



Dynamics of inequality, poverty and sustainable development of Delta State, Nigeria

Clement Ebizimor Deinne · Dickson Dare Ajayi

Published online: 11 September 2019
© Springer Nature B.V. 2019

Abstract This article examines the dynamics of inequality, poverty and sustainable development of Delta State, Nigeria. A non-probability and probability sampling technique was adopted. Inequality was measured based on Gini coefficient, while poverty categories (non-poor, transient poor and chronic poor) was measured using \$1.25 and \$2.00 thresholds respectively. The non-poor are living above \$2.00 a-day poverty threshold, the transient poor are living below the \$2.00 a-day poverty threshold, while the chronic poor are living below \$1.25 a-day poverty threshold. The result reveals that a Gini coefficient of 0.4650 was recorded for Delta State in (2004), 0.4698 in (2010), 0.33609 in (2012/2013) and 0.34268 in (2015/2016). There was 343 (41.5%) chronic poor households in Delta South, 283 (33.3%) in Delta Central and 180 (22.2%) in Delta North, while 147 (21.6%) of households in Delta South, 116 (12.7%) in Delta North and 103 (11.3%) in Delta Central were transient poor. One-Way ANOVA significantly explained the spatial variation in distribution of inequality and poverty among households at ($p \leq 0.05$). Water source, distance to water source, improved sanitation, road length and household size were important predictors of spatial variation of inequality and poverty. This paper recommends that

government at all levels should invest more in livelihood development, inequality and poverty reduction strategies. Increased public spending on social services and enhance geographic access to basic amenities are key fundamentals to reducing inequality and poverty levels and sustainable development of Nigeria.

Keywords Dynamics · Inequality · Poverty · Sustainable development · Nigeria

Introduction

In Nigeria economic inequality has reached extreme levels, income inequality grew from 40% in 2003 to 43% in 2009. The richest Nigerian earn 8000 times more than what the poorest 10% of Nigerians spend on average for their basic consumption in one year. Regional inequality which translates to higher rates of poverty in north-western States of the country like Sokoto State, 81% of the population is poor, while poverty incidence is lower at 34% in Niger State (OXFAM 2017). Inequality is concerned with the relative position of different individuals (or households) within a distribution. There are three key measures of inequality: income, consumption (as peoples living standards can be understood through what they consume-including food, clothing, housing,

C. E. Deinne (✉) · D. D. Ajayi
Geography Department, Faculty of the Social Sciences,
University of Ibadan, Ibadan, Nigeria
e-mail: cedeinne@gmail.com

education and health services) and wealth (or accumulated capital). Financial measures, however, fail to capture inequalities beyond material standards of living (Atkinson 1970).

Eradicating all forms and dimensions of poverty is the greatest global challenge and an indispensable requirement for sustainable development, given the fact that poverty is a multidimensional problem that transcend borders. Globally, more than 800 million persons are still living on less than \$1.25 a day (UNDP 2018). Poverty is multidimensional, dynamic, location specific phenomenon, thus measuring it presents a number of challenges. Although, the most common approach to measuring poverty is quantitative, monetary-metric measures which use income or consumption to assess whether a household can afford to purchase a basket of goods at a given point in time. Metric methods are widely used because of objectivity and can adjust for differences between households, and intra-household inequalities (Chamhuri et al. 2012). Poverty dynamics is not simply the stock of poverty but the flows of persons into and out of poverty (UNICEF 2011). Poverty situation in the country is becoming more precarious and many Nigerians are more threatened now than at any time in recent past. Previous studies on inequality and poverty eradication focused mainly on patterns and socio-economic determinants, while holistic study of inequality, inclusive development, poverty eradication and sustainable development have received little attention. It is against this background that this paper examines the dynamics of inequality and poverty and sustainable development of Delta State, Nigeria. Subsequently, the National Bureau of Statistics (NBS 2010a, b) report shows that poverty rate in Nigeria has risen to 71.5% using relative measure, 61.9% using absolute measure and 62.8% using dollar-per-day measure. This implies that there has been a trend of increasing levels of poverty and inequality and gnawing deprivation in the midst of so-called economic prosperity. Moreover, the former finance and coordinating minister of the economy, Ngozi Okonjo-Iweala affirmed that despite the growth of the Nigerian economy which is being driven by non-oil sectors, inequality has continued to rise. According to Okonjo-Iweala, the two main challenges facing the economy are inadequate job creation and rising inequality, as only 10% of the population enjoys the benefit of economic growth, while the people at the

bottom are being left behind. If we don't put our hands to this problem, the whole economy may be in danger. Inequality is highly concentrated in certain regions of the economy, we need to pay attention to regional disparity and take care of the regional disparity (Asu 2013). The goal of this paper is to examine the factors influencing the distribution of inequality and poverty, and enhance sustainable development of Delta State, Nigeria. The specified objectives are to (1) analyse the distribution of inequality and poverty among households, (2) examine the spatial factors influencing household inequality and poverty in the study area, (3) examine the likelihood of reducing inequality and exiting poverty among households.

Poverty and inequality profile of Nigeria

An analysis of the poverty and inequality profile of Nigeria is undertaken in this section. Nigeria's poverty rate was merely 27.2% in 1980 for approximately 17.1 million people. By 1992, the percentage of Nigerians in poverty moved up to 43% of 39.2 million people. Moreover, 69% of 170 million Nigerians are below the poverty line in 2010. In 2018, Nigeria has the highest rate of extreme poverty globally overtaking India stressing the need for pro-active action. In analyzing the rate of poverty in Nigeria, it is clear that there is a huge dichotomy between the rates in the states of the north-central, north-east and north-west with range between 67 and 69% respectively, while the states in the south-east, south-south and south-west range between 27 and 43%. (NBS 2010a, b). The proportion of the extremely poor was 6.2% in 1980 the proportion increased to 29.3% in 1996 and then reduced to 22.0% in 2004 before increasing to 38.7% in 2010. The picture was quite different for the moderately poor, as the moderately poor rose between 1980 and 1985 from 21.0 to 34.2%, followed by a decline between 1996 and 2004 from 36.3 to 32.4%, and even dropped further to 30.3% in 2010. On the other hand, the proportion of non-poor decreased from 72.8% in 1980 to 53.7% in 1985, but rose to 57.3% in 1992. The non-poor declined significantly in 1996 to 34.4%, but rose to 43.3% in 2004 and then reduced to 31% in 2010 (HNLSS 2010) (see Tables 1, 2).

