Assessing Income Inequality in North-Eastern Nigeria

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Abstract

This study investigates income inequality in rural North-East Nigeria (NEN), using the Harmonized Nigerian Living Standards Survey (HNLSS) data of 2009/2010. Data were analyzed using; descriptive statistics, Gini index and Tobit regression methods. The results indicate that most of the respondents were in their middle age accounting for 35.2% and approximately 68 % with no formal education. Inequality among rural folks as reflected by the Gini index of 0.85 is very high, The tobit results shows that household size, education, age and marital status were all significant at 1% levels. It is therefore recommended that Government should provide an enabling environment for learning to help household improve on their human capital for a sustained poverty reduction.

Keywords: Inequality, North- east Nigeria, Poverty, Rural, Tobit model.

1. Introduction/problem statement

Increasing level of poverty and income inequality has been a major concern among economists and policy experts because they are the major factors hindering the development of any nation. Many countries view economic growth as the leading indicator of poverty reduction through reduced unemployment, increased household income and reduced inequality.

In Africa, poverty remains a burden that undermines development because it is deep rooted and pervasive (Igbatayo and lgbinedion, 2006). Perhaps, nowhere else in the African continent is the poverty incidence more prevalent than in Sub- Saharan African, where about one sixth of the people are chronically poor (Word Bank, 1996; CFA, 2005). Empirical evidence shows that developing countries achieved a 39.2 percent reduction in the percentage of their population below US$1 (PPP) per day from 1990 to 2004. This significant average gain was, however, not evenly distributed across the developing world. The largest reductions were achieved by Eastern Asia with 67.3 percent, followed by Southern Asia with a reduction of 28.2 percent, while the corresponding reduction rate for Latin and the Caribbean was 22.2 percent. Sub-Saharan Africa, which had the highest level of poverty in 1990 at 46.8 percent merely managed to reduce it to 41.1 percent in 2004, having achieved the lowest rate of reduction of 12.2 percent over the period. This is a clear indication that poverty did not respond appreciably to economic growth in Sub-Saharan Africa. (WorldBank, 2006). To reverse this trend, many Sub-Saharan African -countries from the early 1980s initiated and implemented the IMF World Bank Structural Adjustment Programmes (SAP). These programmes have been reported to have stimulated growth in most of these developing countries. However, in some other countries, there has been little or no change in terms of growth and poverty reduction.

A similar pattern can be observed in Nigeria in terms of inequitable income distribution. Despite government spending a huge amount on various programmes, including poverty eradication, income inequality is still worse off. These programmes have been sparingly unsuccessful due to widespread corruption in public offices. The people are still considered to be poor as the National Bureau of Statistics figures indicate that national poverty incidence reduced from approximately 65.6 percent to about 54.4 percent between 1996 and 2004. However, with increases in population from an estimated 115 million to 140 million between the two periods, it shows that there was an increase in the number of people in absolute poverty from 75.4 million to 76.2 million between the two periods. Similarly, income poverty moved up from 28.1 percent in 1980 to 65.6 percent in 1996 before it returned to 54.4 percent in 2004, and increased to 69 per cent in 2010.

One of the strategies which have been used in reducing the level of poverty and inequality in most developing countries including Nigeria is the economic growth strategy which focuses on the macro and microeconomic policy which ensures rapid growth of the economy. Economic growth is regarded as crucial as it would generate income earning opportunities for the poor and thereby make use of their most abundant asset which is their labour. Besides, human capital, the product of education and improvement of health, is also crucial to raising the living standard by raising productivity, stimulating growth and by opening up economic opportunities to more people, which contributes to reducing income inequality. It encompasses inequalities in opportunities and inequalities in outcomes. The UNDP (2009) describes inequality in Nigeria as a situation in which opportunities for upward mobility are very limited; it means few decent jobs, poor income and low purchasing power for the employed. It also means poor infrastructure and institutional failure in key sectors including education, health and transportation etc. There has not been significant difference in the level of inequality in Nigeria as the national trends measured by Gini coefficient decrease from 0.43 in 1985 to 0.41 in 1992, due to the impact of SAP and the positive growth rate of GDP during the period. Inequality increased from

0.41 in 1992 to 0.49 in 2004, and declined from 0.49 in 2004 to 0.45 in 2010 due to the impact of National Economic Empowerment and Development Strategy (NEEDS) and other institutional reforms that began in 2004 and the sustained growth rate recorded during this period.

