

Linkages Between Non-Income Poverty, Growth and Inequality in Nigeria: A Two Stage Least Square Approach

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Abstract: Poverty alleviation is a major indicator to decide whether economic growth is of benefit to the poor in a society. This study therefore addressed the extent of non-income poverty alleviation between 1999 and 2008, using the Demographic and Health Survey (DHS) data. The fuzzy method and two stage least square approaches were used to analyze the data. The results show that between 1999 and 2003, non-income welfare highly improved in Nigeria, but this could not be sustained in 2008. The rural areas were found to be more deprived in essential basic social services, while the northern part has highest non-income poverty incidences. The two-stage least square regression results show that growth in composite welfare indicators, literacy, household size and number of trained youth significantly reduced poverty incidences ($p < 0.10$), while unemployment rate, number of robbery cases and annual allocation from the federation accounts significantly increased it. It was recommended that government should ensure pro-poor spending on basic social services like improved water, sanitation, education, and employment schemes.

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1. Introduction

The Nigerian economy had over the over the past four decades experienced diverse economic crises of varying dimension and intensity (CBN, 2002). The prolonged weak growth in the economy can be attributed to policy failure, poor governance, as well as considerable social and political instability. Presently, economic stagnation, rising poverty levels, and rapid decline in efficiency of public institutions are among the major development challenges that the country faces. In addition, at almost every level of governance, corruption is seriously undermining the effectiveness of various poverty reduction and development programmes. Also, adverse macroeconomic shocks that inhibit economic growth, and inability of some proposed policy reforms and programmes to tactically ensure equitable distribution of wealth are very paramount factors that have contributed to increasing poverty and inequality (Aigbokhan, 2000).

Furthermore, the economic recession of the early 1980s was the beginning of economic downturn for the nation. This led to worsened economic fortunes and negative growth of the GDP that was as low as an average of -3.23 percent between 1981 and 1984. The recession also hampered growth of major sectors of the economy. During the 1981-1984 period, the GDP from agricultural sector grew at the rate of -1.33 percent. Other pertinent problems that resulted from the recession include increase in unemployment rate, galloping inflation, high

incidence of poverty, worsened balance of payment and increase in fiscal deficits. The country therefore started to seek financial assistance in terms of borrowing and not quite long, the debt profile of the country soared.

The Structural Adjustment Programme (SAP) was therefore implemented in the mid-1986 to address stagnating economic growth and decline in people's welfare. The major components of SAP included market-determined exchange rate and interest rates, liberalized financial sector, trade liberalization and commercialization and privatization of a number of public enterprises. Aigbokhan (2008) submitted that although Nigeria witnessed growth of GDP during SAP with average growth of 3.98 between 1985 and 1989, the expected impact of the programme on poverty had been limited. It should be noted that between 1985 and 1992, national income inequality slightly declined. Also, poverty incidence slightly reduced in all sectors of the economy due to positive economic growth that had been induced by the policies of those years. Akanji (2002) however noted that despite the drop in poverty level in 1992, high population growth resulted in an increase of about 5 million in the population in poverty over the period 1985-1992. The estimated number of the poor therefore rose from 18 million in 1980 to 35 million in 1985 and to 39 million in 1992.

When the country returned to democratically elected government on 29th May, 1999, poverty

situation is believed to have worsened. Akanji (2002) submitted that by the end of 1999, estimated number of the poor rose to 74.2 million, given a 70.6 percent poverty incidence. It should be noted that fluctuations in the per capita household expenditure over the period determined this pattern of poverty movement. Precisely, after normalizing for inflation, per capita expenditure for 1996 was not only lower than for other years but also less than half of 1980 figure. The figures (in 1996 prices) were ₦2400 for 1980, ₦1270 for 1985, ₦1780 for 1992 and ₦1050 for 1996. The estimate for 1999 rose by 10.8% to ₦1163 due to improved workers salary.

In 2004, government adopted the National Economic Empowerment and Development Strategies (NEEDS) as the home grown official Poverty Reduction Strategy Paper (PRSP). The NEEDS package recognized institutional reform as a prerequisite for economic growth and development. This was a vital departure from earlier government reform efforts. Furthermore, the NEEDS strategy considers economic growth as prerequisite for poverty reduction with a projection of between 5-7 percent annual real gross domestic product (GDP) growth rate in 2004 to 2007, while the non-oil GDP is expected to grow at between 7.3 and 9.5 percent. If achieved, by some projections, these goals are expected to produce 5 percent annual reduction in poverty incidence. Also, the NEEDS aimed at attaining average per capita consumption growth of 2 percent per annum, creation of 7 million jobs between 2004 and 2007, increase in immunization coverage to 60 percent by 2007, increase access to safe drinking water to an average of 70 percent and adult literacy rate of at least 65 percent by 2007.

It should be further stressed that the Millennium Development Goals (MDGs) document specifies different goals that should be achieved by 2015. Achieving these goals requires that poverty assessment should be confronted from different indicators of households' welfare. This is very important because there is now a growing literature supporting the multidimensional nature of poverty. Organization for Economic Cooperation and Development (OECD) (2006) submitted that the Development Assistance Committee (DAC) guidelines on poverty reduction emphasized the inter-linkages between the multiple deprivations that poverty takes. Therefore, our understanding of these inter-linkages will help to develop more effective pro-poor growth strategies and integrate these better into national poverty reduction strategies. It will also ensure that policies to address the multiple dimensions of poverty go hand-in-hand. This study therefore seeks to fulfill the objective of determining the state-level development programmes and other

factors that influence non-income poverty incidence reduction in Nigeria. In the remaining parts of the paper, methodology, results and discussion and recommendations are presented in that order.