Table 3 shows that Gini index recorded an increase between 2004 and 2010 and between 2012/2013 and 2015/2016. Gini index increased from 0.4296 to 0.447

Table 1 Poverty profile of Nigeria (1980–2010)

Year	Poverty incidence (%)	Estimated population (million)	Population in poverty (million)
Poverty headcount of Nigeria (1980–2010)			
1980	27.2	65	17.1
1985	46.3	75	34.7
1992	42.7	91.5	39.2
1996	65.6	102.3	67.1
2004	54.4	126.3	68.7
2010	69.0	163	112.47
Year	Non poor	Moderately poor	Extremely poor
Dynamic poverty of Nigeria (1980–2010)			
1980	72.8	21.0	6.2
1985	53.7	34.2	12.1
1992	57.3	28.9	13.9
1996	34.4	36.3	29.3
2004	43.3	32.4	22.0
2010	31.0	30.3	38.7

Source: NBS (2010a, b)

Table 2 Incidence of poverty by zones

Geo-political zones	1980	1985	1992	1996	2004	2010
Percentage incidence of poverty by zones (1980–2010)						
North Central	32.2	50.8	46.0	64.7	67.0	67.5
North East	35.6	54.9	54.0	70.1	72.2	76.3
North West	37.7	52.1	36.5	77.2	71.2	77.7
South East	12.9	30.4	41.0	53.5	26.7	67.0
South South	13.2	45.7	40.8	58.2	35.1	63.8
South West	13.4	38.6	43.1	60.9	43.0	59.1

Source: NBS (2010a, b)

Table 3 Inequality profile of Nigeria (2004–2015)

Location	Gini index		Gini index Wave 2 (2012/2013)	Gini index Wave 3 (2015/2016)
	2004	2010		
National	0.4296	0.447	0.36188	0.38702
Delta State	0.4650	0.4698	0.33609	0.34268
Urban	0.4154	0.4329	0.34604	0.36772
Rural	0.4239	0.4334	0.34907	0.37787
S/South	0.3849	0.434	0.32998	0.36926
S/East	0.376	0.444	0.32416	0.40612
S/West	0.4088	0.4077	0.37673	0.36968
N/Central	0.4459	0.422	0.37634	0.35599
N/East	0.4114	0.4468	0.36902	0.41417
N/West	0.4028	0.4056	0.36367	0.35178

Source: Computed from National Bureau of Statistics (NBS), General Household Survey Panel Data Wave 2 (2012/2013) and wave 3 (2015/2016). Figures for 2004 and 2010 are from NBS Press Briefing on Nigeria Poverty Profile 2010 Report, Abuja

at the national level. At the state level, a Gini coefficient of 0.4650 was recorded for Delta State in (2004), 0.4698 in (2010), 0.33609 in (2012/2013) and 0.34268 in (2015/2016). This rising pattern of inequality is replicated in urban and rural areas as well as in S/South, S/East, N/East and N/West geopolitical zones respectively.

Some of the poverty reduction strategies adopted include: National Accelerated Food Production Program and the Nigeria Agricultural and Cooperative Bank (1972), Operation Feed the Nation (1976), Green Revolution (1979), Directorate of Food, Roads and Rural Infrastructure (DFRRI) (1986), National Directorate of Employment (NDE) (1987), Family Support Program (1993), National Poverty Eradication Program (NAPEP) (2001), National Economic Empowerments and Development Strategy (NEEDS) (2004). Others are Nigerian Vision 20: 2020, Transformation Agenda (2011), Subsidy Reinvestment and Empowerment Programme (SURE-P) (Ogujiuba 2014), Youth Poverty Alleviation Program (YouWin) (2013) and Empowering Nigerian Youths for Prosperity (N-POWER) (2017).

However, most of these anti-poverty policies and programmes have not yielded the desired results because they were mere declarations without concerted efforts, inconsistency, instability, corruption, poor leadership, ethnicity or social inclination, and lack of political will and weak institutional capacity for economic management and coordination. All the poverty alleviation initiatives in Nigeria since independence have yielded very little fruit, and were mostly not designed to alleviate poverty, these poverty alleviation initiatives lacked clearly defined policy frameworks with proper guidelines for poverty alleviation, lacked coordination among different levels of government, suffered from political instability, political interference, macroeconomic truncations, lacked continuity, and are riddled with political deception, corruption and distasteful looting. The poor quality of governance is, therefore, a major obstacle to development and poverty reduction initiatives in Nigeria (UNDP 2010).

Aside this introductory section, the theoretical framework and review of relevant literature is in “[Review of literature](#)” section. Research method is described in “[Research methodology](#)” section along with the data collection procedure. The findings and results were discussed in “[Discussion of findings and](#)

[results](#)” section, while “[Conclusion](#)” section concludes.

Theoretical framework and review of literature

Theoretical framework

The sustainable livelihood framework considered in this sub-section provided the theoretical basis for this research.

Sustainable livelihood framework

The livelihood approach is an actor-oriented perspective in development studies, including economic and development geography. Livelihood studies were brought to the centre stage of development studies in the late 1990’s and the beginning of the new millennium, when the sustainable livelihood framework was promoted by the Department for International Development (DFID) (DE HAAN 2012). The sustainable livelihood framework provided the theoretical basis for this research, sustainable livelihood comprises people’s assets (natural, physical, human, financial, social and information) and the complementary building blocks for their livelihoods is central to this study. Livelihood assets provide both a proxy for absolute poverty and a broader poverty measure (Erenstein 2009). Chambers and Conway (1992) noted that “a livelihood comprises the capabilities, assets and activities required for a means of living”. The approach serves as an instrument for the investigation of poor peoples’ livelihoods while visualizing the main factors of influence which can be understood by qualitative and quantitative analysis at the local or communal level, regardless of where (i.e. which sector or geographical space,...) these factors occur. The sustainable livelihood is multi-dimensional, comprehensive and people-centred (Chang and Tipple 2009). The livelihood assets are conceptualised under the five building blocks of: physical asset/natural asset (shelter, energy, accessibility, sanitation and safe water, health care); social asset (membership of co-operative society, family support, relationship, friendship); financial asset (access to credit, loans, regular flow of money, savings and remittances); human asset (knowledge, good health, skills, leadership).