Similarly, among the geo-political zones the trend shows a decline in the national average in 2004 due to the impact of economic reforms. There is also a disparity in educational attainments in which there is low rates in the North-East, North-West and North-Central zones with literacy rates of 50.6, 53.8, and 59.6 percent respectively. On the other hand, literacy rates in the South-West, South-South and South-East zones are much higher at 78.6, 82.6 and 79.3 percent respectively (UNDP, 2009).

This study therefore, analyzed inequality on rural households in North-East Nigeria with the aim to achieve the attainment of two objectives, first is to provide a descriptive analysis of households' socio-economic characteristics as it relates to their income, and second is to examine factors of inequality in the study area.

2. Literature review

Poverty is multifaceted. Poverty manifests itself in different forms depending on the nature and extent of human deprivation (FOS, 1999). Poverty is associated with the individual or family inadequate access to resources for a decent standard of living (e.g., income and consumption, housing, health, clean water and sanitation, nutrition, productive potential, and other central dimensions of well-being). The World Development Report (1990) refers to poverty as the inability to attain a minimum living standard.

Inequality, on the other hand, implies the dispersion of a distribution whether income, consumption or some other welfare indicators or attributes. Income inequality is often studied as part of the broad analysis covering poverty and welfare. Thus, inequality is a broader concept than poverty because it is defined over a whole distribution (Litchfied, 1999). Following the work of Kuznets (1955, 1966), on the relationship between development and income inequality, many development economists have been inspired to find the major sources of income inequality. In this regard, Datt and Ravallion (1992), proposed a method that decomposed poverty change into income redistribution, income growth and a residual component. Kakwani (1997) adopted an axiomatic approach to decompose poverty change into their growth and redistribution components.

Baye (2005), used Shapley (1953) value for assigning entitlement in distributive analysis and assessed the within and between sector contributions to changes in poverty levels in Cameroon in 1984 and 1996. It was found that the within sector effect disproportionately accounted for increase in poverty, but the between sector contributions in both rural and semi urban areas increase poverty. Similarly, Oyekale et al., (2006) used the 2004 National Living Standard Survey (NLSS) data to determine poverty in Nigeria. The result showed that the overall Gini index for Nigeria was 0.580 and in sectoral sense income inequality was found to be higher in rural areas with Gini index of –0.5808 as compared to urban areas which is –0.5278). They however concluded that employment income increases income inequality while agricultural income decreases it. However, Awoyemi and Adeoti (2004), found that agricultural income is inequality increasing while wage and self-employed income are inequality decreasing. Oluwatayo (2008), used Lorenz curve and Gini coefficients to analyse income inequality and welfare status of rural households in Ekiti State. His findings suggest that there's an unequal distribution in income and other indicators of welfare with a Gini coefficient of 0.3570.

Therefore the study of income inequality becomes relevant to economic development because high level of income inequality produces unfavourable environment for growth and development.

2.1 Inequality measures

Inequality refers to disparities in income distribution in a population. Inequality could also be estimated for other welfare indicators than income, for example non income dimensions such as inequalities in education, employment, health etc. Further inequality gives a broader perspective since it includes the entire population instead of only people living below a poverty line (World Bank, 2005). It is commonly measured by the Gini coefficient which can be derived from the Lorenz curve. The Lorenz curve shows the cumulative proportion of income in relation to the cumulative proportion of a population. The Gini is given by the area between the Lorenz curve and the 45° line of equity from origin. The Gini varies between 0(total equality) and 1 (complete inequality). A value of 0.55 and above is a high level of inequality, 0.45-0.55 is middle-high, 0.35-0.45 is middle and 0.35 and below is a low level of inequality (Bourguignon, 2004).
The Gini coefficient of inequality is given by

$$G = \frac{1}{2n^2\bar{y}} \sum_{i}^{n} = 1 \sum_{j}^{n} = 1 \left| y_i - y_j \right| \tag{1}$$

