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Understanding Subgroup Fertility Differentials in Nigeria

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Abstract

As Nigeria enters a period of potentially rapid economic growth due to the increase in the working age population, it is critical to understand why fertility remains so high there. Nigeria's current total fertility rate (TFR) of 5.5 (0.2 fewer children per woman than the TFR of 5.7 reported in both the 2003 and 2008 NDHS surveys) is projected to continue to decline, but questions remain about whether this decline is inevitable and whether it will continue apace. Regardless, Nigeria's population growth will continue through at least 2050 due to simple population momentum. Other challenges are the persistent and vast fertility differentials; many groups remain above replacement fertility across various social and geographical sub-units of the country. Using data primarily from the 2013 Demographic and Health Survey (DHS), as well as from 2003 and 2008 surveys, we document that many population subgroups and zones of the country are finally beginning to show signs of fertility convergence and decline. Nevertheless, some population subgroups still have higher fertility, especially: Hausa/Fulani/Kanuri women, women who live in the North West geopolitical zone, Muslim and traditionalist women, women who live in poor households, women who have lower levels of education, women who are opposed to family planning, women who marry early, and women who give birth early. In order for the projected decline in the TFR to continue, these subgroups must be highlighted, understood, and targeted with fertility- and poverty-reducing interventions.

Keywords

Nigeria, demographic dividend, fertility, ethnicity

Introduction

According to United Nations projections, Nigeria is expected to be at the threshold of reaping a potential demographic dividend (the economic growth due to the increase in the share of a country's population in the working ages and the corresponding decline of those in the non-working ages), following the expected decline in its dependency ratio from 88 dependents per 100 workers in 2010 to only 69 dependents per 100 workers by 2050 (United Nations, 2013). Likewise, the median age of the total population is anticipated to increase from 17.8 in 2013 to 21.4 years by 2050 and 32.6 years by 2100 (United Nations, 2013). The potential demographic dividend requires more than just declining fertility; it also requires full employment of the working-age population. Moreover, even with fertility decline, Nigeria's population will continue to grow due to population momentum. But continued fertility decline is a prerequisite for any demographic dividend.

In the last decade, many researchers and observers have suggested that Nigeria is one of the African countries in which the fertility transition (a shift from high, fluctuating fertility rates to low, controlled fertility rates) has been stalling, although this fertility stall is debatable (McNicoll, 2011; Bongaarts, 2006, 2008; Westoff and Cross, 2006; Garenne, 2007; Moultrie et al., 2008; Schoumaker, 2008; Shapiro and Gebreselassie, 2008). There is a great deal of uncertainty about Nigeria's fertility trajectory (e.g., fertility rate projections by the United Nations predict continued decline while many authors argue that fertility decline is likely stalled). This uncertainty reflects data quality issues.

Nigeria's total fertility rate (TFR) of 5.5 children per woman in 2013 falls roughly in the middle of the group of West African countries where data are available (Benin, Burkina Faso, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, and Senegal). TFRs for the region range from 4.0 in Ghana to 7.6 in Niger (National Population Commission and ICF International, 2014). The TFR remains above the average TFR for sub-Saharan Africa (SSA), the less-developed regions (LDRs), and the more-developed regions (MDRs). In SSA, the current TFR is about 5.4, which is significantly higher than in the LDRs (2.7) (United Nations, 2013). Both of these regions have shown declines from their peaks of over 6 children per woman in the 1950s. The MDRs, as is well established, are well below replacement level (2.1) at only 1.66 children per woman as of 2010. Nigeria's current TFR of 5.5 is lower than it was in 1990 (6.3), 2003 (5.7), and 2008 (5.7). According to the DHS reports for the past three surveys, the TFR stalled at 5.7 between 2003 and 2008, and only marginally declined to 5.5 by 2013 (only 0.2 fewer children per woman) (National Population Commission and ICF International, 2014).

According to the 2012 World Population Prospects, if current fertility trends continue, Nigeria's population will increase from the current estimate of 174 million to 440 million by 2050, by which time Nigeria will be the third most populous country in the world after China and India (United Nations, 2013). Despite enormous human and mineral resources, Nigeria's projected population growth on a relatively small land mass compared to other very populous countries will not be economically sustainable. Moreover, this grim prognosis is exacerbated by the country's long history of economic crisis and political and religious conflicts. Consequently, addressing unprecedented population growth in a way that will result in sustainable development remains at the center of the agendas of both the Government of Nigeria and international agencies.

However, the enormous intra-country fertility differentials in Nigeria and their significant implications for pointed policy and programmatic responses to the country's demographic and development challenges are not adequately emphasized in research, policy and program agendas. Generally, national-level fertility and reproductive health

indicators conceal enormous subgroup disparities in fertility and contraceptive dynamics within the country. Nigeria is not alone in these dynamics; evidence from Kenya and other East African countries, as illustrated by the variations in stalled fertility declines, shows that the stall is particular to subgroups with certain socio-economic characteristics (Ezeh et al., 2009). The stall in Kenya is identifiable among women with lower or no formal education. Fertility decline, though marginal, continues among the most educated women. Likewise, the stall in contraceptive prevalence is seen mainly among younger women and among those with less education (Westoff and Cross, 2006).

Building on Nigeria's complicated web of ethnic, regional and religious identities and their implications for reproductive behavior and outcomes, in this paper we focus attention on the determinants of fertility outcomes, particularly on the roles of subgroup fertility differentials, which must be understood and targeted with interventions if fertility growth levels consistent with national development aspirations are to be achieved. We highlight the extent to which specific subgroups within Nigeria have experienced an increase or stagnation in their fertility levels while other subgroups continue to experience fertility decline. We also draw implications from our findings for the future of the country's population size, population policy, and program directions.

Literature review

Published studies have offered several hypotheses and explanations for the persistence of high fertility levels in developing countries. The factors identified include the loss of focus on family planning programs in the development agenda of these countries following new health challenges, such as HIV/AIDS (McNicoll, 2011; Agyei-Mensah, 2007), the impact of HIV/AIDS epidemic on infant and child mortality (Westoff & Cross, 2006; Moultrie et al., 2008), changes in proximate determinants of fertility and changing attitudes towards family size preferences and family planning (Bongaarts, 2002, 2006, 2008; Westoff & Cross, 2006), and changes in levels of contraceptive use and socio-economic development, as reflected in changes in women's education, infant and child mortality and real per capita economic growth (McNicoll, 2011; Bongaarts, 2006; Westoff and Cross, 2006; Shapiro and Gebreselassie, 2008). In Kenya, Westoff and Cross (2006) illustrated differentials in fertility outcomes by showing that the trajectory of fertility varies between subgroups with certain socio-economic characteristics. Ezeh et al. (2009) confirmed these differentials for four countries in eastern Africa.