Transforming structures and processes represent the institutions, organisations, policies and legislations that shape livelihoods. These structures are of central importance as the institutions operate at different levels and effectively determine access, terms of exchange between different types of capital, and returns to any given livelihood strategy (Shankland 2000; Keeley 2001). Structures can be described as the private and public organisations that formulate and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect livelihoods (DFID 2000). The absence of well working structures often constitutes an obstacle to sustainable development and makes simple asset creation difficult and restricting people's choice of livelihood strategies that may have a direct impact on livelihood outcomes. Livelihood Strategies comprise the range and combination of activities, events and choices that people undertake in order to achieve their livelihood goals. It is very important to recognise that people compete for jobs, markets and natural resources, and as a result makes it difficult for everyone to achieve simultaneous improvements in their livelihoods.

Review of literature

Review of relevant literature under different themes such as: Inequality and dynamics of inequality, poverty and dynamics of poverty, development and sustainable development is undertaken in this subsection.

Inequality and dynamics of inequality

The concept of inequality which means unfairness often manifest in form of inequitable distribution and skewed income distribution. Inequality implies dispersion of income, consumption or other welfare attributes. Inequality is often studied as part of the broad analysis of poverty and welfare. Thus, inequality is a broader concept than poverty because it is defined over a whole distribution (Litchfield 1999). Income inequality may be considered in relation to a number of interrelated factors such as education, occupation, expenditure pattern, public health, regional, ethnic and political differences. The Gini coefficient is most frequently used measure of inequality,

the extent to which income distribution and consumption expenditure deviates from a perfectly equal distribution where figures closer to 0 signifies equality in the distribution, values closer to 1 shows higher inequitable distribution of income.

Inequality is a historical construct. Under the present global order, majority of humankind are deprived of the potential to realize their full capabilities. In India, almost half the population suffers from physical and mental stunting in childhood, a handicap from which many will never fully recover. In Britain, the class imprint on babies is visible by the age of 22 months. In this sense, inequality is perhaps the biggest crime against humanity. In recent years, the UNDP has begun to calculate inequality of development within nations and regions. Sub-Sahara Africa fares worst overall, followed by South Asia; Income inequality is highest in Latin America, educational inequality is worst in South Asia and life expectancy most unequal in Sub-Saharan Africa (Göran 2017). It is apparent that not only are there high levels of inequalities within most countries, but those inequalities have grown over time, much larger today than they were a third of a century ago (Stiglitz 2017).

Aoki and Nirei (2015) examined the dynamics of income distribution and asked whether tax changes can account for the rise in top income inequality observed in the United States. Moreover, Anand et al. (2016) explored the contribution of unemployment towards inequality in South Africa using individual level panel data from Quarterly Labour Force Survey. Result of the study shows that reducing unemployment is found to be important for reducing inequality, while estimates suggest that a 10% point reduction in unemployment lowers the Gini coefficient by 3%. Achieving a similar reduction solely through transfers would require a 40% increase in government transfers.

Poverty and dynamics of poverty

Poverty is a multidimensional concept which encompasses different dimensions of deprivation related to human capabilities, education, health, consumption and food security. Gore (2002) explained the concept of poverty as all-pervasive where majority of the population lives at or below income levels sufficient to meet their basic needs and the available resources, even when equally distributed. The global economic and poverty landscape has changed with our

understanding of what development and poverty are all about (OECD 2015). Different thresholds could be used to measure poverty, The income or absolute poverty threshold, relative poverty measures based on consumption or body mass index and multidimensional poverty index which measures a range of deprivations such as poor health, lack of education, inadequate living standards, lack of income, violence, disempowerment (Alkire and Santos 2010). Many people also remain vulnerable to a range of factors such as: unemployment, sickness, social exclusion and insufficient resources during old age which threatens to re-impoverish the people in future (OECD 2012).

Adepoju (2012) investigated dynamics of poverty in rural southwest Nigeria using regional panel data. Results revealed an overlap between the determinants of chronic poverty and transient poverty, while 6.8% exited poverty, a larger proportion 15.5% moved into poverty and the level of education of household heads had a strong positive influence on the likelihood of exiting poverty. Furthermore, other studies on the dynamics of poverty in Africa, Bokosi (2006) in Malawi, and Grootaert and Kanbur (1995) in Cote-d'Ivoire revealed that education of household head, value of assets, mean time to services, per capita acreage cultivated and changes in household size are significantly related to the probability of being poor irrespective of poverty status.

Akerele and Adewuyi (2011) used multistage sampling approach and a total of 80 selected households, showed that 38.30% of the households studied in Ekiti State of Nigeria were poor and would have to mobilize financial resources up to 41.80% of \$1.00 per day for each household member to be able to escape poverty. Further results showed that female headed households in the study area were more vulnerable to income poverty with poverty incidence, depth and severity of 0.221 and 0.239, 0.402 and 0.191, respectively. Highest levels of poverty were found among household with 7–9 dependants and values of 1.00, 0.715 and 0.511 for the incidence, depth and severity of poverty respectively.

Ogwumike and Akinnibosun (2013) were concerned with the determinants of poverty among farming households in Nigeria. Ogwumike and Akinnibosun adopted the National Bureau of Statistics (NBS) measure of poverty and employed the logit regression model to estimate the effect of the socio-economic variables on poverty among farming

households. Their results showed high incidence of poverty among farming households, while age, size of household, income, and number of farms were found to be the major determinants of poverty among farming households. They also showed that households in the North-east, North-central, South-east, and South-south geopolitical zones had higher probability of being poor compared to those in the North-west. Olawuyi and Adetunji (2013) also analyzed the incidence, severity and the determinants of household poverty in Ogbomosho Agricultural Zone of Oyo State, Nigeria. One hundred and twenty (120) households were selected through a multistage sampling technique. Olawuyi and Adetunji found that poverty rises with the increase in household size while it reduces with increase in level of education, farm size and participation in non-farm jobs as alternative sources of livelihood. Gender, household size, years spent in school, farm size and non-farm jobs were found to be important and significant factors determining poverty in the study area.

