

# Explaining Polarization and its Dimensions in Nigeria: A DER Decomposition Approach

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### Abstract

Nigeria is a country of high ethnic and linguistic diversity, threatened by internal fissures and persistent levels of violence. It is argued that, ethnically polarized societies are prone to competitive rent-seeking activities by different groups and will have difficulty agreeing on public goods such as infrastructure, education, and good policies. This in part explains high level of inequity in income distribution and poverty in the country. High potential for large regional differences in economic and social conditions makes Nigeria susceptible to disintegration if the regional differences in standards of living continue to grow. Thus, the study aims to give insight into the extent to which income inequality has been socially embedded (polarization) in Nigeria, when the rich and the poor are distinguished not only by their wealth, but also by their language, ethnicity, or other social characteristic and account for the factors responsible. Data used for the study were from the 2003/2004 National Living Standard Survey data set collected by Nigeria National Bureau of Statistics. Duclos, Esteban and Ray (2004) (DER) method which is based on identification (the degree of equality within each group) - alienation (the degree of income differences among groups) framework, derived from rigorous axioms, avoiding arbitrary choices of income ranges and let the area of identification influence be determined by nonparametric kernel techniques, was decomposed. The results reveal a polarization measure of 0.25 ( $\alpha = 0.5$ ) with 0.41, 0.74 alienation and identification components respectively. High level of identification component suggests emerging level of bi-polarization in Nigeria. Variations between the zones (0.83) explain polarization more than intra-zonal variation (0.17). Urban sector (0.25) is slightly more polarized than rural sector (0.24). The population of secondary school leavers, unemployed and retirees, has become significant enough to explain part of polarization in the country (0.15 and 0.35 respectively). Thus, employment creating initiatives and effective social policies will go a long way in alleviating polarization in the country. Equitable distribution of income and poverty reducing policies will also reduce other negative aspects of polarization like severe poverty and higher level of between group inequalities.

Key words: Inequality, polarization decomposition, dimensions, violence and poverty reduction  
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## **1.0 Introduction**

Nigeria is a populous country with a large territory which covers many climatic regions, several ethnic groups and different religious groups. It is not surprising to find large regional differences in its economic and social conditions. Although, there are about 374 identifiable ethnic groups, the country's independent history has been marked by the rivalry between the "big three" ethno-regional clusters that, combined, represent roughly 72.7 per cent of the population: the Hausa-Fulani in the north (39.1 per cent), the Igbo in the south east (11.7 per cent) and the Yoruba in the south west (21.4 per cent). Their rivalry runs through post-independence history. Politicized tribal feelings have provoked not only a civil war in 1970 but also fear among many Nigerians that one of the three may come to dominate the whole. There is widespread notion that the lopsided distribution of the resources of the nation accounted for strong agitation to control power, and therefore resources at the centre. More than anything else, ethnicity has fostered a political culture where the struggle for inter-ethnic equity has impeded that for democratic rights – both of the individual and the group. It has been observed that, ethnically polarized societies are prone to competitive rent-seeking activities by different groups and will have difficulty agreeing on public goods such as infrastructure, education, and good policies (Alesina and Tabellini 1989; Alesina and Drazen, 1991). This may in part explain why Nigeria has produced more than \$400 billion in oil revenue since the early 1970s, (International Crisis Group, 2006) but an average Nigerian is poorer today than four decades ago. This persistent high level of poverty and inequity in income distribution in Nigeria has been so far well documented, (Canagarajah, et al., 1997; Aighokhan, 2000; Araar and Awoyemi, 2006; NBS, 2006; Awoyemi *et.al* 2009). Additionally, there is also a large differential in wellbeing across the zones and ethnic groups in the country. High potential for large regional differences in economic and social

conditions makes the country susceptible to disintegration if the regional differences in standards of living continue to grow. This could become 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 (Shorrocks and Wan 2004). This evidence underscores the need to go beyond conventional measures of inequality if concern is about political feasibility and continuity of reform policies as currently initiated in Nigeria.

