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## Household size and poverty: A study of Northwestern Nigeria

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### Abstract

*Nigeria is currently facing a surge in its population and has been projected to become the fourth-largest population in the world by 2050. In the face of this growing population, poverty is becoming endemic in the country. Northwestern Nigeria has the largest population in the country as well as the highest poverty incidence. Could the population of the north-west be one of the factors responsible for the endemism of poverty in the region? This study explored the relationship between household population and household poverty in Northwestern Nigeria. The study used the national representative cross-sectional data from the 2013 National Demographic and Health Survey (NDHS). In the survey, the northwest region has a sample of 9,673 respondents. Employing the logistic regression estimation model, the study reveals that household population is significant and positively related to household poverty. Households with members of between 6 – 10 and > 10 are 22% (OR = 1.22) and 30% (OR = 1.30) more likely to be poor compared to households with members of 1 - 5. The findings reveal that the household population significantly increases the likelihood of poverty among the households. Policymakers therefore need to pay more attention to the booming population and how the adverse effect could be curtailed.*

**Keywords:** Fertility Rate, Household Poverty, Household Size, Northwestern Nigeria

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### 1. Introduction

The number of individuals or people in a given area or location is generally referred to as population (Boserup, 1976). Household size is fundamental in determining the overall population of a country. Higher fertility rate increases household size and the total population of a country (Nayak & Behera, 2014). Increase in population comes with numerous challenges, particularly in the face of stagnated resources. When the population increases, the per capita share of income or resources may decrease, leading to a poor economic situation (Libois & Somville, 2018). The global population is growing at a rapid pace, which is posing a significant challenge for emerging economies. Many countries in sub-Saharan Africa, including Nigeria, are experiencing population growth that is surpassing their economic expansion rate (Adeosun & Popogbe,

2021). Meanwhile, developed nations are struggling to maintain stable or negative population growth. This may not be unconnected with recognizing the economic and social impact of population growth without the corresponding increase in resources and income. Poverty has been identified as one of the common issues that arise from population growth (Ukpong et al., 2013).

Poverty has become a global issue of concern. Different global development agendas have had poverty reduction in the core of their goals. The Millennium Development Goals (MDGs) that ended in 2015 had as its number one target to halve extreme poverty in the world between 2000 and 2015 (United Nations, 2015a). Similarly, the ongoing Sustainable Development Goals (SDGs) aims to achieve zero poverty worldwide by 2030 (United Nations, 2015b). Few years to the



end of the SDGs, a substantial number of the global population are still living below the poverty line. Using the Multidimensional Poverty Index (MPI)<sup>1</sup>, about 1.1 billion people (more than 10% of the global population) are living in poverty (United Nations Development Programme [UNDP], 2023). 730 million (66%) of this population are from the low- and middle-income countries, while 534 million (about 50%) are from sub-Saharan African (SSA) countries. Nigeria as a middle-income country and one of the SSA countries contributes substantially the global MPI. About 133 million Nigerians (63% of the country's population) were estimated to be multidimensional poor in 2022 (National Bureau of Statistics (NBS) [Nigeria], 2022). With this number, the country alone may have contributed one-fourth of the MPI in the SSA region; and this may not be unconnected with the population of the country. Nigeria is the African country with the largest population and sixth in the world (Statista, 2023; United Nations Department of Economic and Social Affairs [UNDESA], 2022). The northern part of the country, particularly the northwestern region has the highest population. Of the 206, 283, 338 estimated population of Nigerians in 2020, 56, 550, 588 (27%) are from the northwestern region of the country (National Bureau of Statistics (NBS) [Nigeria], 2021). High fertility rate in the country, culminating to large household size, could be responsible for the high population in the country; and the northwestern region has the highest fertility rate (National Population Commission [Nigeria] and ICF International, 2019). Accordingly, the northwest region of the country has the highest multidimensional poverty intensity and multidimensional poor people in the country (National Bureau of Statistics (NBS) [Nigeria], 2022). This could not have been a coincidence; hence,

considering the population of the northwest region and its multidimensional poverty intensity, and households being the basis of the overall population, this study seeks to investigate the empirical relationship between household size and poverty in the northwestern Nigeria. The study is based on premise that increase in population may reduce the per capita share of income or resources (Libois & Somville, 2018).