Development and sustainable development

The Society for International Development (SID) defined development as a process that creates growth, progress, positive change or the addition of physical, economic, environmental, social and demographic components. The purpose of development is rise in the level and quality of life of the population, expansion of resources and employment opportunities without destruction of the environment. Development might be visible but not immediate. Sen (1985) stressed that a comprehensive understanding of development must extend beyond measuring income to include other important aspects of well-being and agency that a person has reason to value. Furthermore, Sen (1999, p. 3) argued convincingly that development was a process of expanding the real freedoms that people enjoy as well as the removal of major sources of unfreedom. On the other hand, development has resulted to inequalities between individuals and States, whereby a large numbers of the world's inhabitants are mired in poverty, especially in Africa. The term development in international parlance encompasses the need and means by which to provide a better lives for people in poor countries. It includes not only economic growth but also human development, providing for health, nutrition, education and a clean

environment. Some constraints on development are high economic poverty, hunger, high mortality rates, unsafe water supplies, poor education systems, corrupt governments, war and poor sanitation these constraints create poverty traps and cycles that must be broken for countries to develop (UNDP 2003).

Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs (United Nations General Assembly 1987, p. 43). The concept of sustainable development can be interpreted in many different ways, but driven by a particular need and finding better ways of doing things both for the future and present generation promoting personal wellbeing, social cohesion and inclusion and creating equal opportunity. (Brundtland Commission 1987; Cerlin 2006; Stoddart 2011) proposed a broad description which does not limit the scope of sustainability, the explanation touches on the importance of inter-generational equity. The overall goal of sustainable development is the long-term stability, integration of the economy, environment and social concerns in order to address the needs of future generations (Stoddart 2011).

Research methodology

A mixed research method was adopted in which a non-probability technique, random sampling technique and systematic sampling technique were utilized. Inequality was measured using the Gini coefficient for 2004 and 2010 based on National Living Standard Survey (NLSS), National Bureau of Statistics (NBS), General Households Survey Panel data wave 2 (2012/2013) and wave 3 (2015/2016) respectively.

Sampling technique

Delta State was purposively selected due to its diversity and inequality levels. An urban centre was randomly selected in each of the 25 local government areas across the 3 senatorial districts. A total of 2521 households were proportionally determined based on 1991 projected population. A structured questionnaire on socio-demographic characteristics (age, educational status and household size), basic amenities (safe water, housing and sanitation facilities), cause of poverty and inequality (loss of livelihood, job and

spouse) was administered systematically to household heads at every fifth house along major roads in each urban centre. Poverty thresholds of \$2.00 and \$1.25 per day were used to classify households into (non-poor, transient poor and chronic poor) respectively using the equivalent value of (2.00 dollars and 1.25 dollars) poverty line in the local currency (Deinne and Ajayi 2017).

The non-poor are living above US\$2.00 a-day poverty threshold, the transient poor are living below this US\$2.00 a-day poverty threshold, while the chronic poor are living below US\$1.25 a-day poverty threshold. The US\$2.00 a-day poverty line is the average (median) poverty line for all developing countries (Chen and Ravallion 2008) and US\$1.25 a-day poverty line (at 2005 purchasing power parity) were chosen to distinguish among non-poor, transient poor and chronic poor respectively, using exchange rate of naira to a dollar. These thresholds were the most typical poverty line regarded as providing the absolute minimum standard of living. The equivalent value of the poverty line in local currency was determined based on the consumption expenditure of household heads. The poverty line is the level of welfare that distinguishes poor households from non-poor households. Specifically, the World Bank defines extreme or chronic poverty as living on less than US\$1.25 per day and moderate or transient poverty as less than US\$2.00 a day. The choice of using an absolute poverty threshold is based on the premise that it gives a clear and straightforward comparable indicator of the levels and dynamics of poverty. The poverty threshold is the same regardless of geographic location and does not account for higher cost of living in large urban areas.

Geographical information system was adopted to reveal the spatial distribution, while analysis of variance was used to examine the variations in the distribution of inequality and household poverty. Likelihood reducing poverty was determined using multinomial regression (Odd Ratio $e(\beta)$). Data used for inequality analysis was the (NBS 2012) reported estimates of Gini coefficient for 2004 and 2010 based on National Living Standard Survey (NLSS), General Households Survey Panel data wave 2 (2012/2013) and wave 3 (2015/2016).

Study area

Delta State is generally low-lying and has three seaports located in Warri, Sapele and Koko. The State is bounded by Ondo State to the northwest, Edo State in the north, Anambra State and Rivers State to the east, Bayelsa State to the south and on the south western flank is the Bight of Benin which covers about 160 km of the State's coastline. Delta State is ethnically diverse and heterogeneous. The State has a total land area of 16,842 km² with a population of 4,098,291 (males: 2,674,306, females: 2,024,085 (Federal Republic of Nigeria, Official Gazette, No. 24, vol. 94, 2009). Delta State relief varies from the north to the south and from the hinterland to the coast. It is highest at Agbor and Ubulu-Uku with an elevation of 110 m and lowest at the coast with elevation of 23.8 m above sea level. Politically, the State has twenty-five local government areas and three senatorial districts namely Delta North, Delta Central and Delta South for easy administrative purposes and to ease accessibility (see Fig. 1).

The choice of the study area is based on the fact that despite being one of the main source of oil exports for the country, this region suffers from poor infrastructure, sanitation, access to healthcare, and educational opportunities, difficulty in satisfying household needs as well as inadequate investment in development. Environmental degradation from oil exploration and exploitation contributed to a number of these problems. NBS (2010a, b) report indicates that among the States in Nigeria, Delta State has one of the highest level of unemployment representing 20.8% of the population. Moreover, livelihoods in the greater part of Delta State are constantly being exposed to the impact of environmental pollution as a result of oil exploration causing a great loss in flora and fauna, a major source of livelihoods of the indigenous people. Specifically, farming and fishing practices have been lost to environmental degradation.