So, the search light has been focused on the extent to which income inequality has been socially embedded in Nigeria. Economic inequality can be said to be socially embedded when the rich and the poor are distinguished not only by their wealth, but also by their language, ethnicity, race or other social characteristic (Zhang and Kanbur, 2001). The conjecture that motivates research on this phenomenon of polarization is that contrasts among homogeneous groups can cause social tension. One of the earliest works on polarization in Nigeria was done by Aighokhan, (2000) who showed concern and alerted the country on the danger of disappearing middle class. He remarked that any government interested in continuity and the sustainability of its policies must show serious concern to what is happening to the middle income group. Of recent, Awoyemi *et al.*, (2009) reported the case of emerging and increasing level of bi-polarization resulting from persistent increase in identification component of polarization and the growing proportion of Nigerian poor at the bottom of the country income distribution. This phenomenon is emerging in Nigeria as a result of some observed specific characteristics of different groups. This paper aims to give insight into the key underlying factors fueling the sense of diversity that may lead to social tension and conflicts in Nigeria. Toward this, we analyze the influence of

socio-economic, demographic and occupational group variables in explaining the level of polarization in Nigeria.

The rest of the paper is organized as follows. Section two presents rationale for the study while section 3 discusses the source and types of data used. Section 4 considers related literatures followed by section 5 which deals with the model and method of its estimation. Section 6 presents and discusses the results while section 7 concludes.

## **2.0 Rationale for the study**

This study underwrites its policy relevance in developing economy of Nigeria in which economic status and social categories like ethnic groups and religion are strongly correlated and which can be described as polarized along these dimensions. First, in order to implement appropriate institutional settings and policies that will reduce the feeling of grievance; the policy makers must understand the nature of the underlying factors fueling sense of diversity. This paper gives insight into this and provides information that could guide the formulation of a more egalitarian and peaceful society as well as policies aimed at helping lagging regions. This will in particular influence the distribution of infrastructural facilities in the country. Second, given inequality, polarization measurements can be used to judge tax reform policy (Rodríguez *et al.*, 2005). Brilliant efforts are currently being made on tax reform in Nigeria. Results from studies like this would give insight into the groups which bear the burden or benefits of government spending or tax regime. These will in-turn inform our policy makers on tax regime to adopt - progressive or regressive tax option thus, guide future deliberations on tax issues in Nigeria. Thus, the paper is set to analyze how characteristics other than income explain the level of polarization in Nigeria.

### **3.0. Data and household surveys**

Data used for this study were sourced from the 2004 World Bank assisted National Living Standard Survey (NLSS) collected by the National Bureau of Statistics (NBS). This survey was designed to provide estimate at both state and local government levels. A two-stage stratified sampling method was adopted. At the first stage, from each of the 36 states and the Federal Capital Territory (FCT, Abuja), cluster 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 state and the FCT, summing up to 22,200 households in all (NBS, 2003). Preliminary analysis of the data shows that out of the 22,200 households that were targeted, only, 19158 completed the questionnaire. The NLSS consists of an integrated household questionnaire designed to collect data on multiple aspects of household welfare. This NLSS questionnaire among others covers the following topics: household size; household consumption level; housing; education; employment and wage income; health; agriculture; transfers and other non- labor income. This is to say that the data set is sufficiently rich for this study. We choose consumption as our indicator of well-being. Total consumption is estimated from the total household expenditure, other expenditure, money paid to the government, and other money spent. The approach of using per capita expenditure has been used in many studies on poverty in Nigeria (e.g. Canagarajah and Thomas, 2001). The study relies on the analysis of the national data based primarily on the six geo-political zones of the country. These zones consist of South-South, South-East, South-West, North-Central, North-East, and North-West which are well defined politically, territorially and culturally. These zones

cut across different geographical belts starting from the forest belt in the south to the derived savannah in the north. The country has great potential for regional disparity.

#### **4.0 Literature Review**

In recent years there has been an upsurge of interest on income polarization as a different concept from inequality (Wolfson, 1997, Esteban and Ray, 1994, Duclos, Esteban and Ray 2004, Rodríguez and Salas 2004, Araar, 2008, Awoyemi, *et al.* 2009). Theoretically, inequality relates to the overall dispersion of the distribution, polarization concentrates on income distribution in several focal or polar modes (Juan et al, 2001 Rodreque and Salas, 2005). According to Wolfson (1994), a bipolarized income distribution is one that is spread out from the median income value, so there are fewer individuals or families with middle level incomes. In a different way, Esteban and Ray (1994) adopt an identification-alienation framework. Identification relates to the notion of a within-groups feeling of identity. Meanwhile, alienation relates to the income distance between people in different groups. Besides, Esteban *et al.* (1999) suggest dividing the population by the mean value, instead of the median value used by Wolfson (1994). Although, the issue of polarization is gaining prominence in recent discussions on income distribution, there is little or no information on this phenomenon in Nigeria. One of the earliest works was done by Aighokhan, (2000) who showed concern and alerted the country on the danger of disappearing middle class in Nigeria. He remarked that any government interested in continuity and the sustainability of its policies must show serious concern to what is happening to the middle income group.