### **Population and Poverty Statistics in Northwestern Nigeria**

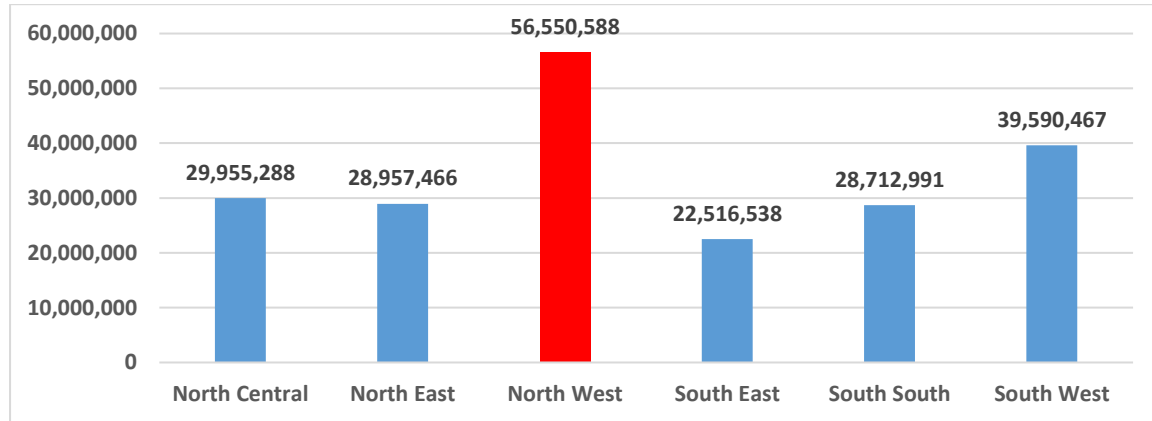
The northwest region of Nigeria is one six geopolitical zones in the country. It constitutes seven (7) states out of the thirty-six (36) states in the country. The estimated population of Nigeria as of 2020 was 206, 283, 338, of which 56, 550, 588 are from the northwestern region. Figure 1 shows the population by the six geopolitical zones in the country. The northwest alone contributes more than 50% of the population in the northern part of the country, and about 27% of the total population in the country. High fertility rate in the northern part of the country, particularly in the northwest, could be responsible of the overwhelming population of the region. Most states with the highest fertility rate of between 6.6 to 7.3 children per woman are from the northwest region (National Population Commission [Nigeria] and ICF International, 2019). This high fertility rate in the region has also made it to have the highest average number of household members. Figure 2 shows the fertility rate, average household size and dependency ratio at the country level and by region. While the statistics for all the three (3) southern regions were below the values at the national level, the statistics for the north-east and north-west surpass the national values. In all, the north-west has the highest values for fertility rate, average household size and dependency ratio among

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Multidimensional Poverty Index measures interlinked <sup>1</sup> deprivations in health, education, and standard of living that directly affect a person's life and well-being

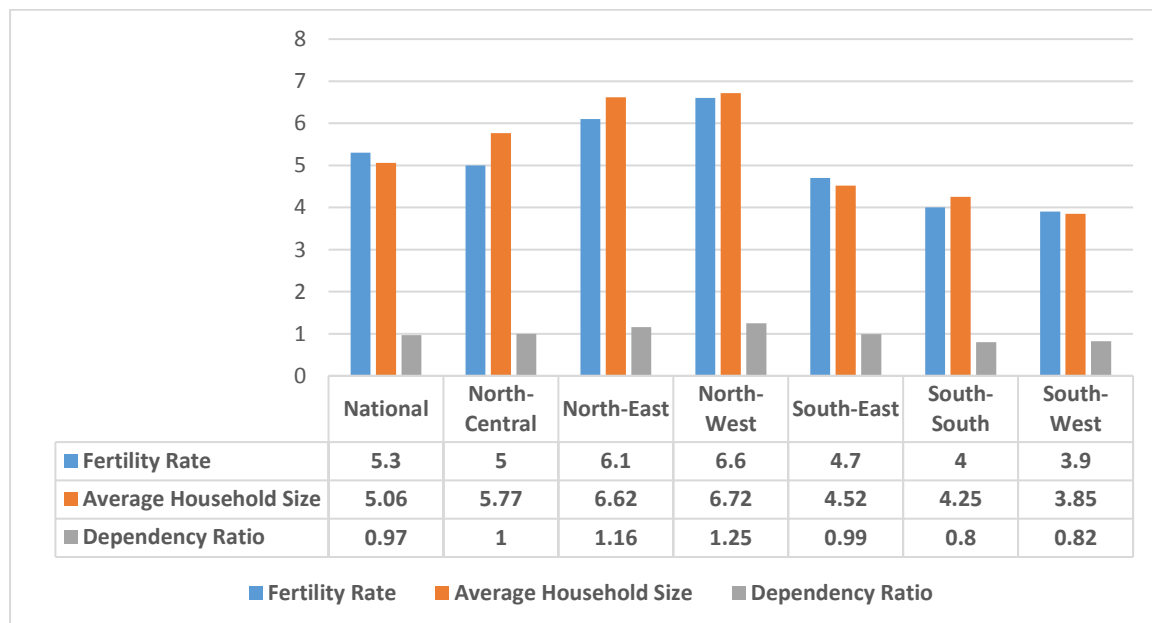
the regions. An important discernible fact from figure 2 is the possible positive effect of fertility rate on average household size,

