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# Regional Differences in Adolescent Childbearing in Nigeria

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## Abstract

*Nigeria's total fertility rate (TFR) and adolescent first birth rate are among the highest worldwide, but variation exists by region. Unfortunately, data to monitor the level of adolescent first births is still scarce in Nigeria. This study examines regional differences in the level of adolescent first birth among women ages 20-49 years (n=23,801) in Nigeria. Data were analyzed using Chi-square and Cox proportional hazard models (a=0.05). Mean age at first birth was lower in the regions of higher TFR, among less educated and poorer women. In the South East, as for other regions in Nigeria, the mean children ever born was 6.13±2.8, 5.18±2.8, 4.1±2.4 and 2.97±1.9 for women who had their first birth at ages <15, 15-19, 20-24 and ≥25 respectively. The adolescent first birth was highest in the North West (74.8%, TFR=6.7) and lowest in the South West (32.1%, TFR=4.6). The hazard-ratio of beginning first birth was 1.58 (CI=1.46-1.70), 2.87 (CI=2.68-3.07), 3.43 (CI=3.23-3.67) and 1.74 (CI=1.61-1.88) higher in the North Central, North East, North West and South South, respectively, than the South West. Regional differences exist in adolescent first birth in Nigeria and TFR was higher in the regions where adolescent first birth was prevalent. Improving women's education, particularly in the core northern regions, can raise the age at first birth in Nigeria.*

## Keywords

*First birth timing; adolescent; childbearing; total fertility rate; Nigeria*

## Introduction

Demographers consider first birth to be the first child born alive to a woman. A woman's first birth is often one of the most important events in her life, as she adopts the roles and responsibilities of a mother, often to the detriment of her socioeconomic advancement. Rindfuss and St. John (1983) observed that the earlier the commencement of these roles and responsibilities, the lesser the likelihood that alternatives be taken and the greater the expected quantity and pace of subsequent childbearing. Age at first birth is an important determinant of the overall level of fertility at the family and national level, which has implications for the health and welfare of the mother and child. It is also a useful yardstick for assessing the level of success of family planning programs, particularly those that target maternal mortality reduction, increasing the contraceptive prevalence rate, delaying age at first marriage and improving child health.

Adolescence is a significant developmental period in a human's life. Adolescent childbearing, therefore, remains a public health problem worldwide. The adolescent period is a stage of

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rapid physical and mental growth, characterized by high risk for early pregnancy-related events, like unwanted sexual activity and forced marriage. Socio-epidemiological problems like sexual violence, incest and rape are troubling social problems worldwide and, troublingly, adolescent women are often victims. Adolescents constitute a higher percentage of pregnant women admitted to hospitals and clinics, and they disproportionately account for high rates of maternal and perinatal mortality in some developing countries. Evidence has shown that adolescent mothers are more likely than older mothers to have children with behavioral and health problems, academic difficulties, developmental delays (Alam, 2000; Olausson, Cnattingius & Haglund, 1999) and mild mental retardation (Tawiah, 2002). To some extent, adolescent mothers are at higher risk of impairing their health and that of their children, which at times results in death (The Alan Guttmacher Institute, 2005). Other consequences of adolescent childbearing included high school dropout, low self-esteem, low job prospects and lower productivity (The Alan Guttmacher Institute, 2005).

Many factors, particularly religion, are associated with age at first birth in Nigeria. Religion has comprehensive structures that control people's spiritual, political and social ways of life. Of Nigeria's over 140 million citizens in 2006, the majority were identified as either Muslim or Christian (National Population Commission of Nigeria, 2006). Family, marriage and sexual intercourse are fundamental to Islamic and Christian societies because of procreation. Religious law for both groups states that sex is only permitted within marriage. Premarital sex, however, is still common among some Muslims and Christians (Palamuleni & Adebowale, 2014). While the two religious groups support procreation, contraception may be used within marriage for the purpose of exercising responsible parenthood, enhancing marital love and protecting women's health. In earlier times, Muslims and Christians believed that any form of contraception violates God's intentions (Poston, 2005). This among other factors facilitated high fertility in Africa in the 1970s, as marriage began early and thus enhanced adolescent childbearing. However, modernization and tighter economy makes limiting family size a necessity in contemporary times. Religion has been found to be one of the principal influences on the decision to use contraception in Nigeria (Adebowale, Adeoye & Palamuleni, 2013). Despite some similarities in contraceptive use acceptance among religious groups, variation exists according to religious denominations, with persistently higher contraceptive prevalence rates among Christian women than among Muslim women in Nigeria (Adebowale, Adeoye & Palamuleni, 2013; National Population Commission of Nigeria & ICF International, 2009/2014).

The connection between adolescent childbearing and overall fertility is yet to be fully studied in developing countries. More attention has been given to age at first marriage as a key determinant of fertility simply because of the assumption that childbearing only occurs within marriage. The assumption might be true in most traditional societies, where premarital childbearing and premarital sexual debut were not accepted for marriage. However, in the modern world where a significant number of children are born out of marriage, this assumption may not be tenable. In the past three decades, various scholars have studied the determinants of fertility levels in Nigeria (Adedokun, 1999; Caldwell, Orubuloye & Caldwell, 1992; Ebigbola, 2000; Isiugo-Abanihe, 1994; Oyefara, 2011a). But examining the pattern of first-time birth during the adolescent period has not been well-documented in Nigeria sub-regions. This study therefore explores regional differences in adolescent childbearing in Nigeria and provides information on whether the level of adolescent first birth is greater in higher fertility regions in Nigeria.

Regional differentials in adolescent childbearing will provide information to program planners and policymakers attempting to integrate population variables into health-related

developmental issues. The current study will also identify high-risk groups with respect to timing of adolescent first birth for the purpose of hypothesis formulation for intervention studies. Also, timely information on adolescent childbearing rate in a society like Nigeria where there are sociocultural diversities could inform evidence-based intervention programs to influence reproductive health policies. Unfortunately, there is a dearth of information on regional differentials in adolescent childbearing particularly among girls who stand a greater risk and eventual dropout of school.

