.0014	0.2730	6.6380	0.9880	0.0023
Informal Credit	0.4110	9.4750	0.9840	0.0076	0.4740	8.5470	0.9830	0.0063
Residual				0.8001				0.2026

Table 11: Decomposition of Change in Poverty Incidence in Nigeria into Income Growth and Redistribution Between 1998 and 2004

State/sector	% Growth in Real Income	Absolute change in Gini	1998 poverty incidence	2004 poverty incidence	Difference	Datts and Ravallion			Shapley	
						Growth	Redistribution	Residual	Growth	Redistribution
All (CAS)	-13.0891	0.1121	0.4051	0.5159	0.1108	0.0595	0.0682	-0.0168	0.0511	0.0597
Urban	16.2114	0.1041	0.2968	0.3161	0.0193	-0.0535	0.0557	0.0171	-0.0449	0.0642
Rural	-26.3098	0.0982	0.4452	0.5900	0.1448	0.1394	0.0422	-0.0368	0.1210	0.0238
North West	-6.7260	0.0256	0.6394	0.6623	0.0229	0.0323	-0.0014	-0.0080	0.0283	-0.0054
Jigawa	-49.5846	0.2483	0.6967	0.8695	0.1727	0.2457	-0.0307	-0.0422	0.2246	-0.0518
Kaduna	-1.4002	0.1239	0.3944	0.5219	0.1275	0.0179	0.1215	-0.0120	0.0120	0.1155
Kano	8.3016	-0.2251	0.6330	0.5243	-0.1086	-0.0506	-0.0861	0.0281	-0.0365	-0.0721
Katsina	3.3369	0.0896	0.6673	0.6557	-0.0116	-0.0135	-0.0039	0.0058	-0.0106	-0.0010
Kebbi	-33.5611	0.0333	0.8151	0.8366	0.0215	0.0839	-0.1247	0.0624	0.1151	-0.0935
Sokoto	-9.7414	0.2839	0.6109	0.6652	0.0543	0.0385	0.0136	0.0023	0.0396	0.0147
Zamfara	21.6864	0.2595	0.6647	0.5795	-0.0853	-0.1260	-0.0349	0.0756	-0.0882	0.0029
North East	2.5000	0.1600	0.5379	0.5561	0.0182	-0.0159	0.0258	0.0083	-0.0117	0.0299
Adamawa	-57.0007	0.3181	0.4323	0.7838	0.3515	0.3325	0.1544	-0.1354	0.2648	0.0867
Bauchi	26.7332	0.1262	0.3351	0.2815	-0.0536	-0.1153	0.0027	0.0590	-0.0858	0.0322
Borno	45.0371	0.2840	0.3103	0.3218	0.0115	-0.1897	0.0690	0.1322	-0.1236	0.1351
Gombe	3.0060	0.1843	0.5944	0.5987	0.0043	-0.0260	0.0217	0.0087	-0.0217	0.0260
Taraba	-13.6393	0.0701	0.5281	0.5843	0.0562	0.0169	0.0056	0.0337	0.0337	0.0225
Yobe	81.2360	0.1264	0.7871	0.5778	-0.2093	-0.2469	0.0036	0.0340	-0.2299	0.0206
North Central	-27.2472	0.0932	0.3502	0.5106	0.1604	0.1522	0.0532	-0.0451	0.1297	0.0307
Benue	-73.2798	0.2270	0.0133	0.5733	0.5600	0.5867	0.2400	-0.2667	0.4533	0.1067
Kogi	-42.9619	0.1451	0.4644	0.5686	0.1042	0.2303	-0.1188	-0.0073	0.2267	-0.1225
Kwara	1.6092	0.0136	0.2702	0.3886	0.1183	-0.0059	0.1243	0.0000	-0.0059	0.1243
Nasarawa	-38.7319	0.1843	0.2694	0.6142	0.3447	0.2306	0.2009	-0.0868	0.1872	0.1575
Niger	15.3350	0.1193	0.4859	0.4615	-0.0244	-0.0769	0.0150	0.0375	-0.0582	0.0338
Plateau	-34.2122	0.0767	0.3069	0.4802	0.1733	0.2088	0.0209	-0.0564	0.1806	-0.0073
FCT	-42.1667	0.0626	0.2971	0.5983	0.3013	0.2552	0.0837	-0.0377	0.2364	0.0649
South West	9.0141	0.1011	0.1580	0.2392	0.0811	-0.0315	0.0974	0.0152	-0.0239	0.1051
Ekiti	3.6041	0.1067	0.2529	0.3503	0.0974	-0.0023	0.1044	-0.0046	-0.0046	0.1021
Lagos	-20.8836	0.0885	0.0261	0.1540	0.1280	0.0355	0.1043	-0.0118	0.0296	0.0983
Ogun	13.3178	0.1299	0.1766	0.3224	0.1458	-0.0349	0.1910	-0.0103	-0.0400	0.1858