and average household size on dependency ratio. And high dependency ratio plunges household or a population into poverty.



**Figure 1:** Population of Nigeria by the Six Geopolitical Zones in 2020

**Source of Data:** National Bureau of Statistics (NBS) [Nigeria] (2021)



**Figure 2:** Fertility Rate, Average Household Size and Dependency Ratio at Country Level and by Region<sup>2</sup>

**Source of Data:** National Bureau of Statistics (NBS) [Nigeria] (2020), and National Population Commission [Nigeria] and ICF International (2019).

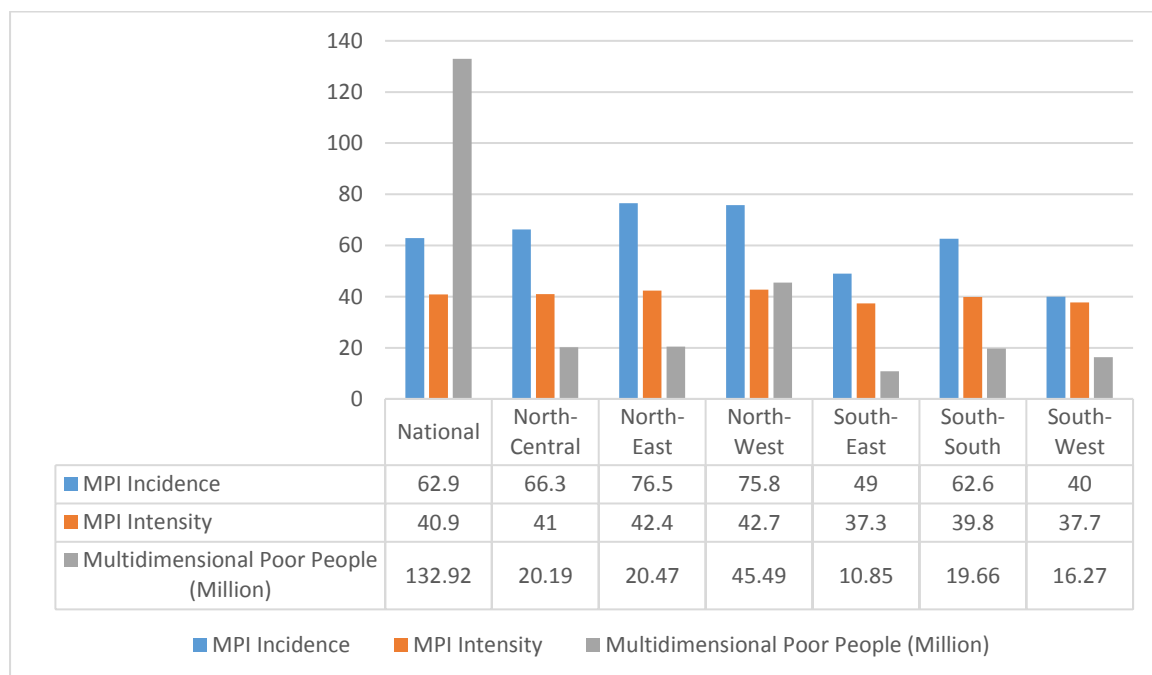
The multidimensional poverty indices (MPI) reported in the country across the regions alluded to the likely effect of high fertility rate and household size, particularly as found in the north-west

region. MPI varies across the regions, and according to the fertility rate and household size. According to the 2022 Nigeria MPI report, about 133 million (62.9%) Nigerians are multidimensionally poor. The north