In spite of the aforementioned reasons, studies on regional polarization are almost of no existence in Nigeria. For instance, Alayande (2003), Aighokhan, (2000), Okunmadewa *et al.* (2006) Awoyemi and Adeoti, (2004), in all these studies, regional polarization is either not

mentioned or touched in passing. To the best knowledge of the authors, study on regional polarization is in its very infancy. This study attempts to fill the gaps identified above and extends the methods earlier used by relying on the recently developed methods to assess the issue of disappearing middle class, at the national, zonal and sectoral levels in Nigeria.

## **5.0 Models and method of estimation**

### **Duclos, Esteban and Ray (DER) (2004) index**

On the dimensions of polarization, we assume that groups are determined by characteristics which their members share, not only on income, but also on the basis of other relevant attributes, as it is possible that there exists a high correlation between income and other characteristics. The main aim here is to present how these characteristics explain polarization in Nigeria.

Duclos, Esteban and Ray (2004) method allows for individuals not to be clustered around discrete income intervals, and lets the area of identification influence be determined by nonparametric kernel techniques, avoiding arbitrary choices of income ranges. The authors establish that a general polarization measure that respects a basic set of axioms must be proportional to:

$$P_{\alpha}(F) = \int f(y)^{\alpha} g(y) dF(y) \quad (1)$$

where  $y$  denotes income and  $F(y)$  its distribution. The function  $g(y)$  captures the alienation effect while  $f(y)^{\alpha}$  captures the identification effect. The higher the  $\alpha$  parameter, the larger the weight attached to identification in the polarization index. The value of  $\alpha$  should be set by the analyst, the policy maker or in general the person who is evaluating income polarization in a given economy. In that sense  $\alpha$  implicitly captures the value judgments of the analyst. DER follow rigorous axiomatic development of the polarization concept and estimation in the “density case”. The authors start off with  $f$  as such a density; they are interested in its polarization  $P(f)$ .

Following the notion of “alienation” (A) and “identification”(I) first, in a unidimensional polarization ( $G = 1$ ), in this case pure income polarization for each individual with income located in the support of  $f$ . They presume that an individual located at  $x$ , feels alienation vis-a-vis another located at  $y$ , and that this alienation is monotonic in distance  $|x - y|$ . It is also, presumed that an individual located at income  $x$  experiences a sense of identification that depends on the density at  $x$ ,  $f(x)$ . (Note,  $G$  denotes the number of groups,  $x$  denotes the level of income  $x$  and  $y$  denotes the level of income  $y$ ). This method is of interest as a characterized measure of polarization not only because it is a natural extension of the work of ER but also appropriate for the case of continuous distributions of our income variable. The following axioms that are satisfied by the DER index are based on a density with finite support (kernel), and symmetric reductions in dispersion that concentrate the density around its mean (squeezes).

*Axiom 1: if a distribution is made up of a basic density, then a squeeze cannot increase polarization.* A single squeeze, in an environment where there is just one basic component, cannot increase polarization (Duclos *et al.* 2004). In other words, if a distribution made up of a population that can be scaled or undergo a slide (basic density) is collapsed inwards towards its global mean (squeeze), polarization will not increase.

*Axiom2: if a symmetric distribution is composed of three basic densities then a squeeze in the outer densities should not reduce polarization.* Here, as opposed to axiom 1, the squeeze is local and not global and will not decrease polarization, although internal alienations in each component densities decreases, as contrast to inequality measures.

*Axiom 3: if we consider a symmetric distribution made up of four basic densities with disjoint supports, then a move of the center distributions towards their outer neighbors, while keeping*

the disjoint supports, should increase polarization. This is to say that a symmetric outward slide will increase polarization.

*Axiom 4:* Given two distributions  $F$  and  $G$ , if  $P(F) \geq P(G)$ , being  $P(F)$  and  $P(G)$  the respective polarization indexes, it must be that  $P(\alpha F) \geq P(\alpha G)$  where  $\alpha F$  and  $\alpha G$  represent a rescaled version of  $F$  and  $G$ . This states that if one situation exhibits greater polarization than another, it must continue to do so when populations in both situations are scaled up or down by the same amount, leaving all (relative) distributions unchanged (Duclos *et al.* 2004).