Where the $\bar{y}$ is mean income, n is the total number of individuals, y_i are individual incomes (Litchfield, 1999). The Gini satisfies several important properties of measuring inequality. It also satisfies the Pigou-Dalton criterion of transfer sensitivity, i.e. an income transfer from rich to poor reduces inequality. However the Gini

cannot be broken down to compare subgroups or sources of income since the sum of the Gini in subgroups is not equal to the total Gini of the society (World Bank, 2005).

Another method of measuring inequality is regression based decomposition method. It uses regression technique to model the per capita income or expenditure as a function of explanatory variables. This determines how much income inequality is accounted for by each explanatory variable and how much is unexplained, as measured by the error term. The decomposition is done by specifying an income function as shown below:

$$Y = X\beta + \varepsilon \qquad (2)$$

Y is per capita income or expenditure, X is the matrix of explanatory variables, ε is the stochastic error term. The explanatory variables are exogenous individual, household characteristic which determines income level. They capture household's income generating capacity in both formal and informal labour markets and self-employment. These include, education, occupation of head, assets, market and location variables. Since the econometric results yield estimates of the income flows attributed to household variables, they allow the decomposition of inequality by factor income. The income contributed by the socioeconomic variables as given in the estimated regression equation is:

$$Y_i = \sum_{k}^{k} = 1 y^k \qquad (3)$$

The income flow can then be used directly to calculate decomposition component for all regression variables and the contribution of each of the socio-economic factors (Xi) to Gini inequality can be estimated.

3. Study area

The study area is North-East zone of Nigeria, which comprises of about one fourth of the countries land mass. Its situates within 9°-14°N and 8°-15°E (Iloeje, 1976). Politically, the zone comprises of Bornu, Yobe, Adamawa, Taraba, Gombe, and Bauchi (six States).

Most of these states share boundaries with international communities like Cameroun, and Chad Republics. It experiences acute dryness on the soil, which hardly supports luxuriant growth of grass and other flora biodiversities. However, there is luxuriant growth of trees around riverbeds, mountains and highlands, which supports arable and animal husbandry. The region's population is made up of both sedentary arable farmers and migratory herdsmen, mainly of Fulani ethnic group. There are about 200 ethnic groups in this zone, among which are the Tiv, Fulani, Bachama, Kutep, Jukun, etc (TEE-REX, 2003). This zone was chosen because it has high prevalence of poverty and income inequality (NBS, 2006)

3.1 Methodology

The survey data used in this study was collected by Nigeria's National Bureau of Statistics (NBS) formerly known as the Federal Office of Statistics (FOS). They were based on Harmonized National Living Standard Survey (HNLSS, 2010) data of households that was carried out in November 2009 to October 2010. It covers 36 states and Abuja. It comprises a large sample size of 34,769 usable households. A total of 4,999 were used for the analysis, which is the total population of North East zone of Nigeria.

3.2 Model specification

3.2.1 Analytical Techniques

The analytical methods include; descriptive statistics, Gini index and the Tobit regression model.

Descriptive Statistics: - Descriptive statistics (such as means, tables, frequencies, percentages) were used to analyze, summarize and describe the socioeconomic characteristics of the respondents.

