SOCIO-ECONOMIC DETERMINANTS OF MULTIDIMENSIONAL CHILD POVERTY IN NIGERIA

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ABSTRACT
One of the global community's sustainable development objectives is to end all types of poverty. Although there has been significant improvement made on a global scale, it is still uneven and unacceptably high in sub-Saharan Africa, especially particularly Nigeria. Health, educational, and living conditions are widely disadvantaged throughout the nation's states and geopolitical regions. Consequently, this study evaluates the socio-economic determinants of multidimensional child poverty in Nigeria. For the theoretical connection between unidirectional and multidimensional poverty, the study mostly relied on Sen's capacity approach. To determine the effect of socioeconomic variables on multidimensional poverty, a Probit model was computed. Additionally, the Probit model's marginal effect was simulated to ascertain the likelihood of multidimensional child poverty

given particular socioeconomic factors. According to the study, the largest determinants of the likelihood of multidimensional child poverty in Nigeria are household per capita consumer spending, per capita family income, household size, child's age, and the gender of the household head. In particular, the marginal effect model shows that increasing per capita consumption expenditure by 1% will result in a reduction in the likelihood of multidimensional child poverty of 0.872, while increasing per capita income by 1% will result in a reduction in the likelihood of multidimensional child poverty of 0.047. Once more, being in an urban region lowers the likelihood of multidimensional child poverty by around 0.068. While families with a male head have a multidimensional child chance that is -0.230 lower than those with a female head. However, efficient family planning initiatives that encourage women to have fewer children will significantly improve the situation for children living in poverty.

1. INTRODUCTION

Significant advancements have been made in eliminating extreme poverty all throughout the world. For instance, the World Bank (2019) indicated that the number of people in the world living in poverty decreased significantly (from 1.3 billion to 736 million) between 1990 and 2015. While the reductions in poverty are impressive, there has been uneven development throughout the world as most of the initiative has come from South Asia while sub-Saharan Africa (SSA) is well behind other regions in terms of poverty reduction. In SSA, poverty is a dynamic rather than a static issue. A modest increase in income can lift a large number of individuals out of poverty while leaving them vulnerable to relapsing into poverty. Losses of income have the opposite effect because two

out of every five SSA poor households are transient poor, moving between states of poverty as a result of variations in their income, with conflict, ill health, and displacement ranking as the three main causes of vulnerability and transient poverty (Dang & Dabalen, 2018). The fact that there is a high concentration of world poverty in SSA and that this is not likely to alter is a crucial implication of the region's weaker track record in the elimination of extreme poverty (see Figure 1.1).

Figure 1.1: Regional poverty incidence 2018 and projected in 2030
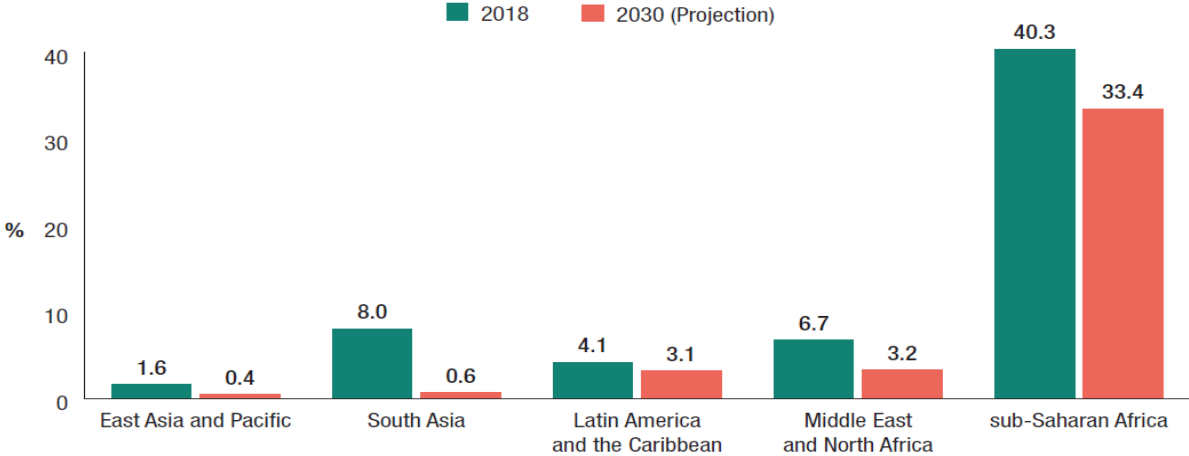
Source: World Bank (2019) using the absolute poverty measure of 1.9 dollar per day

It has been projected that by 2030 when the current SDG will end that the incidence of poverty in SSA will continue at around 30% or more with one in every three people in the region depending on less than $1.90 daily. This projection is hinged on economic growth rates over the last decade. Aside from the incidence of poverty being majorly pronounced in SSA relative to other regions, children in the SSA account for the larger share of poverty in the region and the world in general. SSA is the youngest region around the globe with two-thirds of the population aged below 24 and 42% of the population below 15 (see Figure 1.2). The significant age disparity between SSA and other regions perhaps accounts why the region is the epicentre of child poverty in the world.

Figure 1.2: Estimated population shares for under-24 age groups by region, 2018
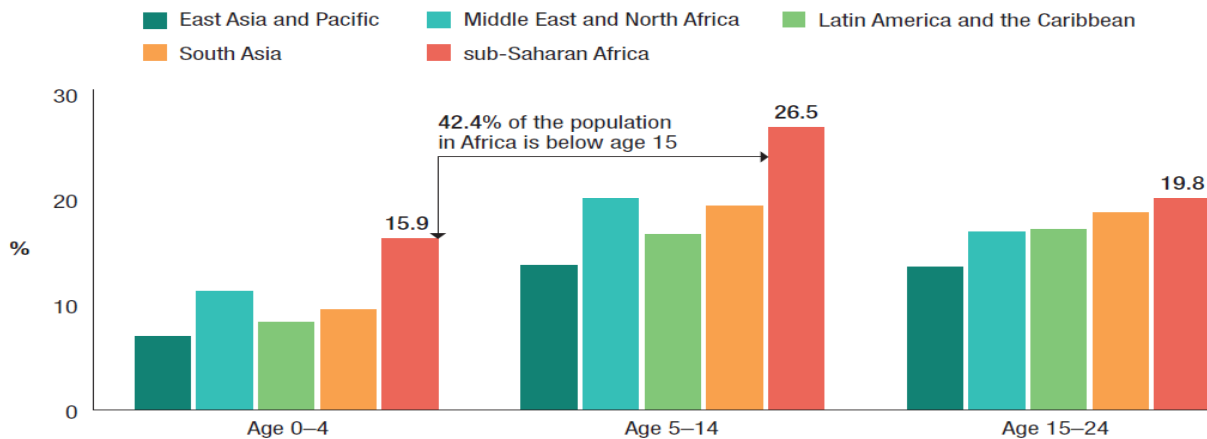
Source: UN Department of Economic and Social Affairs (2017)