A previous analysis in Nigeria (Reed and Mberu, forthcoming) suggested similar differentials, with variations in fertility outcomes identified across geopolitical zones[1], education, household wealth and place of residence. The North East (TFR 6.3) and North West (TFR 6.7) geopolitical zones of Nigeria (predominantly Muslim and populated by Hausa, Fulani and Kanuri ethnic groups) have pre-transition TFRs. The TFR rates for these two zones increased between 2003 and 2008, and decreased marginally in 2013. All of the geopolitical zones in the southern part of Nigeria (predominantly Christian and populated by Yoruba, Igbo, and other ethnic groups) experienced "stalled fertility declines" between 2003 and 2008 and again between 2008 and 2013. The southern zones have current TFRs

[1] States in Nigeria have been officially grouped into six geopolitical zones based on linguistic affinity, contiguity and cultural affiliation. The six geopolitical zones include the North Central, North East, North West, South East, South South, and South West (these are the names used by the DHS). The zones include the following states: North Central: Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and Federal Capital Territory, Abuja; North East: Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe; North West: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara; South East: Abia, Anambra, Ebonyi, Enugu, and Imo; South South: Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers; and SouthWest: Ekiti, Lagos, Ogun, Ondo, Osun and Oyo.

ranging between a low of 4.3 (South South) and a high of 4.7 (South East), which is over two children per woman lower than the TFR of the two core northern zones. Since 2003, the North Central zone has had a TFR that is lower than that of the other northern zones, but which is still, on average, one child higher per woman than the TFR of the southern zones in 2003, 2008 and 2013 (National Population Commission and ICF Macro, 2009; National Population Commission and ICF International, 2014).

Other quantitative and qualitative studies have identified ethnicity and religion as significant determinants of reproductive behavior and fertility outcomes, particularly in some parts of northern Nigeria. A recent qualitative study (2007-2008) implemented in the States of Kano and Jigawa found that fertility is a key socio-political, cultural and economic resource in the region. The same study identified several factors that contribute to the continued high fertility levels there, such as the Koranic inheritance doctrine (which engenders childbearing competition among co-wives in mostly polygynous households) and the depiction of contraceptives as against Islamic doctrine and injurious to women's health in dominant local religious and cultural discourses (Izugbara et al., 2009).

Apart from perspectives anchored in religion, other explanations of drivers of fertility in northern Nigeria include the young age at which most women continue to marry, polygyny and divorce, confusion regarding expectations surrounding spousal communication on fertility and reproduction, the marked high status attached to having large families, the persistent unavailability of contraceptives and trustworthy family planning providers (especially in rural and semi-rural areas), and the general lack of adequate and comprehensive information on contraceptives in the region (McNicoll, 2011; Population Council, 2007; Smith, 2004; Obono, 2003). Despite widespread pro-natalist beliefs and opinions, it is important to note the existence in northern Nigeria of a contrary perspective that supports fertility regulation. This perspective holds that because Islam recognizes the centrality of the family to social life, matching family size with economic resources is a key to rearing children who will not bring disrepute to the Islamic religion (Izugbara et al., 2009).

Despite a fair amount of existing research about fertility in the region, the quantitative ranking of predictors and determinants of fertility and their relative importance in predicting fertility outcomes has yet to be determined. As the country looks forward to a possible demographic dividend, it is important that these factors be highlighted, understood, and targeted with policy and program interventions in order to better understand the country's national and sub-national population and development trajectory.

Analytical framework

Most of the studies that have attempted to explain observed fertility levels, patterns, differentials and stall in fertility decline in SSA have followed three models and the changes associated with them: (a) the reproductive behavior model; (b) the institutional model; and (c) the socio-economic model (Ezeh et al. 2009).

For the *reproductive behavior model*, proximate determinants of fertility could explain both high and low fertility outcomes. The model primarily focuses on changes in fertility preferences or behavior. In general, age and tempo of marriage, early start of motherhood, shorter birth intervals, levels of out-of-wedlock childbearing, low contraceptive use and/or declining infertility rates are linked to fertility outcomes (Bongaarts, 2006, 2008; Garenne, 2007; Shapiro and Gebreselassie, 2008; Garenne, 2008). Following evidence from both the empirical and theoretical literature on the determinants of fertility behavior and outcomes, in this study we focus on the roles of age at first marriage, age at first sexual intercourse, ideal family size, and adolescent childbearing as key predictors of fertility levels in Nigeria.

The *institutional model* focuses on the family planning service environment, particularly the role played by organized family planning programs in initiating fertility transition in the region. A body of research has found significant linkages between the adoption of national population policies by developing countries between the late 1960s and mid-1990s, the phenomenal growth in international funding assistance for family planning programs between 1971 and 1985, and fertility decline across Asia, Latin America and SSA by the 1990s (UNFPA 1988; Cutright and Kelly 1981; Davanzo and Adamson 1998). Consequently, the loss of international, national and local focus on family planning programs in SSA since the mid-1990s is identified as a major factor in the stall in fertility decline in the region (McNicoll 2011; Van Dalen and Reuser 2008). Under this perspective, the factors indicative of the level of institutional support for family planning and therefore key drivers of fertility outcomes include the levels of unmet need for family planning, unwanted childbearing, knowledge of family planning methods or sources, attitudes towards family planning, and the importance of public institutions as a key source of family planning services. Other related measures linked to institutional support for family planning include the proportion of national budgets allocated to family planning services, the proportion of international development assistance going into family planning programs, number of organizations and personnel working in the area of family planning, and the amount of media coverage for family planning programs (Davanzo et al.1998).

While data limitation hindered our examination of the full importance of these institutional variables, the differing levels of ethnic, religious and regional support for family planning in Nigeria led us to expect that underserved subgroups (particularly by public institutions) would have higher levels of unwanted childbearing and lower contraceptive use, hence higher fertility outcomes. Further, mass media campaigns have been linked to promoting positive changes or preventing negative changes in health-related behaviors across large populations, although this requires concurrent availability of required services and products, community-based programs and policies that support behavior change (Wakefield et al., 2010). It has been argued that the transition from high to low birth rates requires: a climate of opinion that supports modern contraceptive use and the concept of smaller family sizes; the spread of information through mass media; efforts to promote family planning; and the adoption of contraception across geographic areas or over time within geographic areas (Honik et al., 2001; Cleland and Ali, 2006). In our analysis, we are interested in whether respondents and their husbands are opposed to family planning. Positive family planning messages have been promoted through massive investment in information, education, and change campaigns by governments, non-governmental and international agencies globally. Individuals who have had greater exposure to such messages are usually more open to the idea of family planning. Therefore, measures of opposition to family planning can serve as proxy for the exposure of respondents and their husbands to institutional promotion of family planning.

