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What determines fertility among women in Nigeria? A disaggregated analysis using Poisson Regression

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Abstract

Nigeria continues to face rapid population growth and outburst due to rising rates of fertility. And With weak economic growth rate and rising unemployment, it becomes desirable for the country to seek for ways through which this rising rate of fertility could be cushioned. Hence, this study investigates the determinants of fertility in Nigeria. The study utilized data from the 2013 Nigeria Demographic and Health Survey (NDHS) by employing the Standard Poisson regression, and the Ordinary Least Squares for estimations. The result showed that maternal education, income, use of contraception, Access to health center, Place of Residence, age, and age at first Birth all had significant impact on fertility rate. Furthermore, the findings revealed that the determinants of fertility differed among geo-political zones. The study concludes by emphasizing the role of education, use of contraception, and enlightenment of women in cushioning the rise in fertility in the country. Further recommendations are also discussed.

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1. Introduction

A vital issue in the development plan of any nation is its human population, which is a strong determinant of the socioeconomic and political prosperity of a nation. However, if the growth rate of the population is not properly managed, it then poses a threat to the society. There are three major components of population change: the first is death rate, the second is migration, and the third fertility, which is often regarded as the most critical component of population change. This is because fertility determines the size and structure of a country's population (Chicoyo, 2014; Olatoregun et al., 2014); and simply indicates the number of children born alive (Oyefara, 2016). Increased fertility rate could be a problem in the absence of corresponding economic progress. Ushie et al. (2011) stated that rapid population growth in the absence of sustainable resources could constitute a significant problem in the society. Hence, controlling fertility rate has been a major priority across nations.

In recent time, there has been a significant change in fertility patterns within and among countries. According to the United Nations (2015), world total fertility now amounts to 2.5 children per woman. In developed nations, total fertility rate has substantially declined. However, in Africa, total fertility rate has remained high and has been a dominant feature in the Sub Saharan African region (Alabi, Olubosoye and Olasimi, 2017). And in Nigeria, the rate of fertility has remained substantially high. It also varies by place of residence and zones in the country. It is highest in the North West and remained lowest in the South South zone of the country. Izugbara and Ezeh (2019) states that compared to the rest of the country, the North has the highest rate of fertility and this could be because it has the lowest use of contraception. Also, women in urban areas have 4.7 children on the average compared to 6.2 children per women in rural areas according to the Nigeria Demographic and Health Survey (2013).

High fertility has remained one of the primary determinants of rapid population growth which has the tendency of hindering socioeconomic development. As a matter of fact, a demographic transition from high to low fertility rate is viewed as an important process of economic development (Adiri et al, 2010). Oyefara (2016), Lutz (2017) and Lee (2018) have argued that in developed countries where a considerable proportion of women participate in the labour force, total fertility and total population are considerably low. Lutz (2017) particularly notes that educated women are generally desirous of having fewer children and they tend to find effective ways of achieving this. This is because these women are more concerned with the quality of their children than their less educated counterparts. Also, educated women are usually aware of the health risk associated with having a large number of pregnancies and make efforts to limit the number in their own health interest.

Globally, there have been recent studies on fertility pattern among countries. A study by Chicoyo (2016) on the influence of socio-cultural factors on fertility in Morogoro district in Tanzania employing simple random sampling showed that the total fertility rate of the district was 6.1, with the figure been higher than the regional and national fertility rate. Further result showed that the mean number of children ever born increases monotonically with age. Also, highly religious respondents had higher number of children than less religious respondents. In Nigeria, Adiri et al. (2010) in their study of fertility patterns of men and women in three communities in Kaduna state, Nigeria found that age is a strong determinant of fertility in the communities. Olatoregun et al. (2014) also revealed that women with education beyond primary level have low fertility level. Furthermore, the study revealed that education, age at first marriage, marital status, urban-rural migration, wealth index and contraceptives use are main factors influencing high fertility rate in Ghana and Nigeria.