Demography has a significant but generally ignored influence on the rising world poverty profile. Relative to other developing regions, SSA is in her early stages of demographic transition and the regions fertility rate is 5.0 relative to 2.9 in South Asia. Similarly, SSA is responsible for an increasing share of the globe's births and its children population as the region in the first quarter of the 1990s was responsible for one in every five births in the world. It is estimated that the share will continue to increase to one in every three births in the second half of the 2020s. The region's children share is also steeply increasing and by 2030 the region is estimated to account for roughly 30% of 0–14-year-olds which is double the share in 2000 (Figure 1.3).

Figure 1.3: Sub-Saharan Africa's share of developing world births, children and 15–24-year-olds
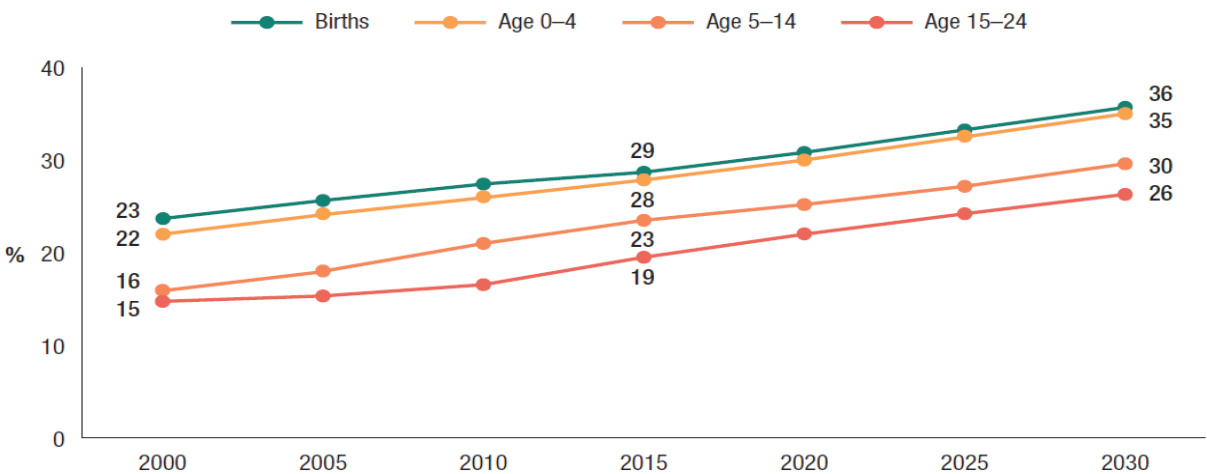
Source: UN Department of Economic and Social Affairs (2017)

There is an apparent link between demography and child poverty as SSA region are among the world's poorest households. The poor children in the region are lifted out of poverty far more slowly than children in other regions. This shows that children in the region are much more at the danger of being born into poverty than children from other climes. Figure 1.4 shows that by 2030

about 304.7 million children will be living in extreme poverty in 2030 with these children accounting for over 55% of the global poverty rates in 2030.

Figure 1.4: Number of children in poverty by region, 2018–2030 (millions)
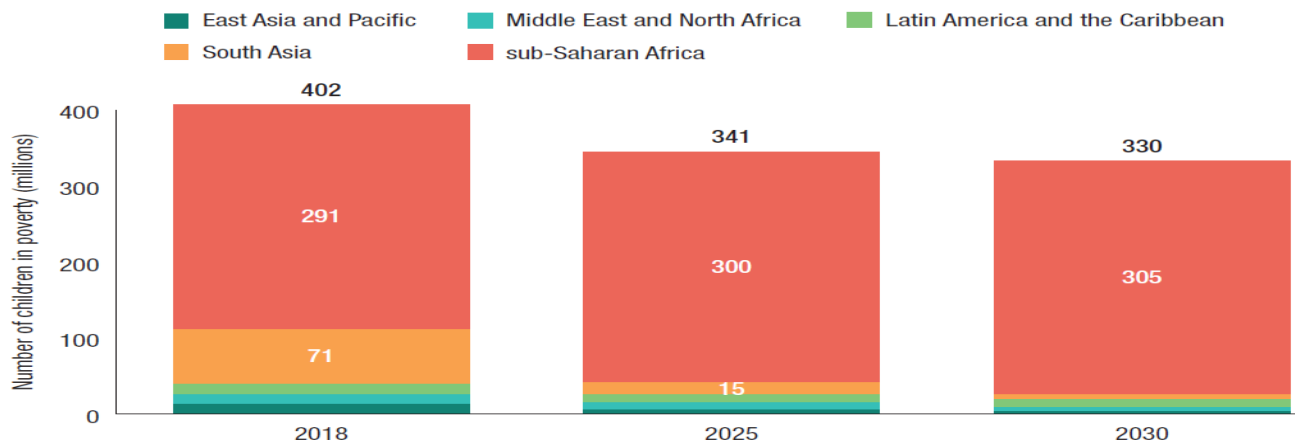
Source: Open Data Institute (ODI, 2019)