The socio-economic model is the most dominant model in the explanation of fertility levels and differentials within and across countries, especially with regard to the roles of socio-economic and sometimes socio-cultural differences among groups (Caldwell, 1982; Stecklov, 1999). The key socio-economic characteristics that have been identified to drive childbearing behavior and explain fertility levels and differentials include education, female labor force participation, urban residence, household wealth, cultural norms (often measured by religion or ethnicity), and overall levels of social development (often measured by region or level of urbanization) (Ezeh and Dodoo, 2001; Bongaarts, 2002, 2006, 2008; Schoumaker, 2004; Garenne, 2007; Shapiro and Gebreselassie, 2008). Earlier work on fertility transition in SSA has particularly emphasized the importance of women's education in contributing to low fertility, both directly and through the proximate determinants of age at marriage, contraceptive use, and the influence it has on infant and child mortality (Shapiro and Gebreselassie, 2008). Building on the evidence that groups defined by several

socio-economic factors participated in the initial fertility decline in SSA, we re-evaluated the relative contribution of socio-economic factors to Nigeria's fertility profile, and focused particularly on ethnic origin, religion and geopolitical zones, while controlling for specific behavioral and institutional factors.

Data and methods

Data

We primarily use the 2013 Nigerian Demographic and Health Survey (DHS) dataset for our analyses, but also draw on indicators from the 2003 and 2008 survey reports. The DHS surveys, primarily funded by the U.S. Agency for International Development, are generally considered to produce high-quality nationally representative data. The technical expertise of DHS survey advisors — who often work in conjunction with local in-country statistical agencies and survey staff — generally leads to a high level of data quality. In addition, DHS data are heavily edited and recoded to fix errors or impute missing values as much as possible before they are publicly released. The 2008 and 2013 data in particular seem to be of relatively good quality, when sampling errors and age distributions, as well as other key indicators are evaluated (National Population Commission and ICF Macro 2009, 2014).

The DHS includes three basic questionnaires: household, women, and men. Households are sampled using a nationally representative and stratified two-stage cluster sampling design, and all women ages 15-49 who are usual residents of the household are interviewed. The household questionnaire, in addition to data about ownership of household goods (used to construct the wealth index variable) and information about the presence of electricity and water and sanitation, includes a roster of household members. The roster is used to identify eligible adult men (ages 15-59) and women (ages 15-49) for individual interviews. We do not use the men's questionnaire but primarily rely on the individual women's questionnaire for this paper. The women's questionnaire includes information on individual women's socio-demographic characteristics (age, education, religion, ethnicity, etc.), reproductive histories, knowledge and use of family planning methods, antenatal and delivery care, infant feeding practices, childhood vaccinations, recent child illnesses, marriage and sexual activity, fertility preferences, women's status and decision-making, mortality (including maternal mortality), husband's socio-demographic characteristics, and AIDS-related knowledge, attitudes and behavior.

In the 2013 DHS sample, which is the main source of data used in the multivariate analysis in this paper, there were 40,320 households identified, 38,904 occupied, and 38,522 interviewed, for a response rate of 99 percent. Out of 39,902 eligible women in these households, 98 percent were interviewed, for a total sample of women of N=38,948 (urban women=15,545; rural women=23,403). Note that our sample sizes in the multivariate analyses are significantly reduced as we only estimated models for ever-married women ages 15-49 (N=26,643) and ages 40-49 (N=6,351). In the 2008 DHS sample, there were a total of N=33,385 women interviewed out of 34,596 eligible women (response rate=96.5%), and in the 2003 DHS sample (which was significantly smaller), there were a total of N=7,620 women interviewed out of a total of 7,985 eligible women (response rate=95.4%). We only use the 2003 and 2008 data for descriptive analysis.

Methods

We use multiple linear regression to determine the relationship between fertility and regional place of residence, ethnicity, and religion, as well as socio-demographic, economic, and family planning factors in Nigeria. Our main

dependent variable is total children ever born to all ever-married women of reproductive age (15-49) and ever-married women ages 40-49, who have likely almost completed or completed their childbearing.

Our independent variables are categorized under the three theoretical models identified above:

a) Reproductive behavior model:
   1) Ideal number of children: Continuous variable.
   2) Age at first sex: Continuous variable.
   3) Age at first birth: Continuous variable.
   4) Age at first marriage: Dummy variable, coded 0 if married at 20 or below and 1 if married after 20 years old.

b) Institutional model:
   6) Opposed to family planning use: Dummy variable, coded 0 if respondent is not opposed to using family planning methods and 1 if respondent is opposed to using family planning methods.
   7) Woman believes husband is opposed to family planning use: Dummy variable, coded 0 if woman answers that husband is not opposed to family planning and coded 1 if a respondent perceived that her husband is opposed to using family planning methods.
   8) Ethnicity: Five ethnic group categories are defined for: Igbo; Yoruba; Niger-Delta[2]; Middle-Belt[3]; and Others. The category Hausa/Fulani/Kanuri/Shuwa of the core northern zones of Nigeria is the reference category in the models.
   9) Religion: Three religious categories are defined as Catholic (reference category), Protestant, and Islam/Traditionalist/Other.

c) Socio-economic model:
   10) Highest educational level obtained: Three dummy variables for no education, primary school, secondary school. Higher education is the reference category in the model.
   11) Urban/rural residence: Dummy variable, 1=urban.
   12) Wealth index categories: Four dummy variables for poorest, poorer, middle, and richer. Richest is the reference category in the models.
   12) Employment: Dummy variable, coded 1 if currently working for pay.

We ran all of our analyses using the svy commands in Stata to adjust for sampling design effects. We presented a summary of means of key continuous variables used in the multivariate analysis in table 1. In our bivariate analysis, presented in tables 2 and 3, we identified zones and subgroups that continue to experience fertility decline and those experiencing stall in fertility decline, which include subgroups whose fertility levels have stopped declining or have been growing in the inter-survey periods between 2003, 2008 and 2013. For the multivariate analysis, summarized in tables 4 and 5, we ran four models, adding additional sets of variables each time to see the extent to which subgroup differentials in fertility hold after controlling for other indicators, according to the different fertility change models.