## Background

High rates of adolescent fertility have been of particular concern in many countries (Haub, 2013). About 16 million adolescent women give birth each year, which accounts for about 11% of all births worldwide. Ninety-five percent of these births occur in low- and middle-income countries. The average adolescent birth rate in middle-income countries is more than twice as high as that in high-income countries, with the rate in low-income countries being five times as high (World Health Organization (WHO), n.d.). The proportion of births during adolescence is about 2% in China, 18% in Latin America and the Caribbean, and more than 50% in sub-Saharan Africa. Half of all adolescent births occur in just seven countries: Bangladesh, Brazil, the Democratic Republic of the Congo, Ethiopia, India, Nigeria and the United States. In low- and middle-income countries, almost 10% of girls become mothers by age 16, with the highest rates in sub-Saharan Africa and South Central and Southeastern Asia (WHO, n.d.).

In the 1970s, about one third of all fertility in Africa was credited to adolescent mothers (Gyepi-Garbrah, 1985). Recent evidence shows that the overall level of adolescent fertility in African sub-regions is relatively high compared to the advanced nations (Population Reference Bureau, 2015). Even though the total fertility rate (TFR), defined as the number of children to which a woman will give birth if she experiences the prevailing age-specific fertility rate throughout her reproductive years, is declining in Nigeria (5.7 births per woman in 2003 and 2008; 5.5 births in 2013), adolescent childbearing remains a problem. Twenty-three percent of women ages 15-19 have already begun childbearing and about one third (32%) of women ages 20-49 have had a birth by age 18 (National Population Commission of Nigeria & ICF International, 2014). The report shows that 49% of women have become mothers by the age of 20.

Fertility levels and patterns vary among adolescents worldwide, particularly with respect to their socioeconomic characteristics like marital status, place of residence, educational level and timing of first marriage. In sub-Saharan Africa, studies have established that adolescents living in rural areas have a higher fertility rate than their urban counterparts, while fertility is lower among more educated adolescents (Njau & Lema, 1988; Oyefara, 2011b).

Age at first birth is of interest to both researchers and the public. It has a substantial impact on the total number of births that a woman might have in her life, which may influence the size, composition and future growth of the population (Mathews & Hamilton, 2009). This has a subsequent effect on maternal and child morbidity and mortality. According to the Nigeria Demographic and Health Survey (NDHS) 2013, the age at which childbearing begins can also have a major impact on the health and well-being of both the mother and the child (National Population Commission of Nigeria & ICF International, 2014). As a result, understanding the age at first child cannot be overemphasized especially in developing countries where TFR is

still high. This is because adolescent fertility contributes considerably to TFR and one of the major factors determining adolescent fertility is early age at marriage and childbearing (Ihejiamaizu, 2001). Early childbearing exposes adolescent women to unnecessary risks, reduces the likelihood of advancing her education, reduce her quality of life and limits her opportunities for training and employment (Spence, 2008; Westoff, 2003). In a traditional setting like Nigeria, adolescent women who have their first birth out of wedlock may be abandoned by their relatives and left with the task of providing all the needs of their child. This in some cases may lead to prostitution, repeated illegal abortion and death (Mashalaba, 1989; Meekers, 1990; Njau & Lema, 1988). Other consequences of adolescent childbearing include its effect on population levels and growth, especially in populations that appear to be governed largely by natural fertility (National Research Council, 1993).

Despite the adverse effects of early childbearing, previous studies have documented some benefits. For instance, an international collaborative study on breast cancer and reproductive experiences of women in seven areas of the world revealed a striking relationship between age at first birth and breast cancer risk (MacMahon et al., 1970). The risk was observed in all the locations where the study was conducted. It was found that women having their first child before the age of 18 have about one third the breast cancer risk of those whose first birth is delayed until the age of 35 or older (MacMahon et al., 1970). Also, using data from the National Longitudinal Survey of mature women, Spence (2008) found late childbearing to be significantly associated with more depressive symptoms.

The causes of declining or rising adolescent fertility vary widely among countries because the trend varies sharply across regions. However, increasing the age at childbearing is a key factor in lowering both fertility and high population growth in impoverished regions (United Nations Population Division, 2011). Reducing the high levels of fertility in developing countries is one of the UN's Millennium Development Goals.

It should be noted that just as fertility decline is due in part to delayed childbearing among younger and adolescent women, lower fertility preferences might also reduce the pressure for women to start childbearing at a young age in order to meet their family size goals (Gupta & Mahy, 2003). For instance, in places where births outside of marriage are socially unacceptable, delayed marriage plays a significant role in fertility decline. But social norms, and expectations that girls will marry young, can also encourage early marriage and childbearing.

Studies from developing countries have shown a strong association between women's education and reduced childbearing (Ainsworth 1994; Gupta & Mahy, 2003; Martin & Juarez 1995). Enrolling and ensuring that girls stay in school delays marriage and childbearing. The literature also shows that as women receive more education, their desired number of children declines (Haub, 2013; Lappergård & Rønsen, 2005; Rindfuss & St. John, 1983). A study among the Tanzanian women reported that the education of a woman plays one of the greatest roles in influencing age at first birth in Tanzania (Ngalinda, 1998). Other factors documented in the literature as determinants of age at first birth include place of residence, contraceptive use, labor force participation, wealth, race and religion (Mott, Fondell, Hu, Kowaleski-Jones & Menaghan, 1996; Ngalinda 1998; Teachman & Schollaert, 1991; West, 1987).

Religion is a factor that has gained wide attention in the literature because of its influences on social and health issues like age at first birth, contraceptive use and fertility. This cannot be over-emphasized. The national surveys conducted in Nigeria have consistently reported higher age at first birth among Christians than among Muslims (National Population

Commission of Nigeria & ICF International, 2009/2014). Religion was identified as one of the most significant factors affecting age at first birth which in turn has an implication on fertility (Agadjanian & Yabiku, 2014; Fagbamigbe & Idemudia, 2016; Nahar & Zahangir, 2013). In three selected countries from east Africa, differences in adolescent first births across religious groups had been established (Neal, Chandra-Mouli & Chou, 2015).