This study seeks to investigate the determinants of fertility in Nigeria using the Demographic and Health Survey (DHS) of the year 2013 for Nigeria. This is justified based on the premise that population explosion has negative consequence on the overall growth and development of any nation. The United Nations has projected that Nigeria's population will reach about 398 million by the end of the year 2050 (World Population Review, 2019). Hence, it becomes necessary to understand the determinants of fertility in order to provide policy options aimed at controlling population growth and avoiding an explosion which could have negative trickle-down effects such as a low-quality life, low income per capita, unemployment increase, and environmental degradation amongst others. Furthermore, because Nigeria is heterogeneous in terms of the population composition, the study adds value to extant literature by disaggregating the analysis into regions in order to understand region-specific determinants, in order to provide a robust policy option. The study is divided into six sections; introduction; methodology; presentation of results; discussions; policy recommendations; and the conclusion.

2. Data and Methodology

2.1 Data

The data utilized for the study comes from the Nigeria Demographic and Health Survey (NDHS) of 2013, a survey conducted every five years for monitoring and generating information on the population and health situation of the country. The NDHS provide up-to-date information on issues such as fertility level, marriage, family planning, maternal and child health, domestic violence, nutrition, malaria, HIV & AIDS, child mortality amongst other socio-economic variables. Implemented by the Nigerian National Population Commission, the NDHS represents a survey with a sample of 38,948 women within the age range of 15-49 in selected households. The survey provides information at the national level, six zones, urban and rural areas of the entire states in the country with the Federal Capital Territory (FCT). However, as it is consistent in fertility studies, 14,879 female observations within the age range of 25-49 were employed. This is because, assumptively, women between these ages are more likely to undertake their fertility decisions and who in principle at least have higher outcomes.

The foundation for the economic theory of fertility can be traced to Becker (1960). He opined that children can be viewed as durable goods which could yield returns in future. Among the major variables that could influence household fertility decisions are family income and female wages. In line with this, this study further makes use of variables frequently used in fertility studies. In our study we capture fertility by the number of living children per woman.

The woman's educational level is used with an apriori expectation of a negative relationship. It is assumed that as a woman seeks more education, she will trade it off with childbirth. In the survey, the variable is a categorical variable (0= no education, 1= primary education, 2= secondary education, 3= higher education). Family wealth (*income* as used in the analysis) which from theory is a major determinant of household fertility decision is measured using the wealth index, an index used in the survey to capture beyond income levels, all household properties. It is also a categorical variable with five strata (1= poorest, 2= poorer, 3= middle, 4= richer, 5= richest). But the expected relationship between family income and fertility is not a straightforward one. Since, children are perceived as goods, it is expected that as family income increases, the number of children increases, which is called the "income effect". However, according to Wang and Famoye (1997), family income can also have a negative substitution effect (price effect). This is because according to the Becker and Lewis's (1973)

quantity-quality approach, it is predicted that there is likely to be a tradeoff (substitution effect) from quantity to quality of children with rising family income. That households would prefer to go for quality (which is relative expensive to produce) rather than quantity, which in turn reduces fertility.

We also include variables such as the woman's desire for more children (fertility preference). The variable is measured as; 1 if the woman wants a child within two years, 2 if she wants after 2+ years, 3 if she wants but unsure of timing, 4 undecided, 5 if she wants no more, 6 if she is sterilized, and 7 declared infecund. We expect that this variable should be significant, with the intuition that women have a greater role in wanting to have and keeping pregnancies.

Other covariates include the husband/spouse educational status which is measured the same way as that of the woman, and his age. Also, the woman's age is also factored in with the assumption that the higher her age, the higher the likelihood of fertility. But because we expect this relationship to be negative at certain limit, we include a squared term for age whose sign we expect to be same with that of another covariate, age at first birth, which is consistent in fertility analysis. Because when a woman begins to produce children at an earlier age, the more likely she would have more children than when she does so at a later age. Those using contraception are measured as 1, and 0 for those who do not. Access to Health Center is proxied by number of antenatal care visits, which is a count variable. Those who had access to the media (specifically television) at least once a week are coded as 2, those who access less than once a week were coded 1, and those who did not at 0. Urban residents are coded 1, while Rural residents are coded 0.