Child poverty is a global phenomenon but is remarkably high in SSA region (Landiyanto, 2018; Ogwumike & Ozughalu, 2018). Child poverty is one of the most important aspects of poverty and it has drawn the attention of policymakers and development experts around the globe. As noted by Chen and Corak (2008), child poverty has maintained its dominance in the analyses and discussions of poverty. The importance of child poverty in poverty analysis could be contingent on these justifications. First, the incidence of poverty hampers children from enjoying their basic human rights. Extreme or severe poverty occurring over an extended time inhibit the development of children and damage their prospect for optimum life fulfillment including the roles expected of them in their families, communities and societies as they advance in age (Gordon, Nandy, Pantazi, Pemberton & Townsend, 2003). Second, they are more vulnerable to poverty regardless of time and place as children rely largely on their immediate environment to meet their basic needs. Considering that they are not yet economic independent actors, they completely rely on the resources distribution by their guardians or parents in the structure of the community and household setting (Roelen & Gassmann, 2008). Furthermore, children are powerless and they are unable to work to enhance their living circumstance or adequately support themselves when they have unmet needs (Best, 1987; Dieker, 2013). Their fates and lives are shaped by others. On the contrary, some adults to some extent may slide into poverty owing to their actions which could be as a result of poor skill set, laziness and refusal to work (Robinson, 2011). These adults can enhance their economic status and even break away from poverty by working harder, upgrading their skills among others. Hence, children, unlike the adults, are innocent in sliding into poverty and powerless to escape poverty, and if we do concur that the poor deserve priority, then it is safe to say that poor children deserve even a greater priority and their plights should always be at the forefront. Third, as they grow up in poverty, the children are confined in the chain of the phenomenon and are very likely to continue in the poverty trap in their adulthood; hence it is stated that poverty usually exhibits itself in the form of a vicious cycle, making children to be confined in it from birth onwards (Roelen, Gassmann & Neuborg, 2010). Fourth, relative to adult, poverty

affects children differently. This is predicated on the fact that children's basic needs are distinct from those of adults. For example, children's dietary and protection needs are distinct from those of adults, as well as their educational requirements (Roelen & Gassmann, 2008; Roelen, et al., 2010). Hence, children-focused poverty approach is capable of pinpointing those fundamental needs that are specifically very essential for children to develop and attain their full potentials (Roelen & Gassmann, 2008). This situation is regrettable given that Nigeria is regarded as the giant of African and before its recessionary experience was witnessing a significant growth rate. It is very important to address the issue affecting children in Nigeria and it is against this backdrop that this study examines the socio-economic determinants and multidimensional impact of child poverty in Nigeria.

1.1 Statement of the Problem

Since the 1970's, there has been a growing recognition amongst economists that poverty is multifaceted involving interconnected variables that are linked and complementary to each other (Alkire, et al., 2015; Ajakaiye & Afeikhena, 2014). This understanding of the complex nature of poverty led to the formulation of new measures of poverty that captures the complex interrelationships between monetary and nonmonetary poverty (Alkire, et al, 2015; Suppa, 2021; Dirksen & Alkire, 2021). As a result more and more studies has adopted multidimensional poverty measures that seek to capture the intricate relationships between various monetary and non-monetary deprivations that affect individual and household welfare (Adetola & Olufemi, 2012; Plavgo & Milliano, 2014).

In recent times, attention of development economists has moved to the study of multidimensional child poverty (Fonta, Yameogo & Fonta, 2020; Lawson, Angemi & Kasirye, 2020; Dirksen, et al., 2021). Emphasis on that is premised on the fact that children are society's most vulnerable group and account for the larger part of the incidence of poverty in the world. According to the statistics from a joint study of UNDP and OPHI (2019), out of 1.3 billion multidimensionally poor people, 663 million are children and about 428 million (32.3%) of them are below 10 years old. Also, 63.5% of SSA children are multidimensionally poor with the region recording the highest incidence among other regions of the world.

Nigeria is one of the topmost countries in SSA where child poverty is prevalent. Majority of the country's children encounters challenges like lack of access to safe drinking water and education, poor health facilities, lack to social insecurity, food among others (Olagunju, Ogunniyi & Olafadewa, 2018). This situation is more pronounced in rural areas where the majority of children who resides in rural areas are without access to basic resources for survival relative to their counterparts in developed nations. Most often they drink water from hazardous and unknown sources, they lack access to toilet facilities as well as medical care and they reside in houses with crowded rooms, they do not attend school and have no access to learning and information facilities (Gordon, et al., 2003). The main objective of this study is to investigate the socio-economic determinants and impact of child poverty in Nigeria.

2. LITERATURE REVIEW
2.1 Conceptual Issues
Child poverty has been considerable growth from the traditional to wider multi-dimensional conceptualization. Such growth could be linked to the increased attention on the rights of the child

(Ben-Arieh, 2000; Roelen & Gassmann, 2008) greatly supported by international conventions and summits which includes the 1989 CRC, World Summit for Children (WSC) of 1990 as well as the 2002 Declaration titled "A World Fit for Children" (WFFC). Two important features distinguish multidimensional child poverty and traditional child poverty. The first is that it focuses on outcomes of the child and access to critical services instead of relying only on resource inputs. A definition provided by WSC which is frequently cited in literature throws more light on the above point. According to WSC, child poverty refers to a situation typified by severe deprivation of essential human needs such as health, food, clean drinking water, shelter, information, sanitation facilities and education. Notice that the conceptualization did not rely only on income but also having access to social services (Gordon, et al., 2003; Baschieri & Falkingham, 2007). The second is an effort to capture the children's rights and survival needs as well as their developmental rights and needs in the welfare concept (Bray & Dawes, 2007) and this is captured in UNICEF's State of the World's Children 2005 Report from which the working definition of child poverty emerged: Children living in poverty faces deprivation of the emotional, spiritual and material resources required to develop, survive and succeed making them incapable of enjoying their basic rights, attain their full potential or contribute as bonafide society's members (UNICEF, 2004).

The definition provided by UNICEF shows that multidimensional child poverty is beyond material resources and also includes spiritual and emotional resources. Furthermore, it shows the effect poverty has on the children's ability to fulfill their rights as children. It recognizes how poverty hampers children's abilities to achieve their full potential, revealing the individual and social poverty costs. Specifically, mentioning participation in the conceptualization is linked to the notion of power: powerlessness is a poverty symptom; with the consequences that being poor is a hindrance to the attainment of a variety of human rights (Tsegaye, et al., 2008).