Tobit Regression Model: - Tobit model was employed to ascertain the determinants of poverty and inequality among households in the study area. The Tobit model (Greene, 2003) employed was of the form;

$$Y_{ij} = \beta X_i + \ell_i \qquad (4)$$

Where:

Yi = Dependent variable

Xi = Vector of explanatory variables

β = Vector of respective parameters

ℓ_i = Independently distributed error term

Thus, the explanatory variables in the regression analysis were and measured as;

X1 = Age (in years)

X2 = Gender (Female = 1, Male = 0)

X3 = Marital status (Married = 1, Single, Divorced or Widowed = 0)

X4 = Household size

X5 = Years of formal education

X6 = Income/ expenditures of respondents (Naira)

4. Results and discussion

4.1 Socio-economic characteristics of respondents

A socio-economic profile of the respondents (Table 1) shows that 94.8% of respondents were male with an average household size of 5. The larger the size the larger the resources required to meet basic needs of food and other necessities. The socio-economic profile also revealed that the majority (67.9%) of the respondents had no formal education. Poverty is concentrated among persons with no education and those with only primary education. This has serious implications on the poverty level because education plays an important role in creating awareness in farming communities and educated people are better equipped to source information. Majority of the respondents are married.

Table 1: Distribution of respondents based on their socio-economic characteristics

Variable	Frequency	Percentage
Age (years):		
≤30	687	5.7
31-40	781	16.5
41-50	1025	18.7
51-60	1159	23.9
>60	1314	35.2
Educational qualification:		
No formal education	3376	67.98
Primary education	592	11.92
Secondary	573	11.54
Post secondary	330	6.65
Others	95	1.91
Household size		
1-3	1483	29.86
4-6	1952	39.31
7-9	1085	21.85
10-12	446	8.98
Sex		
Male	4712	94.89
Female	254	5.11
Marital Status		
Married	4691	94.44
Divorced	101	
Widowed	174	3.52

Source: Author's computation from NLSS (2009) data

4.2 Gini decomposition analysis

The decomposition of inequality components by average per capita expenditures across the North-East zone is presented in tables below.

4.2.1   Inequality decomposition within the sector

Table 2 shows the decomposition of inequality within urban and rural sector in the North Eastern part of the country. The rural region shows the highest level of inequality with Gini index of 0.94, though rural areas are characterized by low productivity of labour and unequal distribution of income and factors of production. Inequality in urban areas is not as high as in rural areas, though it's still high considering the value of Gini that indicate 0.55 and above as high. An indication of 0.72 shows that income has increased relatively more but the distributional effect has not favoured the urban poor. Also, more than 80% of the inequality in the zone is accounted for within the groups while less than 10% of the inequality is accounted for the differences in urban and rural locations in the zone.

Table 2: Inequality Decomposition by Residential Location of the Household Head

Group	Gini index	Population share	Income contribution	Absolute contribution	Relative contribution
urban	0.7225	0.1180	0.0378	0.0032	0.0034
rural	0.9456	0.8820	0.9622	0.8025	0.8554
Within group	-------	-------	-------	0.8057	0.8588
Between grp	-------	--------	--------	0.0802	0.0855
overlap	-------	--------	---------	0.0522	0.0557
total	--------	1.0000	1.0000	0.9382	1.0000

Source: Author's computation from NLSS (2009) data

4.2.2   Inequality decomposition by education of the household head

The level of inequality has been known with increase in educational attainment in any society, the higher the income, the higher the inequality. Inequality is highest within the household where 97% is accounted for secondary school, followed by the primary education (95%) as measured by the Gini index. Majority of them had secondary education. This is an indication that the north eastern part of the country still lag behind in terms of education which is the social equalization ladder. Within the group decomposition shows that 35% account for within the group and 23% between the groups, its contribution to total poverty is very low. Therefore, differences in educational level by the household head are indications that their income level differs depending on their job.

