

# The Dynamics of Income Inequality in Rural Areas of Nigeria

Zainab A. Usman<sup>1\*</sup>, Krisztian Ritter<sup>2</sup> and Sergey A. Vinogradov<sup>3</sup>

<sup>1</sup>Faculty of Economics and Social Sciences, Szent Istvan University, Godollo, Pater Karoly u. 1, 2100, Hungary.

<sup>2</sup>Institute of Regional Economics and Rural Development, Szent Istvan University, Godollo, Pater Karoly u. 1, 2100, Hungary.

<sup>3</sup>Department of Methodology for Economic Analysis, Szent Istvan University, Godollo, Pater Karoly u. 1, 2100, Hungary.

## Authors' contributions

This work was carried out in collaboration between all authors. Author ZAU designed the study, wrote the first draft and literature. Author KR contributed to literature, developed protocols, edited and supervised the manuscript. Authors ZAU and SAV performed and managed the statistical analysis and interpretations of the study. All authors read, edited and approved the final manuscript.

## Article Information

DOI: 10.9734/AJAEES/2016/27441

### Editor(s):

(1) Ian McFarlane, School of Agriculture Policy and Development, University of Reading, UK.

### Reviewers:

(1) K. A. Oluyole, Cocoa Research Institute of Nigeria, Ibadan, Nigeria.

(2) Nnanna M. Agwu, Michael Okpara University Of Agriculture, Umudike, Abia State, Nigeria.

Complete Peer review History: <http://sciencedomain.org/review-history/15317>

**Original Research Article**

**Received 1<sup>st</sup> June 2016**  
**Accepted 1<sup>st</sup> July 2016**  
**Published 9<sup>th</sup> July 2016**

## ABSTRACT

The main aim of this study is to measure rural income inequality and assess its disparities across zones, planting periods and socioeconomic characteristics and also to determine the defining factors of income inequality in rural areas. The study covered 3,164 rural households across the six geopolitical zones in Nigeria. They include; North West, North East, North Central, South West, South East, and South South. In addition, the study designs also featured classification based on the two main planting periods in Nigeria which are post-plant periods and post-harvest. Data were extracted from the 2012/2013 General Household Survey under the Living Standard Survey Measurement programme of the World Bank. Data analysis approach include the use of descriptive statistics, Gini and Theil index methodology and regression based decomposition analysis. The

\*Corresponding author: E-mail: [zainabus23@gmail.com](mailto:zainabus23@gmail.com);

result showed that income inequality among rural households in Nigeria is 0.3460 and 0.2500 Gini and Theil index respectively. Among the geographical zones, inequality is highest in the North West with Gini and Theil indices of 0.3726 and 0.4338, and lowest in the North East with Gini and Theil index of 0.2972 and 0.1516 respectively. While the result showed that rural households are more income insecure in post-plant periods; gender, rural household size and number of dependants were identified factors influencing rural income inequality in Nigeria. The study recommended the need to restructure the concept of rurality to create rural job opportunities, integrate rural policies across geopolitical zones and create equal access to skills and educational opportunities across age group and gender.

*Keywords: Income inequality; rural; Nigeria.*

## 1. INTRODUCTION

Income inequality has been described as the defining challenge of our time [1] and has a significant relationship with poverty incidence in a country [2]. On a global view, income inequality is continually on the increase implying a scarce amount of income available for the populace, a recalculated view revealed global income inequality to be about 70 Gini points [3]. Its widening effects in the world today is a necessary evil and becomes more important due to its palpable impact on rural households; not because they constitute majority of poor populace in the world today, but are as well drivers of primary economic growth. Increasing income inequality substantially dispossess people of enough income to have access to proper education and good health services, consequently depriving them of physical and human capital accumulation [4] which can have huge effects on the macroeconomic view of a country. This has been stressed by the International Monetary Fund (IMF) studies of impact of income inequality in emerging and developing countries between the periods of 1980 to 2012 which significantly revealed the negative impact of income inequality on the Gross Domestic Product [5]. Global alertness of inequality has led to building strategies that are inclusive, examples are the EURO 2020 strategy which aims at inclusive approach to benefit the largest possible number of people.

Income inequality in Nigeria has been on the increase since early 1980s [6]. Between 1977 and 1985, trend in inequality was on a sharp increase, and reached a peak of 0.7391 index in 1999 and 2004 [6]. While countries with relative inequality falls between 0.29 and 0.35, Nigeria still lies between 0.50 and 0.70 [7]. At the regional level, inequality is explicitly shown to be above national average of 0.488 in 2010 in the Southern region compared to the Northern

region. Regional inequality across the six geopolitical zone between 1985 and 2004 rose from 0.48 to 0.51 (South South), 0.44 to 0.45 (South East), 0.43 to 0.55 (South West), and 0.39 to 0.47, a decrease in North Central 0.41 to 0.39 and North West 0.41 to 0.37 [8]. Comparing rural and urban areas, rural and urban inequality exhibits trend between the same periods, the rural areas consistently increased from 0.39 in 1985 to 0.519 in 2004 [8]. The disparities created by inequality approbate the low income group to poor housing, poor or no access to health, poor educational status etc. While the high income group shares the opposite of the low income group scenarios, the middle class characteristics is between both. Additionally, of growing concern in research is the bipolarization of the income class in Nigeria setting, that is the disappearing of the middle class, this occur as a result of income concentration in two ends or tails [9], in this case, the high income and the low income tail. [9] observed a sharp increase in polarization between the six geopolitical zones in Nigeria with a higher reflection in the upper income class in the South-South and South West zone region and a higher concentration in the lower income class in North East and North –West zones. [10] established a slightly differential levels in urban and rural areas, 0.25 and 0.24 respectively, with identified increasing polarization in the country caused by increasing unemployment, number of retirees and number of secondary school leavers.