2.2 Theoretical Literature Review
2.2.1 Classical Theory of Poverty
This theory pioneered by the influential works of Adam Smith and David Ricardo was developed in the eighteenth and nineteenth centuries and it also contained the theories of distribution and value. The value of the product was viewed to completely rely on the costs incurred in producing that product. The classical economics description of costs simultaneously serves as an explanation of distribution. In line with its expression in original agricultural terms where rents are collected by landlords, wages are received by workers and a capitalist tenant farmer collects profits on their outlays (Davis & Sanchez-Martinez, 2015). No investigation was conducted into the motivation behind the various flows of income that accrues to the diverse sectors involved (that is the shape of these payments distribution).

The classical theory presumes that the exchange outcomes happening in the market place are efficient and thus wages reflect accurately the productivity of the individual. Consequently, poverty is majorly viewed as a corollary of poor individual decisions (for instance poor people lacks self-discipline) which negatively affect productivity although it is recognized that pure variations in fundamental genetic are also potential poverty causes. As described below, the wrong decisions individuals made could engender them to find themselves in a "poverty or welfare trap". To combat poverty beyond a minimum level, the intervention of the government is usually seen negatively as a "source of economic inefficiency"; by producing misaligned incentives between people suffering from poverty and the entire society as welfare programmes as viewed to reinforce

or potentially cause poverty (through welfare reliance). At most, the government is expected to intercede whenever poor people require supportive activities or threats to rectify unfavourable economic incentives (Davis & Sanchez-Martinez, 2015). Under this view, the bulk of the policy prescriptions concentrates on attempts to improve the productivity of poor people to enter the labour force as soon as they can (although it is recognized that some people – sick people, older people and the young people cannot partake and will require alternative support).

2.2.2 Neoclassical Theory of Poverty

The most significant step concerning the advent of neoclassical economics is Alfred Marshall Principles of Economics published in 1890. Marshall described price by the intersection of demand and supply curves. The introduction of diverse market 'periods' was Marshall's vital innovation as he took demand and supply as stable functions and expanded the demand and supply prices explanations to all time horizons. He contends that it was easier for supply to differ over the longer scope and hence became a more vital price driver in the long run.

Building on the classical tradition, neoclassical theory emphasize the role of the uneven initial endowments of skills, talents and capital which influences an individual's productivity in generating poverty in a market-based competitive economic system. Market failures like moral hazard, adverse selection, externalities, information asymmetry are also regarded as poverty aggravators (Davis, 2007). Uncertainty could play a huge role in engendering poverty because poor people are more susceptible to shocks to their welfare (for instance sickness, family breakdown, and recessions). Just like classical tradition, there is also scepticism regarding government's role among neoclassical theorists, although policies targeted at tackling market failures could be necessary in some cases.

For instance, microfinance or microcredit institutions are viewed as potentially beneficial from a purely economic perspective. This is predicated on the fact that these unions could conquer the moral hazard risk involved in lending to poor people when faced with income fluctuations or wish to establish a micro-enterprise. Moral hazard otherwise engenders a high social cost and/or inadequate credit availability. The poor decisions as critiqued by classical thinker could sometimes be rationalized as information challenges which could be solved partly through "small-scale policies" designed at shifting incentives (Banerjee & Duflo, 2011).

Under the Second Welfare Theorem of welfare theory – following which a Pareto-efficient allocation could be achieved post-relocation given that it is optimally conducted – reallocation strategies intended at lowering inequality could be efficiency-neutral. Nonetheless, similar to the classical belief, neoclassical economists usually concur that in most practical conditions, the aim of full income equality, for example, may not be accomplished without suffering excessive cost in efficiency terms. Existing welfare economists support the Kaldor–Hicks criterion: Public policy is validated if it generates benefits above losses so that it is constantly viable for winners from the policy to compensate losers (using the second welfare theorem) although this compensation do not usually happen (Jung & Smith, 2007).

Hinged on the idea that interpersonal utility assessment was unsuitable and on the Kaldor-Hicks principle (which emphasize the normative view that public policy should be worried about efficiency maximization and not equality), some adherents of the neoclassical school do not see

poverty reduction as an overriding economic goal; poverty alleviation was hence seen as useful only if it improved resources allocation efficiency among the population. In this aspect, it differs with classical thinkers and early neoclassical theorists like Marshall and Keynes. They maintained that it was suitable to evaluate individuals' utilities and there exists a diminishing marginal utility across income, indicating that an additional income unit was more important to an individual who is poor than a wealthy one, showing that utility is enhanced through redistribution.

2.3 Empirical Review

Using cross-sectional data from 2016, Sulaimon (2020) assesses the factors that contribute to multidimensional poverty in Nigeria. The Multidimensional Poverty Index (MPI) serves as a proxy for multidimensional poverty. Ordinary least squares (OLS), Tukey's test, and analysis of variance (ANOVA) were used to assess the data. The ANOVA results reveal considerable regional differences in multidimensional poverty. The Tukey's test demonstrates significant differences in multidimensional poverty between southern and northern areas, as well as between the majorities of northern sub-regions. In the south, there are no appreciable differences in multidimensional poverty amongst sub-regions. The OLS results after adjusting for capital spending reveal that labour force and fertility rate significantly affect multidimensional poverty, with the latter showing a positive association. Sulaimon (2020) draws the conclusion that given Nigeria's vast population, an increase in fertility rate will result in a significant rise in the number of people who are multidimensionally poor. Similar to this, Muhammad, Ibrahim, Maryam, and Yahanasu (2020) looked into how puberty affects how children live because most of the previous publications did not go into detail on the subject. In order to acquire data for this labour study, secondary data were used. The study's findings suggest some strategies for reducing child poverty in the nation while also drawing the conclusion that it is wealthy. There is scant evidence to support claims that egregious resource misuse, bad management, sociocultural issues, and corruption are to blame for the nation's present child poverty problem.

