Two-tier Fertility Decline in Nigeria: The Growing Discrepancy between Muslims and Christians

Abstract

At nearly 170 million inhabitants, Nigeria is Africa's most populous country by twofold and fertility levels remain higher than most other sub-Saharan African nations. Throughout the last several decades, the fertility gap between Christians and Muslims has grown, causing demographers to question the proximate causes for observed divergent trajectories. Where the Demographic and Health Survey (DHS) of 1990 revealed a non-significant difference of .3 children, this figure had increased to 2.3 children by 2008. As the total fertility rate (TFR) of Christians decreased significantly from 6.1 to 4.7 children per woman between 1990 and 2008, the TFR of Muslims increased from 6.4 to 7.1 children per woman. It is particularly interesting to note that the timing of this divergence coincides with the formal institutionalization of Sharia law over the course of several years following the 1999 return to civil rule and subsequent reinstatement of constitutional law. We ask whether "sharia culture" is a reason for stalling fertility decline among the Muslims in the north of the country. We examine the role of religion on education, contraception, and family behavior. Finally, we touch upon the implications for population growth and the religious composition of Nigeria in the coming decades.

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Introduction

At nearly 170 million inhabitants, Nigeria is Africa's most populous country by twofold and is on pace to have one of the largest populations in the world. It is also one of the most divided, with a great number of differences between groups of diverse linguistic and ethnic backgrounds (Katzner, 2002; Lieberman & McClendon, 2013). Nigeria is the only state in the world with equal proportions of Christians (49.3% in 2010), mainly located mainly in the South, and Muslims (48.8%) (PEW, 2012) who are living mainly in the Northern regions of the nation. The balance between the two dominant religions, however, is likely to shift in the future as a result of distinctly different trajectories of demographic change. While the Muslim North is currently in an early phase of demographic transition with very high fertility rates, fertility rates of Christians and Muslims in the South are on decline and the demographic transition is underway. These diverging trajectories in demographic behavior can lead to the end of the current equilibrium between the two religious with significant implications for the future of the country. Within this study we examine possible reasons for divergent population trajectories along religious lines as well as the path that these trajectories may potentially take in the future.

As with several other Western African countries, ethno-regional and religious divides largely overlap in Nigeria and are manifested in a pronounced North-South gap (Mancini, 2009). Here, inequalities have emerged along north/south and ethnic divisions as well as along socioeconomic lines between nomadic herdsmen and farmers (for environmental drivers of conflict in Nigeria, see e.g. Fasona & Omojola, 2005). While ethnic divides were of great importance in the past, a religious divide now appears to be becoming more pronounced as religious tensions compound traditional ethnic and geopolitical rivalries, magnifying underlying insecurities and grievances.

The past decade has seen increasing reports of sectarian violence in Nigeria's Middle Belt where ethnic and religious communities meet. And in an ominous sign of things to come, these attacks have been increasingly framed in terms of religious conflict. Religious unrest following the implementation of Sharia law in 12 Northern states has resulted in thousands of deaths in Kaduna state alone and an escalation of hostilities along ethnic and religious lines (Barker & Ricardo, 2005, p. 33). This drastic shift is reflected in the Pew Research Center's Social Hostilities Index which has documented a surge from 4.4 to 8.5 on a 10-point scale between 2007 and 2012 – one of the highest scores in the world. Attacks on Christians and moderate Muslims by the militant group Boko Haram, which translates literally to "Western Forbidden", may be orchestrated with the goal of stoking religious tensions between the predominately Christian Igbo in the South and Hausa-Fulani Muslims in the North, with the Yoruba in the West representing a mix of Christianity and Islam.

The history of Islam in Nigeria dates back to the 11th century when traders introduced the religion to the present day region of Borno, spreading to Hausa city-states during the 15th century, and gaining significant influence during the Fulani expansionism of the 18th century (Ostien & Dekker, 2010). Christianity was more recently introduced to the South by missionaries during the colonial era in the 19th century. While the relative similarity in size between Muslims and Christians populations emerged only during the past 40 years, Muslims have never been a clear majority in a united Nigeria[1] (Mi, 1987). This situation may soon be relic of the past as we identify an ongoing demographic bifurcation that could

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significantly change the religious composition of Africa's demographically largest nation, and may radically change population outcomes.