Policies and programmes such as the Structural Adjustment Programme (SAP) of 1980s, the National Economic Empowerment and Development Strategies (NEEDS) in 2004, the green revolution, Operation Feed the Nation (OFN) among others have failed to achieve targeted aims. As a result, incidences of poverty and inequalities have been prevalent, prominent ones were recorded in 1985 – 1992 and 1996 – 2004 [11]. With a record of 36.2% Human

Poverty Index (HPI) in 2009, Nigeria was rated the 7<sup>th</sup> poorest country in the world [12], with prior history of worsening indices of income inequality between the periods of 1980, 1985 and 1996 were stated as 28.1, 46.3 and 65.6 percent. It worsened after the Structural Adjustment Programme in 1986 [13] with a Gini points of 65.6, 58.3 and 69 percent in 1996, 2005 and 2010 respectively [13]. However a record of 42.9 was made in 2004 which further increased to 44.7 in 2010 [14]. Of important causality of persisting rural income inequality, the failure to embrace the changing roles of rurality in Nigeria. Rurality concept has been solely attached to primary activities like agriculture. Policies have been defined to aid agricultural development with the hopes that the rural areas are as well developed. However, over the years, increasing income inequality in rural areas in Nigeria brings to light the need to redefine the concept of rurality as certain rural households engage in varying non-farm income activities. This further revealed the underutilization of the rural resources and the need to redefine the rurality concept, this study justifies this opinion by assessing income inequality in post-plant and post-harvest seasons and further addressing the need to redefine rural concept to solve the problems of inequality in the rural areas of Nigeria. Most significant is that the rural households constitute the largest share of the populace in most developing countries like Nigeria involve in primary activities. In Nigeria, the rural households constitute 53% [15]; the largest share of the populace in Nigeria and agrarian community. The rural households highly depends on agriculture which contributes about 40% to the country's GDP and thus serves as a means of income to a wider range of its populace [16]. In this vein, income variation at the rural level portends great danger to the economic status of the country [17].

The multiplier effect of poverty has prompted various studies on income inequality. In order to understand the basis on which to lay this study, there is need to review related literatures based on their various approach in the methodology, data usage and application. Gini coefficient is one of the measurement of income inequality in Nigeria, this was used in [18], in the study of measurement and sources of income inequality in rural and urban Nigeria using secondary data from the household survey data of the Nigeria Bureau of Statistics. It was discovered that the total income recorded a Gini inequality index of 0.58 for rural and 0.52 for urban which showed

that income inequality in Nigeria is on the high ends. It was also discovered that income inequality increased poverty between 1998 and 2004 in Nigeria. By [19], a higher Gini coefficient of 0.67 is illustrated in rural household study in Abia state which is in the South-Eastern geopolitical zone of Nigeria. [17] employed descriptive statistics, Lorenz curve and Gini coefficients to examine rural households' income distribution and level of inequality in Ekiti State in South Western part of Nigeria. The result was an unequal distribution with a Gini coefficient of 0.3570. However, income and household size are positively significant factors of unequal income distribution, while marital status and primary education are negatively significant. [20] characterized the structure of inequality of rural areas in Nigeria by the household per capita expenditure. Using household as the unit of analysis, households were decomposed into a 'within group' and between group' components. It was argued that decomposability allows the partitioning of inequality into sub-groups [20].

In measuring inequality, the expenditure based approach was employed due to the variation of income at the level of rural households. The study discovered that age, gender, education and level of household heads as determinants of inequality in the country. Certain socioeconomic attributes has been discovered to be persistently significant sources of income inequality, one, two or more can include age, gender and educational level of household heads, household size, income source, and seasonality as determinants of inequality in the country [19-21]. On the basis of gender, female rural household heads have more evenly distributed income compared to male household heads, higher, however, the number of dependants and household size are culpable of putting more households below the poverty line [22]. Based on seasons; post-plant and post-harvest periods, few or no research have explicitly measured rural income inequality based on these two periods, however, varying income sources have been employed to reflect possible inequality in these two seasons. Counteracting results have shown agricultural income as contributing more to rural income inequality according to [23]; and less to income inequality with reference to [24]. In order to bridge the knowledge gap on the present level and determinants of rural income inequality in rural areas, a study of income differentials in rural households in Nigeria becomes more important, it is also required for rural economic development.