Hegde, Devarani, Lahiri, Datta and Hemochandra (2019) studied the determinants of child multidimensional poverty in Meghalaya India. The study sampled 80 children from 60 households and they found that livelihood diversification, landholding, parents age and educational level, as well as income, are the most influential factors that determine child poverty in India. Olagunju, Ogunniyi and Olufadewa (2018) employed the 2013 Nigeria DHS and 2004 NLSS and found that being employed in the agricultural sector, larger households influence the incidence of child poverty in Nigeria while educated households, having access to essential infrastructure, annual rainfall negatively affects child poverty in Nigeria. In another study in Indonesia, Landiyanto (2018) found that residing in rural areas, households with lower educational attainment, and non-Muslims households as the major factors that influence child poverty in Indonesia.

Birhanu, Ambaw and Mulu (2017) applied logit model and three waves of Ethiopia microdata and conclude that the major predictors of multidimensional child poverty in Ethiopia are household location, social network and capital, family income, structural and economic changes and other geographic connected variables. Kim and Nandy (2018) applied the logit model and the 2013 Korean National Child Survey and they found that single-parent and working-poor households influence child poverty in Korea. Pérez (2016) focused on the drivers of children living in poverty in Uruguay using Uruguay's micro-level data and probit model. The study established that the most significant variables influencing child poverty are parental labour status and

education. Again, Ogunwale and Olanrele (2016) applied the logit model and found that the existence of health facilities, parent's engagement in the service sector, child's age, educational attainment of the parent, wealth households as well households headed by males reduces the likelihood of child poverty in Nigeria whereas household employed in the agricultural sector, age of the head of the household, households headed by females, large family size enhances the likelihood of a Nigerian child being poor. Dayioğlu and Demir (2016) employed four waves of Survey on Income and Living Conditions and found that children residing in less-educated and younger persons that are unemployed or currently underemployed are very likely to be poor. Finally, Wasswa (2015) in a study in Uganda focused on the determinants of multidimensional child poverty using a logit model. The study found the significance of health infrastructure, education, engagement in the non-agriculture sector, small household size in reducing the incidence of the country's multidimensional child poverty.

3. RESEARCH METHODS
3.1 Research Design
Research design refers to the framework or set of procedures which the researcher adopts in collecting, analyzing and interpreting the sets of variables and data specified in the research problem. As noted by Creswell (2014), research design defines the study type (such as quantitative, qualitative, correlational, descriptive, experimental, semi-experimental, meta-analytic, review, etc); research problem and research hypotheses; dependent and independent variables; data collection protocols and analytical strategy. This study adopts quantitative research design.

Quantitative research process deals with numbers and quantities through a systematic approach that involves empirical investigation of observable phenomena. It involves the use of statistical, mathematical, computational and econometric procedure in providing answers to research questions. The quantitative design was adopted for several reasons. First, it enables the researcher to obtain quantitative estimates of the relationship between sets of variables. It also enables the researcher to test theories objectively by investigating the link among and between variables. As observed by Robson (2016), quantitative research method is usually designed to guarantee reliability, objectivity and generalizability. In this method, respondents are randomly selected in an unbiased approach from the study population. Statistical methods are adopted to investigate pre-agreed hypotheses concerning the relationships between particular variables. The researcher adopting this method is considered external to the specific research he is conducting; thus, the findings are supposed to be replicable when conducted by someone else. Robson and McCartan (2016) argued that the major advantage of the quantitative technique is that it produces quantifiable and reliable data that can be generalized to the larger population.

This study involves the use of Livimg Standards Measurement Survey (LSMS). Quantitative estimates of the incidence of child poverty for Nigeria, various geo-political zones, gender distribution and rural urban dichotomy shall be obtained using a quantitative research technique known as Akire-Foster multidimensional poverty measurement approach. This approach shall also be used to estimate the severity, intensity and vulnerability of the poor. Further, discrete variable estimation procedures would be employed to investigate the determinants and impacts of poverty in Nigeria. The discrete variable estimation techniques would enable the researcher to obtain quantitative estimates that could provide reasonable and reliable answers to the research questions.

3.2. Area and Population of Study

The area of study is Nigeria. Nigeria is a West African country that shares border with Benin Republic (in the West), Niger and Chad (in the North) and Cameroon (in the South). With a population of 201 million people and a land mass of about 923,768 km², Nigeria is located at the latitude and longitude of 9.0820° N and 8.6753° E respectively. Administratively, Nigeria has 36 states plus the Federal Capital Territory, Abuja, which is the seat of federal government. The states including the Federal Capital Territory are structured into six regions, namely, North Central (Niger, Kwara, Benue, Kogi, Plateau, Nasarawa and Federal Capital Territory), North East (Gombe, Yobe, Bauchi, Adamawa, Taraba and Borno); North West (Kebbi, Kaduna, Zamfara, Jigawa, Kano, Sokoto and Katsina), South East (Imo, Anambra, Abia, Enugu and Ebonyi); South West (Osun, Ogun, Lagos, Oyo, Ekiti and Ondo);and South South (Delta, Bayelsa, Rivers, Akwa Ibom, Edo and Cross River) (see Figure 3.1).
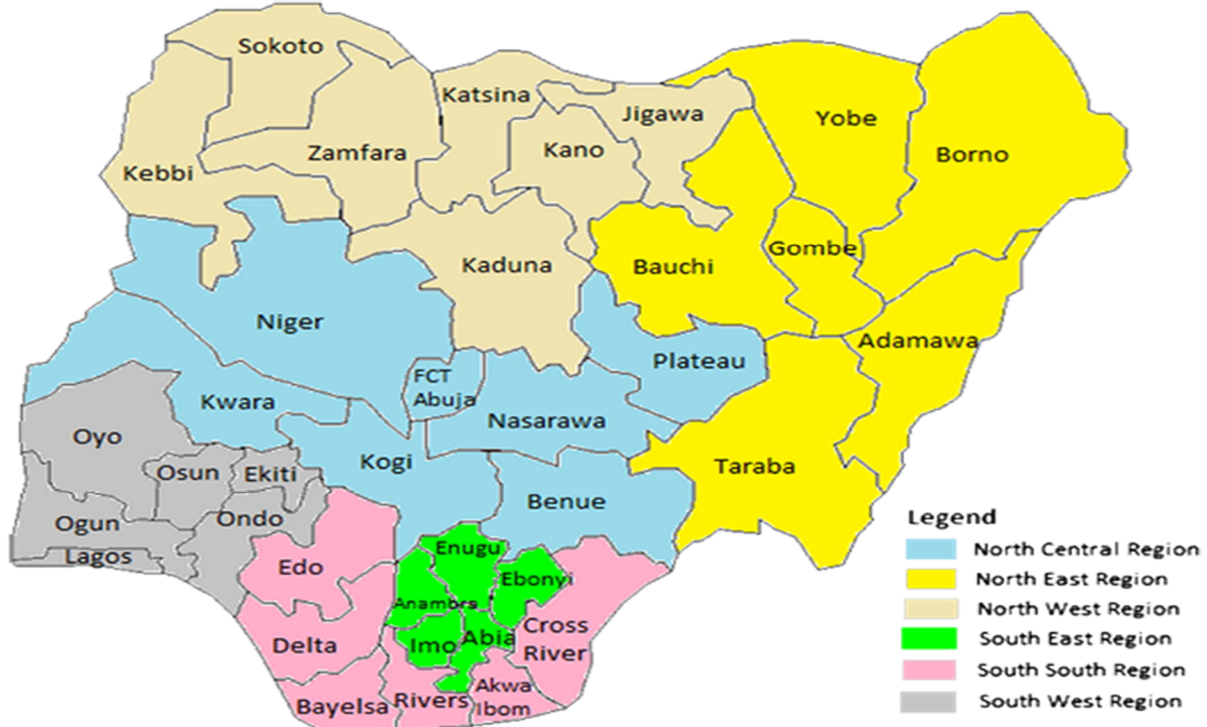