## Research Methodology

### *Study Area*

Nigeria's population is about 180 million with a national growth rate estimated at 3.2% per annum year (Population Reference Bureau, 2015). With this population, Nigeria is the most populous nation in Africa, and the seventh most populous country in the world (Population Reference Bureau, 2013). Nigeria's population pyramid has a broad base, an indication of a young population. Adolescents, broadly defined as the young population ages 10-19, are a vital population segment making up approximately 32% of the total population of Nigeria, with 15.8% being female (National Population Commission of Nigeria, 2006). The three major ethnic groups in Nigeria are Hausa, Yoruba and Igbo. Presently, Nigeria is comprised of 36 states and a Federal Capital Territory, grouped into six regions: North Central, North East, North West, South East, South South and South West. The regions in Nigeria are homogenous in ethnic composition except the North Central. The North Central is comprised of heterogeneous ethnic diversities with Hausa/Fulani, Yoruba and others. TFR varies across these regions. The people in the Northern region are predominantly Muslim while Christians dominate the South.

### *Study Design and Data Collection Procedure*

The study utilized a cross-sectional design and secondary data, the 2013 Nigeria Demographic Health Survey (NDHS). The survey covered the entire population residing in non-institutional dwelling units in the country.

The National Demographic Survey used the list of enumeration areas (EAs) prepared for the 2006 Population Census of the Federal Republic of Nigeria as a sampling frame. The primary sampling unit, referred to as a cluster in the 2013 NDHS, was defined on the basis of EAs from the 2006 EA census frame. The sample was selected using a stratified three-stage cluster design consisting of 904 clusters, 372 in urban areas and 532 in rural areas. A representative sample of 40,680 households was selected for the survey and a minimum target of 943 completed interviews per state. In this study, women who did not provide information on any of the variables used in the study, particularly where information on age at first birth was missing, were excluded. Further excluded from the original sample were women who had never had sexual intercourse and those younger than 20. The exclusion of women younger than 20 was because the women are adolescents and as such, the adolescent first birth status of some of them is yet to be known. They might have their first birth as an adolescent or otherwise. Therefore, the final sample used for this study was 23,801 with the distribution into regions as follows: North Central (3,510), North East (4,414), North West (6,776), South East (2,239), South South (3,246) and South West (3,616). The distribution reflects the regional population proportion of women ages 20-49 in Nigeria.

### *Variable Description*

The dependent variable is age of the woman at first birth. This is also categorized into three groups: <15 years, 15-19 years and ≥20 years. The key independent variable of interest is region while others includes wealth quintile, highest level of education, religion, place of residence, religion and ethnicity.

### *Methods of Analysis*

Data were analyzed at bivariate and multivariate levels using Chi-square and Cox proportional hazard model. The Chi-square was used to examine the association between age at first birth (<15 years, 15-19 years and ≥20 years) and the independent variable in each of the six regions in Nigeria at 5.0% level of significance. At the multivariate level of the analysis, a Cox proportional hazard model was used to identify the predictors of first birth when the studied women were adolescents (10-19 years).

The Cox proportional hazard model is useful for modelling the time to a specified event, based upon the values of given covariates. For each woman, we observe a duration X, the time from birth to age x when the first birth occur and an index $J$ taking one among the following values $(i = 1,2, \dots, p)$. This form of the sample is $(X_i, J_i)_{i=1.2,..,n}$. The index $J$ indicates a woman that had her first birth as an adolescent. Observations allow simply estimating functions of the form $P(X > u, J = j)$for each u and each j. Therefore, the survivorship function $S(t) = P(X > 0 = exp\left(-\int_0^t \gamma(u)du\right)$ and the hazard function for all t is given by, $\gamma(t) = \lim_{\Delta t \to 0} \frac{1}{\Delta t} P(X \in \{t, t + \Delta t\}/X > t) = \sum_{j=1}^{p} \gamma_j{}^*(t)$. The basic model offered by the Cox regression procedure is the proportional hazards model, which can be extended through the specifications of a strata variable or time-dependent covariates. The proportional hazards model assumes that the time to event and the covariates are related as; $\log_e\left\{\frac{\gamma_i(t)}{\gamma_0(t)}\right\} = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_p x_{ip}$. Where; $\gamma_i(t)$ is the hazard rate for the $i^{th}$ case of a woman having her first child as adolescent i.e at t<20 years; $\gamma_0(t)$ is the baseline hazard at time t; $\beta_j$ is the value of the $j^{th}$ regression coefficient; $x_{ij}$ is the value of the $i^{th}$ case of the $j^{th}$ covariate.

### *Ethical Approval*

The data originators obtained ethical approval from Nigeria's National Ethics Committee functioning under the Ministry of Health. Informed consent was obtained from all of the study participants after describing to them all of the issues related to the study in detail at the point of data collection. Eligible respondents who declined participation were excluded from the survey. Each consented participant was made to sign an appropriate agreement form before the interview. Also an approval to use the data for this study was granted by the data originator before data access and subsequent retrieval.

## Results

In Figure 1, the data show that women in the North West began childbearing as adolescents earlier than any other region in Nigeria and the least was found in the South West. About

74.8% of women in the North West began childbearing during adolescence compared to 32.1% in the South West. The pattern of age at first birth is similar in the core Northern regions (North East and North West) and in the South East and South West regions. The proportion of women who started childbearing as adolescent mothers is 46.2% and 49.8% in the North Central and South South respectively.