<sup>2</sup> The north-east values for fertility rate and average household size exclude Borno state. The survey was not conducted in the state due to insecurity.

hosts 86 million (65%) of this population, and the south hosts 47 million (35%) (National Bureau of Statistics (NBS) [Nigeria], 2022). Taking comparison at the zonal level, the north-west is worst hit as it hosts 45 million of the entire poor population in the country, a little less than the entire poor people in the south. Figure 3 presents the multidimensional poverty statistics at the country level and by region. It shows that in terms of the incidence and intensity of MPI, all the northern regions are greater than the national, while their

southern counterparts fall below. The north-east and north-west are at par, except for the number of poor people, the north-west doubles the north-east. Except for the north-west, the number of poor people in each of the zones ranges from 11 – 20 million. The north-west alone has 45.49 million people that are multidimensionally poor. This situation of the north-west may not be unconnected with its larger population as a result of its high fertility rate and large household size.



**Figure 3:** Incidence and Intensity of Multidimensional Poverty, and Multidimensional Poor People at Country Level and by region

**Source of Data:** National Bureau of Statistics (NBS) [Nigeria] (2022)

## 2. Literature Review

Theoretically, the relationship between poverty and population growth has been a topic of discussion for decades, with its roots in classical economics. Different theorists postulated the existence of a relationship between the two. Popular among them are the Malthus’s and Marx’s. Malthus opined that high fertility with improvidence results in household poverty; and household being the basis of a society, poverty in the society is a reflection and

aggregation of household poverty (Crook, 1996). Malthus and the neo-Malthusians posited that high fertility rate leads to increase in household size, which in turn increases poverty in the household if resources remain constant or there were no plans to provide for the increased number(s). This agrees with common sense. If household members increase and there is no corresponding increase in the household’s earnings, the per head share of household members in terms of



consumption, educational training and healthcare will certainly reduce. This is because the increased members would have their share from the same resources or income previously shared. Marx had an entirely contrary position on the relationship between poverty and population or household size. He opined that household poverty is not necessarily the result of high fertility, rather, it is a result of unemployment and landlessness (Crook, 1996). An unorganized political, economic and social system as well as lack of enabling environment to engage the human resources productively could be responsible for poverty in the household, and not high fertility (Addae-korankye, 2019). Instead of high fertility causing poverty, Marx postulated that it is poverty that causes early marriage and consequently high fertility (Crook, 1996). This is typical in a primitive or rural society where lands are in abundance. Seeing production opportunities around that need human resource, poor people in such society may engage in early marriage to produce the needed labor for the lands, which may be a way out of their poverty. Theoretically therefore, the relationship between poverty and population or household size can be bidirectional (Lindert, 1980). Then under what condition does high fertility (household size) causes poverty, and vice versa? When resources are in abundance, and there are employment and productive opportunities, poverty may increase high fertility because that is one way to get out of poverty. On other hand, when resources are exhausted by the existing population or household members, improvident fertility may cause poverty in the household.

Similar to the theories, empirical studies on the relationship between household size and poverty are conflictual. However, empirical evidence from Nigeria are unambiguous in showing positive effect of population growth on poverty at the country and household levels. According to a study

by Ukpong et al. (2013), Nigeria's population growth is revealed to have a direct and positive relationship with poverty rate. This implies that an increase in population growth would lead to a corresponding increase in poverty rate. This finding suggests that Nigeria's fast-paced population growth could potentially hinder the country's economic growth. The finding of this study was a reflection or aggregation of the happenings at household level as posited by Malthus (Crook, 1996). Studies at the household level corroborated this finding. According to a study by Anyanwu (2014), household size is a significant factor influencing poverty in Nigeria. The study found that having a single person household significantly lowers the likelihood of poverty, while having more family members gradually increases the probability of becoming poor. In a similar study of Nigeria context, using a nationally representative cross-sectional data from the 2013 Nigeria Demographic and Health Survey (NDHS) and logistic regression, Yakubu (2021) found that having household members of 6 – 10 and above 10 increase the likelihood of poverty by 26% and 29% respectively, as compared to having household members of 1 – 5. The study further shows that households in northern Nigeria are 77% more likely to be poor compared to their southern counterparts. Not only that the study revealed positive effect of household size on poverty in Nigeria, it supports the report by National Bureau of Statistics (NBS) [Nigeria] (2022) that 65% of multidimensionally poor people in Nigeria are from the north.