There are various solid mineral deposits within the state—industrial clay, silica, lignite, kaolin, tar sand, decorative rocks, limestone, etc. the raw materials for industries such as brick making, ceramics, bottle

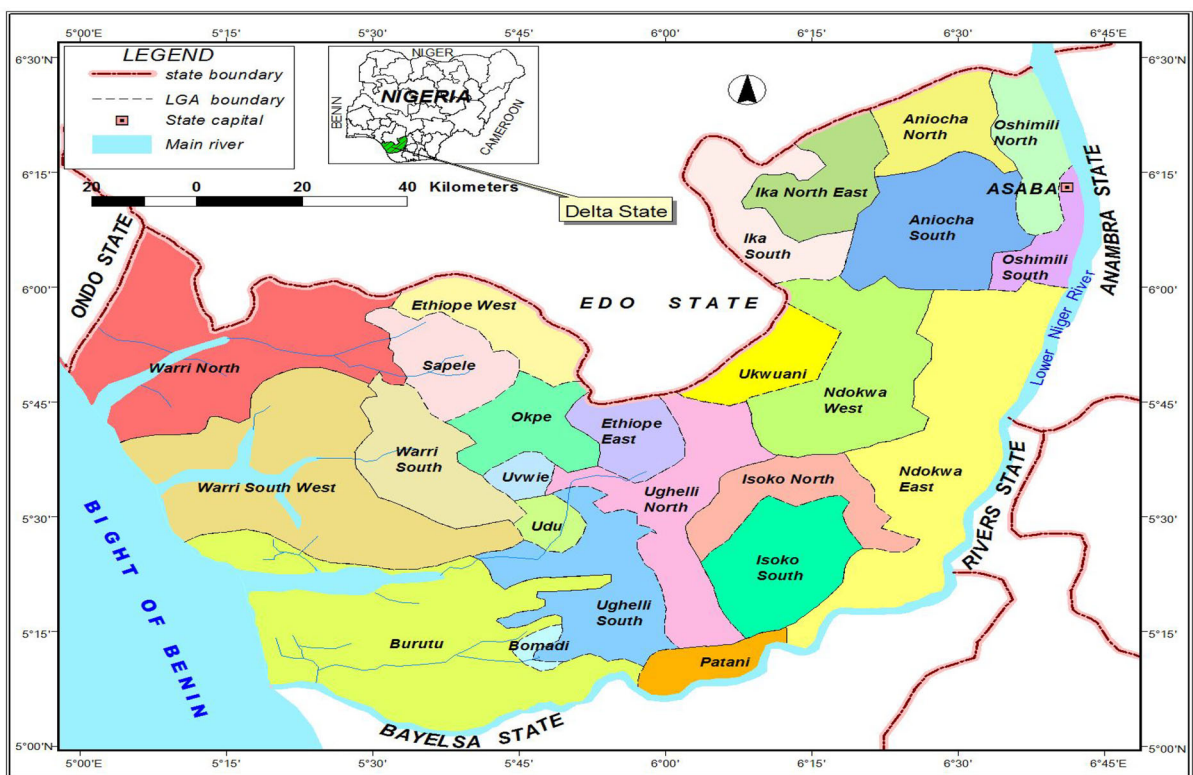


Fig. 1 The study area. Source: Ministry of land, survey and urban development Delta State