2. Materials and Methods

The Data

The study made use of survey based secondary data and time series secondary data. The survey based secondary data consists of data from three different surveys of the DHS for 1999, 2003 and 2008. The 1999 National Demographic Sample survey was designed as probability sampling of eligible respondents within all regular households in the entire country. The sampling frame used for selecting the Primary Sampling Units (PSUs) was the Enumeration Areas (EAs) into which the country was delineated for the 1991 National Population Census. The frame contains 212,079 EAs that are mutually exclusive and collectively exhaustive of the territorial land area of Nigeria. The 36 states and Federal Capital Territory (FCT) of the country were grouped into five Survey Statistical regions. The 212,079 EAs were classified into rural and urban strata, where urban EA (U) is defined as an EA within a locality having population of 20,000 and above, while rural EA (R) is an EA within a locality with population less than 20,000 persons. A total of 7919 households were interviewed comprising 5319 from rural areas and 2600 from urban areas.

In the DHS for 2003, the sample frame was the list of enumeration areas (EAs) developed for the 1991 Population Census. Administratively, at the time the survey was planned, Nigeria was divided into 36 states and the Federal Capital Territory (FCT) of Abuja. Each state was subdivided into local government area (LGA) units and each LGA was divided into localities. In addition to these administrative units, for implementation of the 1991 Population Census, each locality was subdivided into enumeration areas (EAs). The list of approximately 212,080 EAs, with household and population information (from the 1991 census) for each EA, was evaluated as a potential sampling frame for the 2003 NDHS. The EAs are grouped by states, by LGAs within a state, and by localities within an LGA, stratified separately by urban and rural areas. Any locality with less than 20,000 population constitutes a rural area. Also available from the 1991 census were maps showing the location of the EAs. A total of 7684 households were sampled.

In 2008, the sampling frame that was used for the 2008 DHS was the 2006 Population and Housing Census of the Federal Republic of Nigeria conducted in 2006. This was provided by the National Population Commission (NPC).

Administratively, Nigeria is divided into states. Each state is subdivided into local government areas (LGAs), and each LGA is divided into localities. In addition to these administrative units, during the 2006 Population Census, each locality was subdivided into convenient areas called census enumeration areas (EAs). The primary sampling unit (PSU), referred to as a cluster for the 2008 NDHS, is defined on the basis of EAs from the 2006 EA census frame. The 2008 NDHS sample was selected using a stratified two-stage cluster design consisting of 888 clusters, 286 in the urban and 602 in the rural areas¹. A representative sample of 36,800 households was selected for the 2008 NDHS survey, with a minimum target of 950 completed interviews per state. In each state, the number of households was distributed proportionately among its urban and rural areas.

The time series secondary data were obtained from the publication of the national Bureau of Statistics (NBS) (NBS, 2009). The data are state-level aggregated data on immunization coverage (%), HIV prevalence (%), unemployment rate (%), number of youths trained in state employment generation schemes, telephone penetration rate (%), annual budgetary allocations to the states (billion naira), literacy rate (%) and number of reported robbery cases. In addition, average age of household heads and average household size were computed from the DHS for each of the years.

Computation of Non-Income Welfare Indices

Bossert *et al* (2009) submitted that in measuring multidimensional poverty, it is necessary to first aggregate the information regarding the different functioning failures of each individual into a measure of poverty at the individual level, and second to aggregate the latter across individuals to obtain a measure of poverty for the entire society. In this study, as part of objective one, indices of multidimensional non-income wealth indices (CWI) were computed using the Fuzzy Set theory originally developed by Zadeh (1965). This approach had been widely applied to poverty analysis by authors like Cerioli and Zani (1990), Martinetti (2000), Costa (2002), Dagum (2002), Costa (2003), Deutsch and Silber (2005) and Berenger (2010) among others. Berenger (2010) noted that in terms of integrating the vague and complex nature of poverty, fuzzy sets theory is very advantageous. Therefore, instead of dividing the population between poor and non poor, fuzzy approach takes into account a continuum of situations between these two extremes. Zadeh (1965) characterized a fuzzy set as a class with a continuum of grades of membership. Therefore, in a population A of n households $[A = a_1, a_2, a_3, \dots, a_n]$, the subset of poor households B includes any household $a_i \in B$. These households present some degree of deprivation in some of the m poverty attributes (X).

Table 1: Fuzzy Assigned Weights for the Selected Welfare Attributes

Attribute	Coding	1999 Weight	2003 Weight	2008 Weight
Source of Drinking Water	Improved source =1			
	Unimproved =0	0.164	0.361	0.263
Toilet	Improved method =1			
	Unimproved =0	0.138	0.146	0.310
Floor of the house	Improved material =1			
	Unimproved =0	0.204	0.175	0.220
Room (s) per person	One or more per person =1			
	Less than one per person =0	0.673	0.455	0.382
Electricity	Yes =1, No = 0	0.339	0.289	0.341
Radio	Yes =1, No = 0	0.204	0.136	0.138
Television	Yes =1, No = 0	0.582	0.515	0.452
Refrigerator	Yes =1, No = 0	0.805	0.756	0.862
Telephone	Yes =1, No = 0	1.740	1.257	0.342
Formal Education	Yes =1, No = 0	0.247	0.247	0.222
Car	Yes =1, No = 0	1.107	1.017	1.125
Iron	Yes =1, No = 0	0.602	0.512	0.541
Fan	Yes =1, No = 0	0.498	0.432	0.434
Bicycle	Yes =1, No = 0	0.622	0.479	0.624
Motorcycle	Yes =1, No = 0	0.867	0.805	0.600

The welfare attributes considered in this study are based on the DHS data. Following Costa (2002), the degree of being poor by the i-th household ($i=1, \dots, n$) with respect to a particular

attribute (j) given that ($j = 1, \dots, m$) is defined as: $\mu_B [X_j (a_i)] = x_{ij}$, $0 \leq x_{ij} \leq 1$. Specifically, $x_{ij} = 0$ when the household does not possess welfare

enhancing attribute and $x_{ij} = 1$ when the household possesses it. Betti *et al* (2005) noted that putting together categorical indicators of deprivation for individual items to construct composite indices requires decisions about assigning numerical values to the ordered categories and the weighting and scaling of the measures. Individual items indicating non-monetary deprivation often take the form of simple 'yes/no' dichotomies. In this case x_{ij} is 0 or 1.