Table 3: Inequality Decomposition by Education of the Household Head

Group	Gini index	Population share	Income	Absolute	Relative
None	0.9199	0.6798	0.4900	0.3064	0.3266
Primary education	0.9514	0.1192	0.1473	0.0167	0.0178
Secondary education	0.9658	0.1154	0.2720	0.0303	0.0323
Post secondary	0.9342	0.0665	0.0860	0.0053	0.0057
College degree	0.5906	0.0191	0.0047	0.0001	0.0001
Within group -		-	-	0.3588	0.3825
Between -		-	-	0.2345	0.2500
Overlap(residue) -		-	-	0.3449	0.3676
Total -		1.0000	1.0000	0.9382	1.0000

Source: Author's computation from NLSS (2009) data

4.2.3   Inequality decomposition by gender of household size

However, inequality index is similar no matter the gender of the household head as the Gini index for both sexes is 93.3 and 95.9 respectively. This is shown in the decomposition analysis as revealed by Table 4; it shows that inequality is high in both sexes.

Table 4: Inequality Decomposition by Gender of Household Size

Group	Gini index	Population share	Income	Absolute	Relative
Male	0.9334	0.9489	0.8566	0.7587	0.8087
Female	0.9598	0.0511	0.1434	0.0070	0.0075
Within group	---	----		0.7657	0.8162
Between	----	----	----	0.0922	0.0983
Overlap(residue) -		-	-	0.0802	0.0855
Total		1.0000	1.0000	0.9382	1.0000

Source: Author's computation from NLSS (2009) data

4.2.4   Determinants of poverty and inequality in North-East Nigeria

Tobit regression model was used to determine the poverty and inequality status among the rural farming households in North East, Nigeria. The likelihood ratio statistics as indicated by χ^2 statistics (8161.0387) was highly significant ($P < 0.0001$), suggesting the model has a strong explanatory power. The results of the analysis as shown in Table 5 revealed that age, marital status, household size, and educational level are the major determinants of inequality in the study area. The coefficients of age and gender were positive which implies that increase in the value of any of these variables may likely increase the probability of being poor. As the respondents are getting older, the likelihood of being poor is increasing.

This is can be justified based on the fact that elderly persons decline in strength and productivity as they get older as well as declining health conditions. Household size also increases the likelihood of being poor and this could be because of increase in household size directly or indirectly reduces income per head (per capita income) as well as impair standard of living of the households.

Education is another determinant of inequality in the study area; human capital theory suggests positive

correlation between educational level and job opportunities and capacity to earn high income. Hence, employment opportunities tend to vary between individuals depending on the level of educational attainment. This is because one's labour productivity is affected by the amount of knowledge, information and skills acquired and education can be a major determinant of inequality.

Table 5: Tobit estimation result of determinants of inequality in North-East Nigeria

zyz	coefficients	t-value
Household size	0.36184	0.000***
sex	.0002857	0.943
Age	0002295	0.000***
Marital status	-.0072124	0.000***
Level of education	-.0293274	0.000***

*10%, **5%, ***1% level of sig

Pseudo R^2 =   -1.3794

Number of obs =   34769

Log likelihood = 8161.0387

Prob > chi2   =   0.0000

5. Conclusion and recommendations.

Increasing income inequality and poverty continue to be the most challenging economic problem facing most of the developing countries today. This study examines the determinants of inequality in North-East Nigeria. The socio-economic profile of the respondents shows that 94% were male with an average household size of 5 members and majority of them were married. 67.9% of them had no formal education. The result of the Gini index(0.94) shows that the rural areas has the highest level of inequality, inequality is also high within the household size where 97% accounted for secondary school education, this shows that majority had secondary education. The tobit result shows that age, sex, education and household size are major determinants of inequality in the study area.

Therefore it is recommended that:

- There is need to promote human capital development through vocational and technical education in order to enhance self employment, wealth creation and poverty reduction.
- Western education should be promoted and encouraged through sensitization programmes and campaigns on various social media as education is the social equalization ladder, most especially in North-East Nigeria.
- There is need in creating awareness on family planning to control birth. The household size in North-East Nigeria is fairly large and this has serious implications on the income and well being of households.

References.

Adeoti, A.I. and Oyekale, T.O. (2006): Measurement and Sources of Income Inequality among Rural and Urban Households in Nigeria. PMMA Working Paper 2006-20, Poverty and Economic Policy Research Network (www.pep-net.org).