2.2 Methodology

The standard poisson regression is employed to estimate the determinants of fertility in Nigeria. The choice of the Poisson approach is because fertility which is represented by the number of children living in a family is a count variable in which the Poisson regression estimates are consistent and efficient under certain assumptions. According to Woodridge (2010), "count variables are variables that take on the form of non-negative integer values, where there are no upper bounds meaning the variables are strictly positive." This makes the use of the poisson regression more appropriate than the usual Ordinary Least Square (OLS) approach because the Poisson approach assumes positive values for the regressand. The standard Poisson with robust standard errors can account for problems that arise with count data and gives efficient and consistent estimates. Hence in this study, we make use of the standard Poisson regression technique because of its consistency and efficiency, and the OLS as a check of robustness with emphasis of the signs of the regressors.

Our basic Poisson model can be represented as:

$$Pr(Y = y) = \frac{e^{-\mu}\mu^{y}}{y!}, \qquad y = 0, 1, 2, \ldots \tag{1a}$$

Where Y is the count (Children) which is presumed to follow a Poisson distribution. The regression model, which is log-linear, is specified as:

$$\mu_i = E(Y_i|X_i) = exp\left(\beta^T Xi\right) \tag{1b}$$

Where X_i is vector of covariates and β is an unknown vector of regression coefficients

And, finally, the OLS model is specified as

$$Y = X_i'\beta \quad (2)$$

Where X_i is vector of covariates and β is an unknown vector of regression coefficients

3. Presentation and Discussion of Results

This section begins with the descriptive statistics for selected variables in the model. For the dependent variable, which is the number of children, the mean score is about 2.55. Further descriptive statistics show that the rate of fertility differs slightly amongst income groups, education and region. Fertility for the poorest stood at 3.30, the poorer 2.87, middle 2.62, richer 2.31 and the richest 1.86. At the maternal educational level, the mean score of fertility for those with no education is 3.46, for primary education is 3.37, secondary education 1.52 and those with higher education is 1.57. Furthermore, at the zonal level, the North Central zone has a mean score of 2.31, North East 2.92, North West 3.07, South East 2.16, South South 2.20 and the South West 2.16. As for the place of residence, the mean score of fertility for those dwelling in urban area is 2.19 and those in the rural area is 2.78. The mean score for other important variables in the model such as *income* is 3.12, *age at first birth* 19.37 with its minimum value as 12 which is suggestive present of child and early marriages and *age* 28.86.

The descriptive statistics results reveal that the most women in the sample had no education, and primary education. Also, it further shows that most families in the sample were at the middle-income cadre. The age at first birth which could give an insight into the time of marriage shows that most women in the sample give birth relatively early, and the average age of women in the sample are under thirty.

Table 3.1 Estimates of Poisson Regression, and the OLS

	Poisson	OLS
Maternal Education	-0.0957***	-0.290***
	(0.00513)	(0.0179)
Income	0.0553***	0.172***
	(0.00408)	(0.0148)
Use of Contraception	-0.0145	-0.0998**
	(0.00913)	(0.0313)
Access to Health Center	-0.00120***	-0.00439***
	(0.000223)	(0.000730)
Residence	-0.0307***	-0.0607*
	(0.00879)	(0.0309)
Media	0	0
Less than Once a Week	-0.00753	-0.0337
	(0.0107)	(0.0383)
At least Once a Week	-0.0565***	-0.193***
	(0.0106)	(0.0377)
Fertility Preference	0.0628***	0.249***
	(0.00221)	(0.00894)
Age at First Birth	-0.0222***	-0.124***
	(0.000729)	(0.00265)
Age	0.559***	1.672***
	(0.00825)	(0.0338)
Age-squared	-0.000763***	-0.00122***
	(0.0000248)	(0.000108)
Paternal Education	0.0118***	0.0361**
	(0.00325)	(0.0119)
R^2		0.901
AIC	56312.8	53110.2
BIC	56404.0	53201.5
F		10041.1
Pearson goodness-of-fit	9816.363	
N	14818	14818

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's computation.

Table 1 shows the estimate for the Poisson regression, and the non-linear OLS. Our result shows the same pattern or trend in the output. The signs of the variables are the same across both techniques. We make our inferences using the modified Poisson regression because it uses the robust error estimate to deal with the possibility of variance underestimation or overestimation in correlated data analysis with the *vce(robust)* option on STATA. The Poisson regression also accounted for the likelihood of under or over dispersion. The Pearson goodness-of-fit statistic is not significant, showing the model is properly specified and void of misspecification problems.