However, some items may involve more than two ordered categories, reflecting different degrees of deprivation. Consider the general case of $c = 1$ to C ordered categories of some deprivation indicator, with $c = 1$ representing the most deprived and $c = C$ the least deprived situation. Let c_i be the category to which individual i belongs. Cerioli and Zani (1990), assuming that the rank of the categories represents an equally-spaced metric variable, assigned to the individual a deprivation score as:

$$x_{ij} = (C - c_i) / (C - 1) \quad 1$$

where $1 \leq c_i \leq C$. Therefore, x_{ij} needs not to be compulsorily 0 or 1, but $0 \leq x_{ij} \leq 1$ when there are many categories of the j th indicator and the household possesses the attribute with intensity. Details of the welfare attributes that were used is contained in table 1.

The multidimensional welfare index of a household, $\mu_B(a_i)$, which shows the level of welfare and membership to set B is defined as the weighted average of x_{ij} ,

$$\mu_B(a_i) = \sum_{j=1}^m x_{ij} w_j / \sum_{j=1}^m w_j \quad 2$$

w_j is the weight attached to the j -th attribute.

The intensity of deprivation with respect to X_j is measured by the weight w_j . It is an inverse function of the degree of deprivation and the smaller the number of households and the amount of their deprivation, the greater the weight. In practice, a weight that fulfils the above property had been proposed by Cerioli and Zani (1990). This can be expressed as:

$$w_j = \log \left[\sum_{i=1}^n g(a_i) / \sum_{i=1}^n x_{ij} g(a_i) \right] \geq 0 \quad 3$$

Ideally, $g(a_i) / \sum_{i=1}^n g(a_i) > 0$ and $g(a_i) / \sum_{i=1}^n g(a_i)$ is the relative frequency represented by the sample observation a_i in the total population. Therefore when $x_{ij}=0$, the welfare attribute should be removed.

Two Stage Least Square (2SLS) Method

Two Stage Least Square (2SLS) method was used to analyze the impact of growth and inequality of CWI on the state-level changes of non-income

poverty incidence computed for 1999/2003 and 2003/2008. The conventional ordinary least square (OLS) regression is invalid because while growth in aggregate (overall) CWI influences change in poverty incidences, growth itself can be influenced by a host of other factors. Therefore, the endogeneity problem with respect to the growth variable is to be resolved by the use of instrumental variables. Between 2003 and 2008, changes in poverty incidences was modeled with change in Gini-coefficient, literacy and fertilizer inputs being used as the instrumental variables, having established their high correlation with growth variable and very low correlation with poverty change. The estimated models has growth rate in CWI (%), northern states dummy (yes = 1, 0 otherwise), immunization coverage (%), HIV prevalence rate (%), unemployment rate (%), number of trained youths, telephone penetration (%), annual allocation (billion Naira), change in Gini coefficient, average age (years), number of robbery cases, literacy rate (%) and average household size as the explanatory variables. The model can be stated as:

$$\Delta P_{it} = \alpha_1 + \alpha_2 G_{it} + \alpha_3 \Delta I_{it} + \beta_j \sum_{j=1}^{10} X_{it} + e_{it} \quad 4$$

$$\Delta P_{it} = \theta_1 + \theta_2 G_{it} + \pi_j \sum_{j=1}^{10} X_{it} + f_{it} \quad 5$$

Where ΔP_{it} is the change in poverty in i th state in period t , ΔI_{it} is the change in Gini inequality index of i th state in period t and X_{it} are the other exogenous variables. The endogeneity of G_{it} poses problem to the model if estimated by Ordinary Least Square (OLS) method. In order to resolve this problem, the 2SLS method was used to estimate the equations. The first stage is to present a reduced form equation for the determinants of G_{it} , such that instrumental variables that are correlated with it but uncorrelated with ΔP_{it} are identified. Equation 4 was estimated for the ΔP_{it} in 1999/2003 where ΔI_{it} is not correlated with growth, but equation 5 was estimated for ΔP_{it} in 2003/2008 because was one of the instrumental variables having being confirmed to be uncorrelated with ΔP_{it} .

$$G_{it} = \sigma_1 + \sigma_2 I_{it} + \varpi_j \sum_{j=1}^2 X_{it} + h_{it} \quad 6$$

The reduced form equation is expressed as:

$$G_{it} = \sigma_1 + aDi + \varpi_j \sum_{j=1}^2 X_{it} + z_{it} \quad 7$$

The estimated equations were

$$\Delta P_{it} = \alpha_1 + \alpha_2 G_{it} + \alpha_3 \Delta I_{it} + \beta_j \sum_{j=1}^{10} X_{it} + e_{it} \quad 8$$

$$\Delta P_{it} = \theta_1 + \theta_2 G_{it} + \pi_j \sum_{j=1}^{10} X_{it} + f_{it} \quad 9$$

3. Results and Discussions

Construction of Composite Welfare Indices and Access by the Poor

We used fuzzy set method to construct composite welfare indices (CWI) for each of the households using the selected fifteen welfare attributes. This was necessitated by inability to find comparable welfare indices in the three datasets. Precisely, the 1999 DHS survey did not incorporate asset index variable, while the 2003 and 2008 datasets did. Using the available constructed asset indices will limit the analysis to two years (2003 and 2008). However, because major economic reforms of the democratic government started since late 1999, it is important to include the 1999 survey dataset in order to have a reasonable trend of analysis. Similarly, we were faced with the concern of how comparable the asset indices in the 2003 and 2008 datasets are. This is due to the different array of household assets that the two datasets contain with 2008 data having wider coverage. To therefore ensure comparability across time, we constructed composite welfare indices that integrate similarly coded attributes using the fuzzy set method.