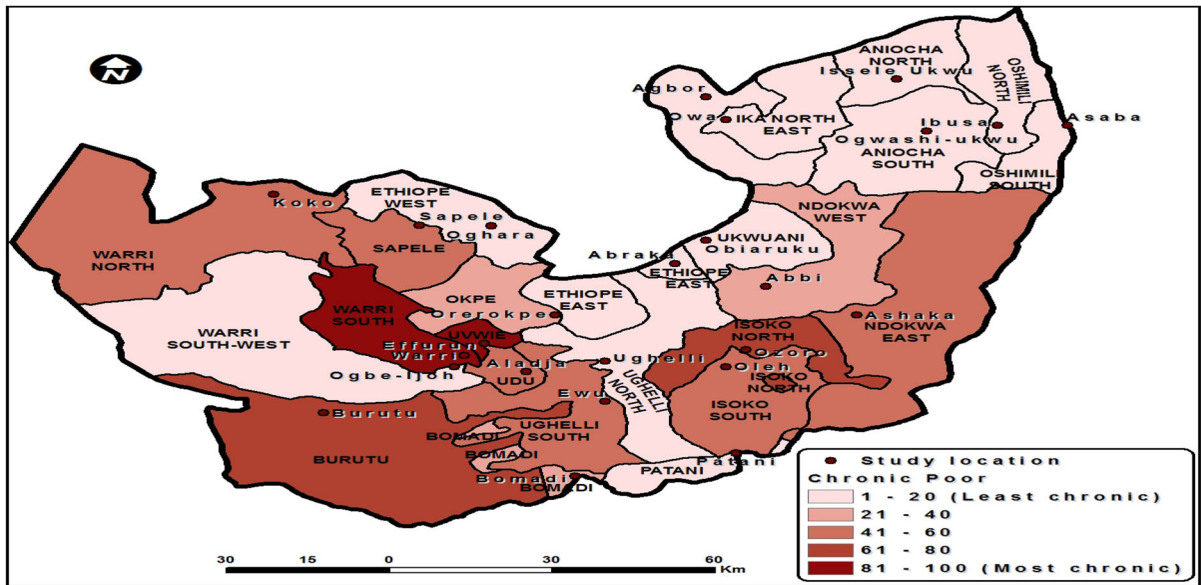


Fig. 2 Spatial pattern of chronic poor

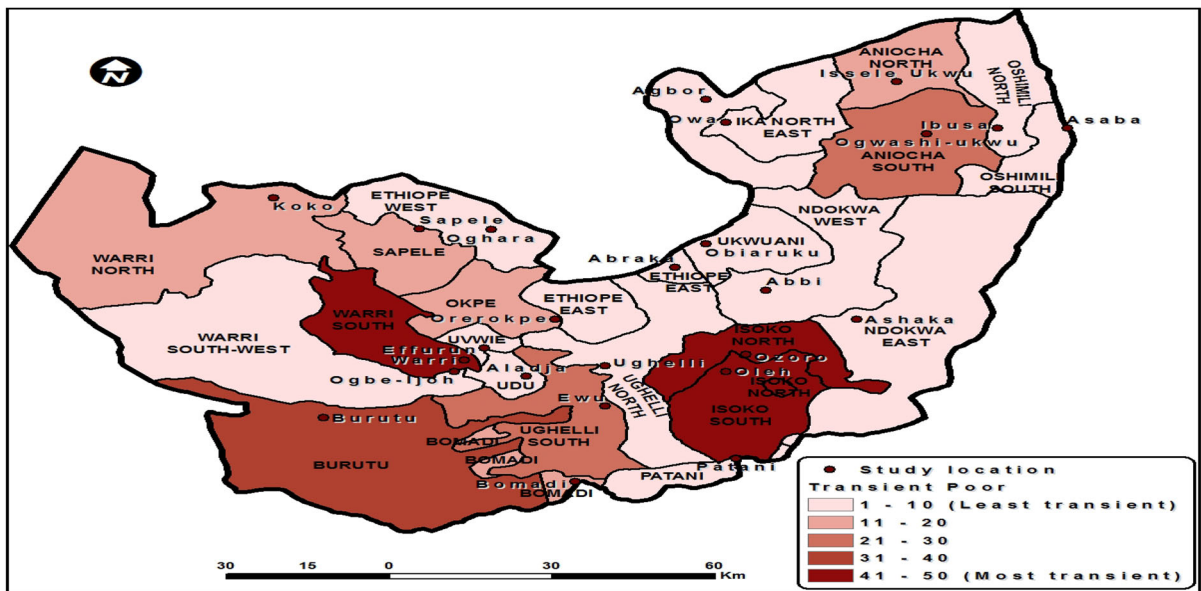


Fig. 3 Spatial pattern of transient poor

manufacturing, glass manufacturing, chemical/insulators production, chalk manufacturing and sanitary wares, decorative stone cutting and quarrying. But these minerals are under-utilized. Delta state also has huge deposits of crude oil and is also one of the largest producers of petroleum products in Nigeria. Revenue and sales of petroleum products is what majorly drives its economy. Therefore, it is not possible to discuss

sustainable livelihoods in Delta State without referring to the impacts of oil extraction on the environment which have significantly increased in recent years due to pollution, deforestation and constant discharge of effluents and wastes from oil operations onto land, into mangrove and freshwater swamps, and into the sea and have destroyed arable and fertile farmlands with further alteration on the ecosystem and livelihoods.

Table 4 Spatial variation of household poverty and inequality

Variables	Sum of squares	Df	Mean square	F	Sig.
Source of water					
Between groups	735.117	23	31.962	24.786	0.001
Within groups	3219.886	2497	1.290		
Total	3955.004	2520			
Distance to water source					
Between groups	637.168	23	27.703	18.509	0.001
Within groups	3737.316	2497	1.497		
Total	4374.484	2520			
Improved sanitation					
Between groups	1127.343	23	49.019	15.973	0.001
Within groups	7662.807	2497	3.069		
Total	8790.240	2520			
Accessibility/good road					
Between groups	35.822	23	1.557	9.468	0.001
Within groups	410.738	2497	0.164		
Total	446.561	2520			
Household composition					
Between groups	4.882	23	0.212	7.398	0.001
Within groups	71.642	2497	0.029		
Total	76.524	2520			
Location					
Between groups	901.149	23	39.180	167.680	0.001
Within groups	583.453	2497	0.234		
Total	1484.602	2520			

Source: Authors analysis

Discussion of findings and results

Distribution of poor households

Geographical information system (GIS) reveals that household poverty in nearby locations are similar to one another. Furthermore, chronic poverty among households in Delta State therefore tends to be spatially concentrated, rather than being evenly spread. At the senatorial district level, the chronic poor are concentrated in Delta South and Delta Central respectively, this pattern implies the presence of deprivations in access to basic amenities, inability to afford the basic needs and limited opportunities which restricts the likelihood of reduction of poverty and inequality thresholds (see Fig. 2).

The result reveals an uneven distribution of transient poverty pattern across local government areas of Delta State. At the senatorial district level, the transient poor are not homogeneously spread across

Delta North, Delta Central and Delta South respectively partly due to variation in household economics, employment, geographic access to opportunities and good roads. Transient poverty among households was unevenly distributed throughout the study area (see Fig. 3).

Spatial factors influencing household inequality and poverty levels

This study shows that dynamic poverty is positively linked with inequality and spatial characteristics of the households especially household composition, accessibility, location, sanitation, water source and distance to water source. One-way analysis of variance on the following spatial factors: water source, distance to water source, improved sanitation, accessibility, household size and location yield F values of 167.680, 24.786, 18.509, 15.973, 9.468 and 7.398 respectively which are significant at 0.001 level. The