We present the results of the study in terms of percentage change in odds/expected counts and Incidence Rate Ratio (IRR) which are the exponents of the coefficient (these are available in the appendix). First, all other variables *maternal education, income, place of residence, access to a health center, access to media, fertility preference, age, age at first birth, age square*, and *paternal education* were all significant at less than 1% ($p < 0.01$) with the exception of the use of contraception which was significant only at 10 percent level of significance. All other factors held constant, for an increase in the educational level of the woman, her fertility rate will reduce by a percent change in the odds/expected count of 9.6% with an IRR of 0.9087467. For increase in family wealth (income) fertility will increase by odds/expected count of 5.5% with an IRR of 1.056835. The higher the woman's age at first birth, the more her fertility rate will reduce by 2.2% with an IRR of .9780115. Furthermore, the result for age shows that for an increase in the age of the woman her fertility rate increases by odds or expected counts of 55.9% with an IRR of 1.749672 but will be diminishing at -2.2% with an IRR of .9992374 (since age square is negative). Those resident in urban areas have a reduced fertility rate of -3.1% with an IRR of .9697887 compared to those on rural areas. Those women who used contraceptives also have a reduced fertility rate of -1.5% with an IRR of .9856294 compared to those who did not. Furthermore, those who had access to the media at once a week have a reduced fertility rate of -5.6% with an IRR of .9450943 compared to those who did not have access and those did less than once a week. Other significant variables include fertility preference and paternal education.

Table 2 shows the estimate for fertility by zones. The country is made up six zones with similar but differentiated cultural background, which is the motivation for conducting a regional analysis. Conducting the regional analysis is very important in order to make more efficient recommendations and conclusions. The regions include the North Central, North East, North West, South East, South South and the South West. The results show that the relationship between fertility and variables; *maternal education, income, age, fertility preference, age at first birth and age square* are the same across all region. However, *paternal education* shows a significant and negative relationship with fertility in the North West, South South and South West regions, but shows an insignificant relationship in the other regions. The *use of contraception* showed a negative and significant relationship with fertility in the North West, a positive and significant relationship in the South East and South West, and an insignificant relationship in other regions. *Access to Health Centers* proxied by antenatal care visits showed a positive and significant relationship with fertility rate in the North West, a negative and significant relationship in the South South, and insignificant relationship in the other regions. Also, in the North East and North West regions, there were no residential differentials between urban residents in fertility. However, in the North Central, South South and South West, urban residents were likely to have a lower fertility compared to those in the rural areas, while in the South East, urban residents are likely to have higher fertility rate than rural residents. With the exception of the North Central region, there was no significant relationship between media exposure and fertility rate in other regions. However, in the North Central, the result shows that those who had access to the media were likely to have a reduced fertility rate than those who did not.

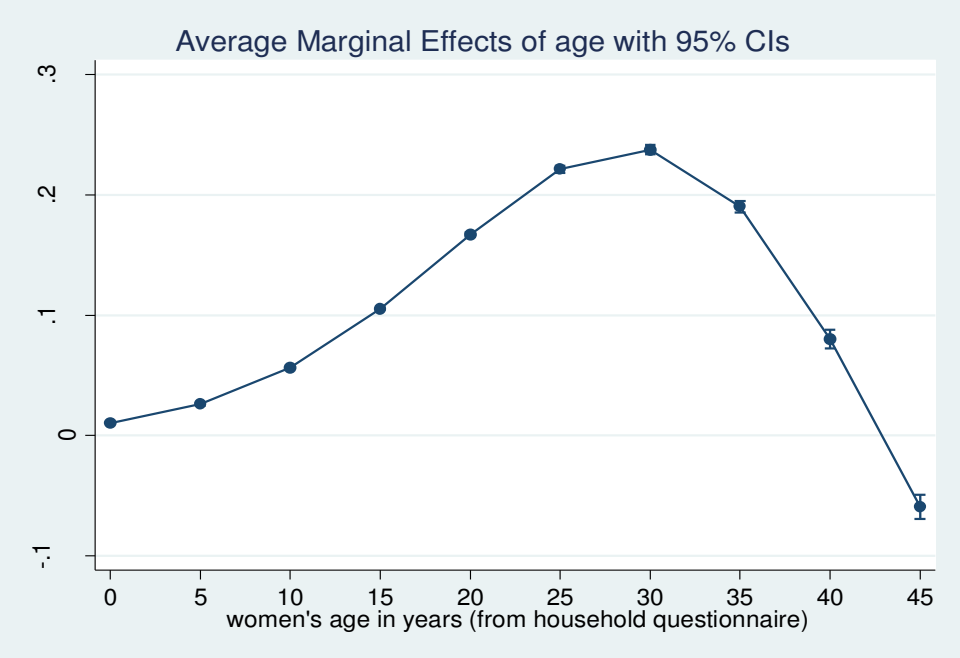
Table 2: Determinants of Fertility by Zones