#### *Estimation method*

As in ER, effective antagonism of an individual with income  $x$  towards another person of income  $y$  (under  $f$ ) could be written as  $T(i, a)$  where  $i = f(x)$  and  $a = |x - y|$ . It is assumed that  $T$  is increasing in its second argument and that  $T(i, 0) = t(0, a) = 0$ , just as in ER. Here, polarization is proportional to the “sum” of all effective antagonisms written as:

$$P(F) = \iint T(f(x), |x - y|) f(x) f(y) dx dy \quad (2)$$

DER establish that a general polarization measure  $P$ , as described in (6), satisfies axiom 1-4 of polarization if and only if it is proportional to

$$P_\alpha(f) \equiv \iint f(x)^{1+\alpha} f(y) |y - x| dy dx, \quad (3)$$

where  $\alpha \in [.25, 1]$

Concerns about estimating procedure and associated statistical inference follow DER approach which first remark that for every distribution function  $F$  with associated density  $f$  and mean  $\mu$ ,

$$\text{we have } P_\alpha(F) = \int f(y)^\alpha a(y) dF(y), \quad (4)$$

with  $a(y) \equiv \mu + y(2F(y) - 1) - 2 \int_{-\infty}^y x dF(x)$ . From our random sample size  $n$  assumed to be from i.i.d observations of expenditure  $y_i$ ,  $i=1, \dots, n$ , drawn from the distribution  $F(y)$  and ordered such that  $y_1 \leq y_2 \leq \dots \leq y_n$ .  $P\alpha(F)$  was estimated as:

$$P_\alpha(\hat{F}) = n^{-1} \sum_{i=1}^n \hat{f}(y_i)^\alpha \hat{a}(y_i), \quad (5)$$

where  $\hat{a}(y_i)$  is given as

$$\hat{a}(y_i) = \hat{\mu} + y_i(n^{-1}(2i-1) - 1) - n^{-1} \left( 2 \sum_{j=1}^{i-1} y_j + y_i \right) \quad (6)$$

$\hat{\mu}$  is the sample mean, and where  $\hat{f}(y_i)^\alpha$  is estimated nonparametrically using kernel estimation procedures. It smoothes the density avoiding the noise induced by the use of a sample instead of the whole population. We estimated a function  $f(y)$  over the logarithm of incomes  $\mathbf{y}=(y_1, \dots, y_n)$  in the sample assuming that there exists an original density  $f(y)$  from which the sample was extracted. We used the estimator:

$$\hat{f}(y_i) = \frac{1}{h(y)} \sum_{j=1}^n K\left(\frac{y_j - y_i}{h}\right) \forall j \quad (7)$$

where  $h(\cdot)$  smoothing bandwidth parameters, and  $K(\cdot)$  is the *kernel* function, which is Gaussian in our case. These estimates were computed using the facilities in the DAD software developed by Araar, Duclos and Fortin, (2006).

### **5.1 The socio-demographic sub-population groups and polarization: DER decomposition method**

The main aim here is to account for the contributions of socio-demographic characteristics or how some population groups can explain the level of polarization in Nigeria. First, we are guided by the pioneer work of Bhattacharaya and Mahalanobis (1967) on the decomposition of Gini

index, and largely the work of Pyatt, (1976), Lambert and Aronso, (1993) and Araar (2006) on the decomposition of inequality index by sub-population groups. The idea is that between-group inequality represents the inequality of the group when each household has the average income of its group. Then the algebraic decomposition of the Gini index takes the following form:

$$A = \sum_g \varphi_g \psi_g A_g + \bar{A} + R \quad (8)$$

Where  $\varphi_g$  and  $\psi_g$  are the population and income shares of the group  $g$  respectively.  $\bar{A}$  is the between group inequality and equals to the Gini index when each member of the group has the average income of its group. It is good to note that if incomes do not overlap, the residual part (R) of this decomposition vanishes (Araar, 2008). It follows that group with low residual of relative contribution will have high explanatory power of the polarization. This decomposition of Gini index helps to shed light on the decomposition of polarization as we can use the indicator R/A to assess the explanatory power of the interest group to polarization. This we applied to the decomposition of the DER index by population groups following Araar (2008). Here our groups comprise of zone, sector, educational groups, occupational groups and sex.