At the first stage, attributes that were common to all the three datasets were carefully selected. The selected attributes are sources of drinking water {for which our definition of improved sources is derived from UNICEF (2010) as households' pipe connections, public standpipes, borehole, protected dug wells, protected springs and rainwater, while unimproved sources are unprotected wells, unprotected springs, vendor-provided water, bottled water and tanker truck provided water}, sanitation (with improved sanitation defined as connections to public sewers, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines, unimproved sources are bucket latrines, public latrines and open latrines), main floor material (with finished type classified as improved while rudimentary types are unimproved sources), rooms per person, electricity, ownership of radio, ownership of television, ownership of refrigerator, ownership of telephone, attainment of formal education, ownership of motor car, ownership

of electric iron, ownership of electric fan, ownership of bicycle and ownership of motorcycle. The definition of poverty for each attribute and the weight of the attributes are provided in table 1. The table also shows that across the years covered by the surveys, attributes with highest weights are ownership of mobile phone (in 1999 and 2003 only), motor cars, motorcycle and refrigerator.

CWI Spatial Distribution

Table 2 shows some descriptive statistics of the constructed CWI across the states, geo-political zones (GPZ) and urban/rural sectors. It shows that at the national level, in 1999, average CWI for all the households is 0.214. This increased to 0.325 in 2003 before it slightly declined to 0.307 in 2008. These findings are confirmations to the progress made in ensuring poverty reduction in all its ramifications as a result of several economic reforms embarked upon by the Nigerian government since the country returned to democratic governance since 29th May 1999. Okonjo-Iweala and Osafo-Kwaako (2007) specifically noted that with macroeconomic stability that resulted from the economic reforms, economic growth rates have averaged about 7.1 percent annually for the period 2003 to 2006, and attention was also given to pro-poor expenditures within the budget in order to improve the country's performance in some Millennium Development Goals indicators. Also worthy to mention is the fact that several authors (Dijkstra, 2011; Iyoha and Oriakhi, 2007) have found that the 2005 debt relief that was granted to Nigeria by the Paris Club had a modestly positive effect on economic growth and poverty reduction, especially through the stock and conditionality channels. It was noted that this will lead to a greater achievement of the MDGs in the future.

Table 2 further shows that at the state level, highest average CWI in 1999 are found in Lagos (0.386), Delta (0.310), Anambra (0.302) and Osun (0.297), while the lowest are in Sokoto (0.058), Jigawa (0.074), Kebbi (0.085) and Zamfara (0.095), all from northern Nigeria. In 2003, Lagos, FCT, Rivers and Kwara states have the highest average CWI of 0.560, 0.488, 0.460 and 0.445, respectively, while the lowest average CWI are in Jigawa, Kebbi, Sokoto, Bayelsa and Ebonyi states with 0.138, 0.140, 0.152, 0.169 and 0.173, respectively. In the 2008, Lagos, FCT, Anambra and Abia have the highest average CWI of 0.534, 0.497, 0.490 and 0.463, respectively, with the lowest being in Yobe (0.158), Jigawa (0.163), Bauchi (0.169), Zamfara (0.178) and Taraba (0.184).

It should be noted that the World Bank sponsored Nigeria Community Based Poverty Reduction Project (which is a very viable avenue for ensuring rural communities' access to basic

education, portable water, electricity and health) became effective in September 2001 with beneficiary states for the first phase comprising Abia, Ekiti, Cross River, Kebbi, Kogi, and Yobe state. At the

second phase, additional six other states comprising Delta, Ebonyi, Gombe, Kwara, Osun and Zamfara States have been included with four of them being supported by the Africa Development Bank (AfDB).