	North Central	North East	North West	South East	South South	South West
Maternal Education	-0.0859***	-0.0817***	-0.0442***	-0.0180*	-0.0446***	-0.0620***
	(0.0103)	(0.0112)	(0.0110)	(0.0195)	(0.0143)	(0.0122)
Income	0.0602 ***	0.0783***	0.08101***	-0.0391***	-0.0420***	-0.0802***
	(0.0096)	(0.0095)	(0.0073)	(0.0124)	(0.0196)	(0.0118)
Use of Contraception	0.0282	-0.0062	-0.1088***	0.1021***	-0.0022	0.0311*
	(.01970)	(0.0332)	(0.0307)	(0.0233)	(0.0196)	(0.0152)
Access to Health Center	-0.0008	0.0010	0.0011*	0.0003	-0.0012***	0.0005
	(0.0063)	(0.0005)	(0.0005)	(0.0006)	(0.0003)	(0.0005)
Residence	-0.0937***	-0.0051	-0.0321	0.1337***	-0.0410*	-0.1656***
	(0.0212)	(0.0240)	(0.0184)	(0.0197)	(0.0210)	(0.0217)
Media						
Less than Once a Week	-0.0077	-0.0494	0.0381	-0.0088	0.362	-0.0089
	(-0.0228)	(0.0256)	(0.0197)	(0.0314)	(0.0272)	(0.0270)
At least Once a Week	-0.0552**	-0.0181	-0.0203	-0.0335	0.0269	-0.0256
	(0.0213)	(0.0286)	(0.0217)	(0.0313)	(0.0251)	(0.0270)
Fertility Preference	-0.0865***	-0.0487***	-0.0339***	-0.1082***	-0.1054***	-0.115***
	(0.0056)	(0.0052)	(0.0040)	(0.0075)	(0.0062)	(0.0057)
Age at First Birth	0.0254***	0.0143***	-0.0151***	-0.0305***	-0.0260***	-0.0241***
	(0.0017)	(0.0016)	(0.0014)	(0.0024)	(0.0019)	(0.0019)
Age	-0.5060***	0.489***	0.5100***	-0.4724***	-0.4450***	-0.4390***
	(0.0206)	(0.0191)	(0.0156)	(0.0266)	(0.0237)	(0.0219)
Age-squared	-0.0064***	-0.0005***	-0.0006***	-0.0005***	-0.0005***	0.0001***
	(0.0019)	(0.0001)	(0.00005)	(0.0001)	(0.0001)	(0.0001)
Paternal Education	-0.0135	0.0118	-0.0125**	0.0065	-0.0267***	-0.0327***
	(0.0082)	(0.0071)	(0.0048)	(0.0117)	(0.0092)	(0.0098)
N	2321	2758	4,356	1374	1804	2205

Source: Author's computation. Note: Standard errors in parentheses.

As an additional analysis, the study progresses to testing the long run relationship between fertility and maternal age in Nigeria employing the average marginal effect graph. Figure 1 is a graphical representation of the relationship between fertility and maternal age in marginal terms. From the diagram, it is visible that fertility at the early stage increases as age increases but begins to fall at the latter part of the woman fertile ages. It further shows that the peak of fertility in the country is at the 25-30 age brackets, and then it begins to decline. This is reasonable because it is at this age bracket many women in the country tend to marry. The graph affirms the significance of including the square of age in our analysis to see the accurate relationship between the fertility and age as the latter increases.