From (2), DER could in a way be written as:

$$P = AI(\alpha)[1 + \rho] \quad (9)$$

where  $I(\alpha) = \int f(y)^{1+\alpha} dy$  is the average identification component,  $A$  the Gini coefficient and the parameter  $\rho$  is the normalized covariance between alienation and identification which is equals to

$$\rho = \frac{\int (a(x) - E[a]) (f(x)^\alpha - E[f^\alpha]) f(x) dx}{AI} \quad (10)$$

$a(x)$  is the alienation component which can be decomposed into  $\delta(x)$  and  $\sigma(x)$ , the expected deprivation and surplus of individual with income  $x$  respectively

$$a(x) = \delta(x) + \sigma(x)$$

According to Runciman (1966), the magnitude of relative deprivation is the difference between the desired situation and the actual situation of a person.

Replacing  $a(x) = \delta(x) + \sigma(x)$  in equation (3) we find that

$$P = \int f(x)^{1+\alpha} [\delta(x) + \sigma(x)] dx = D+S \quad (11)$$

where  $D = \int f(x)^{1+\alpha} [\delta(x)] dx$  is the deprivation component and the complement part  $S$  is the surplus. When the distribution is symmetric or when the parameter  $\alpha$  equals zero, these two components are equal. Given the usual asymmetric distribution of incomes, expectedly  $D > S$  (Araar, 2008).

Following  $\int f(x)^{1+\alpha} [\delta(x) + \sigma(x)] dx$  and let the density function for group  $g$  be  $f_g$  the contribution of individual(s) with income  $x$  to the DER index is written as:

$$c(x) = \frac{a(x) f(x)^{1+\alpha}}{\mu^{1-\alpha}}. \quad (12)$$

## 6.0 Results and Discussions

### 6.1 Polarization

It is shown that polarization measures provide information that inequality measures do not, adding important insights for the analysis of sectoral and zonal income dynamics. Table 1 shows results of the decomposition of polarization using DER identification-alienation frame work. It is evident that identification component (0.74) is higher than alienation component (0.41), reflecting the significant size of the groups. It is striking that urban sector is slightly more polarized than the rural sector, despite the fact that rural sector harbours larger portion of the

population than the urban sector. Perhaps, higher degree of alienation (0.42) in the urban sector as a result of higher degree of inter group disparities compare with lower degree of inter-group disparities in the rural sector and lower degree of alienation (0.39) makes this explainable. Northern zones seem to be more polarized than the southern zones. This may be as a result of high level of similarities in attributes within the zones, and positive feelings toward the groups as reflected by high degree of identification. It is worth noting that these could signal emerging level of bipolarization and inherent potential of social tension and conflicts in the country

**Table 1: Duclos, Esteban and Ray (DER) analysis of polarization (2004) (alpha=0.5)**

Subgroups	Estimate	Alienation	Identification
<b>Sector</b>			
Rural	0.24	0.39	0.74
Urban	0.25	0.42	0.74
<b>Geopolitical zones</b>			
South South	0.24	0.39	0.75
South East	0.23	0.37	0.75
South West	0.24	0.40	0.73
North Central	0.25	0.42	0.78
North East	0.25	0.40	0.78
North West	0.24	0.38	0.76
<b>National</b>	<b>0.25</b>	<b>0.41</b>	<b>0.74</b>

## 6.2 DER decomposition approach

Here, it is argued that despite polarization occurring in the income space, groups in the distribution are the result of similarities with respect to a relevant attribute other than income. This gives insight into what would change if we assume that groups in society share certain attributes other than the level of expenditure. Tables 2, 3, 4 and 5 present the explanatory power of geo-political zones, gender, educational levels and occupational groups respectively.

It is evident from table 2 that relative contribution of variations between the zones contributes (0.83) more to the level of polarization than relative contribution of variations within the zones (0.17). High ethnically divided nature of Nigeria and diverse agro-climatic regions make the observed higher explanatory power of between zones relative to within zones explainable. This in turn makes the policy concerns about the spatial distributions of infrastructural facilities among the zones coupled with mass education, to be highly imperative. This is to say that all zones not only deserve fair share of the national resources but also need to be educated on the benefits of diversity in the country, in order to stall social tension and conflicts. High deficit/surplus (D/S) ratio values of the northern zones indicate high proportion of the poor in their population (4.2, 3.8, 3.6, for North-east, North-west and North-central, respectively. compared to 1.6, 2.1, 2.6 for South-east, South-west and South-south respectively) This corroborates earlier findings which suggest the need for more effective and efficient poverty targeting strategies in the northern Nigeria. On gender basis, male seems to contribute more to polarization than their female counterpart in Nigeria, however, the difference is marginal (0.007). Interestingly, it is an indication of more potential conflict or tension inherent in male than female group. In spite of the fact that Nigeria society is mainly patriarchal, where men have better access to productive resources than women, the poor are more among men than women (Table 3) Table 4 illustrates the contribution of different levels of education to polarization in Nigeria. It is evident that in absolute and relative terms, the population of secondary school leavers contributes more to polarization than any other levels. It is good to note that this is an indication that this group is growing to a significant size in Nigeria. Demographically, they constitute large proportion of the population and enlightened enough to form a formidable pressure group in society. Strategies aim at increasing the productivity of the youth will help in alleviating social tension in the country. Further, there are