Within the context of an ethnically and religiously diverse country such as Nigeria, a newfound emphasis on religious identity coupled with religion-specific fertility differentials could carry significant political and economic implications. Indeed, Mazrui (1994) finds that religious divisions in sub-Saharan Africa are most likely to lead to conflict when they reinforce underlying ethnic differences, precisely the situation we now observe in Nigeria. It is particularly important to note that the emergence of militant Islamic sects and potential spread of Sharia to additional states is potentially a response to the growing North/South gap and perceived political dominance of the South (Isa, 2010). Indeed, while its implementation has ignited hostilities particularly in the border states making up the Middle Belt, Sharia law was being applied to Muslims in most Northern states long before its formal institutionalization (Ostien & Dekker, 2010). Our discussion of possible mechanisms will thus examine Sharia both as a symptom of stagnating modernization as well as a driver of falling educational levels among other fertility related factors.

The Increasing Gap in Religion-specific Fertility in Nigeria

Using Demographic Health Survey (DHS) surveys[2], in this study we identify religion based fertility differentials and project potential demographic futures based on a number of scenarios. We find that the total fertility rate (TFR) of Christians decreased significantly from 6.1 to 4.7 children per woman between 1990 and 2008 while the TFR of Muslims increased from 6.4 to 7.1 children (Figure 1)[3]. A religious divide is also evident along regional lines with Christians comprising a mere 6% of the population in the Northern regions while about 30% of Muslims reside in the Southern states (DHS 2008).

Figure 1 about here

The timing of the divergence in fertility trends coincides with the formal introduction of Sharia law over the course of several years following the 1999 return to civil rule and subsequent reinstatement of constitutional law (Kendhammer, 2013; for an overview see e.g., Oba, 2002; Ostien & Dekker, 2010). We observe that in stark contrast with the North, Southern Nigeria has exhibited progress in fertility transition among both Christians and Muslims. Our evidence from Sharia law in Table D confirms this – from 1990 to 2008, Muslim fertility rose from 6.4 to 7.8 in the 12 states where Sharia has been implemented while fertility fell from 6.4 to 5.4 among Muslims in non-Sharia states (Table 1).

Table 1 about here

Note: Sharia was introduced as source of civic and criminal law from 1999. Thus, DHS 1990 indicates results in pre-Sharia law states. (*) Because of small number of observations it was not possible to calculate TFR for Christians in Sharia states in 1990

Thus, the widening gap in fertility of Christians and Muslims can be seen as a result of persistent high fertility and pronatalist culture among Muslims in Sharia law states contrasted with a progressing

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fertility transition among Christians and moderate Muslims residing in the Southern states. As discussed in the next section, we hypothesize that the adoption of Sharia and societal norms related to its practice sustains high fertility culture and contributes to increasing fertility differentials.

Islam, Sharia, and Family Behavior

The institutionalization of Sharia law to 12 Northern States beginning in 1999 and consequent subjugation of English legal system represented a return to Islamic primacy which has not been observed since the precolonial period (Ostien & Dekker, 2010). The spread of Sharia law and extended jurisdiction to cover criminal as well as civil matters represents the gradual and some would argue inevitable decline of the system of common law that was imposed on Nigeria during colonialism (Oba, 2002). Indeed, Sharia law was already being carried out among Nigerian Muslims in regards to civil/personal law prior to the official proclamation (Nmehielle, 2004). In this sense, the return of Sharia law can be viewed as symptomatic of preexisting societal preferences as well as emblematic of a nascent movement away from Western conceptions of law, education, and the secular state.

Despite its revival in the North, Sharia law has not yet supplanted customary personal law in the Southern states of Nigeria nor is it practiced among Muslims (Ostien & Dekker, 2010). Thus, although customary law often reflects the influence of Islamic law, the norms and procedures regulating marriage and divorce in the South have remained uncodified and thus largely contingent on local customs. Strict adherence to Sharia law could imply a lack of sexual health education and/or suspicion toward Western forms of contraception, as well as the relatively low educational levels among young girls. Mazrui (1994) outlines several ways in which Islamic fundamentalism can affect fertility such as conservatism, distrust of the west, association of contraception with prostitution, Quran based fatalistic attitudes regarding procreation, attitudes toward polygyny and large families, subversion of traditional birth spacing, and large age gap between husbands and wives. While these factors may impact fertility, we will focus primarily on the interplay of Sharia, education, and contraception and its implications for differential North/South fertility levels.