Figure 3.1: Nigeria's map

Source: Google Map (2018)

Nigeria is classified as a lower middle-income economy. With a GDP of about US$440,777 billion, Nigeria is the largest economy in Africa. However, Nigerian per capita income is roughly $5,250 (World Bank, 2022). As a frontier economy, Nigeria has flourishing entertainment, financial service and communication sectors. Although it has continued to make accelerated effort towards economic diversification, crude oil remains the major source of revenue and foreign exchange earning with annual returns amounting to over 80% of total revenue. Although Nigeria produces about 2.7% of the world oil supply, oils sector contributes only 9% of the nation's GDP. Nigeria has expanding urban population amounting to 50.34% of its total population. The rural population largely engages in agriculture with over 85% of its agricultural enterprise being operated as subsistence ventures (Lin & Ankrah, 2019).

Educationally, Nigeria ranked 124th out of 140 countries in the World education system ranking and 25th out of 38 countries in Africa. This far below Seychelles (43rd in the world, 1st in Africa), Tunisia (71st in the world, 2nd in Africa) among others. Child education and survival in Nigeria has been rated low with an ever-rising number of out-of-school children. In fact, according to UNICEF report (2019), only 35.6% of Nigerian children aged 36-59 months receive early childhood education with the population of out-of-school children amounting to 10.5 million children. According to UNICEF (2019), about 46% of Nigerian population represents children under the ages of 15. In other words, Nigeria is a young population with about 90 million persons under the age of 15. With over 7 million annual new born, the population of children under 5 is about 31 million. UNICEF (2019) also estimated that three in every four Nigerian children are poor.

3.3 Model Specification

To investigate the determinants of child poverty in Nigeria, we would utilize a probit model. Probit model belongs to broad family of generalized linear model with discrete response variable. In a standard probit model, the discrete response variable is related to the exogenous variables through a non-linear probit link function which could be specified as:

$$\Phi = \eta^{-1}(\mu) \qquad\qquad 3.1$$

η^{-1} in Equation 3.1 refers to the inverse of the standard normal cumulated distribution function (CDF). The CDF has a characteristic non-decreasing shape which ensures that in the transformation to the cumulative distribution function, the property that an increase in the exogenous variables in associated with notice that in general linear model. Φ is rather expressed as a function of linear exogenous variables $x_1, x_2, ..., x_k$. In other words, Equation 3.1 will be rewritten as:

$$\Phi = \mu = \sum_{k=1}^{K} \beta_k x_k \qquad\qquad 3.2$$

With the assumption that the observations are random samples of unreplicated dichotomous variables, the untransformed continuous response derived from the constructed multidimensional child poverty index (MCPI), y_c^* is transformed into dichotomous response $\tilde{y}_c$ that has binary outcome that $\tilde{y}_c \in \{0,1\}$ with

$$\tilde{y}_c = 1, \text{if } y_c^* > 1, 0 \text{ otherwise} \qquad\qquad 3.3$$

In the above function, 1 represents the poverty cutoff line while $y_c^* > 1$ refers to all non-poor children. The response variable takes the value 0 when a child is classified as poor.

Introducing probability and combining Equations 3.1-3.3, we have:

$$P(\tilde{y}_c = 1) = \eta \left[\sum_{k=1}^{K} \beta_k x_k \right] \qquad\qquad 3.4$$

Notice that since $\tilde{y}_c$ is a binary response variable, the events are complementary such that the probability of a child being poor is given as:

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$$P(\tilde{y}_c = 0) = 1 - \eta \left[\sum_{k=1}^{K} \beta_k x_k \right]$$

3.5

Equation 3.5 is utilized in estimating the predicted probabilities given the values of the explanatory variables.