Policies and programmes failure at the rural level can be traced to the concept of rurality in Nigeria still tied to agriculture. To a very large extent, the concept of rurality is yet to be redefined to clarify its differing functions from sole agriculture. From time past, policies for agricultural development have been assumed to as well develop the rural areas and improve rural socioeconomic status, but these policies have failed severally and the rural areas still lacks basic social, economic and environmental needs. Additionally, certain rural households have found succour in engaging in off/non-farm activities, this can be attributed to rural farm households needs to spread risk, ensure income security especially in post-plant periods. It is however important to keep an update on corroborating past studies on measurement of income inequalities in rural areas in Nigeria with specific target on variation in post plant and post-harvest periods. This study will make recommendations to policy makers to restructure the rural sector. Policy makers will see the need to redefine the concept of rurality as encompassing and not agriculturally dependent. This will enable them to promote non and off-farm activities by improving the agricultural value chain for better rural economic structures. It will also contribute to government, non-governmental and NGOs policies in modelling rural inclusive socioeconomic policies, separating rural activities from agricultural activities. Also, an important focus is creating policies to harness regional integration for equal income opportunities among regions in Nigeria. The objectives of the study are as follows:

1. Profile the socioeconomic characteristics of rural households in Nigeria;
2. Measure income inequality of rural households in general and based on plant seasons;
3. Decompose income inequality according to regions (Geo-Political Zones), plant season and socioeconomic characteristics;
4. Estimate rural socioeconomic determinants of income inequality in Nigeria.

## 2. MATERIALS AND METHODS

### 2.1 Scope of the Study

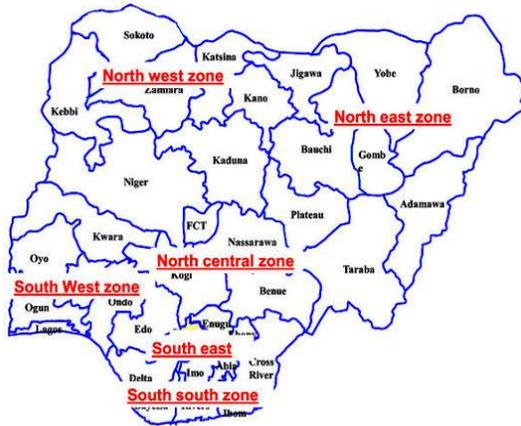
This study covers rural areas in Nigeria. Nigeria is located in the Western region of Africa (see Fig. 1) and occupies a land area of 923, 768 square Kilometres. It is bounded by Benin Republic, Niger Republic, Cameroun and the

Atlantic Ocean to the West, North, East and South respectively (see Fig. 1). There are six regions known as geopolitical zones (North West, North East, North Central, South West, South East and South South) with 36 states (see Fig. 2) and 774 local governments in total. Across the geopolitical zone, Nigeria has varying agro-climatic zones which makes it suitable for production of varying agricultural crops and livestock. The mangrove and rainforest is found in the Southern region of Nigeria, existing towards the Northern region is the savanna (Guinea, Sahel and Sudan Savanna). The climate is arid in the extreme North East, semi-arid in some parts of North West and North East, sub-humid and humid climatic conditions can be found in the southern region. The Southern region has high humidity with mean temperature of 30°C to 32°C and 33°C to 35°C in the North. The population of Nigeria is over 167 million [25]. Each of the geo-political zone is agriculturally rich and rural households engage in various agricultural activities varying from mangrove and rainforest crops produce such as cash crops (cocoa, rubber) and food crops (vegetables, yams, cassava, rice etc).In the Northern region, prominent crop produce are tuber crops, millet, sorghum, pepper etc. Some rural households heads engage in trading activities, government jobs, self employed etc .to complement farm activities.



**Fig. 1. Map of Africa showing the location of Nigeria [26]**

Source: <http://catalog.flatworldknowledge.com>



**Fig. 2. Map of Nigeria showing geographical zones and states [27]**

Source: <http://www.africaprimenews.com>

## 2.2 Data

The data used in this study were extracted from the Living Standard Measurement Survey-Integrated Surveys on Agriculture (LSMS-ISA). The LSMS-ISA is a project that foster innovations and efficiency in statistical research on the links between agriculture and poverty reduction. The LSMS-ISA survey is established by Bill and Melinda Gates Foundation and implemented by the LSMS team in Burkina Faso, Ethiopia, Malawi, Mali, Niger, Nigeria, Tanzania and Uganda. In Nigeria, the LSMS-ISA works with the national representative which is the Nigeria Bureau of Statistics to implement General Household Survey (GHS) Panel. The data consists of two phases described as waves, the Wave 1 data was released in June 2011, while wave 2 data was released in January 2015. The objective of the GHS panel which is key to this research is to improve the production of household level agriculture statistics linked with

non-agriculture dimensions of household welfare and behavior. And also to foster the dissemination of this data. The GHS covers for 22,000 households and it is carried out annually in February to March 2013 (5,000 panel and 17,000 non-panel households). The GHS is representative at the national level and for the six geopolitical zones in Nigeria, but not representatives at the state level. This study used 2012/2013 GHS panel data (Wave 2), released in 2015 with focus on the rural domain. The reason for using this data is that, it is a comprehensive report suitable for research and serves as the main national data for the country, also due to the reliability of the data. Most importantly it captures waves of income flow which is important for this study. Each Wave also comes in two seasons, the post plant collated in November 2012 and post-harvest, February – April 2013. The Wave 2 purpose built on re-interviewing the households and individuals interviewed in Wave 1. To suffice for inadequacy like movement of households after Wave 1 survey, the team either tracked households that moved to a new dwelling or communities, but no tracking of individuals that moved out. In total, 4716 households (1465- urban and 3251 rural), inclusive is 126 and 90 tracked urban and rural households as shown in the Table 1. After data cleaning, 3164 rural households constituted the sample size for this study.