several arguments in favour of education as a key factor in poverty - reducing initiatives in Nigeria (Aromolaran, 2002). In this study, no education has the highest value of deprivation to surplus ratio of 4.6 compared to tertiary education level with the ratio value of 1.1. This affirms the notion that people without education are more vulnerable to poverty than people with education. Thus, it is worth noting that the poor can still constitute a formidable population to raise the level of polarization in the country. This study reveals the second highest relative contribution of 7 per cent, (0.07) of non-educated population to polarization in Nigeria, after secondary school level, which accounts for about 15 per cent (0,15). Table 5 reveals that the number of unemployed, students, retired and disabled people contribute more to the level of polarization (0.38) than gainfully employed people. We can therefore safely say that employment creating initiatives and effective social policies will go a long way in reducing sense of diversity among these groups.

**Table 2: Decomposition of DER index based on geo-political zones**

Group g	$\phi_g$	$\psi_g$	$P_g$	$R_g$	$D$	$S$	$D/S$	$AC^*$	$RC^{**}$
North-central	0.1437	0.1229	0.215	0.9469	0.0252	0.007	3.6078	0.004	0.0186
North-east	0.1336	0.115	0.2453	0.8905	0.026	0.0062	4.2116	0.0038	0.0173
North-west	0.2565	0.2138	0.2125	0.9328	0.0475	0.0124	3.8363	0.0125	0.0574
South-east	0.1208	0.1582	0.2011	1.0082	0.0137	0.0088	1.5553	0.0032	0.0146
South-south	0.1498	0.1562	0.2093	1.001	0.0229	0.009	2.5469	0.0048	0.0219
South-west	0.1955	0.2339	0.2133	1.052	0.0261	0.0124	2.1016	0.009	0.0413
Within-group								0.0372	0.1712
Between-group								0.1798	0.8288
National								0.217	1

**Table 3: Decomposition of DER index based on gender**

Group g	$\phi_g$	$\psi_g$	$P_g$	$R_g$	$D$	$S$	$D/S$	$AC^*$	$RC^{**}$
Female	0.4954	0.4959	0.2226	1.0053	0.0815	0.0291	2.7987	0.0549	0.2461
Male	0.5046	0.5041	0.2214	1.0055	0.0832	0.0294	2.8265	0.0567	0.2539
Within-group								0.1116	0.5
Between-group								0.1116	0.5
Total								0.2232	1

**Table 4: Decomposition of DER index based on education**

Group g	$\phi_g$	$\psi_g$	$P_g$	$R_g$	$D$	$S$	$D/S$	$AC^*$	$RC^{**}$
No education	0.3013	0.2208	0.208	0.8972	0.0607	0.0133	4.5704	0.0157	0.0702
Elementary	0.0262	0.0246	0.2025	1.0114	0.0043	0.0015	2.8042	0.0001	0.0006
Primary	0.201	0.1946	0.2074	1.0079	0.0326	0.0121	2.6972	0.0084	0.0375
Secondary	0.3659	0.4279	0.2221	1.0438	0.052	0.0248	2.0924	0.0323	0.1446
Tertiary	0.0385	0.0699	0.223	1.092	0.0034	0.0032	1.0553	0.0004	0.0019
Other	0.067	0.0623	0.2175	0.9819	0.0118	0.0036	3.2459	0.0009	0.0042
Within-group								0.0578	0.2591
Between-group								0.1654	0.7409
Total								0.2232	1