[2] Includes the following ethnic groups in the South South zone: Urhobo, Isoko, Edo, Itshekiri, Annang, Efik, Ijaw, Ogoni, Ibibio, Ukale, Kwale, Ekoi, Yakurr, Ogoja, Oron, and Ika.
[3] Includes the following ethnic groups in Central Nigeria: Tiv, Igala, Idoma, Nupe, Kamberi, Gwari, Ibira, Jukun, Berom, Bogom, Bassa, Kaninko, Ninzom, Kataf, Eggon, Angas, Mambilla, Kutep, Jonjo, Mumuye, Tarok, Auchi, and Kabba.

In Model 1 we include the ethnic variables; in Model 2 we add the institutional variables; in Model 3 we include socio-economic variables; and in Model 4 we include reproductive variables. The basic model is as follows:

$$CEB = \alpha + \beta_1 X_1 \ldots$$

Where CEB is the total number of children ever born, α is the constant, β_1 are the regression coefficients and X_1 are the independent variables. Additional βXs are added in groups in each subsequent model.

Results

Table 1 shows the mean number of CEB to ever married women at 4.0 children, which is only a marginal shift from 4.1 CEB in both 2003 and 2008 surveys. Similarly mean age at first birth at 17.7 years and first intercourse at 15.6 reflect the challenges of early sexual debut and early motherhood identified in previous studies in Nigeria with important implications for overall level of fertility, higher morbidity and mortality for both the mother and child, as well as adverse social consequences, particularly regarding educational attainment (NPC and ICF Macro 2009). The current mean ideal number of children of 7.1 for ever married women, up from 6.7 recorded for married women in the 2008 survey, points to the persistence of pronatalist views entrenched in the country and perhaps suggests the demographic future of the country. Following the multivariate analysis, the net effects of each of these variables in our understanding of fertility differentials are further discussed in the subsequent sections of the paper.

Bivariate results

Fertility Differentials across Nigeria's Sub-populations

In general, fertility rates among Hausa/Fulani/Kanuri ethnic groups, those who live in the North East and North West geopolitical zones, those with no formal education, those from the poorest backgrounds, Muslims, and those from rural areas remain much higher than the national average. We find not only group variations in stalled fertility decline but also evidence of stalls at different fertility levels across sub-units of the population. While most high fertility groups are stalling at high parity levels, low fertility groups have also ceased to decline and in some cases increased during the inter-survey periods, especially between 2003 and 2008. While we see mostly marginal declines across most subgroups between 2008 and 2013, some groups at both high and low parities remain stalled over the three survey years. Also profound are the high pre-transition fertility levels that persist across all three surveys among married women 40-49, who are more likely to have either completed or to be on the threshold of completing their fertility. Overall, the mean number of children ever born among married women aged 15-49 declined from 4.1 children in 2003 and 2008 to 4.0 in 2013 and from 6.8 in 2003 and 6.5 in 2008 to 6.1 in 2013 among married women aged 40-49.

In the first three columns, table 2 shows the variations in Nigeria's mean number of children ever born (a measure of past fertility) to married women aged 15-49 in 2003, 2008 and 2013 surveys by ethnic origin, geopolitical zone, religion, education, household wealth status, and place of residence, among other variables. In the subsequent four columns, the table shows whether fertility is declining or has stalled as well as the magnitude of change in either direction between 2003, 2008 and 2013 inter-survey periods. In the first inter-survey period (2003 to 2008), fertility among ever married women aged 15-49 stalled among the Hausa/Fulani/Kanuri, the Igbo, the Middle Belt, and the Yoruba ethnic groups. In the second inter-survey period (2008 to 2013), fertility continued to stall among the Hausa/Fulani/Kanuri at the highest levels of 4.4 children per woman and among the Yoruba at the lowest levels of 3.3 children per woman. The Niger-Delta ethnic group continued to experience fertility decline from 4.4 in 2003, to 3.9 in

2008, and to 3.6 in 2013, an 11.4% and 7.6% decline in each subsequent period, respectively. While the Middle Belt ethnic group stalled between 2003 and 2008, they experienced the greatest decline (15%) between 2008 and 2013. The Yoruba and residents of the South West geopolitical zone have consistently had the lowest fertility levels across all the survey years, but their fertility remained stalled at 3.3 children per woman throughout the entire 10-year observation period. Further, while fertility stalled at the highest level in the North West geopolitical zone at 4.4 children per woman, it also stalled at 4.1 children per woman for the South East zone across all three survey years. In sum, the stall in fertility outcomes observed in four of the six geopolitical zones (North West, North East, South East and South South) between 2003 and 2008 remained in three zones (North West, North East, South East) between 2008 and 2013, but at a higher level in the North West geopolitical zone. The South South, the North East and the North Central zones experienced fertility declines between 2008 and 2013.

Examining fertility change across religious groups, Christian groups demonstrated continued decline over the two inter-survey periods. Muslim women, however, experienced a stall at the highest fertility levels between 2003 and 2008 and that stall remained during the 2008 and 2013 inter-survey period. Ever married women with no formal education and those with primary education consistently had a higher number of CEB (about 1.5 children per woman higher) than women with secondary and higher education across all three survey years. Except for women with higher education who continued to show a decline over the two inter-survey periods, there was a stall in fertility levels across all educational categories between 2003 and 2008 and for women with primary education between 2008 and 2013. The differences between rural and urban fertility outcomes narrowed over the study period, although marginally. Further, the differences between the rich and the poor in terms of fertility outcomes was supported by our data across all three surveys, with an average of 1.5 children per woman more for women in the poorest households relative to those in the richest category. Also, women from the poorest households experienced an increase in CEB from 4.3 in 2008 to 4.6 in 2013.

In order to further explore observed fertility levels and patterns of stall in fertility decline, we examined the mean number of children ever born to women 40-49 (a proxy measure for completed fertility), as shown in table 4. Although this is more of a reflection of the immediate past than current fertility regimes (because the critical age of childbearing for most Nigerian women is between 20 to 30 years old), table 3 shows similar fertility dominance of the Hausa/Fulani/Kanuri over other ethnic groups and of the Northern over the Southern geopolitical zones in all three DHS survey reports. While all other ethnic groups experienced fertility declines across both inter-survey periods, the Hausa/Fulani/Kanuri experienced consistent fertility increase from 6.9 children per woman in 2003 to 7.6 children per woman in 2008 to 7.7 children per woman in 2013. Similarly, while fertility declined across all three southern geopolitical zones and the North Central zone between 2003 and 2008, it increased over the same period only in the North East zone and the North West zone, with the North West zone experiencing a 15% increase in fertility. In the 2008 to 2013 inter-survey period, while both core northern zones experienced marginal fertility declines, they remained the most fertility dominant zones in the country, with the North West zone having at least 1.5 to almost 3 more births than all of the southern zones and the North Central zone. Equally important is the fact that the core Northern zones are stalling at pre-transition fertility levels of 7 children and above. This is also true for Muslim women, women with no formal education, and women living in rural areas and from the poor and poorest households across all three survey years.