## 2.3 Defining Variables

In order to capture the rural households income effectively, income is proxied by expenditure, this is due to income variation especially at the rural household. This is also due to availability of data more on households' expenditures rather than a fixed source of income. The post plant and post-harvest data are proxied to indicate income flow differentials as a result of possible

**Table 1. Number of urban and rural households respondents in each geopolitical zone in Nigeria**

Geopolitical zones	Wave 1			Wave 2		
	Urban	Rural	Total	Urban	Rural	Total
North Central	217	577	784	214	570	784
North East	138	659	741	117	624	741
North West	170	728	878	156	722	878
South East	204	590	763	197	566	763
South South	229	540	761	219	542	761
South West	611	253	789	562	227	789
	1569	3347	4716	1465	3251	4716

Source: LSMS-ISA Nigeria (2015)

flow of income from non/off farm activities. The variables extracted include: Household total expenditure, household per capita expenditure, and household expenditure in post-plant period, household expenditure in post-harvest period, number of dependants, gender, household size, age of household heads and marital status of household heads.

## 2.4 Methods of Analysis

The method of analysis employed include descriptive statistics, Gini and Theil index and regression decomposition analysis. The first objective will be realized by using descriptive statistics such as frequency, percentages, mean and standard deviation to analyse households' socioeconomic characteristics. The second objective employed the Lorenz curve, Gini coefficient and Theil index to measure income inequality and its distribution based on geopolitical zones and post-plant and post-harvest periods. Gini and Theil index corroborates the decomposition of 'within' and 'between' groups. The second objective employed income inequality decomposition analysis based on socioeconomic characteristics such as household size, gender, age, and marital status.

### 2.4.1 The gini index

The Gini index (see equation 1.) which provides appropriate standard for measurement of inequality and it is as well the most commonly used economic measures. The model of Gini Coefficient is:

$$I_{gini}(y) = \sum_{i=1}^n ai(Y)Y \text{ where } ai(Yi) = \frac{2}{n^2\mu} [i - \frac{n+1}{2}]yi \quad (1)$$

Where

n = number of observation

Where

$\mu$  = mean of the distribution  
 $Y_i$  = income of the  $i$ th household  
 $I_{gini}$  = income Gini.

### 2.4.2 Theil index

For this study, the two income inequality measures used are the Gini coefficient and the Theil Index. The Gini index is widely used and

Theil index is important for group decomposition. In the decomposability form, it is represented as the 'between' and 'within'. Decomposability is an important feature of inequality measurement. It expresses the contribution of sub-groups to total inequality. While the within inequality captures the variability within each group, the between inequality expresses the inequality across groups. A general decomposed inequality index (equation 2.) consists of the within, between and a residual, it is represented as:

$$I = I_{WITHIN} + I_{BETWEEN} + K_{RESIDUAL} \quad (2)$$

Theil index is referred to as an entropy measure. Literarily, it depicts the measurement of disorderliness, just like similar concept of inequality, it measures the deviations from perfect inequality. While the Gini index is able to compare between units and sizes of populations, it does not apply to grouped data, in situation where it does, it leaves a residual. The Theil index is able to split within and between group components of data, this is called perfect decomposability (equation 3.). It is defined as:

$$E(I) = \frac{1}{n} \sum_i \left( \frac{y_i}{\bar{y}} \right) \ln \left( \frac{y_i}{\bar{y}} \right) \quad (3)$$

Where  $y_i$  is income of individual, 'i' is the average income of the population, 'n' is the number of population.

The decomposition form of the Theil index (equation 4.) is represented thus:

$$T = \underbrace{\sum_{k=1}^m \left( \frac{n_k \bar{y}_k}{n \bar{y}} \right) T_k}_{WITHIN} + \underbrace{\sum_{k=1}^m \frac{n_k}{n} \left( \frac{\bar{y}_k}{\bar{y}} \right) \ln \left( \frac{\bar{y}_k}{\bar{y}} \right)}_{BETWEEN} \quad (4)$$

Where  $y^k$  is the individual income and 'n' is the number of population.

In regional decomposition, the first sub-groups will include two regions, the Northern region (North-Central, North-West, and North East) and the Southern region (South West, South East, and South-South). The second and third sub-groups will include gender (Male and Female). The fourth will include household size and number of dependants, age and marital status.

### 2.4.3 Regression based inequality decomposition method

The regression based decomposition is an important tool for explaining the structure of income and their distributions. It depicts the impact of individual/households or group

differences on their inequality. It was proposed by Fields (2000) and Morduch and Sicular (2002) as cited Almas 2004 is stated below (see equation 5).

$$S^k = B^k \left( \frac{\sum_{i=1}^n a_i(Y) Y^k}{I(Y)} \right) \quad (5)$$

Where

$a_i$  = weight attached to individual  $i$  income component  $k$ ,  $Y^k$

$B^k$  = The estimated explanatory variables.

$S^k$  = proportional contribution of the source  $k$  to overall inequality

This regression based decomposition analysis relies on linear regression functional form and also considers differences in mean outcomes which are its basic shortcomings.

#### **2.4.4 The Lorenz curve**

The Lorenz curve shows the relationship between the percentage of income recipients and the percentage of the total income during a given year. The Lorenz curve shows the 45 degree ray represents the line of equality or line of perfection, it is a line at which all individual are at the same income level and the line of curvature shows the unequal income distributions.