**Table 5: Decomposition of DER index based on occupational groups**

Group $g$	$\phi_g$	$\psi_g$	$P_g$	$R_g$	$D$	$S$	$D/S$	$AC^*$	$RC^{**}$
Administration	0.0011	0.0017	0.1693	1.6982	0.0001	0.0001	2.0939	0	0
Agric. and Forestry	0.1971	0.1584	0.207	0.9315	0.0371	0.0095	3.9012	0.0071	0.0318
Clerical	0.018	0.0243	0.2015	1.1143	0.0021	0.0013	1.645	0.0001	0.0003
Manufacturing & Processing	0.0055	0.0068	0.1929	1.0985	0.0007	0.0004	1.7362	0	0
Production & Transport	0.0142	0.0171	0.1965	1.0854	0.0018	0.001	1.8682	0	0.0002
Professional or technical	0.0239	0.0387	0.2286	1.112	0.0025	0.0019	1.3552	0.0002	0.0007
Sales and related	0.0643	0.0782	0.2187	1.0619	0.0087	0.0043	2.0203	0.001	0.0045
Services and related	0.0532	0.0446	0.2084	0.9568	0.0098	0.0026	3.6973	0.0005	0.0024
Student, retired, unemployed etc	0.6106	0.6159	0.2248	1.0026	0.1001	0.0366	2.7332	0.0842	0.3772
Others	0.0121	0.0144	0.2043	1.0996	0.0016	0.0008	1.9363	0	0.0002
Within-group								0.0932	0.4174
Between-group								0.1301	0.5826
Total								0.2232	1

## Legend

$\phi_g$  = Population share of group g

$\psi_g$  = Income share of group g

$P_g$  = Polarization of group g

$R_g$  =Residual part of the decomposition

$D$  = Deprivation

$S$  = Surplus

$D/S$  Deprivation surplus ratio

$AC^*$  =Absolute contribution

$RC^{**}$  =Relative contribution

## 7.0 Conclusions

Nigeria, the most populous country in Africa is largely characterized by diverse ethnic groups, high level of inequality, poverty and prone to social tension and conflicts. The paper attempts to give insight into the underlying factors fueling this sense of diversity and violence. This paper has used data from the 2004 National Living Standard Survey, conducted by the National Bureau of Statistics. The paper follows Duclos, Esteban and Ray (2004) measures of polarization and adopts Araar (2008) DER decomposition method. The study reveals high level of identification component of polarization which invariably may signal emerging level of bi-polarization in the country. Disparities between the zones seem to contribute more to polarization than intra-zonal disparities. It is argued that strategies focused on the reduction of inter-zonal disparities will be effective and efficient in terms of resource allocation in reducing poverty and alleviate social tension and violence in the country. It is evident that the population of secondary school leavers is becoming significant in explaining the level of polarization in the country. Other underlying factors include unemployed group in the society. We infer that job creating strategies will go long way in alleviating poverty and reduce sense of grievance among the people.

## References

- Abdelkrim Araar and Awoyemi Taiwo Timothy, (2006). "Poverty and Inequality Nexus: Illustrations with Nigerian Data," Cahiers de recherche 0638, CIRPEE.
- Abdelkrim Araar, (2006). "On the Decomposition of the Gini Coefficient: an Exact Approach, with an Illustration Using Cameroonian Data," Cahiers de recherche 0602, CIRPEE.
- Abdelkrim Araar, (2008). "On the Decomposition of Polarization Indices: Illustrations with Chinese and Nigerian Household Surveys," Cahiers de recherche 0806, CIRPEE.
- Aighokhan Ben E., (2000) "Poverty, Growth and Inequality in Nigeria: A Case Study". AERC Research Paper 102 African Economic Research Consortium, Nairobi, Kenya.
- Alayande, Babatunde (2003) "Decomposition of Inequality Reconsidered: Some Evidence from Nigeria" Paper presented at the UNU/WIDER Conference on Inequality, Poverty and Human wellbeing in Helsinki, Finland between 29th and 31st of May, 2003.
- Alesina, A. (1994). "Political Models of Macroeconomic Policy and Fiscal Reforms." In *Voting for Reform: Democracy Political Liberalization and Economic Adjustment*. Eds. Stephen Haggard and Stephen Webb. New York: New York University Press.
- Alesina, A., and A. Drazen. (1991). "Why are Stabilizations Delayed?" *American Economic Review*.
- Alesina, A., and G. Tabellini. (1989). "External Debt, Capital Flight and Political Risk." *Journal of International Economics* 27: 199–220.
- Aromolaran, Adebayo, B. (2002). "Private Wage Returns to Schooling in Nigeria: 1996-1999" Economic Growth Center, Yale University, New Haven, CT, Center Economic Discussion Paper, Number, 849.
- Awoyemi T.T. and Adeoti I. A detola (2004). The Decomposition of Income Inequality by Sources of Income: The Rural Nigerian Experience. *African Journal of Economic Policy Vol. 11, Number 1*.
- Awoyemi Taiwo.T., Oluwatayo Isaac B.. and Oluwakemi Adewusi (2009). "Inequality, Polarization and Poverty in Nigeria" Poverty and Economic Policy Network, Working Paper PMMA 0832 (Forthcoming) Universite Laval Quebec, Canada.
- Bhattacharaya, N. and B. Mahalanobis (1967): "Regional Disparities in Household Consumption in India," *Journal of the American Statistical Association*, 62.
- Canagarajah, S., J., Ngwafon and S. Thomas. 1997. "The evolution of poverty and welfare in Nigeria, 1985-92". Policy Research Working Paper No. 1715.
- Duclos Jean-Yves, Joan Esteban, and Debraj Ray, (2004). "Polarization: Concepts, Measurement, Estimation", *Econometrica*, Vol. 72, No. 6 (November, 2004), 1737–1772.
- Esteban, J., & Ray, D. (1994). On the measurement of polarization. *Econometrica*, 62(4), 819–851.