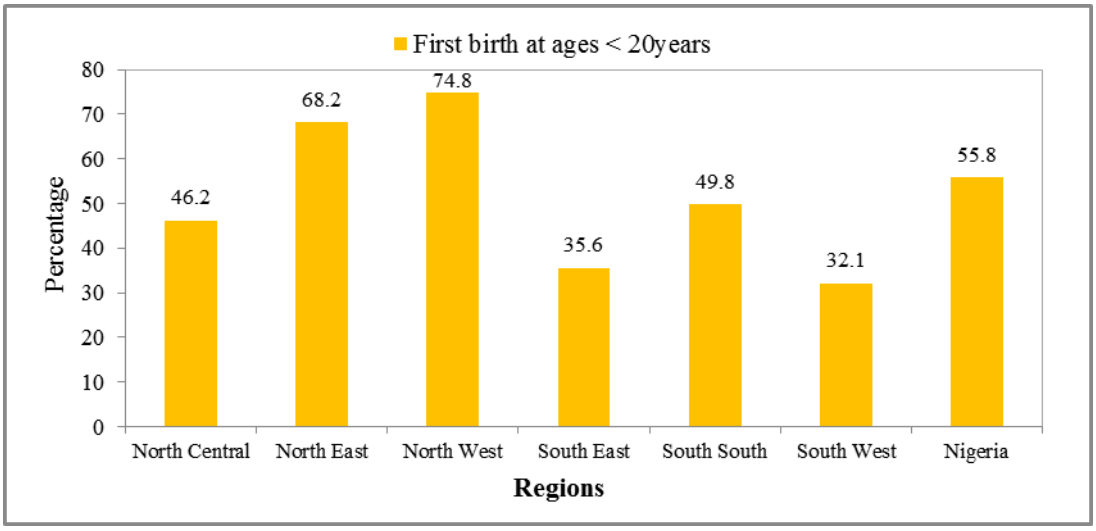


**Figure 1**: Adolescent childbearing by regions in Nigeria

In Figure 2, the data reveal that in all the regions in Nigeria, fertility is higher among women who began childbearing at earlier ages than those who started at later ages. For instance, in the South East, the mean children ever born (mCEB) was 6.13±2.8 and 2.97±1.9 for women who had their first births at ages younger than 15 and ≥25 respectively. The timing of adolescent first birth (AFB) appears to have more influence on fertility in the North East (6.07±3.0), North West (6.28±3.1) and South East (6.13±2.8) than in other regions in Nigeria. In these regions, mCEB was found to be significantly higher among women who had their first birth as younger adolescents (<14 years) than women residing in North Central (4.93±2.4), South South (4.95±2.6) and South West (4.97±2.3) where the pattern was similar. Also women in the North East and North West who had their first births between 15 and 19 years had higher mCEB than those who had their first births at ages <15 years in other regions in Nigeria.

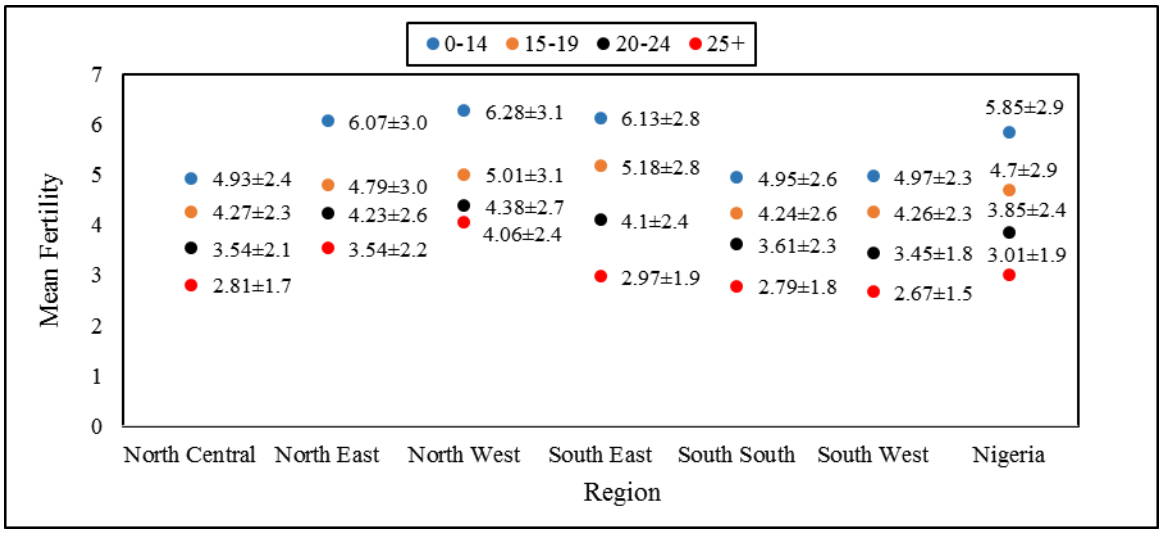


**Figure 2:** Age at first birth and mean fertility by regions in Nigeria

Figure 3 shows the percentage of women who had their first births at exact age x in Nigeria. The data show that childbearing commenced earlier in the North East and North West than in other regions in Nigeria. Delay in first birth timing was experienced among women in the regions in the South including North Central, but this delay was most prominent among women in the South West.

*The mean±σ age at first birth was: North Central 20.45±4.4; North East=18.50±3.8; North West=17.90±3.5; South East=21.83±5.0; South South=20.30±4.4; South West=21.84±4.4; Nigeria=19.68±4.4.*

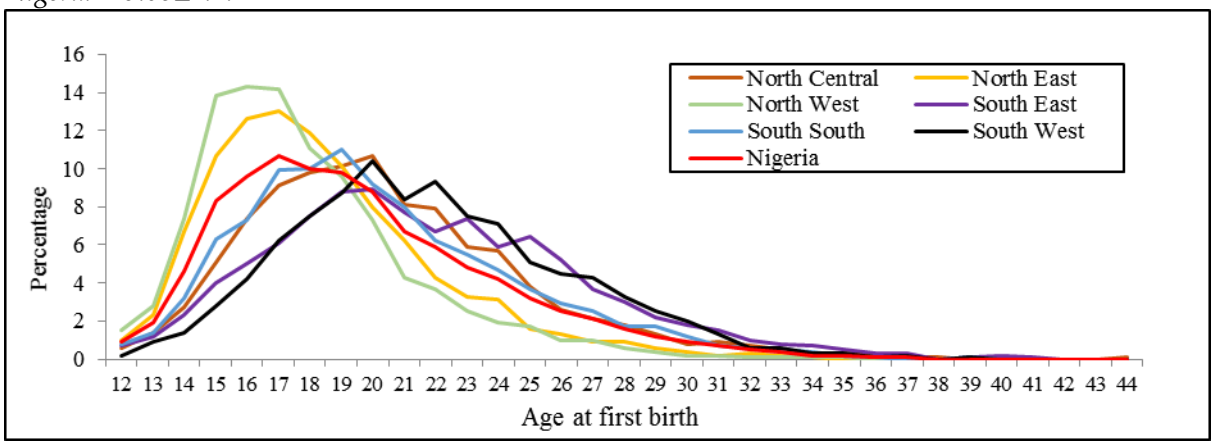


**Figure 3**: Pattern of age at first birth in regions in Nigeria

Table 1 shows the pattern of adolescent childbearing in each of the regions in Nigeria. The data show that 11.8% of women in the North West started childbearing as a younger adolescents (10-14 years), which is the highest in Nigeria, compared to 2.6% in the South West. Meanwhile, 63.0% of women in the North West and 29.5% of the women in South West had their first births between ages 15 and 19. The distribution pattern of adolescent childbearing is similar in each sociodemographic factor considered in this study across the six geopolitical zones in Nigeria. In the North Central, North East, North West and South West, variables — which included age, residence, education, wealth and religion — were found to be significantly associated with adolescent childbearing ($p<0.05$) while religion and residence were not significant in the South East, and only religion was found to be insignificantly associated with adolescent childbearing in the South South. In all the regions, the proportion of women in the rural areas who had their first births as adolescents was greater than that of the urban areas. For instance, 33.0% of women in the North Central who are usual residents of urban areas became mothers at ages <20 compared to 52.8% in the rural areas.