The basic interpretation for this is that the closer the line of curvature to the line of perfection, the lower the inequality and vice-versa. The Lorenz curve is modelled to range from 0 to 1. The Lorenz curve has a shortcoming of not clearly identifying dominance relationships, these are quite apparent in the Generalised Lorenz curve. While the Lorenz curve measure from 0 to 1 the Generalised Lorenz Curve) measures from 0 to the mean as shown in equation 2.

$$GL(y, p) = \mu L(y, p) \quad (6)$$

Where

GL = Generalised Lorenz

L = Lorenz curve

$y$  = income share and  $p$  = population share.

$\mu$  = mean of income

### **3. RESULTS AND DISCUSSION**

#### **3.1 Descriptive Statistics of Socioeconomic Characteristics of Rural Households**

Table 2 shows the socioeconomic characteristics of rural households in Nigeria. It can be seen that

the rural household is a typical large one with an average household size of 6. The mean age of rural household heads is 52.25 years. While the average number of dependants is 3, with maximum of 16, household annual aggregated income is 476,082 Nigerian Naira (NGN) which is equivalent to 2,145.35 Euros with a percapita income of 91467.15 (412.18 Euros). Additionally, household income and percapita income varies seasonally; income in post-plant and post-harvest season is 677,138 (3,051.37 Euros) and 514,173 (2,317.00 Euros) with percapita income of 131,464 (592.41 Euros) and 97,341(438.64 Euros) respectively. This differing seasonal income reflected streams of income from non/off farm activities as depicted by post-plant period income. The implication of this, if not checked could lead to low productivity in agriculture which could as well be driven by migration factors. This is in line with the [28] analysis of income volatility among farming households and [24], whose analysis showed that non-farm income contributed to half of farm household income.

#### **3.2 Income Inequality Measurement of Rural Household in Nigeria**

Gini and Theil indices of rural households in Nigeria in 2013 were 0.3460 and 0.2500 respectively. This shows that rural income inequality though still high, has decreased compared to measures of 0.5808 as stated in [18], The relative Theil index showed that income inequality in rural households constituted 3.1 percent of the maximum inequality. The cumulative share of rural households' in Nigeria is depicted by the Lorenz curve in Fig. 3. From the Lorenz curve, one of the highest points of income inequality can be seen at the 0.6 percentile of which cumulative rural households' population have income share less than 0.4 percentile.

#### **3.3 Decomposition Analysis of Income Inequality**

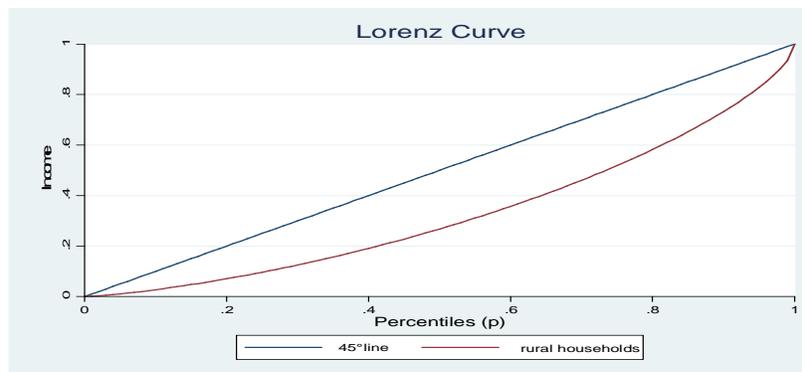
From the result of the study, both Gini and Theil indices gave the same interpretation. Among the zones, income inequality was highest in the North West with Gini and Theil indices of 0.3726 and 0.4338, and lowest in the North East with Gini and Theil index of 0.2972 and 0.1516 respectively. While the South West had the second lowest income inequality with a Gini and Theil index of 0.3191 and 0.1694 respectively; the South-South had the second highest income inequality with Gini and Theil index of 0.3626 and

0.2421 respectively (see Fig. 4). This result is contrary to [18] findings, which depicted a higher income inequality in South-East and lowest in South-West.

**Table 2. Summary statistics of socioeconomic variables of rural households in Nigeria**

Variables	Mean	Standard deviation	Maximum	Minimum
Number of dependants (persons)	3	2	16	0
Household size (persons)	6	3	26	1
Age of household heads (years)	52.24	15.1	20	110
Annual aggregated household income (NGN)	476,082	590,190.2	27,800,000	14,300.39
Percapita income (NGN)	91,467.15	105,607.40	4,639,410	7,150.20
Total household income in post-plant season (NGN)	677,137.57	1,323,455.49	67,900,000	14,582.59
Total household income in post-harvest season (NGN)	514,173.09	396,215.71	5,911,873	13,728.54
Percapita income in post-plant season (NGN)	131,464.23	224,939.28	11,300,000	3,952.18
Per-capita income in post-harvest season (NGN)	97,341.25	87,732.47	1,426,366	4,867.54
Continuous variables		Frequency	Percentage	
Gender		2717	85.9	
Male Household Heads				
Female Household Heads		447	14.1	
Total		3164	100	
Age				
20 to 40		798	25.2	
41 to 60		1488	47.2	
60 <		878	27.7	
Marital status				
Married		2545	80.4	
Never Married		58	1.8	
Separated		54	1.7	
Widowed		434	13.7	
Divorced		21	0.7	
Missing		52	1.6	
Total		3164	100	