Sharia law and the implicit societal norms associated with its practice can influence fertility levels through a number of indirect and direct causal avenues including lowered age of marriage as well as outright prohibitions on education. While there is variation among different schools of thought, puberty marks the age of marriage for young girls under classical Sharia (Rehman, 2007). In addition to the increased prevalence of pregnancy and implications for attending school, child brides are frequently forbidden from attending school or lack the time to continue their education (Warner, 2004). A low marriage age thus results in higher fertility by increasing the probability of pregnancy while precluding assess to education that could result in lower fertility preferences (Westoff et al., 1992). Disparate age differences are also conducive to increased patriarchy, resulting in increased male control over contraceptive practices and reproductive behavior which evidence suggests leads to higher realized fertility (Bankole & Singh, 1998; Ezeh et al., 1993; Isiugo-Abanihe, 1994).

Societal norms, patriarchy, and a resistance towards Western influence – which are sustained by Sharia law - seem to play a role in high fertility culture among the Muslims in Northern Nigeria. High fertility of

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Muslims in the Sharia states is coupled with their persistently high fertility ideals (Table 2). More than 35% cited 10 or more children as ideal and only 5% were in favor of smaller families with 3 or 4 children. In contrast, DHS shows a trend towards somewhat lower fertility ideals among Christians and to a lesser extent among the Muslims in Sharia states. Muslims residing in non-Sharia states not only have lower TFR but also differ to those in the Sharia states in their perception of ideal number of children with fewer having a preference for 10 or more children and more frequently citing 3-4 children as ideal. Another striking difference is a high proportion of non-numeric responses to this question among Muslims in Sharia states. This may represent fatalistic views but can also indicate the perception of lacking control over one's fertility and the fact that women frequently do not have the power or right to influence fertility outcomes. Extremely low contraceptive prevalence and a high proportion of non-users not intending to use family planning in future (discussed later in this paper) speak in favor of high fertility ideals and unlimited fertility.

Table 2 about here

Note: DHS 1990 cannot be used due to differently phrased response options. In 1990 category "God's will" was explicitly stated but in 2003 and 2008 it was removed and non-numeric response is recorded only if numeric is not given after probing. As a result the fraction of non-numeric responses dropped from more than 50% to about 10%.

The high fertility gap between Muslims and Christians can be linked to differences in mean age at marriage and more widespread practice of polygyny. Our findings confirm that mean age at first marriage remains very low, at about 15 years for Muslim women in the Sharia states across all waves of DHS (1990-2008). Muslim women residing in non-Sharia states marry at about 18, while the mean age at first marriage has significantly increased from 18 to 20 years of age among Nigeria's Christians during 1990-2008. We also see a decline in polygyny among Christians while the decline in polygynous marriages has halted in the Sharia states according to 2003 and 2008 DHS. One of the underlying mechanisms behind the changes in reproductive and marital behavior is education. As we show in the next section, education levels among Christian women increased, while education levels among Muslim women in the Sharia states remain low. Modernization in the form of rising education levels, higher contraceptive use, and lower desired fertility may have contributed to declining fertility in the largely Christian South. Concurrently and potentially in response to this development, anti-Western attitudes and growing fundamentalism in the largely Muslim North may have resulted in low education levels, early marriage age, and retention of pronatalist beliefs.

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Education

Educational attainment is conventionally cited in explanations of differences in fertility. Numerous studies find a negative relationship between fertility and educational attainment. Can improvements in educational levels explain variation in fertility levels and the opening gap between Muslims and Christians in Nigeria? As shown in Figure 1, we observe a widening gap in TFR by religion and also diverging trends over time, with Christian fertility on decline and Muslim fertility on the rise. If trends in education were to explain these differences, we should observe a/ higher educational levels of Christians compared to Muslims, and b/ educational improvement among Christians as opposed to stalling education or even worsening educational characteristics of Muslim women.

Nigeria witnessed educational expansion since the 1970s upon introduction of mandatory primary schooling. Enrollment at primary levels translated into increasing completion of secondary and higher education[4] but this seems to be limited to the majority Christian South. As expected, we find huge differences in educational attainment between Muslim and Christian women in reproductive age (Figure 2). In 2008 only 10% of Christian women aged 15-49 had no education and a majority attained at least lower secondary education (57%). In contrast, 2/3 of Muslim women had no formal schooling in 2008, a modest improvement compared to 83% in 1990. Furthermore, the gap in completed mean years of schooling (MYS) between Christian and Muslim women increased from 4.0 to 5.9 years during 1990-2008 despite significant gains by non-Sharia state Muslims (Table 3). Consistent with the theoretical impact of Sharia on female educational attainment, the data show that this growing rift is driven entirely by stalled educational gains among Sharia state Muslims, 70% of which lack any formal education (DHS 2008 final report).