Ondo	41.1465	0.1385	0.2806	0.2325	-0.0481	-0.1563	0.0401	0.0681	-0.1222	0.0741
Osun	22.6298	0.0910	0.0885	0.1650	0.0765	-0.0463	0.1187	0.0040	-0.0443	0.1207
Oyo	15.0428	0.1036	0.1152	0.2140	0.0988	-0.0535	0.1132	0.0391	-0.0340	0.1327
South South	-22.6170	0.2384	0.2672	0.4717	0.2045	0.1448	0.1411	-0.0814	0.1041	0.1004
Akwa Ibom	-27.1612	0.3762	0.2313	0.5053	0.2740	0.2171	0.1993	-0.1423	0.1459	0.1281
Bayelsa	130.8553	0.3956	0.8296	0.6222	-0.2074	-0.4296	-0.0667	0.2889	-0.2852	0.0778
Cross Rivers	-70.6929	0.1840	0.2374	0.5468	0.3094	0.4820	-0.0072	-0.1655	0.3993	-0.0899
Delta	-55.5392	0.3172	0.0781	0.4740	0.3958	0.4479	0.2448	-0.2969	0.2995	0.0964
Edo	-24.0933	0.3148	0.2123	0.5496	0.3373	0.1885	0.2619	-0.1131	0.1319	0.2054
Rivers	27.7805	0.0319	0.2737	0.2486	-0.0251	-0.1089	0.0140	0.0698	-0.0740	0.0489
South East	-42.9784	0.2068	0.3618	0.6510	0.2892	0.2433	0.1393	-0.0934	0.1966	0.0926
Abia	-54.7825	0.3313	0.0349	0.4922	0.4574	0.3333	0.2791	-0.1550	0.2558	0.2016
Anambra	-60.7804	0.2537	0.0082	0.4221	0.4139	0.3443	0.2295	-0.1598	0.2643	0.1496
Ebonyi	-60.4921	0.1910	0.5879	0.9024	0.3145	0.2907	0.0651	-0.0412	0.2701	0.0445
Enugu	14.0008	0.2618	0.6004	0.6522	0.0518	-0.0518	0.0932	0.0104	-0.0466	0.0983
Imo	-23.0754	0.3273	0.2459	0.6066	0.3607	0.1710	0.2927	-0.1030	0.1194	0.2412

Table 12: Decomposition of Change in Poverty Depth in Nigeria into Income Growth and Redistribution

State	1998	2004	Difference	Datts and Ravallion			Shapley	
				Growth	Growth	Redistributi	Growth	Redistribution
All (CAS)	199.5056	358.0780	158.5723	43.2933	121.5708	-6.2918	40.1474	118.4249
Urban	142.8899	205.7188	62.8289	-30.5452	90.8664	2.5077	-29.2914	92.1202
Rural	220.5087	414.5983	194.0897	107.5000	106.5090	-19.9194	97.5403	96.5493
North West	337.8210	467.7537	129.9327	30.8751	106.6101	-7.5525	27.0989	102.8338
Jigawa	330.9678	702.3859	371.4181	345.1076	118.7750	-92.4645	298.8753	72.5427
Kaduna	166.8334	324.8399	158.0065	4.6210	153.6180	-0.2325	4.5048	153.5017
Kano	390.4619	359.7040	-30.7578	-30.8938	-8.2625	8.3984	-26.6946	-4.0632
Katsina	377.9731	404.0359	26.0628	-14.2018	38.9396	1.3251	-13.5393	39.6021
Kebbi	532.7236	630.4250	97.7015	174.7219	-57.4127	-19.6077	164.9181	-67.2166
Sokoto	247.5998	487.5450	239.9452	51.0294	208.2634	-19.3476	41.3556	198.5896
Zamfara	318.0269	381.9980	63.9711	-86.9285	126.9151	23.9845	-74.9362	138.9073
North East	294.0322	374.7745	80.7423	-8.8147	88.2258	1.3313	-8.1491	88.8914
Adamawa	215.8604	658.2123	442.3519	307.5024	189.0436	-54.1942	280.4054	161.9466
Bauchi	124.1134	167.1838	43.0704	-56.7279	87.2931	12.5052	-50.4753	93.5457
Borno	103.9821	208.7313	104.7493	-66.1792	176.0827	-5.1542	-68.7563	173.5056
Gombe	257.6389	354.3644	96.7255	-13.6289	108.0057	2.3487	-12.4545	109.1800
Taraba	332.7854	390.5450	57.7595	43.9926	11.7070	2.0599	45.0226	12.7370
Yobe	519.1642	352.6079	-166.5563	-264.7241	54.7526	43.4152	-243.0165	76.4602
North	154.7525	335.8373	181.0848	99.8693	96.1213	-14.9057	92.4164	88.6684