NGN: Nigerian Naira. Euro equivalent uses March 2015 exchange rate.  
Source: Computed by Author based on LSMS Data 2015

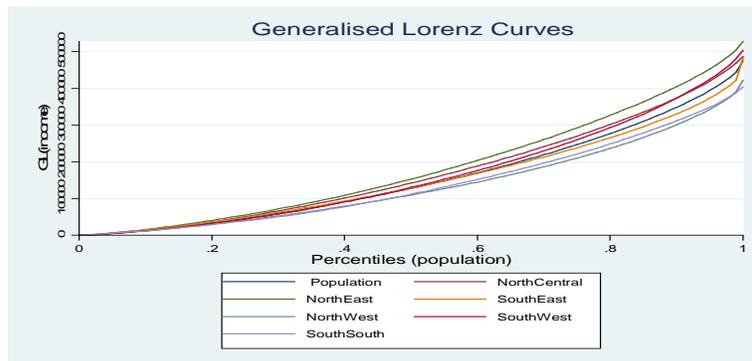


**Fig. 3. Lorenz curve of rural households' income (NGN) in Nigeria, 2013**  
Source: Computed by Author based on LSMS data, 2015

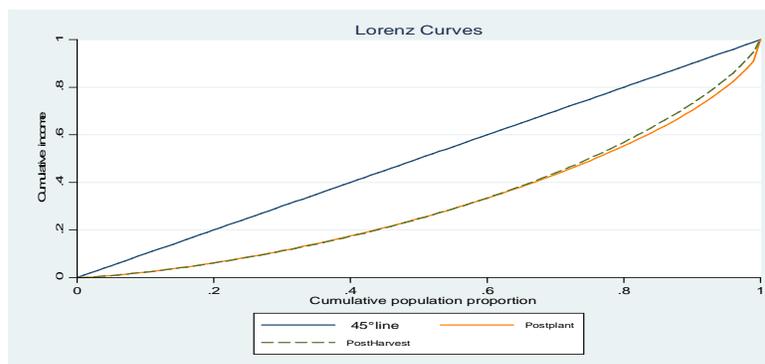
However, only the North West, South-South and South-East were above the calculated Gini index of rural areas in Nigeria (0.3460). Additionally, while the North West had the highest population share of 22.38%, the South West had the lowest population share of 3.5%. However, the South West had the highest income share (29.5%), while the South-East had the lowest income share of 15.59%. The relative contribution of Gini and Theil showed that the Northwest contributed highest (5.5% for Gini, 6.6% for Theil) to the maximum inequality while the South West contributed lowest. From the generalized Lorenz curve, the zone with the lowest inequality index; the North East, was closest to the arbitrary 45° line and the North West was the farthest. In assessing differentials in seasons, rural households had higher income inequality in post-plant periods (0.3824) than in post-harvest period (0.3694) (see Fig. 5).

This could be due to shortage in farm income and possibilities of few farmers engaged in non-farm activities more in post plant periods. It is also important to note the possible impact of

diversification of rural resource base. This is coherent with Nesmelyi [29] findings, which indicated rural dependency on agriculture, underutilized resources and influence of political elites as rebuttal cause of inequality. This is also in view of earlier studies [18], [24] and [28], To corroborate the result, few rural farm households who engaged in non-farm activities could have likely increased differentials in income distribution. This also suggests high possibility of certain rural households to fall below the poverty line in post plant periods. While source of income in both seasons were indicators of increase or decrease in rural income inequality, this finding depicted the possible impact of rural areas multifunctional activities on income distribution and equality assessment. It can be seen that sole dependence on agriculture can leave rural households more income insecure, however, exploring other functions of rural areas can increase their income level and close the inequality gap. This suggests that the Nigeria rural households are yet to move in full force with the wave of changing roles of rural areas to adjust for seasonal impacts on income.



**Fig. 4. Generalised Lorenz curve of rural households head according to geopolitical zones**  
 Source: Author's computation based on LSMS data 2015



**Fig. 5. Lorenz curve of rural households in post-plant and post-harvest season**  
 Source: Author's computation based on LSMS data 2015

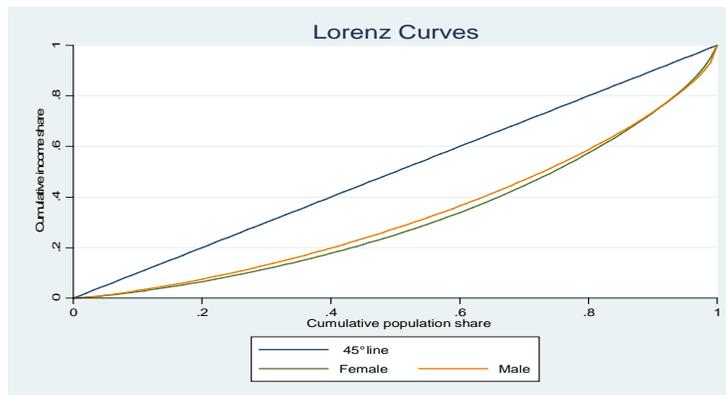
Gender is a cogent issue in sustainable development, it is a key element of inclusive growth. However, in this study, female household heads have a higher income inequality (gini index of 0.362) than the male household heads (gini index of 0.3356) (see Fig. 6).