The rural-urban difference in adolescent childbearing is more prominent in the North Central, South West and South South than North West and North East regions. The distribution of women by timing of first birth as an adolescent shows an inverse relationship with the level of education and wealth quintile. As an example, in the North West, where most women had their first birth as an adolescent, 76.8% and 44.4% of women with no formal education and higher education became mothers at ages younger than 20 respectively. Among those with higher level of education in each of the region, there is variation in the proportion of women who had their first birth at ages below 20 years; 15.7% (North Central), 30.2% (North East), 44.4% (North West), 12.9% (South East), 23.4% (South South) and 8.9% (South West). Although the association was not significant in the South East and South South, for the two main religious groups in Nigeria, a lower proportion of Christian women had experienced adolescent childbearing compared to Muslim women. It is observed that the total fertility rate

is higher in the regions where adolescent childbearing was found to be more prominent than others.

As shown in Table 2, three models identify the predictors of adolescent childbearing in Nigeria. The first model was restricted to only the region in order to see its singular effect on adolescent childbearing while the second model introduced other variables as controls. In addition, model 3(a-f) was designed to identify the predictors of adolescent childbearing in each of the six regions in Nigeria. In the second model, ethnicity was included whereas in the remaining model it was excluded because the number of cases for non-dominant ethnic group was too small to be analyzed. For instance, in the North East, which predominantly is home to people of the Hausa/Fulani ethnic group, the number of Yoruba and Igbo people included in the sample was far too small, which is the case for other regions.

In model 1, the data showed that hazard ratio of adolescent childbearing was 1.74 (C.I=1.61-1.88, $p<0.001$), 3.43 (C.I=3.23-3.67, $p<0.001$) and 2.87 (C.I=1.46-1.70, $p<0.001$) higher among women in the South South, North West and North East than their counterparts in the South West. This pattern was observed but with a reduction in the risk when other variables were used as controls (model 2). The identified predictors of adolescent childbearing among women ages 20-49 in Nigeria were region, age, residence, education, wealth index, religion and ethnicity. Education was found to be a common predictor of adolescent childbearing in all of the regions in Nigeria. Variation exists in the hazard of adolescent childbearing within the levels of education across the six regions.

The data further shows that the Islamic religious group had a higher hazard ratio of adolescent childbearing in the North West, North East and North Central regions than the Christian group. Also, Muslim women in the North Central region (HR=0.87; C.I=0.76-0.98, $p<0.05$) were less likely to have experienced adolescent childbearing than their counterparts who are Christians, but the reverse pattern was observed in the North East and North West.