Benue	2.0908	437.7151	435.6243	283.0438	138.8600	13.7205	289.9040	145.7203
Kogi	212.5694	365.2257	152.6563	217.3543	2.0387	-66.7367	83.9859	-31.3297
Kwara	93.8961	240.4579	146.5618	-3.7159	150.3062	-0.0285	-3.7302	150.2920
Nasarawa	115.0691	453.6788	338.6097	146.7033	206.4520	-14.5457	139.4305	199.1792
Niger	217.3106	301.9458	84.6352	-48.7112	122.8810	10.4653	-43.4785	128.1137
Plateau	137.0484	293.2267	156.1783	125.0539	50.9066	-19.7822	115.1628	41.0155
FCT	168.1252	383.9616	215.8364	158.6146	50.4079	6.8139	162.0215	53.8149
South West	52.0884	140.2229	88.1345	-11.0284	101.5231	-2.3602	-12.2085	100.3430
Ekiti	92.0764	216.3374	124.2609	-7.7293	131.7505	0.2397	-7.6094	131.8704
Lagos	6.9122	106.7520	99.8398	10.3423	81.6339	7.8636	14.2741	85.5657
Ogun	66.3051	177.9678	111.6627	-16.9841	139.7101	-11.0633	-22.5157	134.1784
Ondo	99.4141	120.6201	21.2061	-59.6644	84.8451	-3.9747	-61.6517	82.8578
Osun	21.7268	111.0485	89.3217	-13.3704	110.9058	-8.2136	-17.4772	106.7990
Oyo	24.0644	113.9247	89.8604	-11.6050	110.5648	-9.0994	-16.1548	106.0151
South South	105.8841	343.3774	237.4934	69.0129	179.9508	-11.4704	63.2778	174.2156
Akwa Ibom	69.6192	377.5482	307.9290	90.2483	234.9809	-17.3002	81.5982	226.3308
Bayelsa	550.2065	507.8304	-42.3762	-360.5378	147.6179	170.5438	-275.2659	232.8897
Cross Rivers	58.8352	381.2578	322.4226	432.7989	54.8373	-165.2137	350.1921	-27.7695
Delta	19.8286	363.5696	343.7410	204.9844	194.6765	-55.9199	177.0245	166.7166
Edo	58.0273	402.8030	344.7757	76.9403	272.9492	-5.1137	74.3834	270.3923
Rivers	98.5910	145.3441	46.7531	-47.5181	85.0598	9.2113	-42.9124	89.6655
South East	183.9068	505.0753	321.1685	180.3945	166.0622	-25.2882	167.7504	153.4181
Abia	3.6923	358.5739	354.8815	130.1334	192.5496	32.1985	146.2327	208.6489
Anambra	1.7884	311.2356	309.4473	132.2911	152.1559	25.0002	144.7912	164.6560
Ebonyi	338.6300	752.7054	414.0754	366.4248	75.8391	-28.1885	352.3306	61.7448
Enugu	317.2345	492.3298	175.0953	-53.5135	215.5627	13.0460	-46.9904	222.0857
Imo	77.7983	452.6111	374.8128	75.5352	299.8241	-0.5465	75.2620	299.5508

## Appendix 1: Income Share, Inequality and Consumer Price Indices in Nigeria

State/zone	Growth in real income (%)	Gini of 1998 real income	Gini of 2004 real income	Gini of 1998 Nominal Income	Gini of 2004 Nominal income	Average Price Index	Mean Income	Income share (%)	Population share (%)
All	-13.0891	0.4643	0.5765	0.4501	0.5802	-			
Abia	-54.7825	0.2252	0.5565	0.2303	0.5589	1.2300	90605.3251	1.4184	1.7040
Adamawa	-57.0007	0.4009	0.7190	0.4029	0.7021	1.0460	67861.2936	1.7335	2.7805
Akwa ibom	-27.1612	0.2111	0.5873	0.2307	0.5732	1.2637	110058.0384	1.8765	1.8559
Anambra	-60.7804	0.3211	0.5748	0.3424	0.5600	1.2620	129679.1454	1.9199	1.6115
Bayelsa	130.8553	0.2254	0.6210	0.2229	0.6214	0.9229	132462.7998	1.0851	0.8916
Bauchi	26.7332	0.2994	0.4256	0.2907	0.4012	1.3628	102158.3986	2.3121	2.4635