Additionally, the male household heads had a higher income share; 90.28% than the female household heads; 9.7%. From the relative theil index, it can be seen that the female household heads contributed more (3.6%) to maximum income inequality than the male (3.0%). The between and within group inequality across gender showed that inequality within the gender group accounted for the greater proportion of observed inequality, while the differences between the groups accounted for 0.9%.

To decompose household size, the household size was grouped into two with reference to the mean rural household size. below showed that

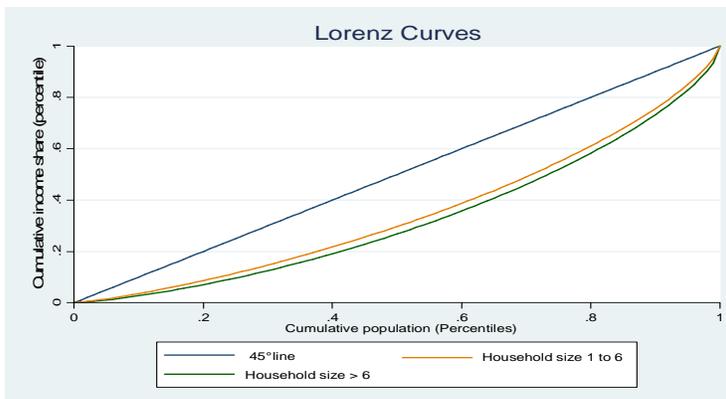
rural household size above the average had higher income inequality with Gini index of 0.3622 and Theil index of 0.2976 while rural households size below rural average have lower income inequality of 0.3356 and Theil index of 0.1619 This depicted that household size as a contributing factor to income inequality (see Fig. 7).

Additionally, the within-between group analysis showed that income inequality is higher within group than between group. While the age group 20 to 40 had the highest income inequality (0.3745, 0.3945), age group 41 to 60 had the highest income share and relative inequality contribution. The inequality contribution within and between group is 0.3588 and 0.0649 respectively. The economic effect of marital status cannot be totally disregarded, marital status formed part of socioeconomic characteristics in this study. From the decomposition analysis, rural household heads



**Fig. 6. Lorenz curve of rural households head gender**

Source: Author's computation based on LSMS data 2015



**Fig. 7. Lorenz curve of rural households' size**

Source: Author's computation based on LSMS data 2015

**Table 4. Assessing the impact of households' socioeconomic characteristics on income inequality**

Variables	Coefficients	Standard Error	T-value	Sig. level
Age	-496.9597	709.8545	-0.70	0.484
Marital Status	6324.941	9868.467	0.64	0.522
Gender	57090.48	31737.26	1.80	0.072***
Number of dependants	-27019.44	7621.502	-3.55	-0.000*
Household Size	54712.29	5382.952	10.16	0.000*
Constant	191089.60	50034.26	3.82	0.000
R Squared : 0.053, Adjusted R-Squared: 0.0537		F-statistics: 36.32		
Prob > F : 0.000				

\*1 percent, \*\*5 percent, \*\*\*10%

Source: Author's computation based on LSMS Data 2015

that were not divorced and separated had the highest income inequality. The never married status had the lowest income inequality, this study concluded that the factor of dependants might play a role in this. The Married group had the highest income and population share. The Within-Between group inequality analysis showed that income inequality is highest between group.

### 3.4 Assessing the Impact of Rural Household Socioeconomic Characteristics on Income Inequality using the Regression Based Decomposition Analysis

From this study, it was observed that number of dependants, household size, and gender of rural household heads are significant socioeconomic factors that influenced rural income inequality (see Table 4). Household size was positively signed at 1% significant level. Also, gender was positively signed and significant; this showed that the gender of household head had a significant impact on rural income inequality. This result is in line with [18], [23]. However, number of dependants was negatively signed and significant at 1%, its interpretation is economically weird and referred to decreased income inequality as number of dependants increased. One could look at this from perspectives of a higher income does not implies lower inequality. However could mean a lower share of income among the populace which is closer to equality. Although the model was fitted as shown by the significant F-statistics, the R-squared only explained 5.3% of the variation in the dependent variable which was quite weak. However, this further justified the multidimensionality of income inequality and showed the need for comprehensive national data on exogenous and endogenous variables to

actually define the main determinants of income disparities at the rural households levels.

## 4. CONCLUSION

This study have shown that rural income inequality is still high, though has decreased compared to earlier studies. Additionally, analyses presented in this study have shown the changing role of rurality and its possible impact on the reduction of income inequality. There is however a need to restructure the concept of rurality in the Nigeria system. To accomplish this, integrating rural policies and programmes are needed across geopolitical zones, through building rural institutions to enhance rural tourism and promote off and non-farm employment. This is needed to encourage productivity in other rural sector such as tourism, local products making, processing etc. and as well widen the concept of rurality in Nigeria beyond its parochial view. This can only be driven with needed rural social infrastructures in place to attract investors. Furthermore, it is recommended that disbursement of policies at grassroot levels should integrate gender and as well create equal access to educational opportunities, skills and entrepreneurial activities across age groups. It is also important that policies address rural population growth through intensifying campaign on proper birth control methods.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Dabla NE, Kalpana K, Nujin S, Frantisek R, Evridik T. Causes and consequences of