**Table 1**: Pattern of adolescent childbearing by regions in Nigeria

| Background variables | North Central | | | North East | | | North West | | | South East | | | South South | | | South West | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TFR=5.3 | | | TFR=6.3 | | | TFR=6.7 | | | TFR=4.7 | | | TFR=4.3 | | | TFR=4.6 | | |
| | AFB | | Total num. of women | AFB | | Total num. of women | AFB | | Total num. of women | AFB | | Total num. of women | AFB | | Total num. of women | AFB | | Total num. of women |
| | <15 (%) | 15-19 (%) | | <15 (%) | 15-19 (%) | | <15 (%) | 15-19 (%) | | <15 (%) | 15-19 (%) | | <15 (%) | 15-19 (%) | | <15 (%) | 15-19 (%) | |
| **Total** | 4.7 | 41.6 | 3510 | 10.0 | 58.2 | 4414 | 11.8 | 63.0 | 6776 | 4.2 | 31.4 | 2239 | 5.4 | 44.5 | 3246 | 2.6 | 29.5 | 3616 |
| **Age** | | | **107.7*** | | | **169.6*** | | | **176.5*** | | | **69.2*** | | | **75.2*** | | | **89.7*** |
| 20-24 | 6.0 | 59.4 | 534 | 10.1 | 74.9 | 864 | 11.5 | 75.1 | 1267 | 3.4 | 43.8 | 233 | 6.7 | 60.2 | 460 | 3.2 | 48.0 | 348 |
| 25-29 | 4.3 | 41.3 | 870 | 9.9 | 58.1 | 1026 | 10.0 | 66.3 | 1575 | 3.8 | 24.8 | 420 | 5.2 | 38.4 | 648 | 3.2 | 29.5 | 722 |
| 30-34 | 4.8 | 39.4 | 665 | 8.3 | 57.3 | 786 | 13.9 | 60.2 | 1204 | 3.7 | 22.3 | 403 | 5.4 | 42.2 | 611 | 1.6 | 25.9 | 761 |
| 35-39 | 4.7 | 37.0 | 579 | 10.6 | 51.5 | 717 | 10.5 | 57.9 | 1065 | 3.8 | 28.4 | 395 | 3.8 | 42.0 | 626 | 2.3 | 25.2 | 726 |
| 40-44 | 5.8 | 36.0 | 480 | 9.8 | 49.6 | 518 | 12.9 | 54.4 | 800 | 3.9 | 34.4 | 389 | 6.7 | 41.3 | 463 | 1.3 | 28.0 | 543 |
| 45-49 | 2.1 | 35.1 | 382 | 12.1 | 49.9 | 503 | 13.1 | 57.5 | 865 | 6.5 | 40.4 | 399 | 5.0 | 46.8 | 438 | 4.7 | 30.2 | 516 |
| *Mean±σ* | | | *32.6±8.0* | | | *32.1±8.3* | | | *32.2±8.5* | | | *35.2±8.2* | | | *33.8±8.1* | | | *34.5±7.7* |
| **Residence** | | | **121.8*** | | | **37.8*** | | | **56.4*** | | | **0.700†** | | | **56.5*** | | | **88.4*** |
| Urban | 3.0 | 30.0 | 1157 | 7.1 | 53.6 | 974 | 8.4 | 59.8 | 1517 | 4.5 | 31.3 | 1441 | 3.4 | 37.0 | 1012 | 2.0 | 25.6 | 2583 |
| Rural | 5.5 | 47.3 | 2353 | 10.8 | 59.5 | 3440 | 12.8 | 63.9 | 5259 | 3.8 | 31.6 | 798 | 6.3 | 47.9 | 2234 | 4.1 | 39.5 | 1033 |
| **Education** | | | **247.7*** | | | **208.4*** | | | **163.7*** | | | **233.4*** | | | **191.3*** | | | **339.9*** |
| None | 5.6 | 50.8 | 1188 | 11.5 | 61.0 | 2964 | 12.9 | 63.9 | 5362 | 11.8 | 48.1 | 212 | 7.7 | 49.4 | 271 | 7.4 | 48.3 | 408 |
| Primary | 6.3 | 47.4 | 975 | 9.3 | 62.1 | 699 | 10.1 | 67.1 | 744 | 6.0 | 44.6 | 679 | 8.6 | 52.9 | 1133 | 3.9 | 40.2 | 899 |
| Secondary | 2.9 | 35.8 | 947 | 5.4 | 48.9 | 569 | 4.8 | 53.7 | 564 | 2.2 | 25.0 | 1086 | 3.0 | 42.6 | 1513 | 1.5 | 26.9 | 1713 |
| Higher | 2.2 | 13.5 | 400 | 3.3 | 26.9 | 182 | 3.8 | 40.6 | 106 | 1.9 | 10.3 | 262 | 3.3 | 20.1 | 329 | 0.7 | 8.2 | 596 |
| **Wealth Index** | | | **201.1*** | | | **52.0*** | | | **113.4*** | | | **105.9*** | | | **135.2*** | | | **243.6*** |
| Poorest | 6.6 | 46.5 | 256 | 11.4 | 59.6 | 1688 | 13.8 | 64.2 | 2667 | 5.6 | 41.1 | 124 | 21.4 | 42.9 | 14 | 11.8 | 54.4 | 68 |
| Poorer | 7.6 | 49.8 | 673 | 9.6 | 60.3 | 1301 | 12.4 | 63.4 | 2062 | 7.6 | 42.3 | 317 | 6.5 | 45.4 | 355 | 5.0 | 44.2 | 242 |
| Middle | 4.3 | 49.4 | 1087 | 9.9 | 58.8 | 709 | 10.4 | 64.7 | 974 | 5.1 | 37.6 | 606 | 6.8 | 52.8 | 886 | 4.6 | 41.1 | 482 |
| Richer | 3.4 | 39.4 | 789 | 8.5 | 53.9 | 425 | 8.1 | 60.1 | 675 | 3.5 | 28.8 | 657 | 5.4 | 48.1 | 1132 | 3.0 | 35.0 | 1115 |
| Richest | 3.1 | 22.3 | 705 | 6.5 | 45.7 | 291 | 4.3 | 53.8 | 398 | 1.9 | 18.9 | 535 | 3.3 | 30.7 | 859 | 1.1 | 19.7 | 1709 |
| **Religion** | | | **7.055***** | | | **101.2*** | | | **103.3*** | | | **0.248†** | | | **1.197†** | | | **35.1*** |
| Christian | 5.1 | 40.1 | 1825 | 7.8 | 46.4 | 887 | 9.0 | 44.8 | 368 | 4.1 | 31.5 | 2174 | 5.4 | 44.4 | 3146 | 2.5 | 26.5 | 2443 |
| Islam | 4.1 | 43.0 | 1620 | 10.6 | 61.2 | 3486 | 11.8 | 64.2 | 6358 | 12.5 | 12.5 | 8 | 4.1 | 49.3 | 73 | 2.7 | 35.7 | 1157 |
| Others | 7.7 | 47.7 | 65 | 9.8 | 56.1 | 41 | 26.0 | 44.0 | 50 | 8.8 | 31.6 | 57 | 3.7 | 40.7 | 27 | 6.2 | 43.8 | 16 |

*AFB: Age at first birth; *Significant at 0.1%; ***Significant at 5.0%; †Not significant at 5.0%; TFR: Total Fertility rate; ^Estimate obtained from 2013 Nigeria Demographic and Health Survey Report; num: number*