Benue	-73.2798	0.3258	0.5528	0.3223	0.5871	0.9277	100810.7418	0.4588	0.4953
Borno	45.0371	0.2337	0.5177	0.2190	0.5283	0.9845	201526.9843	2.1277	1.1492
Cross river	-70.6929	0.3103	0.4943	0.3804	0.5409	1.2725	83268.0935	0.7023	0.9180
Delta	-55.5392	0.2316	0.5489	0.2469	0.5653	1.3796	94383.9269	1.0996	1.2681
Ebonyi	-60.4921	0.3147	0.5057	0.3151	0.5179	1.1305	30862.9322	0.8633	3.0447
Edo	-24.0933	0.2586	0.5735	0.2389	0.5899	1.3470	84122.1879	2.5726	3.3287
Ekiti	3.6041	0.3818	0.4885	0.4113	0.4901	1.0050	92555.6180	2.4205	2.8466
Enugu	14.0008	0.3306	0.5925	0.3280	0.6046	1.1152	77126.3551	2.2603	3.1900
Gombe	3.0060	0.3237	0.5080	0.3057	0.4986	0.9886	83245.0216	2.3285	3.0447
Imo	-23.0754	0.2790	0.6064	0.2694	0.6268	1.0668	81417.7222	2.1095	2.8202
Jigawa	-49.5846	0.3227	0.5711	0.3249	0.5768	0.8551	52561.0862	1.6616	3.4410
Kaduna	-1.4002	0.3837	0.5075	0.3691	0.5049	0.9212	117233.5962	3.5709	3.3155
Kano	8.3016	0.7218	0.4967	0.6281	0.5004	0.8736	108581.9745	3.5182	3.5268
Katsina	3.3369	0.4349	0.5245	0.4003	0.5189	0.9281	92375.8146	2.8978	3.4146
Kebbi	-33.5611	0.5272	0.5605	0.5587	0.5502	1.0477	49878.9636	1.4073	3.0711
Kogi	-42.9619	0.4054	0.5505	0.4796	0.5709	1.0868	85837.1082	2.8490	3.6127
Kwara	1.6092	0.5250	0.5386	0.4836	0.5464	0.8875	124554.7370	3.8317	3.3485
Lagos	-20.8836	0.3495	0.4379	0.3490	0.4508	1.1806	213705.7394	5.4721	2.7871
Nasarawa	-38.7319	0.4148	0.5991	0.4057	0.6130	0.9291	115210.4062	3.0619	2.8928
Niger	15.3350	0.4327	0.5519	0.4345	0.5658	0.9840	111373.2931	3.6019	3.5202
Ogun	13.3178	0.3808	0.5107	0.3934	0.5446	1.0549	112524.7336	3.3251	3.2164
Ondo	41.1465	0.3285	0.4669	0.3633	0.4854	1.0907	127382.8757	3.8569	3.2957
Osun	22.6298	0.3845	0.4756	0.3681	0.5086	0.9281	177038.7548	5.3389	3.2825
Oyo	15.0428	0.3810	0.4846	0.3626	0.5186	0.9733	193368.6151	5.7022	3.2098
Plateau	-34.2122	0.4334	0.5101	0.4270	0.5353	0.9129	126834.8656	3.6864	3.1636
Rivers	27.7805	0.4250	0.4569	0.4095	0.5042	1.4592	189354.3660	4.1132	2.3644
Sokoto	-9.7414	0.3180	0.6020	0.3388	0.6198	1.0089	88420.1156	2.3714	2.9192
Taraba	-13.6393	0.5217	0.5917	0.5248	0.6519	0.9765	126775.1491	4.1077	3.5268
Yobe	81.2360	0.3842	0.5106	0.3439	0.5332	0.9930	92393.1696	3.1338	3.6920
Zamfara	21.6864	0.3481	0.6076	0.3624	0.6052	1.0119	118416.2041	3.7075	3.4080
FCT	-42.1667	0.5153	0.5779	0.5215	0.5806	1.3603	103168.8361	1.4961	1.5785
North west	-6.7260	0.5489	0.5744	0.4814	0.5749	-	90178.6766	19.1348	23.0962
North east	2.5000	0.4295	0.5895	0.4316	0.5889	-	102808.5133	15.7263	16.6502
North centra	-27.2472	0.4642	0.5574	0.4760	0.5716	-	111035.6036	18.9857	18.6117
South west	9.0141	0.3960	0.4971	0.4028	0.5217	-	152517.4705	26.1156	18.6381
South south	-22.6170	0.3308	0.5692	0.3258	0.5819	-	117272.3502	11.4492	10.6268
South east	-42.9784	0.4079	0.6147	0.4158	0.6198	-	75530.8863	8.5885	12.3770
Urban	16.2114	0.4132	0.5173	0.4065	0.5278	-	162768.3443	40.4631	27.0590
Rural	-26.3098	0.4799	0.5781	0.4649	0.5808	-	88845.7002	59.5369	72.9410