Nevertheless, there is profound evidence that despite this persistence of some pro-natalism among these subgroups, fertility levels among women 15-49 overall show some convergence among most other subgroups, reflecting a significant amount of ongoing fertility transition in the country. Conversely, the fertility levels of women 40-49 (who

have likely completed their fertility) had high levels of divergence among different subgroups, especially between 2003 and 2008, reflecting the historically high fertility regimes in the northern zones, among Muslims and among the Hausa/Fulani Kanuri ethnic nationalities. While the North East zone and the North West zone had an average of two births more than other geopolitical zones, ethnicities, and religious groups, the North Central zone and ethnic groups in the Middle Belt had on average about one child more than the geopolitical zones in the south and ethnic groups across the 2003, 2008, and 2013 surveys.

Multivariate regression models

Using the latest 2013 nationally representative DHS data, we show in table 4 the results from four successive linear regression models predicting total children ever born to ever married women 15-49 years of age, based on a series of independent variables covering the institutional, socio-economic status and reproductive behavior theoretical models. Model 1 tests the influence of ethnicity alone, with the major ethnic groups compared to the reference category of Hausa/Fulani/Kanuri. It is important to note that this model explains only about 2% of the total variance in fertility (R^2=.02), so ethnicity alone is not a key explanatory variable. Nevertheless, we do find that the Hausa/Fulani/Kanuri ($p<.001$) ethnic groups have significantly higher fertility compared to all other ethnic groups in Nigeria. The regression coefficients for all the other ethnic groups are negative and significant.

Model 2 adds institutional variables (i.e. religion and attitudes to family planning) to the model, which only marginally increases the explained variance by 1 percentage point; the R-squared is 0.03. Relative to Catholics, the coefficient for other Christians is negative and significant ($p<.001$). Muslims, traditionalists and other religious groups[4] ($p<.001$) have significantly higher fertility than Christian groups. The coefficients for women and husbands who are opposed to family planning are both positive and significant ($p<.001$), with the husband's opposition having larger coefficient values. Despite the significant fertility differences due to religion and attitudes to family planning observed in the bivariate results, all the ethnic differences remain significant at $p<.001$, though with slightly reduced coefficient values.

In Model 3, we add social and economic status (SES) variables, such as zone of residence, rural/urban residence, age, currently married or formerly married (widowed, separated, or divorced), married after or before age 20, highest educational attainment, current employment status and household wealth status, to the model. These variables help to explain much more of the variance in fertility outcomes; the R-squared increases to 0.54. All of the eight new variables are significant at the $p<.001$ level, except rural versus urban residence and residence in North Central and South South versus South West geopolitical zones. Rural residence is surprisingly not significant, neither in this model nor in the subsequent full model, although it should be noted that in the bivariate results, the rural/urban fertility gap is not as large as it is in many other countries, perhaps due to continued relatively high urban fertility (at least among poorer, less educated urbanites) in Nigeria.

Relative to residence in the South West geopolitical zone (which had the lowest fertility levels across all three survey years), residence in the North East, North West and South East had a positive and significant effect on fertility outcomes ($p<.001$), and residence in the North West had the highest coefficient value. While residence in the North Central and in the South South geopolitical zones had positive and negative fertility effects respectively, both

[4] Muslims, traditionalists and other religions had to be grouped together due to small sample sizes for traditional and other religions. Muslims are the dominant percentage (about 80%) of this category.

outcomes were not statistically different from residence in the South West. This is pointing to significant but slow fertility transition and convergence across most of the zones of the country.

Age and being currently married had a positive significant effect on children ever born ($p<.001$). Education was clearly the most important predictor in this model; all three categories of education (none, primary, and secondary) had significantly higher fertility compared to those with higher education (the reference category) at the $p<.001$ level. Women who are employed had slightly higher fertility (at $p<.001$), but while this effect remained significant in Model 4, the value of the coefficient was reduced by about half ($p<.001$). As expected, there was an inverse relationship between household wealth and fertility. Women from the richest households had a significantly lower number of births than those from less economically-endowed households, with the value of the coefficients increasing almost monotonically as household economic status worsened. While the differences between Catholics and other Christians were no longer significant following the introduction of these control variables, the variations between Catholics and Muslims remain, although the value of the coefficient declined by about 50% and statistical significance also declined ($p<.01$). Further, the fertility effects of ethnic origin remained significant at $p<.001$ for all groups, although with reduced coefficient values, except for the Niger Delta and for other ethnic groups, which corresponded to ethnic nationalities in the North Central and South South geopolitical zones.

Finally, in Model 4, which is the full model, we added reproductive behavior/health variables: marriage before or above 20 years of age, age at first intercourse, and age at first birth (accounting for exposure to non-marital child bearing), and the fertility-behavior-related ideal number of children variable. These variables improved the explained variance in fertility variance by 12 percentage points with the R-squared increasing to 0.62. Marriage above 20 years of age had the strongest negative effect on CEB in the entire model ($p<.001$). In other words, women who married at ages above 20 years had fewer children than those who married before age 20, which confirmed the known importance of delayed marriage for overall fertility reduction. Strangely, age at first sex had a significant but small negative effect on childbearing ($p<.001$), which was not the expected result. However, age at first birth had a small positive and significant effect on CEB ($p<.001$), and not surprisingly, women's CEB significantly increased as their ideal number of children increased ($p<.001$). It is important to note that net of the effects of all control variables, the other ethnic groups still had lower fertility relative to the Hausa/Fulani/Kanuri. This remained consistent across all models, but it was only statistically significant for the Yoruba ethnic group ($p<.05$) in this final model. The differences between the Hausa/Fulani/Kanuri and all other ethnic groups were no longer statistically significant. While the highest fertility of Muslims remained and Catholics still had marginally higher fertility compared to other Christians, religious differences in fertility were no longer significant in the final model. The final model showed no significant variation in fertility between rural versus urban residents. The net significant fertility effects of the SES variables — current age, marital status, level of educational attainment, employment status, and household wealth status — remained significant and moderate in the final model.