Awoyemi, T.T and A.I. Adeoti, (2004) The Decomposition of Inequality by Sources of Income: The Rural Nigerian Experience. African Journal of Economic Policy,11 (1):1-16 Aigbokhan, B. (1997) Poverty Alleviation in Nigeria: Some Macroeconomic Issues. Nigerian Economic Society's Annual Conference Proceedings, Ibadan.

Atkinson, A.B and Bourguignon, F. (2000) Introduction: Income Distribution and Economics. Handbook for Income Distribution, Vol. 1, North Holland, Amsterdam.

Baye, P.M. (2005) Structure of sectoral Decomposition of Aggregate Poverty changes in Cameroon. Paper presented at The International Conference on Shared Growth in Africa, Accra, Ghana (July)

Birdsall, N. (2005) Rising Inequality in the New Global Economy. World Institute for Development Economic Research (WIDER) Angle. No 2. PP. 1.

Bourguignon, F, M. Fournier, and Gurgand M,(1998) Distribution, development and education :Taiwan, 1979 - 1974. World Bank, Mimeo. Central Bank of Nigeria (2009): Annual Report and Statement of Accounts , pp. vi Commission for Africa (CFA) (2005) Our Common Interest. Report of the Commission for Africa. Website -w.w.w.commissionforafrica.org. pp. 219

Dalt, G. and Ravatlion, M. (1992) Growth and Redistribution Component of Changes in Poverty Measures: A decomposition with Application to Brazil and India in the 1980s. Journal of Development Economics.

Federal Office of Statistics (FOS) (1999) Poverty profile for Nigeria, 1980-1996. Lagos, pp. 24.

Igbatayo, S.A. and Igbinedion, S.O. (2006) The Challenges of Poverty Reduction in Sub-Saharan Africa: The South African Experience. Journal of Business Administration and Management. Vol.1,Number 1,

Duncan Science Journals, pp .35

Kakwani, N. (1997) On Measuring Growth and Inequality Components of Changes in Poverty with JORIND 9(2) December, 2011. ISSN 1596–8308. Application to Thailand. A discussion paper at The University of New South Wales.

Kuznets, S. (1955) Economic Growth and Income Inequality. American Economic Review 45 (March). pp. 1-28.

Kuznets, S. (1966) Modern Economic Growth. New Haven, Conn; Yale University Press

Litchfield, J.A. (1999) Inequality Methods and Tools. Text for World Bank's site on Inequality, Poverty and Socio- economic performance.

Okojie, C.E.E, Anyanwu, J.C., Ogwumike, P.O. and Alayande B.A. (2000) Poverty in Nigeria: An Analysis of Gender Issues, Access to Social Services and the Labour Markets. A draft Report to the African Economic Research Consortium (AERC), Nairobi, Kenya.

Oluwatayo, I.B. (2008) Explaining inequality and welfare status of households in rural Nigeria: Evidence from Ekiti State. Humaninity and Social Science Journal 3 (1): 70-80, 2008

Salai-Martin, X, and Subramanian, A. (2003) Addressing the Natural Resource Curse: An Illustration from Nigeria. May. PP. 1.

Shapley L. (1953) A Value for n-person Games, In: H.M. Kuhm and A.W. Turker (eds.) Contribution to The Theory of Games. Vol. 2.Princeton University Press.

Soludo C.C. (2006) Can Nigeria Be The China of Africa? Being a Lecture Delivered at the Founder's Day of the University of Benin, Nigeria; Nov. 23. pp. 10.

United Nations Development Programme (UNDP) (1990) Human Development Report: New York. Oxford University Press.

World Bank (1996) Taking Action to Reduce Poverty on Sub- Saharan Africa: An Overview. Washington, D.C. pp. 2-3.

World Bank (1996) Nigeria's Poverty in the midst of Plenty: The Challenges of Growth with inclusion. Population and Human Resource Division, West Africa Department, Africa region.

World Bank (2000) Attacking Poverty: World Development Report, 2000/2001. Washington D.C. pp109

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