Table 2: Means and Standard Deviations of CWI

Year/ State/Zone	1999				2003				2008			
	Freq	%	Mean	Std Dev	Freq	%	Mean	Std Dev	Freq	%	Mean	Std Dev
Akwa Ibom	641	8.38	0.250	0.158	183	2.53	0.341	0.191	928	2.72	0.398	0.214
Anambra	189	2.47	0.302	0.174	255	3.53	0.456	0.230	837	2.46	0.490	0.203
Bauchi	154	2.01	0.121	0.157	370	5.12	0.177	0.165	922	2.71	0.169	0.152
Edo	189	2.47	0.229	0.189	151	2.09	0.467	0.231	883	2.59	0.445	0.220
Benue	340	4.45	0.193	0.155	292	4.04	0.260	0.178	890	2.61	0.209	0.171
Borno	148	1.94	0.145	0.156	231	3.20	0.341	0.220	955	2.80	0.215	0.191
Cross Rivers	113	1.48	0.172	0.179	130	1.80	0.304	0.203	817	2.40	0.250	0.201
Adamawa	142	1.86	0.138	0.142	189	2.62	0.290	0.194	906	2.66	0.227	0.186
Imo	197	2.58	0.292	0.177	232	3.21	0.464	0.220	770	2.26	0.417	0.224
Kaduna	291	3.81	0.203	0.153	361	5.00	0.335	0.224	951	2.79	0.342	0.220
Kano	476	6.22	0.179	0.143	369	5.11	0.380	0.215	1,178	3.46	0.304	0.215
Katsina	307	4.01	0.162	0.145	246	3.40	0.291	0.190	977	2.87	0.211	0.160
Kwara	112	1.46	0.250	0.172	149	2.06	0.445	0.223	827	2.43	0.317	0.241
Lagos	401	5.24	0.386	0.171	383	5.30	0.560	0.191	1,304	3.83	0.534	0.174
Niger	208	2.72	0.243	0.183	211	2.92	0.302	0.203	904	2.65	0.319	0.226
Ogun	275	3.60	0.261	0.168	181	2.51	0.307	0.220	948	2.78	0.333	0.200
Ondo	173	2.26	0.235	0.172	142	1.97	0.246	0.195	953	2.80	0.324	0.228
Oyo	407	5.32	0.233	0.187	272	3.76	0.261	0.225	975	2.86	0.351	0.208
Plateau	200	2.62	0.183	0.154	194	2.69	0.329	0.215	930	2.73	0.227	0.175
Rivers	198	2.59	0.242	0.163	280	3.88	0.460	0.235	932	2.74	0.396	0.226
Sokoto	160	2.09	0.058	0.058	144	1.99	0.152	0.160	952	2.79	0.186	0.185
Abia	131	1.71	0.263	0.169	165	2.28	0.361	0.211	791	2.32	0.463	0.200
Delta	190	2.48	0.310	0.211	205	2.84	0.390	0.219	930	2.73	0.384	0.216
Enugu	146	1.91	0.126	0.103	233	3.22	0.330	0.241	835	2.45	0.322	0.220
Jigawa	160	2.09	0.074	0.052	176	2.44	0.138	0.096	930	2.73	0.163	0.152
Kebbi	163	2.13	0.085	0.073	130	1.80	0.140	0.135	900	2.64	0.214	0.184
Kogi	230	3.01	0.275	0.176	183	2.53	0.358	0.221	983	2.89	0.346	0.207
Osun	211	2.76	0.297	0.201	172	2.38	0.305	0.182	970	2.85	0.363	0.223
Taraba	175	2.29	0.227	0.194	141	1.95	0.211	0.132	902	2.65	0.184	0.168
Yobe	157	2.05	0.131	0.134	128	1.77	0.320	0.200	878	2.58	0.158	0.158
Bayelsa	58	0.76	0.232	0.159	61	0.84	0.169	0.132	899	2.64	0.255	0.185
Ebonyi	143	1.87	0.124	0.107	150	2.08	0.173	0.104	898	2.64	0.270	0.198
Ekiti	106	1.39	0.176	0.129	105	1.45	0.285	0.186	940	2.76	0.354	0.208
Gombe	101	1.32	0.122	0.132	132	1.83	0.234	0.192	895	2.63	0.197	0.174
Nassarawa	79	1.03	0.192	0.154	89	1.23	0.273	0.164	863	2.53	0.309	0.192
Zamfara	201	2.63	0.095	0.111	150	2.08	0.220	0.149	854	2.51	0.178	0.199
FCT	75	0.98	0.287	0.193	40	0.55	0.488	0.184	863	2.53	0.497	0.231
NC	1244	16.27	0.226	0.172	1,158	16.03	0.327	0.212	6,260	18.37	0.317	0.224
NE	877	11.47	0.151	0.161	1,191	16.48	0.253	0.196	5,458	16.02	0.192	0.174
NW	1758	22.99	0.141	0.135	1,576	21.81	0.273	0.209	6,742	19.79	0.232	0.200
SE	806	10.54	0.230	0.172	1,035	14.33	0.373	0.235	4,131	12.13	0.389	0.226
SS	1389	18.16	0.247	0.175	1,010	13.98	0.388	0.229	5,389	15.82	0.357	0.223
SW	1573	20.57	0.282	0.189	1,255	17.37	0.365	0.240	6,090	17.87	0.386	0.220
Urban	2,482	32.46	0.321	0.188	2,931	40.57	0.438	0.224	10,724	31.48	0.466	0.211
Rural	5,165	67.54	0.162	0.143	4,294	59.43	0.248	0.192	23,346	68.52	0.235	0.190
Total	7647	7.647	0.214	0.176	7,225	100	0.325	0.225	34,070	100	0.307	0.224

Table 3: CWI Poverty Incidence and Gini-Inequality Indices in Nigeria

States	Non-Income Poverty Incidence					Inequality Indices				
	1999	2003	2008	Change 1999/2003	Change 2003/2008	1999	2003	2008	1999/2003 Growth	2003/2008 Growth
Akwa Ibom	33.85	44.26	29.2	10.41	-15.06	0.3485	0.3048	0.3077	-12.54	0.93
Anambra	26.99	22.75	14.58	-4.24	-8.17	0.3257	0.2815	0.2356	-13.57	-16.30
Bauchi	81.82	81.89	80.91	0.07	-0.98	0.5600	0.4578	0.4397	-18.26	-3.96
Edo	46.03	23.18	23.22	-22.85	0.04	0.4593	0.2782	0.2835	-39.43	1.92
Benue	49.71	59.24	70.78	9.53	11.54	0.4077	0.3770	0.4258	-7.54	12.94
Borno	75	47.19	70.68	-27.81	23.49	0.4905	0.3618	0.4631	-26.25	28.00
Cross Rivers	66.37	54.62	60.59	-11.75	5.97	0.5085	0.3627	0.4407	-28.67	21.50
Adamawa	67.6	57.15	64.02	-10.45	6.87	0.5104	0.3625	0.4367	-28.97	20.48
Imo	27.41	22.42	26.88	-4.99	4.46	0.3391	0.2667	0.3033	-21.34	13.70
Kaduna	56.01	50.69	43.32	-5.32	-7.37	0.3836	0.3569	0.3575	-6.97	0.15
Kano	57.56	36.32	51.7	-21.24	15.38	0.4064	0.3129	0.3836	-23.01	22.58
Katsina	65.15	58.95	70.62	-6.2	11.67	0.4470	0.3579	0.3969	-19.95	10.92