Evidence is substantial in literature indicating that having large households is positively associated with poverty, and this association is typical with developing nations (Aassve et al., 2009; Brück et al., 2010; Meyer & Nishimwe-Niyimbanira, 2016; Orbeta Jr, 2005), especially those in Africa (Anyanwu, 2014). For example, in Nigeria, children are often seen as a source



of income and security for the household, especially in terms of providing for parents in old age. However, if a family has too many children, it becomes difficult to invest in their health and education, which can lead to low income and prolonged poverty (Yakubu, 2021). This is known as a poverty-fertility trap (Aassve et al., 2006). When a family has more children, each member of the household has less access to resources. In addition, a mother's ability to work and be productive may be hindered by the demands of taking care of a newborn, which can make it harder for her to earn a living and provide for her family. Further, high fertility led household size can only increase poverty when the dependency ratio is high in the household – when you have younger household members (Bayudan-Dacuycuy & Lim, 2013). The risk of poverty in large households is influenced by the number of adults and children. More adults typically decrease the risk of poverty, while more children have the opposite effect due to a larger dependency ratio and fewer resources per capita (Kuepie & Hamadou, 2013).

In a study by Kamuzora & Mkanta (2000), poverty was less associated with households with large family size in Tanzania. Similarly, a study conducted in Nepal using data from the Nepal Living Standard Survey found that having more children had no adverse effects on household income or consumption (Libois & Somville, 2018). Similar results were found in the research by Cao et al. (2016), which revealed a negative correlation between family size and poverty vulnerability in China's southwest ethnic region. Despite conflicting empirical evidence, the neo-Malthusian premise remains unchallenged. As explained earlier, the different findings could be due to two potential explanations. Firstly, the individuals living in the household may not necessarily be younger, hence could be engaged in economic activities that contribute to the household income.

Second, in an agrarian society with vast agricultural land for cultivation, larger family size, particularly with mostly adults, may reduce poverty as more adult members will contribute to the family (Kamuzora & Mkanta, 2000; Meyer & Nishimwe-Niyimbanira, 2016). Unless in these scenarios, high fertility is expected to increase household size, and consequently reduces household's per capita income.

The total sample of households in the 2013 NDHS was 40,680, 16,740 and 23,940 from urban and rural areas respectively. Members of the households eligible for interview were men and women, age 15-49, who were permanent members or visitors present in the sampled households on the night before the survey. In the interview, 39,902 women and 18,229 men were identified as eligible for the interview. At the conclusion of the interview, 99% response rate was achieved in the sampled households, 98% and 95% of eligible women and men respectively were successfully interviewed.

In exploring the influence of micro determinants in achieving the MMR, U5MR, UNFP, and poverty targets of the SDGS, this study follows other previous studies reviewed and employ cross-sectional survey data from the 2013 NDHS (Grepin & Bharadwaj, 2015; Klaauw & Wang, 2011; Maitra & Pal, 2008; Sado et al., 2014; Uddin et al., 2016; Wang, 2003). The NDHS is conducted in five years interval. The 2013 NDHS is the current and fifth wave of the surveys, previous surveys were conducted in 1990, 1999, 2003, and 2008. The NDHS provides current information on population health and socioeconomic situation in Nigeria, particularly in the area of fertility preference, fertility rate, use of contraceptives, women and children nutritional status, adult and childhood mortality, educational levels, wealth, and other population characteristics.

### 3. Methodology

The study uses the national representative cross-sectional data from the 2013 National Demographic and Health Survey (NDHS). The NDHS is conducted after every 5 years starting from 1990 to capture the health, demographic, and socioeconomic characteristics of the population in the country (National Population Commission [Nigeria] and ICF International, 2014). The 2013 survey was the 5<sup>th</sup> wave. Considering that the survey is at country level, multi-stage sampling technique is generally being employed for the survey in order to cover every constituent and characteristics of the population. The 2013 survey interviewed a sample of 39, 902 and 18, 229 women and men respectively. 9,673 (24%) of the women interviewed are from the north-western region. This current study employed the data from the women survey since the study is on household size which is connected with fertility, and fertility is measured mostly in relation to women. Hence, to empirically analyzed the relationship between household size and poverty in the north-west Nigeria, the study used the sample of north-west women survey data from 2013 NDHS data.