Figure 2 about here

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Table 3 about here

As noted above, a large proportion of the population in the Islamic North remains uneducated, resulting in a growing educational gap between Christians and Muslims. The gap in educational attainment is partly sustained by the persistent perception of Western education as being anti-Islam (Csapo, 1981). (Lincove, 2009) found a significant effect of religion on school attendance and Kazeem et al. (Kazeem, Jensen, & Stokes, 2010) show that children from Christian households are five times more likely to attend school compared to those from Muslim households. In particular, female education remains at very low levels and it is accompanied by a mean marriage age that has remained at about 15 years in all waves of DHS[5] for Muslim women in the Sharia states. Studies also suggest that many Muslim parents prefer their daughters to attend traditional Islamic schools, because it guarantees preserving religious values and traditional female roles (Ogunjuyigbe & Fadeyi, 2002). Indeed, Adiri et al. (2010) indeed find that a Quranic education is more common than other types of school among Muslim women (49.5%).

The expected inverse relationship between education and fertility (Skirbekk, 2008) holds. We find that that fertility is lower among the better educated in both religions (Figure 3). Among Christians, those with primary or less education had at least 6 children in 2008, while those with at least secondary only have 4 children. Between 1990 and 2008, fertility fell with roughly half a child for all educational groups among Christians. Overall, fertility levels were more than one child higher among Muslims compared to Christians within all educational groups.

However, TFR rose substantially among Muslims in the period 1990-2008. We find the most pronounced increase among those with no education, a smaller increase for those with at least some primary education, and stalled fertility among women with at least completed lower secondary education. This has taken place in spite of modest improvement in educational attainment of Muslim women (Figure 2). Thus, trends in education do not explain change in fertility and the widening gap between Christians and Muslims. As can be seen from Table 4, the structural effect of increased education depressed fertility of Muslims by -0.2 children per woman. However, fertility increased by 0.9 children per woman once education is controlled for, using a two-component decomposition of fertility change among Christians and Muslims (see Appendix A1, Retherford & Thapa, 2004). Therefore, other factors, such as possible changes in contraceptive use and possibly introduction of Sharia law in 12 states since 1999, stand behind the increased Muslim fertility in Nigeria.

Figure 3 about here

Table 4 about here

Contraception

Past research has found that contraceptive use is more common among Christian women than Muslim women in Nigeria (Adebowale, Fagbamigbe, & Bamgboye, 2011). Our analysis reveals that among currently married or cohabiting Christian and Muslim women in Nigeria, there is an increase in

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contraceptive practice (either using modern or traditional methods) in non-Sharia states. Despite this modest increase, only around 16% of women of reproductive age use modern contraception (see Table 5). Among all Christians, the proportion of currently married women not using any method to prevent pregnancy has declined from 88% to 75% between 1990 and 2008. The fraction of non-users has also declined among Muslims in non-Sharia states from 92% to 80%. In contrast, contraceptive use among Muslim women in states where Sharia law has been introduced since 1999 has remained negligible and a vast majority of married women do not use any method of birth control. The proportion of non-users slightly declined towards 2003 among the younger women aged 15-34 years; however, this trend reversed between 2003 and 2008 and it is possible that the introduction of Sharia law influenced the trend reversal.

Table 5 about here

Further examination of the DHS surveys reveals that women in Sharia states perceive unmet need for family planning. The proportion of non-users who intend to use or are unsure about using some method of birth control in the future has increased among all groups, including Muslim women in Sharia law states. The proportion of non-users who do not intend to use any method of birth control has dropped to 40% for Christians and 49% among the Muslims in non-Sharia states in 2008. The proportion also declined among the Muslim women in Sharia states, although it remains much higher (at 69%) than among the other groups, see Table 6.