Table 5 Final model of likelihood of poverty reduction

Poverty threshold	B	Std. error	Wald	Df	Sig.	Exp(B)	95% Confidence interval for exp(B)	
							Lower bound	Upper bound
Poor								
Intercept	2.521	627.330	0.000	1	0.997			
[Sex=1]	0.033	0.136	0.059	1	0.808	1.034	0.792	1.349
[Owner=1]	− 0.031	0.157	0.038	1	0.846	0.970	0.713	1.319
[OWNASSET=1]	− 0.446	0.136	10.819	1	0.001	0.640	0.491	0.835
[EXP#LOSS=1]	0.642	0.186	11.895	1	0.001	1.899	1.319	2.735
[HHEMPLOYED=1]	0.126	0.550	0.053	1	0.818	1.135	0.386	3.332
[HHRECEIVE=1]	− 0.321	0.138	5.446	1	0.020	0.725	0.554	0.950
[ROAD=1]	0.482	0.150	10.274	1	0.001	1.619	1.206	2.173
[ILLHEALTH1=1]	0.000	0.872	0.000	1	1.000	1.000	0.181	5.523
[MINERALS=1]	0.140	0.236	0.354	1	0.552	1.150	0.725	1.825
Non-poor								
Intercept	14.229	1.165	149.062	1	0.000			
[Sex=1]	0.077	0.135	0.329	1	0.566	1.080	0.829	1.408
[Owner=1]	0.445	0.147	9.215	1	0.002	1.561	1.171	2.081
[OWNASSET=1]	− 0.214	0.135	2.532	1	0.112	0.807	0.620	1.051
[EXP#LOSS=1]	1.033	0.177	34.031	1	0.000	2.809	1.986	3.975
[HHEMPLOYED=1]	1.466	0.544	7.265	1	0.007	4.330	1.492	12.571
[HHRECEIVE=1]	− 0.512	0.137	14.017	1	0.000	0.599	0.458	0.783
[ROAD=1]	− 0.301	0.155	3.797	1	0.051	0.740	0.546	1.002
[ILLHEALTH1=1]	− 1.881	0.917	4.202	1	0.040	0.152	0.025	0.921
[MINERALS=1]	− 0.135	0.237	0.327	1	0.567	0.873	0.549	1.389

Model fitting criteria: 2Log Likelihood; (3634.094 – 2886.024), Chi Square = 748.071, *df* = 44, Sig. = 0.05

Chi Square goodness-of-fit: Pearson (2702.180), Deviance (2333.301), *df* = 2096, Sig. = 0.05

Pseudo R-square (*R*²): Cox and Snell = (0.257 = 25.7%), Nagelkerke = (0.299 = 29.9%)

result of the one-way analysis of variance reveals that the variation in the distribution of household poverty and inequality in Delta State is significantly influenced by spatial factors (see Table 4).

The Multinomial logistic regression model is a discrete choice model used to analyse the likelihood of transition out of poverty and reduction of inequality. The dependent variable of the model can take one of three discrete values indicating the poverty/inequality status of a household (non-poor households, poor households and inequality). Multinomial regression was adopted to test the hypothesis that the likelihood of reducing poverty and inequality is significantly determined by socio-spatial factors: (gender, age at marriage, own tenure, ownership of asset, livelihood loss, household size, employment status, remittances,

accessibility, health status and availability of mineral resources).

Table 5 presents the results of the final model, the Exp (B) is the exponential beta, or the odds ratio. The result of the odd ratio for the poor households reveal that: gender of household heads with a odds ratio of (1.034), household heads’ loss of livelihoods with odds ratio of (1.899), unemployed household heads with odds ratio of (1.135) are more likely to be left behind and experience inequality, while households in inaccessible locations, health condition of household heads (ill-health) and unavailability of resources (assets) with odds ratios of (1.619), (1.000) and (1.150) are more likely to influence inequality experienced among households. Whereas households that depend on domestic remittance/financial assistance from relatives and friends with odds ratio of (0.599)

and households in inaccessible locations with odds ratio of (0.740) are more likely to experience increased inequality.

Conclusion

The findings in this paper reveals that the livelihood conditions of the poor determine their access to assets and livelihood opportunities, and the way in which these can be converted into positive or negative outcomes such as moving out of poverty or remaining in poverty is influenced by existing government institutions and non-government institutions, processes and laws. The result of the multinomial regression reveals that the likelihood of poverty and inequality increases with gender of household heads, loss of livelihoods, unemployed household heads are more likely to be left behind in poverty and experience inequality. Moreover, households in inaccessible locations, health condition of household heads (ill-health) and unavailability of resources (assets) are more likely to influence inequality experienced among households. Whereas households that depend on domestic remittance/financial assistance from relatives and friends are more likely to experience increased inequality. In addition, being a male head of household or female head of household and availability or non-availability of mineral resources does not say a household cannot be poor, it is the ability of the household to be psychologically prepared to take advantage and utilise opportunities at their disposal to enable them reduce the poverty and inequality experienced and contribute to sustainable development of the society. The solution and change to these disturbing inequalities and poverty levels would come from a responsive government (political system), diversification of socio-economic activities and progressive taxation. Hence, this paper recommends that government at all levels should invest more in livelihood development, inequality and poverty reduction strategies such as the education sector, increase public spending on social services and enhance geographic access to basic amenities, improvements in human, physical and social capital, livelihood assets of the poor are key fundamentals to increasing the well-being of households, reducing household poverty and inequality, and sustainable

development of Delta State in particular and Nigeria at large.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The manuscript was prepared based on the ethical standard of this Journal. The Manuscript has not been submitted elsewhere for Publication.

References

- Adepoju, A. O. (2012). Poverty transition in rural Southwest Nigeria. *Global Journal of Science Frontier Research*, 12(1), 19–29.
- Akerele, D., & Adewuyi, S. A. (2011). *Analysis of poverty profiles and socioeconomic determinants among urban households of Ekiti State, Nigeria*. Abeokuta: Department of Agricultural economics and farm management, University of Agriculture.
- Alkire, S., & Santos, M. (2010). Acute multidimensional poverty: A new index for developing countries. In *Oxford poverty and human development initiative. Working paper (Vol. 38)*. Oxford: Oxford Poverty and Human Development Initiative.
- Anand, R., Kothari, S., & Kumar, N. (2016). In *International monetary fund (IMF, 2016) working papers on labor market dynamics and inequality in South Africa*. IMF working paper African development. WP/16/137 (pp. 1–37).
- Aoki, S., & Nirei, M. (2015). Zipf's law, Pareto's law, and the evolution of top incomes in the U.S. In *Working paper*. Hitotsubashi University.
- Asu, F. (2013). Nigeria's economy faces danger as inequality rises. <http://businessdayonline.com>. Accessed 24 Dec 13.
- Atkinson, A. B. (1970). On the measurement of inequality. *Journal of Economic Theory*, 2(3), 244–263.
- Bokosi, F. (2006). Household poverty dynamics in Malawi, Munich personal RePEc. Archive paper no. 1222.
- Brundtland Commission. (1987). *“Our common future”*. World commission on environment and development. Oxford: Oxford University Press.
- Cerin, P. (2006). Bringing economic opportunity into line with environmental influence: A discussion on the coarse theorem and the Porter and van der Linde hypothesis. *Ecological Economics*, 56(2), 209–225.
- Chambers, R., & Conway, G. (1992). Sustainable rural livelihoods: Practical concepts for the 21st century. IDS Discussion Paper 296. Sussex: IDS, University of Sussex. Retrieved October 29 2009, from <http://catalogue.nla.gov.au/Record/1913332>.
- Chamhuri, N. H., Karim, H. A., & Hamdan, H. (2012). Conceptual framework of urban poverty reduction: A review of literature. In *ASIA Pacific international conference on environment-behaviour studies Mercure Le Sphinx Cairo Hotel, Giza, Egypt, 31 October 2 November 2012*.