Probit model utilizes maximum likelihood estimation (MLE) framework for estimating $\hat{\beta}_k$. In effect, $\hat{\beta}_k$ maximizes the log of the probit likelihood function. Given the assumption that $\tilde{y}_c$ has a sample of N independent observations, the likelihood function is expressed as:

$$L(\tilde{y}_c / x, \beta) = \prod_{i=1}^{N} \left[\eta \left(\sum_{k=1}^{K} \beta_k x_k \right) \right]^{\tilde{y}_c} \left[1 - \eta \left(\sum_{k=1}^{K} \beta_k x_k \right) \right]^{1-\tilde{y}_c}$$

3.6

The predicted probability could be combined with the estimated parameter to drive the marginal effect. The marginal effect of x_k is defined as the effect of 1 unit change of x_k on $P(\tilde{y}_c = 1/ x_k)$ while holding other variables constant. To derive the marginal effect, the partial derivative of Equation 3.7 with respect to x_k is taken as follows:

$$\frac{\delta P(\tilde{y}_c = 1)}{\delta x_k} = \eta \left[\sum_{k=1}^{K} \beta_k x_k \right] \beta_k$$

3.7

Note that x_k is a 1 x N vector of explanatory variables. Essentially, x_k includes mapping of demographic factors, household capital endowment, infrastructural endowment, social capital and economic/structural factors.

As noted by Alkire, et al., (2015), the M_0 can be decomposed into subgroups such as spatial groupings (eg rural and urban) and regional groupings (eg geopolitical zones: North East, North Central and North West; South South, South East and South West). Subgroup decomposition enhances the understanding of the depravity and poverty dynamics of the component units that make up the population. Suppose the population share (τ^φ) and subgroup achievement matrix (X^φ) are given or obtainable for subgroup , φ, M_0 could be redefined as:

$$M_0(X) = \sum_{i=1}^{m} (\tau^\varphi) M_0 (X^\varphi)$$

3.8

Notice that Equation 3.8 is additive. This implies that one can compute the contribution of each subgroup ($\mathbb{Q}_\varphi^0$) to the overall M_0 such that:

$$\mathbb{Q}_\varphi^0 = \tau^\varphi \frac{M_0(X^\varphi)}{M_0(X)}$$

3.9

The full map of x_k is shown on Table 3.1.

Table 3.1: Identification of Variables

Variable	Description and Measurement
Demographic variables	
Single parent	A parent is said to be single, if a child stays with either his father or mother, notwithstanding both parents ever married, or separated. takes 1 if single parent, otherwise 0
Male headed household	If the head of the household in which the child belongs is a male, we assign 1, otherwise 0
Female headed household	If the head of the household in which the child belongs is a female, we assign 1, otherwise 0
Household size	This refers to the number of persons in a household, including father, mother, children and relatives. The value is indicated as log of household size.
Household in rural area	This variable takes 1 if household is in urban area, and 0 if it is in rural area.
Age of household head	We take the log of the age of the head of household
Gender of child	A child is assigned 1 if he is male, otherwise 0
Religion	The religions indicated are Christianity (1), Islam (2), African traditional religion (3) and others (4)
Household capital	
Total amount of land owned by the household	The total amount of land owned by the household measured in hectares. It is indicated as log of land
Educational status of household head	This refers to the highest educational qualification attained by the head of household. It takes0 for none, 1 for primary education, 2 for secondary education, 3 for post-secondary education,
Job status of mother	The job status of a child's mother indicates whether the mother is working or not. Household chores and keeping of a backyard garden does not qualify as working. This variable is assigned 1 if the child's mother is working otherwise 0.

Source: Authors Compilation using data from LSMS, 2019.

3.4 Data Sources

One important task that confronts a researcher is to ascertain the procedure or approach to obtaining the data for the study. The source of data is as important as the outcome of the research. In fact, as observed by Kothari (2004), the validity of research process is largely dependent on the validity, reliability, completeness, consistency and correctness of the data used by the researcher. This study is a nationwide study. This implies that nationwide data is required. However, a nationwide survey is always highly costly such that the research student could hardly undertake such adventure. However, there are some nationwide survey data that could be sufficient for the execution of the task and demands of this study. This study would utilize living standards measurement survey (LSMS). LSMS is a World Bank project implemented in collaboration with National Bureau of statistics. The survey is implemented to provide data on economic conditions, socio-demographic patterns, education, household welfare and health conditions and outcomes in the country. Other areas of coverage of the LSMS include employment and gender roles, domestic violence, fertility preferences and childhood illnesses among others. Essentially, the sampling approach utilized in the data collection of LSMS is random systematic sampling technique. Systematic sampling is a probability sampling method in which a random sample, with a fixed periodic interval, is selected from a larger population.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Probit Model
Table 4.1 Estimated result of the impact of socio economic variables on Multidimensional child poverty

VARIABLES	(1) Probit Model 1	(2) Probit Model 2
hhsize	0.030	0.052**
	(0.024)	(0.025)
lpc_income	-0.261***	-0.250***
	(0.071)	(0.072)
lconsumption	-4.884***	-4.950***
	(0.359)	(0.363)
age	0.530***	0.507***
	(0.165)	(0.168)
agesq	-0.025***	-0.023***
	(0.009)	(0.009)
sex	0.190	0.246
	(0.192)	(0.195)
ruralurban	-0.391*	-0.428*
	(0.208)	(0.219)
male_head		-1.079***
		(0.363)
mother_alive		0.136
		(0.543)
owns_land		0.418
		(0.331)
Constant	57.919***	58.892***
	(4.361)	(4.490)
Observations	967	967

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

To capture the impact of selected socio economic variables on child multidimensional poverty in Nigeria, the study estimated two Probit models as well as the marginal effect of the estimated Probit models. Evidence from the estimated Probit models indicate that per capita household consumption expenditure (totcons_pc) and per capita income (Pc_income) both has a negative and statistically significant impact on the probability that a child aged between 0 to 14 years is multidimensionally poor. This implies that higher household income and consumption expenditure significantly reduces the Log odds in favour of multidimensional child poverty in Nigeria. For instance, the estimated model indicates that increasing per capita household income by 1% will decrease the log odds of child multidimensional poverty by about 0.026 % all thing being equal. The significant negative impact of income on multidimensional child poverty is not

surprising as it follows appriori economic expectations. Evidence from several studies indicates that deprivations in income are correlated with other forms deprivations (Alkire, et al., (2015). Increases in per capita income allow household access to better healthcare, quality education and improved living standard.