Kwara	36.6	27.51	48.61	-9.09	21.1	0.3728	0.2827	0.4310	-24.17	52.45
Lagos	8.48	4.96	7.21	-3.52	2.25	0.2440	0.1933	0.1801	-20.78	-6.85
Niger	40.39	50.71	48.56	10.32	-2.15	0.4064	0.3715	0.3926	-8.59	5.68
Ogun	32	49.17	41.46	17.17	-7.71	0.3605	0.4013	0.3419	11.34	-14.81
Ondo	38.15	66.2	47.21	28.05	-18.99	0.4066	0.4258	0.3998	4.72	-6.11
Oyo	45.7	61.77	38.46	16.07	-23.31	0.4454	0.4684	0.3390	5.17	-27.63
Plateau	58	50.51	66.02	-7.49	15.51	0.4249	0.3622	0.4032	-14.75	11.32
Rivers	35.35	23.93	30.04	-11.42	6.11	0.3782	0.2908	0.3265	-23.13	12.29
Sokoto	95.63	83.34	77.21	-12.29	-6.13	0.4564	0.5199	0.4974	13.92	-4.32
Abia	33.59	42.42	16.18	8.83	-26.24	0.3570	0.3205	0.2464	-10.20	-23.12
Delta	33.16	35.61	31.39	2.45	-4.22	0.3865	0.3154	0.3209	-18.41	1.73
Enugu	73.29	50.21	46.94	-23.08	-3.27	0.3955	0.3947	0.3783	-0.22	-4.14
Jigawa	95.63	90.34	81.07	-5.29	-9.27	0.3780	0.3830	0.4538	1.33	18.48
Kebbi	89.57	87.69	69.44	-1.88	-18.25	0.4300	0.4633	0.4451	7.74	-3.92
Kogi	32.18	44.27	38.15	12.09	-6.12	0.3603	0.3436	0.3387	-4.64	-1.42
Osun	32.7	48.83	38.35	16.13	-10.48	0.3778	0.3332	0.3514	-11.79	5.44
Taraba	49.14	75.89	74.72	26.75	-1.17	0.4609	0.3271	0.4706	-29.02	43.85
Yobe	73.25	50	79.38	-23.25	29.38	0.4743	0.3422	0.5075	-27.85	48.28
Bayelsa	43.11	86.89	57.29	43.78	-29.6	0.3800	0.4031	0.3980	6.07	-1.27
Ebonyi	72.73	80	56.8	7.27	-23.2	0.4628	0.3450	0.4047	-25.47	17.31
Ekiti	55.66	55.24	39.15	-0.42	-16.09	0.3947	0.3599	0.3348	-8.81	-6.96
Gombe	77.22	71.97	73.52	-5.25	1.55	0.5080	0.4157	0.4551	-18.18	9.47
Nassarawa	59.49	53.93	45.88	-5.56	-8.05	0.3980	0.3248	0.3437	-18.38	5.80
Zamfara	87.06	74	82.32	-13.06	8.32	0.5269	0.3588	0.5118	-31.91	42.65
FCT	25.33	10	17.73	-15.33	7.73	0.3565	0.2037	0.2665	-42.86	30.79
NC	44.21	47.67	48.07	3.46	0.4	0.4045	0.3593	0.3962	-11.18	10.27
NE	69.78	66	73.84	-3.78	7.84	0.5154	0.4122	0.4663	-20.02	13.12
NW	71.9	61.3	67.16	-10.6	5.86	0.4687	0.4089	0.4503	-12.76	10.11
SE	44.67	40.29	32.9	-4.38	-7.39	0.4102	0.3490	0.3308	-14.92	-5.22
SS	38.66	37.63	38.19	-1.03	0.56	0.3966	0.3317	0.3574	-16.36	7.75
SW	31.91	40.8	33.69	8.89	-7.11	0.3764	0.3737	0.3278	-0.72	-12.29
Urban	23.17	26.57	18.79	3.4	-7.78	0.3290	0.2908	0.2591	-11.61	-10.89
Rural	62.92	66	64.34	3.08	-1.66	0.4574	0.4075	0.4325	-10.91	6.13
Total	-	-	-	-	-	0.4436	0.3844	0.4087	-13.35	6.32

Furthermore, using the median as the poverty line in each year, we were able to compute the non-income poverty incidences as presented in table 3. The table shows that in 1999, Sokoto (95.63 percent), Jigawa (95.63 percent), Kebbi (89.57 percent), Zamfara (87.06 percent), Bauchi (81.82 percent), Gombe (77.22 percent), Borno (75.00 percent), Enugu (73.29 percent), Yobe (73.25 percent) and Ebonyi (72.73 percent) have the highest values, whereas Lagos (8.48), FCT (25.33 percent), Anambra (26.99 percent), Imo (27.41 percent), Ogun (32.00 percent), Kogi (32.18 percent) and Osun (32.17 percent) have the least values. The table further shows that in 2003, non-income poverty incidences are highest in Jigawa (90.34 percent), Kebbi (87.69 percent), Bayelsa (86.89 percent), Sokoto (83.34 percent), Bauchi (81.89 percent), Ebonyi (80.00 percent), Taraba (75.89 percent) and Zamfara (74.00 percent), while Lagos (4.96 percent), FCT (10.00 percent), Imo (22.42 percent), Anambra (22.75 percent), Edo (23.18 percent), Rivers (23.93 percent) and Kwara (27.51 percent) have the least values. Similarly, in 2008, Zamfara (82.32 percent), Jigawa (81.07 percent), Bauchi

(80.91 percent), Yobe (79.38 percent), Sokoto (77.21 percent), Taraba (74.72 percent) and Gombe (73.52 percent) have the highest non-income poverty incidences, while Lagos (7.21 percent), Anambra (14.58 percent), Abia (16.18 percent), FCT (17.73 percent), Edo (23.22 percent), Imo (26.88 percent) and Akwa Ibom (29.20 percent) have the least values. These results, when put by the side of the monetary poverty incidences for the states in 2004 reveal that states like Jigawa, Kebbi, Bauchi, Yobe, Zamfara, Gombe, Sokoto and Adamawa have highest values and many of these have consistently showed very high non-income poverty incidence in the years covered by the data (Oyekale et al., 2006).