**Table 2**: Predictors of adolescent first birth by regions in Nigeria

| Background variables | Nigeria | Nigeria | North Central | North East | North West | South East | South South | South West |
|---|---|---|---|---|---|---|---|---|
| | TFR=5.5^ | TFR=5.5^ | TFR=5.3^ | TFR=6.3^ | TFR=6.7^ | TFR=4.7^ | TFR=4.3^ | TFR=4.6^ |
| | Model 1 | Model 2 | Model 3a | Model 3b | Model 3c | Model 3d | Model 3e | Model 3f |
| | HR(95% CIHR) | aHR(95% CIHR) | aHR(95% CIHR) | aHR(95% CIHR) | aHR(95% CIHR) | aHR(95% CIHR) | aHR(95% CIHR) | aHR(95% CIHR) |
| **Region** | | | | | | | | |
| North Central | 1.58(1.46-1.70)* | 1.01(0.91-1.11) | | | | | | |
| North East | 2.87(2.68-3.07)* | 1.44(1.30-1.59)* | | | | | | |
| North West | 3.43(3.23-3.67)* | 1.59(1.43-1.76)* | | | | | | |
| South East | 1.15(1.04-1.26)** | 1.13(0.96-1.34) | | | | | | |
| South South | 1.74(1.61-1.88)* | 1.31(1.18-1.45)* | | | | | | |
| South West | 1 | 1 | | | | | | |
| **Age** | | | | | | | | |
| 20-24 | | 1.47(1.38-1.56)* | 2.17(1.77-2.65)* | 1.51(1.32-1.73)* | 1.34(1.21-1.48)* | 1.37(1.06-1.77)*** | 1.61(1.34-1.93)* | 1.64(1.32-2.03)* |
| 25-29 | | 1.09(1.02-1.16)** | 1.43(1.17-1.74)* | 1.12(0.97-1.28) | 1.13(1.02-1.25)*** | 0.88(0.68-1.12) | 0.96(0.80-1.15) | 1.09(0.89-1.33) |
| 30-34 | | 1.05(0.98-1.11) | 1.36(1.10-1.66)** | 1.06(0.92-1.22) | 1.12(1.01-1.24)*** | 0.77(0.59-0.99)*** | 0.99(0.83-1.19) | 0.93(0.76-1.14) |
| 35-39 | | 0.93(0.87-0.99)*** | 1.24(1.01-1.53)*** | 0.98(0.84-1.13) | 0.95(0.85-1.06) | 0.82(0.65-1.04) | 0.87(0.72-1.04) | 0.86(0.70-1.05) |
| 40-44 | | 0.92(0.86-0.99)*** | 1.22(0.98-1.51) | 0.92(0.78-1.07) | 0.94(0.83-1.05) | 0.80(0.64-0.99)*** | 0.90(0.75-1.09) | 0.86(0.69-1.07) |
| 45-49 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Residence** | | | | | | | | |
| Urban | | 1 | 1 | 1 | 1 | | 1 | 1 |
| Rural | | 1.06(1.01-1.11)*** | 1.13(0.97-1.30) | 1.15(1.02-1.29)*** | 1.01(0.91-1.11) | | 1.16(1.02-1.31)*** | 1.03(0.87-1.21) |
| **Education** | | | | | | | | |
| None | | 3.27(2.88-3.71)* | 3.56(2.64-4.79)* | 2.98(2.21-4.02)* | 1.96(1.43-2.67)* | 5.97(3.88-9.18)* | 2.58(1.93-3.45)* | 5.45(3.88-7.64)* |
| Primary | | 3.21(2.88-3.62)* | 3.32(2.49-4.43)* | 2.84(2.10-3.83)* | 2.00(1.46-2.73)* | 4.33(2.93-6.40)* | 2.73(2.13-3.51)* | 4.72(3.49-6.37)* |
| Secondary | | 1.94(1.72-2.18)* | 2.03(1.53-2.69)* | 1.77(1.31-2.37)* | 1.30(0.95-1.78) | 2.03(1.39-2.96)* | 1.66(1.29-2.11)* | 2.86(2.14-3.82)* |
| Higher | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Wealth Index** | | | | | | | | |
| Poorest | | 1.28(1.17-1.40)* | 0.97(0.73-1.27) | 0.87(0.69-1.08) | 1.21(1.01-1.45)*** | 1.11(0.77-1.58) | 1.80(0.92-3.52) | 1.72(1.06-2.79)*** |
| Poorer | | 1.23(1.12-1.34)* | 1.21(0.96-1.53) | 0.87(0.69-1.08) | 1.11(0.92-1.32) | 1.34(1.01-1.76)*** | 1.03(0.83-1.26) | 1.43(1.08-1.88)*** |
| Middle | | 1.31(1.21-1.41)* | 1.21(0.97-1.49) | 0.91(0.73-1.13) | 1.15(0.96-1.36) | 1.31(1.02-1.68)*** | 1.35(1.15-1.59)* | 1.55(1.26-1.91)* |
| Richer | | 1.22(1.13-1.31)* | 1.09(0.89-1.34) | 0.92(0.74-1.13) | 1.02(0.86-1.20) | 1.20(0.94-1.52) | 1.31(1.12-1.52)* | 1.43(1.22-1.66)* |
| Richest | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Religion** | | | | | | | | |
| Christian | | 1 | 1 | 1 | 1 | | | 1 |
| Islam | | 1.08(1.01-1.15)*** | 0.87(0.76-0.98)*** | 1.27(1.12-1.42)* | 1.44(1.17-1.77)** | | | 1.10(0.96-1.26) |
| Others | | 1.01(0.84-1.19) | 1.04(0.74-1.47) | 1.20(0.81-1.78) | 1.19(0.82-1.73) | | | 1.53(0.75-3.07) |
| **Ethnicity** | | | | | | | | |
| Hausa/Fulani | | 1 | | | | | | |
| Igbo | | 0.74(0.63-0.86)* | | | | | | |
| Yoruba | | 0.74(0.66-0.82)* | | | | | | |
| Others | | 0.95(0.89-1.01) | | | | | | |
| ***-2loglikelihood*** | ***257326.021**** | ***255170.135*** | ***25773.837**** | ***47963.043**** | ***84753.305**** | ***11779.920**** | ***25061.922**** | ***18265.150**** |

*AFB: Age at first birth; *Significant at 0.1%; **Significant at 1.0%; ***Significant at 5.0%; TFR: Total Fertility rate; ^Estimate obtained from 2013 NDHS Report; aHR: adjusted Hazard Ratio; CIHR: Confidence Interval Hazard Ratio*

## Discussion

The first visible outcome of the fertility process is the birth of the first child. It is an event of great social and individual importance, and it is recognized in all societies. It marks a woman's transition into motherhood and, often, her social maturity. In Nigeria, where contraceptive use is relatively low, younger age at first birth has a tendency to enhance lifetime fertility. Nevertheless, in societies where family planning is widely used, the timing of first births can affect completed family size if contraception is used for spacing, but not for limiting, fertility. In this study, we set out to determine if adolescent childbearing is associated with differentials in fertility levels across regions in Nigeria. We also assessed how adolescent childbearing is connected with the level of fertility in Nigeria and across its six regions. The study reveals major findings about regional differentials in adolescent childbearing among women from different socioeconomic backgrounds in Nigeria.

The findings will be discussed within the framework of existing literature in adolescent childbearing. The hypothesis that the proportions of mothers who had their first birth before age 20 is greater in the regions of higher fertility than that of lower fertility was true. This finding corroborates WHO's (2013) claims on adolescent childbearing and fertility which highlights that early childbearing shortens the period between generations, widens the reproductive life span and tends to be associated with high population growth. In the document, WHO emphasized that life-time pattern of fertility is likely to be established during adolescence such that those who begin childbearing early usually have more children at shorter intervals than those who postponed childbearing until later ages (WHO, 2013). We found that age at first birth significantly varies across geopolitical regions in Nigeria and that geopolitical regions with higher fertility levels characterized with earlier age at first birth than other regions with lower fertility levels. Essentially, total fertility rate was higher in the regions where adolescent childbearing was found to be more prominent. We identified determinants of age at first birth in Nigeria to include women's age, education, wealth index, residence and region.