- Procedia—Social and behavioral sciences* (Vol. 68, pp. 804–814).
- Chang, Y., & Tipple, G. (2009). Realities of life and housing in a poor neighbourhood in urban China: Livelihoods and vulnerabilities in Shanghai Lane, Wuhan. *International Development Planning Review*, 31(2), 165–198.
- Chen, S., & Ravallion, M. (2008). The developing world is poorer than we thought, but no less successful in the fight against poverty (WPSA4703). The World Bank Development Research Group.
- De Haan, L. J. (2012). The livelihood approach: A critical exploration. *Erdkunde*, 66(4), 345–357. ISSN 0014-0015. <https://doi.org/10.3112/erdkunde.2012.04.05>. <http://www.Erdkunde.Uni-Bonn.De>.
- Deinne, C. E., & Ajayi, D. D. (2017). Spatial dynamics of urban poverty in Delta State Nigeria. *Journal of Poverty*, 22(3), 269–286.
- DFID. (2000). *Sustainable livelihoods—Current thinking and practice*. London: Department For International Development.
- Erenstein, O. (2009). Livelihood assets as a multidimensional inverse proxy for poverty: A district level analysis of the Indian Indo-Gangetic Plains. In *Working paper*. New Delhi.
- Göran, T. (2017). *Dynamics of inequality*. London: New Left Review limited.
- Gore, C. (2002). Globalization, the international poverty trap and chronic poverty in the least developed countries. In *CPRC working paper* No. 30.
- Grootaert, C., & Kanbur, R. (1995). The lucky few amidst economic decline: Distributional change in Côte d'Ivoire as seen through panel data sets, (1985–1988). *Journal of Development Studies*, 31(4), 603–619.
- Harmonised National Living Standard Survey (HNLSS). (2010). NBS Press briefing on Nigeria poverty profile 2010 report. Abuja, Nigeria (pp. 1–12).
- Keeley, J. (2001). *Influencing policy processes for sustainable livelihoods: Strategies for change*. Brighton: Institute of Development Studies.
- Litchfield, J. A. (1999). *Inequality: Method and tools*. Washington, D.C.: The World Bank. Available on <http://www.worldbank.org/poverty/inequal/index.htm>.
- National Bureau of Statistics (NBS). (2010a). National living standard survey (NLSS) Abuja, Nigeria.
- NBS. (2010b). The Nigeria poverty profile 2010 report, National Bureau of Statistics, Abuja
- NBS. (2012). *The Nigeria poverty profile 2010 report*. Abuja: National Bureau of Statistics.
- OECD. (2012). *Perspectives on global development 2012: Social cohesion in a shifting World*. Paris: OECD.
- OECD. (2015). *OECD and post-2015 reflections. Measuring what you treasure and keeping the multiple dimensions of poverty at the heart of development*. Paris: OECD. Element 1, Paper 1.
- Ogujiuba, K. (2014). Poverty incidence and reduction strategies in Nigeria: Challenges of meeting 2015 MDG targets. *Journal of Economics*, 5(2), 201–217.
- Ogwumike, F. O., & Akinnibosun, M. K. (2013). Determinants of poverty among farming households in Nigeria. *Mediterranean Journal of Social Sciences*, 4(2), 365–373.
- Olawuyi, S. O., & Adetunji, M. O. (2013). Assessment of rural households poverty in Nigeria: Evidence from Ogbomoso agricultural zone of Oyo State, Nigeria. *Journal of Scientific Research and Reports*, 2(1), 35–45.
- OXFAM. (2017). Inequality in Nigeria exploring the drivers. Oxfam International May 2017. www.oxfam.org/files/file_attachments/bp210-economy-one-percent-tax-havens-180116-en_0.pdf.
- Sen, A. (1985). Well-being, agency and freedom: The dewey lectures 1984. *The Journal of Philosophy*, 82(4), 169–221.
- Sen, A. (1999). *Development as freedom*. Oxford: Oxford University Press.
- Shankland, A. (2000). *Analysing policy for sustainable livelihoods, research report 49*. Brighton: Institute of Development Studies.
- Stiglitz, J. E. (2017). The dynamics of social inequalities in the present world. In *Roosevelt Institute Working Paper* (pp. 1–19).
- Stoddart, H. (2011). A pocket guide to sustainable development governance. Stakeholder Forum. In *United Nations conference on the human environment (1992). Rio declaration on environment and development*. Rio de Janeiro, Brazil: United Nations.
- United Nation Development Programme (UNDP). (2003). *Human Development Report, 2003. Millennium development goals: A compact to end human poverty*. New York: Oxford University Press.
- UNDP. (2010). *Human Development Report Nigeria 2008–2009. Achieving growth with equity*. United Nations Development Programme.
- UNDP. (2018). *Human development indices and indicators. Statistical Update, Briefing note for countries on the 2018 Statistical Update*.
- UNICEF. (2011). A multidimensional approach to measuring child poverty. New York: UNICEF. [www.unicef.org/socialpolicy/files/A_Multidimensional_Approach_to_Measuring_Child_Poverty\(2\).pdf](http://www.unicef.org/socialpolicy/files/A_Multidimensional_Approach_to_Measuring_Child_Poverty(2).pdf).

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.