The table also shows that CWI inequality at the national level is highest in 1999 with Gini coefficient of 0.4436. This value declined to 0.3844 in 2003 before slightly increasing to 0.4087 in 2008. This finding is also similar to the conclusion of Aigbokhan (2008) using expenditure data in the 2004 survey that although Nigeria had recently witnessed some growth during the past one decade or so, the speed of poverty reduction is rather a bit low due to presence of inequality.

In 1999, highest values of Gini inequality indices are recorded in Bauchi (0.5600), Zamfara (0.5269) and Adamawa (0.5104) and lowest in Lagos, Anambra and Imo states with 0.2440, 0.3257 and 0.3391, respectively. In 2003, CWI inequality is highest in Sokoto (0.5199), Oyo (0.4684), Kebbi (0.4633) and Bauchi (0.4578), while it is lowest in Lagos (0.1933), FCT (0.2037), Imo (0.2667) and Edo (0.2782). In 2008, Zamfara (0.5118), Yobe (0.5075), Sokoto (0.4974) and Taraba (0.4706) have the highest CWI inequality. The results generally reveal that poverty incidences are statistically significantly correlated with inequality ($p < 0.01$) with pair-wise correlation of 0.760, 0.821 and 0.959 in 1999, 2003 and 2008, respectively. This clearly shows that states with high non-income poverty incidences also tend to display a very high Gini-coefficient.

Between 1999 and 2003, table 3 shows that changes in non-income poverty incidences across the states reveal decline by 27.81 percent in Borno, 23.25 percent in Yobe, 23.08 percent in Enugu, 22.85 percent in Edo, and 21.24 percent in Kano, whereas, Bayelsa, Ondo, Taraba, Ogun, Osun and Oyo recorded increases of 43.78 percent, 28.05 percent, 26.75 percent, 17.17 percent, 16.13 percent and 16.07 percent, respectively. Between 2003 and 2008, states that recorded decline in poverty are Bayelsa (29.6 percent), Abia (26.24 percent), Oyo (23.31 percent), Ebonyi (23.2 percent), Ondo (18.99 percent) and Kebbi (18.25 percent), while increases were recorded

in Yobe (29.38 percent), Borno (23.49 percent), Kwara (21.10 percent) and Plateau (15.51 percent). It should also be noted that states with consistent reduction in poverty incidences are Nassarawa, Kebbi, Jigawa, Enugu, Sokoto, Kaduna and Anambra, while it is only in Benue state that poverty consistently increased.

Growth, Inequality and Non-Income Poverty Incidence Linkages

The impact of growth rates of CWI and changes in inequality on changes in non-income poverty incidences was addressed with a two-stage regression. The OLS and 2SLS results for the periods 1999/2003 and 2003/2008 are presented in table 4. The results for the 2SLS show that the Wald Chi Square statistics are 56.19 and 66.42 for 1999/2003 and 2003/2008 respectively being statistically significant ($p < 0.01$). Out of the variables that were included in the 1999/2003 model, growth rate of CWI, number of trained youths, average of annual allocation from the federation account, average age and literacy rate show statistical significance ($p < 0.10$), while in 2003/2008, growth rates of CWI, unemployment rate, telephone penetration, literacy rate and average household size are statistically significant. Change in Gini inequality variable was excluded from the 2003/2008 model because it is highly correlated with growth and uncorrelated with non-income poverty incidence change and thus used as one of the instrumental variables.

Table 4: OLS and Two Stage Least Square Regression of the Impact of Growth and Inequality on Non-Income Poverty Change (1999-2008)

Variables	1999-2003 (OLS)		1999-2003 (2SLS)		2003-2008 (OLS)		2003-2008 (2SLS)	
	Coeff	T value	Coeff	T value	Coeff	T value	Coeff	T value
Growth rate in CWI	-0.1475***	-2.87	-0.1463**	-2.03	-0.1288	-1.53	-0.1924**	-2.01
Northern states dummy	-4.3971	-0.54	-4.4351	-0.66	2.9022	0.31	2.7458	0.39
Immunization	0.00008	1.15	0.00008	1.43	0.00002	0.23	0.00001	0.17
HIV prevalence	0.00003	0.59	0.00003	0.74	0.00007	1.00	0.00006	1.14
Unemployment rate	-0.2870	-1.21	-0.2880	-1.48	1.0194***	2.68	0.9844***	3.37
Trained Youths	-0.0363	-1.41	-0.0362*	-1.79	-0.0016	-0.10	-0.001	-0.09
Telephone Penetration	1.4305	0.87	1.4324	1.10	-0.5340	-1.24	-0.5178	-1.57
Annual Allocation	0.3808**	2.20	0.3814***	2.75	-0.1132	-0.77	-0.1029	-0.92
Change in Gini coefficient	0.2049	1.10	0.2055	1.37	-	-	-	-
Average age (years)	2.2419**	2.05	2.2389***	2.56	0.9297	-0.59	-0.9239	-0.77
Robbery cases	-0.0537	-1.13	-0.0538	-1.42	0.1116*	1.73	0.1047**	2.10
Literacy	-0.3838**	-2.04	-0.3835***	-2.57	-	-	-	-
Average household size	-	-	-	-	-13.8188	-1.91	-13.9495***	-2.53
Constant	-48.6607	-0.86	-48.5612	-1.08	64.3886	0.59	67.1998	0.80
F Value	3.12***				2.58**			
Wald Chi Square			56.19****				66.42***	
Adj R-Squared	0.4338				0.6388			
No of observations	37		37		37		37	

*** significance at 1%, significance at 5%**, * significance at 10%

The results show that a percentage increase in the growth rate of CWI reduced non-income poverty incidence by 0.1463 percent and 0.1924 percent in 1999/2003 and 2003/2008 respectively. Therefore, growth resulted into reduction in non-income poverty incidences in 2003/2008 than in 1999/2003. This finding is similar to that of Oyekale *et al* (2006), Aigbokhan (2008) and Oyekale *et al* (2011) for monetary poverty in Nigeria and Boccanfuso *et al* (2009) for non-monetary poverty incidence in Senegal using Shapley decomposition approach. Meier (1989) asserted that whether absolute poverty is measured by low income, low life expectancy or illiteracy, there is a strong negative correlation between poverty and growth.