- income inequality: A global perspective. IMFSTA Discussion Note; 2015.
2. Awoyemi TT, Oluwatayo IB, Oluwakemi AO. Inequality, polarization and poverty in Nigeria. *Journal of Development and Agricultural Economics*. 2010;2(6):231-244.
  3. Milanovic B. Global inequality recalculated and updated: The effect of new PPP estimates on global inequality and 2005 estimates. *Journal of economic inequality*. Springer Science Business med; 2010.
  4. OECD. Growing unequal? Income Distribution and Poverty in OECD Countries. Retrieved from OECD Multilingual Summaries; 2008.
  5. International Monetary Fund. Inequality, transfers and growth: New evidence from the economic transition of Poland. IMF working paper prepared by Michael P Keane, Eswar S Prasad; 2000.
  6. Awe AA, Olawumi OR. Determinants of income distribution in the Nigeria economy: 1977-2005. *International Business and Management*. 2012;5(1):126-137.
  7. Adegoke YO. Disparity in income distribution in Nigeria: A Lorenz curve and Gini index approach. *Universal JAbournal of Management and Social Sciences*. 2013;3(7):16-30.
  8. Aigbokhan BE. Growth, inequality and poverty in Nigeria: A paper prepared for United Nations Economic Commission for Africa (UNECA), Addis Ababa Ethiopia; 2008.  
Available:[www.uneca.org/](http://www.uneca.org/)
  9. Clementi F, Andrew L, Dabalén Vasco Molini, Francesco Schettino. Economic polarization; The Dark Side of Nigeria; 2014.  
Available:<https://www.ifw-kiel.de/konfer/100-jahre-ifw/folder2014-07-104191296464/social-inclusiveness/1.%20Clementi.pdf>
  10. Awoyemi TT, Araar A. Explaining polarization and its dimensions in Nigeria. A DER Decomposition approach. Prepared paper for the 14<sup>th</sup> Annual conference on econometrics modelling for Africa, Abuja, Nigeria July 8-10; 2009.
  11. Omonona BT. Quantitative analysis of rural poverty in Nigeria. International Food Policy Research Institute: Brief No 17; 2008.
  12. United Nations Development Programme. *Humanity divided: Confronting inequality in developing countries*. New York: A.A United Nations Development Programme, Bureau for Development Policy; 2013.
  13. Aigbokan BE. The impact of adjustment of policies and income distribution in Nigeria: An empirical study. Research Report No 5 Development Policy Centre, Ibadan, Nigeria; 1999.
  14. Evelyn NO, Ogbeye David, Agu O. Poverty and income inequality in Nigeria; Any causality? *Asian Economic and Financial Review*. 2015;5(3):439-452.
  15. World Bank Data. World Bank database; 2015.  
Available:<http://data.worldbank.org/product/s/wdi>
  16. Nigeria Bureau of Statistics. Statistical bulletin; 2014.
  17. Oluwatayo IB. Explaining inequality and welfare status of households in rural Nigeria: Evidence from Ekiti State. *Humanity & Social Sciences Journal*. 2008;3(1):70-80.
  18. Oyekale AS, Adeoti AI, Oyekale TO. Measurement and sources of income inequality in rural and urban Nigeria. A paper presented during the 5<sup>th</sup> PEP Research network General Meeting, June 18-22, Addis Ababa, Ethiopia; 2006.
  19. Agwu NM, Ogbonnaya UO. Analysis of income inequalities and food security among farmers in Abia State, South Eastern Nigeria: Scientific papers series management. *Economic Engineering in Agriculture and Rural Development*. 2014;14(3).
  20. Olaniyan O, Awoyemi TT. Inequality in the distribution of household expenditure in rural Nigeria: A decomposition analysis. Draft final research report, African Economic Research Consortium (AERC), Nairobi. Second phase collaborative poverty Research project; 2005.
  21. Adepoju AO, Adejare KA. Food insecurity status of rural households during the post-planting season in Nigeria. *Journal of Agriculture and Sustainability*. 2013;4(1): 16-35.
  22. Awotide DO, Kehinde AL, Akorede TO. Meta frontier Analysis of access to credit and technical efficiency among smallholder cocoa farmers in Southwest Nigeria. *International Business Research*. 2015; 8(1):132-144.
  23. Ayinde OE, Munchie M, Babtunde RO, Adewunmi MO, Ayinde K, Ibitoye O. Analysis of income inequality in Nigerian

- Agricultural Economy; A case study of Ekiti State. Selected poster paper for presentation at IAAE Triennial Conference. Foz do Iguacu, Brazil, 18 – 24 August; 2012.
24. Babatunde RO. Income inequality in rural Nigeria: Evidence from farming households survey data. Australian Journal of Basic and Applied Sciences. 2008;2(1):134–140.
25. National Population Commission, Nigeria; 2015.  
Available:<http://www.population.gov.ng/>
26. Map of Africa showing the location of Nigeria.  
Available:<http://catalog.flatworldknowledge.com>
27. Map of Nigeria showing geographical zones and states.  
Available:<http://www.africaprimenews.com>
28. Obot D Akpan, Edet J Udoh. Comparative measure of income volatility of farm households in Uyo, Akwa Ibom State, Nigeria: GARCH-CV approach. American Journal of Research Communication; 2016.
29. Nesmelyi GY. The motivations for the diversification of the Nigerian economy focusing on sustainable agriculture. Abstract (Applied Studies in Agribusiness and Commerce) HU-ISSN 1789-221X – Electronic Version: ISSN 1789-7874. 2014;8(1).

© 2016 Usman et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
<http://sciencedomain.org/review-history/15317>