The mean age at first child's birth across all the regions in Nigeria ranged from 17.9 years to 21.0 years. This was lower than the 23 years reported in an American study in 2011 (Martinez, Copen & Abma, 2011). We found that adolescent first birth is very prevalent in Nigeria. About three of every five mothers had their first birth as adolescents. This is at variance with a 2012 America study (Martinez, Daniels & Chandra, 2011) but in agreement with an earlier study on the levels and rate of adolescent childbearing, the timing of the first birth and births to unmarried women in 43 developing countries. The authors of the latter stated that although adolescent pregnancies were beginning to decline in sub-Saharan Africa, has adolescent pregnancy remained very high in most countries of the region (Singh, 1988). The differences in the prevalence of having a first child in adolescence between our study and the American study could be attributed to wide differentials in the TFR of 5.5 to 1.3 (Martinez, Daniels & Chandra, 2011; National Population Commission of Nigeria & ICF International, 2014).

Distinct regional differences were observed in the proportions of women who had their first birth as adolescents. Delay in first birth timing was experienced among women in the Southern regions and also in North Central, but this delay was most prominent among women in the South West. The prevalence in both the North West and North East was twice as prevalent in either the South West or South East. Similar geographical differentials in age at first birth have been reported earlier in some parts of Africa (Arroyo, Payne, Brown & Manning, 2013; Gurmu & Etana 2014; Organisation for Economic Co-Operation and Development (OECD), 2012). A high rate of adolescent first birth in the North East and North West regions may be attributed to the poor economic position of women and early marriage which remains a strong cultural practice in the regions. The literacy level among individuals residing in the North East and North West is

lowest among the regions in Nigeria (National Population Commission of Nigeria & ICF International, 2014).

It is not unlikely that improved health-related indices and important demographic phenomena are found in the urban than rural areas. Rural-urban differentials in social and health infrastructural development and access may account for the difference. For instance, despite a low contraceptive prevalence rate in Nigeria, research shows that the level was significantly higher in urban than rural areas (National Population Commission of Nigeria & ICF International, 2014). Therefore our finding that the proportion of women who had their first birth as adolescents in the rural areas was higher than the proportion in the urban areas across the regions in Nigeria is expected. The rural urban difference in adolescent childbearing is less prominent in the North West and North East regions than in the other regions. Similar differentials have been identified in earlier studies elsewhere (Arroyo et al., 2013; Gurmu & Etana, 2014; Haque & Sayem, 2009; OECD, 2012). Our finding also corroborates Oyefara's (2011a) finding about the pattern of rural-urban first birth among the Yoruba ethnic group in Nigeria.

Level of education was found to be a significant predictor of adolescent childbearing in all of the regions in Nigeria. We found less educational attainment among women who had their first birth during adolescence. Nevertheless, effect of education on adolescent first birth was stronger in the southernmost regions than in the Northern region. Similarly, most women who had their first child during adolescence belonged to households in the poorer and poorest wealth quintiles. This is in line with earlier studies which reported that higher wealth quintiles and higher education were associated with lower rates of adolescent childbearing (Martinez, Daniels & Chandra, 2011; Singh, 1988). The apparent association between adolescent fertility and level of education attained is fallout of young women leaving school early either when they become pregnant or when they are betrothed, especially in the northern regions.

We found that a lower proportion of Christian women had experienced adolescent childbearing compared to Muslim women in the regions considered. This is understandable since the Northern regions are predominantly Muslim, where practice of early marriage and low contraceptive use is prevalent (Doctor et al. 2013; Federal Ministry of Health, 2013; National Population Commission of Nigeria & ICF International, 2014).

In all, first birth during adolescence is more prevalent in Northern regions of Nigeria and coincidentally, these regions have higher TFR than the regions in the South. These regions have repeatedly reported more women with lower educational attainment, living in rural areas, belonging to poor households and marrying early (Adebowale, Fagbamigbe, Okareh & Lawal, 2012; Doctor et al., 2013; Federal Ministry of Health, 2013; National Population Commission of Nigeria & ICF International, 2014). The low prevalence in use of modern contraceptives in the North could have increased early first child birth and thereby raising the total fertility. While our findings confirm that age at first marriage is associated with fertility, factors affecting age at first birth work in circles. These factors range from poverty to low educational attainment, residence, culture and practice.

The present study imparts greater information to audiences interested in regional differentials in adolescent childbearing in Nigeria. Apart from distinctively focusing on adolescent childbearing among women of reproductive age, the study adds to the existing knowledge on timing of first birth in Nigeria. The use of nationally representative data of over 24,000 eligible respondents strengthens the reliability and robustness of our findings. Though efforts were made to ensure scientific integrity, the study has a number of limitations. First, its cross-sectional nature does not allow for an assessment of any causal relationships between adolescent childbearing and regions in Nigeria. Also, the data used for this study might have suffered recall bias because there was no means to verify information supplied by the respondents, especially those without formal

education. In addition, only women ages 20-49 in Nigeria were covered in the sample. Therefore, generalizing the findings of the present study on the situations of the entire population of Nigeria should be done with caution.

## Conclusions and Recommendations

Differentials exist in adolescent childbearing across the regions in Nigeria and this may contribute to higher fertility in some regions. The augmented risk of fertility in women having their first child in adolescence supports the long-established inverse relationship between age at first birth and total fertility, since women who began childbearing early tended to have higher parity. However, this study suggests age, education, wealth and ethnicity as likely factors influencing adolescent childbearing in Nigeria. Mothers who began bearing children as adolescents exhibited higher levels of fertility compared to those who gave birth to their first child at age 20 or older. These findings emphasize the need for further research to better understand the underlining mechanisms responsible for higher adolescent first birth in the core north than other regions in Nigeria. In order to accomplish the national goal of smaller family size, efforts should be articulated for suitable and sustainable intervention programs that will improve young women's education and economic opportunities while decreasing adolescent childbearing.

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