Unemployment rate variable shows statistical significance ($p < 0.01$) in the 2003/2008 and implies that increasing unemployment rate by one percent will increase non-income poverty incidence by 0.9844. This is expected because unemployment constitutes some welfare losses to the households. Todaro (1985) affirmed that provision of gainful employment must be an essential ingredient in any poverty reduction development strategy. Osinubi (2005) reported that based on some Federal Office of Statistics and Central Bank of Nigeria data, poverty incidence in Nigeria declined between 1987 and 1991 due to steady decline in unemployment rate. Closely related to this are the parameters of the number of trained youths that both have negative sign in the two results, but only shows statistical significance ($p < 0.10$) in the 1999/2003 results. This implies that in 1999/2003, increasing the number of trained youth by one unit will reduce non-income poverty incidence by 0.0362. It should be noted that the parameter is very small compared to what was obtained for the unemployment rate. The implication of this finding is that the number of training conducted for youth in recent time does not have impact on poverty reduction. This may be as result of poor targeting and inability to complement training with adequate financial supports to set up.

Telephone penetration statistical significantly ($p < 0.10$) reduces poverty by -0.5178 in the 2003/2008 period. This is expected because telephone penetration seems to rapidly dissolve every barrier to economic integration, which is very vital for economic development. Obayelu and Ogunlade (2006) provided some empirical results to buttress this finding. Unexpectedly, a unit increase in the average annual allocation to the states from the Federation Account in 1999/2003 period increases poverty significantly ($p < 0.01$) by 0.3814 unit. In the 2003/2008 period, the parameter is with negative sign but statistically insignificant ($p > 0.10$). Klump and Bonschab (2004) already noted that it requires pro-

poor spending for government expenditure to result into poverty reduction.

The variable of change in Gini coefficient is with positive sign in the 1999/2003 model, but shows no statistical significance ($p > 0.10$). Average age variable is statistically significant ($p < 0.05$) in the 1999/2003 model. It implies that as average age of the household head increases by one year, non-income poverty incidence will increase by 2.2389. Aigbokhan (2008) also found that because of the life cycle implication of wealth acquisition, above a particular point, expenditure will decline with age. Robbery cases variable shows statistical significance ($p < 0.05$) in the 2003/2008 model and implies that an increase in the number of robbery cases by one unit will increase non-income poverty by 0.1047. Odumosu (1999) noted that when poverty is coupled with high levels of economic and social aspirations, the stage is set for criminal activities - particularly official corruption, robbery and dealing in illegal goods and services. It was emphasized that people who are thwarted in attaining desired social and economic goals legally may seek to obtain them illegally. Therefore, incidence of robbery and traffic in illegal goods tends to be high among members of minority groups who feel the burden of both economic and social discrimination. This is a consequence of widening poverty and inequality gaps. In 1999/2003, a percentage increase in literacy rate significantly reduces non-income poverty incidence by 0.3835 ($p < 0.05$). Klump and Bonschab (2004) already indicated that spending on education provides a vital platform for releasing people from the hooks of poverty. Several other authors (Aigbokhan, 2008; Oyekale *et al*, 2006) have documented the impact of education in ensuring monetary poverty reduction in Nigeria. In the 2003/2008 model, average household size variable is also show statistical significance ($p < 0.05$). This implies that as household size increases, non-income poverty reduces. This is contrary to what had been found by Aigbokhan (2008) for monetary poverty in Nigeria.

4. Recommendations

This study assessed non-income pro-poor growth in Nigeria using the 1999, 2003 and 2008 survey based Demographic and Health Survey (DHS) secondary data. The fuzzy set method was used to construct composite welfare indicators for the households, which were subjected to further pro-poor distributional and parametric regression approaches. The major findings and their policy implications are discussed as follows:

Welfare among rural dwellers is lower than what obtains in the urban areas. There is therefore the need to ensure better access for the poor (majority of

which are in the rural areas) to basic social services. Government's efforts at making some progress towards some Millennium Development Goals should be more intensified and better focused. Investment in provision of safe water and better sanitation should form a major priority, and the inputs of private sector will be vital. It was also found that access to telephone services increased over the years, but the rural poor are more deprived.

The regression analysis also shows that increase in state-level literacy rate significantly reduced non-income poverty incidence. There is therefore the need to ensure progressive educational development in Nigeria. Efforts to ensure better access by poor households to education should therefore form the hallmark of education policies and programmes. Composite average welfare indicator in Nigeria increased between 1999 and 2003, but slightly declined in 2008. However, non-income poverty and inequality are more of northern states phenomenon with Jigawa and Sokoto states standing out by falling among the top 10 in all the years. Other northern states with very high non-income poverty incidences are Zamfara, Bauchi, Kebbi, Yobe, and Taraba. It was also found that non-income poverty incidences are highly correlated with its inequality. It is therefore imperative for government to properly target some northern states where poverty is highly endemic for specific marginal reforms. This is very essential because such states constitute major set back for enhancing development indicators in Nigeria. They may also serve as vital barrier to achievement of rapid economic growth in the present democratic setting.

We found that increasing unemployment rate by one percent will increase non-income poverty incidence. Government therefore to ensure putting in place appropriate programmes to reduce unemployment. This is also vital for addressing insecurity in the form of number of robbery cases in the states which was found to increase poverty. Channeling such efforts at the youths using some recent opportunities in the agricultural production can be of help because it was found that as the number of people engaged in farming increases, growth of CWI among the poor increased.

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