Figure 1: Long Run Relationship between Fertility and Maternal Age.



Source: Authors' computation.

4. Discussion

The need to ensure birth control and reduce overpopulation in the country is highly desirable due to dwindling economic fortunes as a result of revenue drops in the country's mainstay, crude oil. The fall in revenues from the resource has led to low Gross Domestic Product (GDP) and fall in general welfare due to population growth outpacing GDP growth. Hence, it became imperative to conduct this study in order to unveil the determinants of fertility in the country so that policy makers can possess a tool for policy formulation and implementation.

We find that the country analysis of the determinants of fertility conforms to the neoclassical theory of fertility. Increase in educational attainment of the woman and household income reduces fertility. This may be so because for the woman, acquiring higher level of education without having to bear the stress of schooling and fulfilling domestic duties will require her substituting marriage at an earlier age for study, hence leading to reduction in the number of children she may give birth to in a life time. Furthermore, the woman's desire to have children showed a significant relationship with fertility. This reveal that the role of the woman pertaining birth cannot be underplayed, meaning they exert influence in the fertility

decisions of the households. The use of contraception is also seen to reduce fertility significantly. With the use of contraception, individuals will be able to determine how many children they want to have, and prevent unwanted pregnancies, and also to help in spacing of births. The use of contraception is not just important for fertility reductions but also the health of women and children for example through reducing abortions (Stover & Winfrey, 2017). Those women who had access to health centers during pregnancy, that is, antenatal care visits, and those who had access to the mass media were likely to have reduced fertility. This relationship between access to health center through antenatal care seeking and fertility is possible especially as accessing antenatal care services goes beyond just the current pregnancy to also counseling services concerning reproductive health which is inclusive of family planning. With information campaigns and enlightenment on reproductive health and family planning, the relationship between access to the mass media and fertility is plausible.

Also, urban resident had low fertility rate compared to the rural residents. This we argue may be due to access to more family planning services, high educational attainment, late marriages compared to those in rural areas and more access to the mass media. From the results of the regional or disaggregated analysis, we see slightly conflicting results for certain variables, and also, there are slight variations in the magnitude of the coefficients of key variables such as maternal education, use of contraception, place of residence, access to the mass media, and the maternal age at first birth which is an indicator of early marriages. This we suspect may be due to the culture, religion and tradition of the major ethnic groups in the zones. The findings from this are study is similar to the study of Nelago & Lillian (2012), Dawit (2015) and Murigi (2016).

Finally, some variables used in the study are very important for policy, because of their causal effects on fertility in the country. These include variables such as maternal education, use of contraception, access to the media, access to health center and age at first birth which our result show that increases in them reduce fertility significantly in the study area. These estimates are deemed causal because for example, in the case of maternal education, a bias may have been obtainable as a result of factors such as school-living age reforms, gender preferences, and school sizes based on the number of students etcetera. However, in the country's educational policy none of these variables are captured which may exogenously affect the effect of maternal education on fertility in the country, and also, from other simulations although not reported, the first education reform which took place in the mid-1980s had no significant on maternal education. Furthermore, although there is a legislation stipulating that the earliest age for a female to marry is eighteen, however such legislation is rather ineffective due to the need for states to include them in their domestic laws and implement them. This is visible as the result of the summary statistics show that some women's first age of birth was twelve, as also majority of the women in the sample were between the ages of fourteen to eighteen (although it was not reported).