In table 5, we show the results from a repeated analysis similar to table 4, but only for women aged 40-49 to focus on ever married women who should best represent completed fertility. Among this group of women, ethnicity explained 14% of fertility outcomes in Model 1, while the addition of institutional variables in Model 2 improved the model fit by only a two percentage points to an R-Squared of 16%. In Model 3, the addition of SES variables improved the amount of explained variation to 24%. In the full Model 4, we added reproductive health/behavior variables, which increased the R-squared to 35%. Our bivariate analysis of women aged 40-49 over the inter-survey periods showed high levels of divergence among different subgroups, especially between 2003 and 2008, reflecting the historically high fertility regimes in the northern zone among Muslims and among the Hausa/Fulani/Kanuri ethnic nationalities.

Our multivariate analysis of the 2013 data, explained at most only 35% of the fertility variation among ever married women aged 40-49 years. This may be a reflection of increasing fertility changes beyond traditional historical cleavages, as well as increasing fertility convergence across more sub-populations than previously observed. In Model 3, net of the effects of all institutional, SES, and reproductive health/ behavior covariates, the statistically significant fertility variations between the Hausa/Fulani/Kanuri and all other ethnic nationalities were wiped out, with the exception of the Yoruba. Similarly, the significance of geopolitical place of residence disappeared for all zones except for the differences between the South East and South West. We also saw convergence between religious groups with no statistically significant fertility differences between Muslims/traditionalists/other religions, other Christians, and Catholics. While the positive effect for Muslims remained, the coefficient value was reduced by 64% from its value in Model 2 and was no longer statistically significant at the 95% confidence level. While some of these results are noticeable in our analysis of women aged 15-49, the fact that they are equally visible among the oldest cohort of women not only validates our initial results, but helps to underscore the subgroups that are ready for change and upon whom programs should focus to maximize fertility transition to achieve the desired national economic and social development goals.

Summary and conclusions

At over 5 children per woman, Nigeria's total fertility rate (TFR) remains quite high compared to the rest of the less developed countries, and although it is projected to continue to decline, there are questions about whether this decline is inevitable and whether it will continue apace. Regardless of how the fertility rate changes, Nigeria's population growth will continue through 2050 due to population momentum. Generally, Nigeria's fertility transition seems to have stalled at different levels across different subgroups of the population over the 2003, 2008, and 2013 inter-survey periods. Our analysis identified high rates of fertility among the country's subpopulations, which play a large role in this stalled and slow fertility transition. In particular, the Hausa/Fulani/Kanuri ethnic nationalities, residents of the North West and North East geopolitical zones of the country, Muslims and traditionalist religionists, the poor, and those with no formal education are linked to pre-transition fertility levels of up to 7 children per ever married woman.

Age at first sex, age at first marriage, and age at first birth for women have increased over the past decade, but they still remain fairly low in Nigeria (17.6, 18.1, and 20.2, respectively, according to the 2013 DHS; NPC and ICF International 2014). Unmet needs for family planning and pronatalist attitudes remain high. Policies must be implemented that raise average ages to reduce fertility overall. As far as high unmet needs go, the public health infrastructure (particularly the family planning and reproductive health infrastructure) is in great need of reform and improvement (Blattner et al., 2008). Confronting and assuaging Nigerian pro-natalist attitudes, particularly among men, is potentially difficult, but necessary. This requires investment in education for women and an overall focus on improving the status of women, as education is the strongest predictor of fertility outcomes in our analysis. But investment in education, particularly for women, may not make sense without a benefit in terms of employment and consequent economic mobility. Again our analysis identified the positive implications of employment for fertility reduction for women aged 15-49, although the effect disappeared in the final model for women aged 40-49, pointing perhaps to historical female disadvantage in labor force participation for older women. While variations that we found among women aged 40-49 were generally noticeable in our analysis of women aged 15-49, the fact that they are equally visible among the oldest cohort of women not only validated our initial results, but also helped to underscore which subgroups are ready for change and which programs can focus to maximize fertility transition to achieve desired national economic and social development goals.

While our results identify subgroups with high fertility outcomes within Nigeria who need targeted interventions, it also identifies groups which seem to be transitioning on their way to lower fertility regimes. We found strong effects of ideal family size, negative attitudes towards family planning by respondents and their perceived opposition by their husbands to contraception on fertility outcomes. This may be related to the neglect of family planning and reproductive health challenges by governments and global institutions in the last two decades. Our observation of expanding fertility transitions throughout some subgroups that appeared to previously be stalling reiterates support for the renewed calls for the repositioning of family planning in developing countries in the overall goal of addressing the stall in fertility decline. Building on the low levels of contraceptive prevalence and high unmet need, as well as documented evidence of subgroups who are more likely to know about, approve of and use family planning, our study identifies peoples and places ready for change, upon whom new investments in fertility reduction will more likely maximize yields in terms of enhanced family planning use and improved reproductive health (e.g., women who are highly educated, employed, from the richest households, and who live in southern Nigeria).

Finally, the demographic dividend as a potential boon for overall development was first recognized in the case of the East Asian tigers (e.g., Hong Kong, South Korea, Taiwan, Thailand). There is some debate in the literature about whether or not Africa can follow their model and capitalize on this one-time demographic bonus of a large working-age population and relatively small dependent population (World Bank, 2009; Bloom et al., 2007; Bloom et al., 1998). Although it seems a tall order — particularly for a country such as Nigeria — its population, in combination with relative wealth, could be a dynamic engine of growth if harnessed properly. The Government of Nigeria and international donors need to focus on the key challenges of investing in basic public infrastructure, including health, family planning, schools, and basic services, and of reinvesting oil profits in job creation for Nigeria to maximize the golden opportunity presented by the demographic dividend for social and economic development. The evidence of the spread of fertility decline across new territories, such as the North Central geopolitical zone, and the overall fertility transition shown by our data are encouraging signs that more push in terms of policy, program and research interventions are more likely than ever to move Nigeria in the right direction.