- Esteban, J., C. Gradin and D. Ray (1999). "Extensions of a Measure of Polarization, with an application to the income distribution of five OECD countries, unpublished.
- Esteban, J.M. and D. Ray (1994): "On the measurement of polarization", *Econometrica*, n.º 62, 4, pp. 819-851.
- International Crisis Group (2006) Nigeria: Want In The Midst Of Plenty – Report (Brussels).
- Juan Prieto-Rodriguez, Juan Gabriel Rodriguez, (2001). "Interactions Inequality-Polarization: Characterization Results" Instituto de Estudios Fiscales N.I.P.O. 602-O5-004-X I.S.S. N:1578-0252.
- Lambert, P. J. and J. R. Aronson (1993): "Inequality Decomposition Analysis and the Gini Coefficient Revisited," *Economic Journal*, 103, 1221–1227.
- National Bureau of Statistics (2006). "Poverty Profile for Nigeria" Federal Republic of Nigeria.
- Okunmadewa Foluso, Olanrewaju Olaniyan, Sulaiman. A. Yusuf, Abiodun S. Bankole, Olugboyege A. Oyeranti, Bola. T. Omonona, Timothy. T. Awoyemi, Kola Olayiwola (2006). "Human Capital, Institutions and Poverty in Rural Nigeria" Research Report submitted to the African Economic Research Consortium AERC, Nairobi for the Second Phase Collaborative Poverty Research Project.
- Prieto-Rodriguez, J., Rodriguez, J.G. and R. Salas (2004): "Is the inequality neutral flat tax reform really neutral?", *Documentos de Trabajo*, Fundación Centra E2004/43. Electronic version at <http://www2.fundacioncentra.org/pdfs/E200443.pdf>.
- Pyatt, G., (1976). On the Interpretation and Disaggregation of the Gini Coefficient. *Economic Journal*, June, 243-254.
- Pyatt, G., Chen, C.-N., Fei, J., 1980. The Distribution of Income by Factor Components. *Quarterly Journal of Economics*, November, 451-473.
- Rodríguez, J.G., Salas, R., 2003. Extended bi-polarization and inequality measures. *Research on Economic Inequality* 9, 69-83.
- Rodríguez, Juan Gabriel (2006). Measuring Bipolarization, Inequality, Welfare and Poverty" Working Paper Series ECINEQ WP 2006 – 39.
- Runceman, W. G. (1966): *Relative Deprivation and Social Justice: A Study of Attitudes to Social Inequality in Twentieth-Century England*, Berkeley and Los Angeles: University of California Press.
- Shorrocks Anthony and Guanghua Wan (2004). "Spatial Decomposition of Inequality" WIDER Discussion Paper Number 2004/01.
- Wolfson, M. (1994). When inequalities diverge. *American Economic Review*, 84(2), 353–358.
- Wolfson, M. C. (1997) 'Divergent Inequalities: Theory and Empirical Results', *Review of Income and Wealth*, 43(4), 401-421.
- Zhang, X. and R. Kanbur (2001): "What difference do polarization measures make?. An application to China", *Journal of Development Studies*, Number 37, pp. 85-98.