Data were extracted from the survey on the dependent and independent variables, the

Wealth Index (WI), used as proxy for poverty, and number of household members which represents the household size, respectively. Other socioeconomic variables such as education, number of living children in the household, access to electricity and age of household head were used as controlled variables in the study. All the independent variables are categorical variables. The dependent variable, Wealth Index (WI), is dichotomized. The NDHS categorizes the Wealth Index into poor, poorer, middle, rich and richest. For convenience, the current study re-categorized the WI into poor (poor and poorer) and non-poor (middle, rich and richest). This therefore made it suitable for the logistic regression model to be used. When dependent variable is dichotomous, the suitable method to use is the logistic regression, using linear regression produces wrong estimates (Cameron & Trivedi, 2005; Czepiel, 2002; Greene, 2012; Rodriguez, 2007). This study therefore followed previous related studies such as Anyanwu (2014) and Yakubu (2021) to employ the use logistic regression.

The logistic regression model for data estimation is expressed in equation 1.

$$Pov_i = \alpha_0 + \sum \delta_{1i} (\lnhsz) + \sum \delta_{2i} (\lnlchild) + \sum \delta_{3i} (\lnelect) + \sum \delta_{4i} (\lneduct) + \sum \delta_{5i} (\lnagehh) + \mu_i \dots \dots \dots (1)$$

Where;

*Pov* = Wealth Index (WI)

*lnhsz* = Natural log of household size

*lnlchild* = Natural log of living children

*lnelect* = Natural log of access to electricity

*lneduct* = Natural log of education

*lnagehh* = Natural log of age of household head

*u* = Error term

$\delta_1, \delta_2, \delta_3, \delta_4, \delta_5$  are the coefficients of the independent variables, respectively.

$\alpha_0$  = the initial poverty level had there no change in the independent variables.

**4. Results and Discussion**

This section presents the results from the multivariate logistic regression estimation. Four separate models were estimated to take care of the collinearity between some the independent variables. Collinearity exists between number of living children and number of household members, as well as between men education and women

education. Estimating the collineated variables in a single model makes the model unstable and submerge or make the real separate effects of the collineated variables undetected (Munyaneza et al., 2014). In this regard, four separate models were developed, each to capture or include a collineated variable. The results of the estimated models are presented in table 1.

**Table 1:** Multivariate logistic regression results for the relationship between household size and household poverty in Northwestern Nigeria

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
Dependent variable	Poverty	Poverty	Poverty	Poverty
Independent variables	OR [95% C.I.]	OR [95% C.I.]	OR [95% C.I.]	OR [95% C.I.]
<b>Age of household head</b>				
Reference	1.00	1.00	1.00	1.00
≤30	0.89[0.70 - 1.13]***	0.91[0.70 - 1.19]***	0.76[0.61 - 0.94]**	0.80[0.64 - 1.004]**
>60	1.05[0.74 - 1.47]***	1.00[0.72 - 1.37]***	1.11[0.79 - 1.57]***	1.00[0.72 - 1.38]***
<b>Access to electricity</b>				
Reference	1.00	1.00	1.00	1.00
No electricity	11.27[7.68 - 16.53]*	11.18[7.72 - 16.20]*	11.05[7.55 - 16.18]*	10.99[7.61 - 15.88]*
<b>Number of household members</b>				
Reference	1.00	1.00		
6-10	1.22[0.99 - 1.51]***	1.12[0.88 - 1.41]***		
>10	1.30[0.96 - 1.75]***	1.16[0.90 - 1.51]***		
<b>Number of living children</b>				
Reference			1.00	1.00
<5			1.12[0.85 - 1.48]***	0.90[0.72 - 1.11]***
6-10			0.87[0.63 - 1.20]***	0.71[0.56 - 0.91]*
>10			0.40[0.19 - 0.81]**	0.27[0.13 - 0.56]*
<b>Men's education level</b>				
Reference	1.00		1.00	
Primary	0.57[0.43 - 0.75]*		0.57[0.43 - 0.75]*	
Secondary	0.18[0.12 - 0.26]*		0.17[0.11 - 0.25]*	
Higher	0.06[0.03 - 0.10]*		0.05[0.03 - 0.09]*	
<b>Women's education level</b>				
Reference		1.00		1.00
Primary		0.32[0.23 - 0.44]*		0.31[0.23 - 0.43]*
Secondary		0.08[0.05 - 0.13]*		0.07[0.04 - 0.12]*
Higher		0.02[0.009 - 0.06]*		0.02[0.008 - 0.06]*