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Tables

Table 1. Means for continuous variables used in the models (N=26,634)

	Mean	Linearized standard error	[95% Conf. interval]
Number of children ever born	4.0	.03	[3.89 - 4.01]
Current age of woman	31.5	.04	[31.3 - 31.7]
Age at first birth	17.7	.08	[17.5- 17.8]
Age at first intercourse	15.6	.06	[15.5 15.7]
Ideal number of children	7.1	.05	[6.97-7.17]

Data Source: Nigeria Demographic and Health Survey, 2013

Table 2. Mean number of children ever born (CEB) to ever-married women aged 15-49 in Nigeria, 2003 (N=5,533), 2008 (25,363) and 2013 (N=26,634)

	CEB (2003)	CEB (2008)	CEB 2013	Stall vs. Decline (2003-08)	% Change (2003-2008)	Stall vs. Decline (2008-2013)	% Change (2008-2013)
Ethnic group							
Hausa/Fulani/Kanuri	4.2	4.4	4.4	Stall	4.8	Stall	0.0
Igbo	3.9	3.9	3.8	Stall	0.0	Decline	-2.6
Niger-Delta	4.4	3.9	3.6	Decline	-11.4	Decline	-7.6
Middle-Belt	4.1	4.1	3.5	Stall	0.0	Decline	-14.6
Yoruba	3.3	3.3	3.3	Stall	0.0	Stall	0.0
Others	4.4	4.3	3.9	Decline	-2.3	Decline	-9.6
Zone							
North Central	4.1	4.0	3.8	Decline	-2.4	Decline	-5.0
North East	4.5	4.5	4.0	Stall	0.0	Decline	-11.1
North West	4.1	4.4	4.4	Stall	6.8	Stall	0.0
South East	4.1	4.1	4.1	Stall	0.0	Stall	0.0
South South	4.3	3.9	3.5	Decline	-9.3	Decline	-10.3
South West	3.3	3.3	3.3	Stall	0.0	Stall	0.0
Religion							
Catholic	4.2	4.0	3.7	Decline	-4.8	Decline	-7.5
Protestant	3.9	3.8	3.6	Decline	-2.6	Decline	-5.3
Traditionalist	5.9	4.5	5.0	Decline	-23.7	Stall	11.1
Islam	4.1	4.2	4.2	Stall	2.4	Stall	0.0
Other	2.9	4.8	4.0	Stall	65.5	Decline	-16.7
Education							
None	4.5	4.6	4.5	Stall	2.2	Decline	-2.2
Primary	4.4	4.4	4.4	Stall	0.0	Stall	0.0
Secondary	2.9	3.1	3.0	Stall	6.9	Decline	-3.2
Higher	3.0	2.7	2.6	Decline	-10	Decline	-3.7
Place of residence							
Rural	4.2	4.2	4.1	Stall	0.0	Decline	-2.4
Urban	3.9	3.6	3.7	Decline	-7.7	Stall	2.8
Age at marriage							
Married above 20	4.4	3.2	3.1	Decline	-27.3	Decline	-3.1
Married below 20	3.0	4.4	4.3	Stall	46.7	Decline	-2.3
Husband opposed to FP							
Yes	5.4	4.8	5.1	Decline	-11.1	Stall	-6.3
No	5.2	5.0	3.9	Decline	-3.8	Decline	-22

Table 2. Mean number of children ever born (CEB) to ever-married women aged 15-49 in Nigeria, 2003 (N=5,533), 2008 (25,363) and 2013 (N=26,634) (cont.)							
Respondent opposed FP							
Yes	5.4	5.1	4.9	Decline	-5.6	Decline	-3.9
No	5.2	4.9	3.9	Decline	-5.8	Decline	-20.4
Household wealth status							
Poorest	4.6	4.3	4.6	Decline	-6.5	Stall	7.0
Poor	4.4	4.6	4.2	Stall	4.3	Decline	-8.7
Middle	4.2	4.3	4.1	Stall	2.4	Decline	-4.7
Rich	4.1	3.8	3.8	Decline	-7.3	Stall	0.0
Richest	3.2	3.2	3.0	Stall	0.0	Decline	-6.3
Total	**4.1**	**4.1**	**4.0**	**Stall**	**0.0**	**Decline**	**-2.4**

Data Source: Nigeria Demographic and Health Survey, 2003, 2008 and 2013.

Table 3. Mean number of children ever born (CEB) to ever married women aged 40-49 in Nigeria 2003, 2008, and 2013

	CEB 40-49 (2003)	CEB 40-49 (2008)	CEB 40-49 (2013)	Stall vs. Decline 2003-2008	% Change 2003-2008	Stall vs. Decline 2008-2013	% Change 2008-2013
Ethnic group							
Hausa/Fulani/Kanuri	6.9	7.6	7.7	Stall	10.1	Stall	1.3
Igbo	6.5	5.9	5.7	Decline	-9.2	Decline	-3.4
Niger Delta	7.4	6.3	5.5	Decline	-14.7	Decline	-12.7
Middle Belt	7.6	6.6	5.9	Decline	-13.2	Decline	-10.6
Yoruba	5.4	5.0	4.7	Decline	-7.4	Decline	-6.0
Others	7.2	7.1	6.2	Decline	-1.4	Decline	-12.6
Zone							
North Central	7.4	6.4	5.8	Decline	-13.5	Decline	-9.4
North East	7.4	7.5	7.0	Stall	1.4	Decline	-6.7
North West	6.7	7.7	7.6	Stall	14.9	Decline	-1.3
South East	6.8	6.0	6.0	Decline	-11.8	Stall	0.0
South South	7.1	6.3	5.3	Decline	-11.3	Decline	-1.6
South West	5.5	5.0	4.8	Decline	-9.1	Decline	-4.0
Religion							
Catholic	7.0	6.3	5.8	Decline	-10.0	Decline	-7.9
Other Christian	6.5	5.8	5.3	Decline	-10.8	Decline	-8.6
Islam	7.0	7.3	7.2	Stall	4.3	Decline	-1.4
Traditionalist	7.4	6.7	7.1	Decline	-9.5	Stall	6.0
Education							
None	7.1	7.3	7.3	Stall	2.8	Stall	0.0
Primary	7.1	6.6	6.3	Decline	-7.0	Decline	-4.5
Secondary	5.6	5.3	5.0	Decline	-5.4	Decline	-5.7
Higher	4.6	4.2	4.1	Decline	-8.7	Decline	-2.4
Place of residence							
Urban	6.3	5.8	5.6	Decline	-7.9	Decline	-3.4
Rural	7.1	7.0	6.8	Decline	-1.4	Decline	-2.9
Age at marriage							
Married above 20	5.3	5.1	4.8	Decline	-3.8	Decline	-5.9
Married below 20	7.3	7.3	7.1	Stall	0.0	Decline	-2.7
Husband opposed FP							
Yes	5.4	8.1	7.6	Stall	46.3	Decline	-6.2
No	5.2	7.1	6.3	Stall	36.5	Decline	-11.3
Respondent opposed FP							
Yes	5.4	7.5	7.3	Stall	38.9	Decline	-10.7
No	5.2	7.1	6.3	Stall	36.5	Decline	-11.3
Household wealth status							
Poorest	7.2	7.3	7.6	Stall	1.4	Stall	4.1
Poor	7.2	7.3	7.2	Stall	1.4	Decline	-1.4
Middle	6.8	6.8	6.5	Stall	0.0	Decline	-4.4
Rich	7.1	6.4	5.7	Decline	-9.9	Decline	-10.9
Richest	5.7	4.9	4.5	Decline	-14.0	Decline	-8.2
Total	**6.8**	**6.5**	**6.1**	**Decline**	-4.4	Decline	-6.2
N	**1,301**	**5,899**	**6,351**	-	-	-	-

Table 4. Linear regression using OLS estimators of various characteristics on total children ever born to ever married women aged 15-49, DHS 2013, Nigeria.