5. Policy Recommendations

One of the major way's fertility has and is being controlled is using contraception. Hence, we highly recommend a robust family planning policy, such as would command a high coverage and acceptability in the country, with all actors actively involved in its implementation. These contraceptives should be made cheaper and accessible to all. Furthermore, we further recommend that since pregnant women are likely to access health centers during pregnancy, and through the mass media, educating the households through information campaigns on family planning should be increased at these levels. Worthy of attention also is that, for government and policy makers to formulate and implement birth control policies, the

education and enlightenment of women cannot be underscored. The government and other parties involved should give high priority towards the education of the girl-child which would be of help them in making rational decisions. We also recommend that school-leaving age reforms be undertaken, and the educational policy be revisited and improved upon, so that for instance the number of years of educational attainment or schooling be increased in order to cushion the scourge of child marriages in the country. The Government, Civil Society and Non-governmental Organizations should prioritize and take the gospel of reproductive health to educational institutions at all levels in the country. Also, we recommend that the peculiarities of each region in the country should be taken into consideration since our results shows this to be significant. Again, state governments in the country should be pressured to include the federal governments Child Rights Act into their laws in order to reduce the scourge of early marriages in the country. Birth control measures should be put in place especially through legislations and the media should be engaged in terms of disseminating information to the populace. In conclusion, since the NDHS is done periodically, we recommend that follow up analysis should be conducted in order to ascertain how fertility decisions changes with respect to changes in time.

6. Conclusion

The study sought to unravel the determinants of fertility in Nigeria where empirical analysis on it are scarce. The variables used were mostly variables that have been used in fertility theories and studies. In order to ensure a high degree of accuracy, consistency and efficiency in the analysis, the study employed estimation techniques such as the Standard Poisson regression and the OLS technique. Among these, the Poisson regression was used as the choice technique for the study since it was more consistent and efficient. The results from the findings generally conformed to the theory of fertility. Women's education, use of contraception, access to health centers and, access to the media, age at first birth and family income were strong determinants of fertility in the country. However, we suggest further studies that can take into account the effects of diver's kinds of occupation, the heterogeneous effect of ethnicity on fertility in the country.

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APPENDIX

Appendix A1: Descriptive Statistics (Overall)

Variables	Mean	Standard Deviation	Observations
Children	2.5456	2.4642	38948
Maternal Education	1.2069	1.0293	38948
Income	3.1153	1.3912	38948
Age at First Birth	19.3663	4.3647	27451
Age	28.8618	9.6857	38948

Source: Author's computation.

Appendix A2: Descriptive Statistics for Number of Children (Across Zones)

	Mean	Standard Deviation
North Central	2.3067	2.3028
North East	2.9238	2.6089
North West	3.0704	2.5805
South East	2.1641	2.4789
South South	2.1966	2.4008
South West	2.1587	2.0746

Source: Author's computation.

Appendix A3: Descriptive Statistics for Number of Children by Income Category

	Mean	Standard Deviation
Poorest	3.2951	2.5529

Poorer	2.8675	2.5076
Middle	2.6241	2.5531
Richer	2.3136	2.4149
Richest	1.8257	2.0577

Source: Author's computation.

Appendix A4: Descriptive Statistics for Number of Children by Maternal Education

	Mean	Standard Deviation
No Education	3.4571	2.5377
Primary Education	3.3711	2.4772
Secondary Education	1.5189	1.9762
Higher Education	1.5726	1.8922

Source: Author's computation.

Appendix A5: Descriptive Statistics for maternal age at first birth

Variable	Mean	Min	Max
Age at first birth	19.36629	12	45

Appendix A6: Descriptive Statistics for Number of Children by Place of Residence

	Mean	Standard Deviation
Urban	2.1873	2.3664
Rural	2.7836	2.4989

Source: Author's computation.

Appendix A7: Poisson Regression with Incidence Rate Ratio (IRR)

	IRR	Robust Standard Error	z statistic
Maternal Education	0.9254	0.0045	-15.85***
Income	1.0793	0.0040	20.50***
Use of Contraception	1.0079	0.0086	-0.87
Health Access	0.9993	0.0002	-3.04***
Residence	1.3081	0.0082	42.79***
Media			
Less than once a week	1.0112	0.0102	1.11
At least once a week	0.9829	0.0099	-1.70*
Age at First Birth	0.9669	0.0007	-45.15***
Age	1.4650	0.0134	41.84***
Fertility Preference	1.0542	0.0022	2481***
Age Square	0.9996	0.0000	-12.08***
Paternal Education	1.0002	0.0031	0.93
N	14,818		

Source: Author's computation.

Note: *** denotes statistical significance at 1%. Pseudo R^2: 0.1766. Log Pseudolikelihood: -44141.656.