Note: \*, \*\* and \*\*\* denote the significance at 1%, 5% and 10%, respectively. OR = Old Ratio, C.I = Confidence Interval





The multivariate regression results in table 1 reveal that household size (number of household members) in both model 1 and model 2 is significant and positively related to household poverty. Households with members of between 6 – 10 and > 10 are 22% (OR = 1.22) and 30% (OR = 1.30) more likely to be poor compared to households with members of 1 - 5. This implies that higher number of household population could be responsible for the poverty situation in the country, particularly the study area, the Northwestern Nigeria. This finding is corroborated by findings of some previous studies (Brück et al., 2010; Meyer & Nishimwe-Niyimbanira, 2016; Orbeta Jr, 2005). Generally, an increase in the number of household members without proportional increase in the household's earnings reduces the per head share of household's members in terms of consumption, educational training and healthcare. This erodes household income and consequently trap it in the vicious circle of poverty. However, a sparkling finding from table 1 is the effect of the number of living children. The result shows that as the number of children increases from < 5 to 6 – 10 and > 10, the likelihood of the household being poor reduces significantly. Expectedly, as the number of children increases, the per capita share of each child reduces. This is similar to the findings of Cao, Xu, Xie, Liu, & Liu (2016) and Libois & Somville (2014) from Nepal and Southwest China, where large family size was found not to have negative impact on household's income and to be associated with less poverty vulnerability, respectively. This is likely if members are not dependents, younger children, and contribute to the household's income. Similarly, large family size could be associated with less poverty in an agrarian society with available land for cultivation, which increases total productivity and income of the family (Kamuzora & Mkanta, 2000; Meyer & Nishimwe-Niyimbanira, 2016).

Other confounding variables in the study were found to have a significant relationship with household poverty. Age of household head of  $\leq 30$  was found to reduce the likelihood of poverty in the household compared to the reference age of between 31 and 60 in all the four models. The OR were all  $< 1$ . On the contrary, age of household head of  $> 60$  was found to increase the likelihood of poverty in the households compared to the reference age. This finding is expected because compared to the reference,  $\leq 30$  age is initial stage of parenthood with less household members and less family responsibility, which reduces the likelihood of being poor. On the other hand,  $> 60$  year increases extreme poverty because is mostly the retirement age, at which if no proper savings and investment, and retirement security, households with such head could be plunged into extreme poverty, unless if the children are employed and assisting the family. Education of both men and women at all levels were found to consistently and strongly reduce the likelihood of poverty in the households. As the level of education goes higher from primary to tertiary, the effect in reducing poverty in the household became more significant.

Generally, this study conforms with theory on the positive effect of household size on poverty (Crook, 1996), and empirically confirms the existence of such relationship in the north-west Nigeria. The reports from the National Bureau of Statistics (NBS) showing the north-west to have the largest population in the country, and the highest incidence and intensity of multidimensional poverty (National Bureau of Statistics (NBS) [Nigeria], 2021, 2022) has been empirically tested. The poverty endemism in the north generally, and north-west in particular cannot therefore be unconnected with the rising uncontrolled population in the region. The attendant effects of overblown population facing declining per capita share of resources such as poor education attendance, poor healthcare, and



employment are more pronounced and evident in the region (National Bureau of Statistics (NBS) [Nigeria], 2020, 2022). The outcome of this study is timely and pertinent as the country aims to make significant progress in the area of poverty reduction before the end of SDGs in 2030. Policy to reduce poverty particularly in the north should capture fertility control and adequate planning for expected population. Nigeria is projected to be the fourth largest population by 2050 with 375 million people (United Nations Department of Economic and Social Affairs [UNDESA], 2022).

### 5. Conclusion

Northwestern Nigeria has been reported to have the largest population in the country as well as the highest poverty incidence. This study explored the empirical relationship between household population and household poverty in the Northwestern Nigeria. The findings reveal that household population significantly increases the likelihood of poverty among the households. Policy makers therefore need to pay more attention to the booming population and how the adverse effect could be curtailed.

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