	Model 1			Model 2			Model 3			Model 4		
	Coef.	Linear. Std. Err.	p	Coef.	Linear. Std. Err.	p	Coef.	Linear. Std. Err.	p	Coef.	Linear. Std. Err.	p
Ethnicity												
Hausa/Kanuri/Fulani (reference)	-	-	-	-	-	-	-	-	-	-	-	-
Igbo	-0.54	.10	***	-0.36	.12	**	-0.38	.11	***	-0.05	.10	
Niger-Delta	-0.73	.09	***	-0.57	.11	***	-0.15	.11		-0.11	.10	
Middle-Belt	-.086	.10	***	-0.76	.11	***	-0.30	.11	**	-0.11	.10	
Yoruba	-1.06	.07	***	-0.94	.08	***	-0.61	.13	***	-0.22	.10	*
Others	-0.46	.08	***	-0.37	.09	*	-0.10	.12		-0.01	.08	
Religion												
Catholic (reference)				-	-	-	-	-	-	-	-	-
Other Christian/Protestant				-0.71	.20	***	-0.12	.11		-0.12	.11	
Islam				-0.89	.19	***	0.37	.18	**	0.18	.10	
Attitudes towards family planning												
Respondent opposed				0.77	.10	***	0.50	.06	***	0.34	.06	***
Husband opposed				0.94	.13	***	0.63	.08	***	0.57	.08	***
Rural residence							0.04	.04		0.06	.04	
Age							0.22	.00	***	0.21	.00	***
Currently married							0.93	.06	***	0.87	.06	***
Zone												
South West							-	-	-	-	-	-
North Central							.12	.08		0.02	.07	
North East							.34	.10	***	-0.05	.09	
North West							.55	.10	***	0.10	.09	
South East							.37	.11	***	0.16	.09	
South South							-.01	.11		-.05	.07	

Table 4. Linear regression using OLS estimators of various characteristics on total children ever born to ever married women aged 15-49, DHS 2013, Nigeria (cont.)												
Highest educational attainment												
No education							1.30	.07	***	0.56	.06	***
Primary education							1.40	.06	***	0.71	0.06	***
Secondary education							0.87	.06	***	0.45	0.05	***
Higher education (reference)							-	-	-	-	-	-
Employed							0.30	.04	***	0.16	.04	***
Wealth of household												
Poorest							0.84	.08	***	0.44	.08	***
Poorer							0.76	.07	***	0.42	.06	***
Middle							0.68	.06	***	0.38	.05	***
Richer							0.44	.04	***	0.22	.04	**
Richest (reference)							-	-	-	-	-	-
Married above age 20										-1.16	.04	***
Age at first sex										-.07	.00	***
Age at first birth										0.04	.00	***
Ideal number of children										0.15	.01	***
Constant	4.40	.05	***	4.11	.08	***	-6.16	.15	***	-4.86	.14	***
N	26,643			26,643			26,643			26,643		
R-squared	0.02			0.03			0.54			0.62		
*** p≤.05; ** p≤.01; *** p≤.001**												

Table 5. Linear regression using OLS estimators of various characteristics on total children ever born to ever married women aged 40-49, DHS 2013, Nigeria.

	Model 1			Model 2			Model 3			Model 4		
	Coef.	Linear. Std. Err.	p	Coef.	Linear. Std. Err.	p	Coef.	Linear. Std. Err.	p	Coef.	Linear. Std. Err.	p
Ethnicity												
Hausa/Kanuri/Fulani (reference)	-	-	-	-	-	-	-	-	-	-	-	-
Igbo	-1.99	.18	***	-1.25	.23	***	-0.93	.33	**	-0.32	.29	
Niger-Delta	-2.18	.16	***	-1.49	.21	***	-0.42	.32		-0.32	.28	
Middle-Belt	-1.77	.13	***	-1.33	.22	***	-0.63	.30	*	-0.27	.26	
Yoruba	-2.99	.13	***	-2.51	.16	***	-1.08	.28	***	-0.47	.27	
Others	-1.45	.18	***	-.97	.21	***	-0.33	.27		-0.11	.24	
Religion												
Catholic (reference)					-	-	-	-	-	-	-	-
Other Christian/Protestant				-.69	.31	*	-0.35	.30		-0.40	.31	
Islam				1.46	.28	***	0.73	.25	**	0.52		
Attitudes towards family planning												
Respondent opposed				0.85	.16	***	0.73	.15	***	0.62	.14	***
Husband opposed				0.97	.19	***	0.86	.19	***	0.79	.18	***
Rural residence							0.06	.19		0.04	.10	
Age							0.14	.01	***	0.13	.01	***
Currently married							0.98	.11	***	0.85	.11	***
Zone												
South West (reference)							-	-	-	-	-	-
North Central							0.05	.19		-0.00	.16	
North East							0.55	.29		0.05	.26	
North West							0.90	.27	***	0.24	.24	
South East							0.84	.25	***	0.43	.21	*
South South							-0.04	.23		-0.10	.18	

Table 5. Linear regression using OLS estimators of various characteristics on total children ever born to ever married women aged 40-49, DHS 2013, Nigeria (cont.)												
Highest educational attainment												
No education							1.15	.17	***	0.47	.14	***
Primary education							1.52	.15	***	0.90	.13	***
Secondary education							0.76	.13	***	0.43	.11	***
Higher education (reference)							-	-	-	-	-	-
Employed							0.26	.15		0.11	.13	
Wealth of household												
Poorest							1.20	.20	***	0.76	.18	***
Poorer							1.21	.17	***	0.85	.15	***
Middle							0.99	.15	***	0.67	.14	***
Richer							0.53	.12	***	0.35	.10	***
Richest (reference)							-	-	-	-	-	-
Married above age 20										-1.02	.11	***
Age at first sex										-0.07	.01	***
Age at first birth										0.02	.01	
Ideal number of children										0.25	.02	***
Constant	7.66	.10	***	6.80	.18	***	-3.22	-69	***	-2.22	.68	***
N	**6,351**			**6,351**			**6,351**			**6,351**		
R-squared	**0.14**			**0.16**			**0.24**			**0.35**		
*** p≤.05; ** p≤.01; *** p≤.001**												