Further findings reveal the impact of demographic and social variables on multidimensional child poverty in Nigeria. Household size (hhsize) was found to have a significantly positive effect on multidimensional child poverty in Nigeria. In particular, increasing household size by one unit is expected to increase the log odds of multidimensional child poverty by about 0.048 in the period under review. Large family size increases pressure on already scarce resources and worsens dependency burden. This finding has great implication for policies that seeks to reduce fertility rate among poor women and thereby

Place of residence was also found to be an important determinant of multidimensional child poverty with both models finding that it has a significant impact on multidimensional child poverty. For instance leaving in the urban area decreases the log odds that a child will be multidimensionally poor by about 0.458 points compared to a child that resides in the rural area.

Our result reveals a gender bias in multidimensional child poverty. Evidence from the estimated probability of being multidimensional poor. For instance evidence from Model 1 indicate that compared to a boy, being a girl child increases the log odds of being multidimensionally poor although the variable was found to be statistically insignificant.

Age has a concave relationship on multidimensional child poverty. At first multidimensional child poverty rises as age rises but after some point, it begins to decline as age rises giving it a concave shape. The impact is also statistically significant indicating that age is an important determinant of multidimensional child poverty in Nigeria. The turning point is [0.530/2(0.025)=10.6]. This implies that in the multidimensional child poverty equation, the impact of child's age on poverty becomes zero at age of 10.6, beyond that increases in age actually reduces multidimensional child poverty. From the data employed, only about 23% of the children sampled have age that is greater than 10.6.

Evidence from Model two indicates that of the additional variables, only sex of household head has a significant impact on multidimensional child poverty in Nigeria. For instance, compared to a female headed household, the log odds in favour of multidimensional child poverty reduce by 1.07 if the household head is a male. This implies that children in male headed household are less likely to be deprived in multiple dimensions than if they were born in a female headed household. The finding is not quite surprising considering the fact that Nigeria is a patriarchal society with strong bias towards.

Table 4.2 Marginal Effects

VARIABLES	(1) Model 1 Marginal effect	(2) Model 2 Marginal effect
hhsize	0.005 (0.004)	0.009** (0.004)

lpc_income	-0.047***	-0.044***
	(0.013)	(0.013)
lconsumption	-0.872***	-0.874***
	(0.060)	(0.060)
age	0.095***	0.089***
	(0.030)	(0.030)
agesq	-0.004***	-0.004***
	(0.002)	(0.002)
sex	0.034	0.043
	(0.034)	(0.034)
ruralurban	-0.068*	-0.073**
	(0.035)	(0.036)
male_head		-0.230***
		(0.087)
mother_alive		0.023
		(0.089)
owns_land		0.074
		(0.058)
Observations	967	967

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimated marginal effect model was used to measures the change in the probability of multidimensional child poverty for a change in any of the explanatory variables holding all other independent variables constant.

From table we can see that the biggest contributor to probability of multidimensional child poverty is per capita household consumption expenditure. Specifically, table 4.2 indicates that increasing per capita consumption expenditure by 1% reduces the probability of multidimensional child poverty by 0.872. When we include other variables that should affect multidimensional child poverty like sex of household head, mothers education and land ownership status, the probability that per capita consumption expenditure should decrease child poverty increase marginally to about 0.874. The variable is also statistically significant in both models indicating that it is a major determinant of multidimensional child poverty.

Also, Per capita income was also found to have a statistically significant negative impact on the probability of multidimensional child poverty. Increasing per capita income by about 1% reduces the probability of multidimensional child poverty by about 0.047 and 0.044 in models one and two respectively. The variable is also statistically significant in both models. Indicating that it is a major determinant of multidimensional child poverty in Nigeria. The finding is also in line with appriori economic expectations and aligns with previous studies like Rutaremwa (2013). The result further highlights the correlation between monetary deprivation and other forms of deprivation like education, health and living standard (Alkire, et al., 2015).

Furthermore, Evidence from the Model 2 shows a statistically significant positive relationship between household size and the probability of multidimensional child poverty. Precisely, model two indicate that holding all other variables constant, increasing household size by 1 will increase the probability of multidimensional child poverty by about 0.009 or 0.9%. Generally poor people have more children compared to richer more educated people. On the other hand, having more children reduces the resources available for education, healthcare and improvement in the general standard of living. The positive relationship between household size and multidimensional child poverty was also established by previous studies such as Wasswa (2015).

On the other hand living in the urban area as compared to the rural area decreases the probability of multidimensional child poverty by about 6.8%. The impact is also significant at the 5% level. The impact is higher in model two (7.3%) after controlling for more household characteristics. We also found that child's age has a concave relationship with multidimensional child poverty. This implies that multidimensional child poverty rises with child's age, peaks at 10.6 years and thereafter begins to fall as age rises. This has implications for policies that targets children at specific ages in the developmental progress. Moreover the finding is corroborated by the studies done by Rutaremwa (2013). Again, the study found that children in male headed households are likely to be less multidimensionally poor compared to those in female headed households. The probability is -0.23 or 23%. The coefficient is also statistically significant.

5. CONCLUSION AND RECOMMENDATION

This study examined the socio-economic determinants of multidimensional child poverty in Nigeria. The study relied mainly on the Sen's capability approach for the theoretical link between unidirectional and multidimensional poverty and estimated a probit Model to ascertain the impact of socio economic variables on Multidimensional poverty. The marginal effect of the Probit model was also simulated to determine the probability of multidimensional child poverty given selected socio economic variables. The study found that household per capita consumption expenditure, per capita household income, household size, child's age and the gender of household head are the biggest determinant of the probability of multidimensional child poverty in Nigeria. In particular, the marginal effect model indicate that holding other variable constant, increasing per capita consumption expenditure by 1% will reduce the probability of multidimensional child poverty by 0.872., for per capita income a 1% increase will lead to a 0.047 decrease in the probability of multidimensional child poverty. Again, living in the urban area reduces the probability of multidimensional child poverty by about 0.068. While male headed households has a probability of multidimensional child -0.230 lower compared to female headed ones. However, the effective family planning programmes that seek to educate women on fertility so as to reduce family size will go a long way improving child poverty outcomes.

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