Table 6 about here

The main reason given for not intending to use any birth control in the future (by the non-users who do not intend to use any birth control) has shifted from *wanting as many children as possible*, which was the most prominent reason given by the Muslim women from Sharia states, towards *opposition to contraception* in the period from 2003 to 2008, see Table 7. This shift is visible for both Christians and Muslims in Sharia states. The growth in opposition to contraception, from 25% to 28% among Christians and 17% to 38% among Muslims may be related to an internalization of religious teachings – both Christian and Islamic - concerning birth control. A smaller proportion of the respondents explicitly cited religious prohibition as the main reason for not using birth control in the future. Religious prohibition was cited more frequently by Muslims (9% in 2003 and 10% in 2008) than by Christians within which the share actually declined (from 6% in 2003 to 3% in 2008).

Compared to 2003, more Muslim non-users from Sharia states cited husband's opposition to birth control – up from about 4% to 15% in 2008, while Christians saw a stagnation of around 6%. Due to this shift towards presumably more direct pressure not to take contraception, fewer cited disapproval of others as influential in their decision. This suggests that both the internalization of attitudes leading to disapproval of birth control and social pressure against use may have intensified in Northern Nigeria. Moreover, this shift is consistent with a significant body of literature documenting the pivotal role male fertility preferences play on fertility decisions in Nigerian society, particularly among the Hausa ethnic group predominant in Northern Nigeria (Bankole & Singh, 1998; Duze & Mohammed, 2007; Isiugo-Abanihe, 1994; Izugbara, Ibisomi, Ezeh, & Mandara, 2010).

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Table 7 about here

Another difference between all Christian and Muslim non-users in Sharia states is illustrated in the reason for intention not to use contraception in the future. Here we observe that among Christians the rationale for not intending to use is more frequently related to barriers such as lack of knowledge or a lack of access to contraception (e.g., due to high price, no access, or heath concerns). The aforementioned reasons have been increasingly cited by Christian non-users, by about 43% compared to about 17% of Muslims non-users in 2008 (this percentage has not fluctuated). We assume that respondents citing barriers-related reasons are not principally opposed to birth control. If so, a larger proportion of Christian and a smaller proportion of Muslim women would intend to use some methods of preventing pregnancy if they were better informed, had financial means to buy contraceptives, and had more available access to facilities offering methods of family planning[6].

Regression Model

Thus far we have examined several factors such as education and marital behaviors that differ between Christians and Muslims, potentially influencing the fertility outcomes of these groups. The question now arises whether religion per se is associated with fertility outcomes when controlling for the factors mentioned above. Both religions belong to Abrahamic faiths that have pronatalistic leanings in their teaching and interpretations. What is the relative influence on fertility of these two religions? And as religion increasingly enters into the public and political domain, how has the formal institutionalization of Sharia law and its impact on societal norms affected reproductive outcomes.

We carry out regression models for count outcomes to verify the importance of religion and introduction of Sharia law in states of Nigeria on fertility outcomes[7]. Our dependent variable is total number of children born to a female during the 5-year period before the time of interview from the 1990, 2003, and 2008 DHS survey. This specification allows us to compare fertility outcomes before the formal introduction of Sharia law (period 1985-1990) and then when the law system was already introduced in the Northern states (2003-2008). Because of different time of exposure to have children (some females were too young to have children during the whole period), we use the Poisson model with rates controlling for exposure[8].

As main explanatory variables, we include the respondent's *religion* (Christianity, Islam, or Other religion) and an indicator showing if a state introduces *Sharia law* during the period under consideration. This is done by introducing fixed effect through dummy variables. To verify if fertility outcomes are positively related with introduction of Sharia law, or with religion on the aggregated level, we introduce interactions between the indicator of Sharia and the period. If Sharia law indicator was positively related with number of children before introduction of Sharia law, i.e. in case of available DHS surveys in 1985-1990, this would indicate that religion on the aggregated level is related to fertility, but not with Sharia law (institutionalization of Sharia law occurred later in states with Islam as a dominant religion). Furthermore, in modelling we include other independent variables by using dummy variables:

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age (5-year age groups), *marital status* (married, non-married), *education of female* (no education, primary, secondary, and more), and a variable that indicates *type of residence* (urban, rural).

In Model 1, we present results with religion and period variables taken into account (see Table 8). Model 2 consists of an indicator of Sharia states, interactions between sharia indicator and year, and background variables (age, education, marital status, and geography). In Model 3, we present results with all variables under consideration.

Results from Model 1 show that Muslims have higher fertility than Christians in Nigeria, and fertility slightly decreased during the period under consideration. However, when controlling for the background factors and indicator of Sharia state (Model 3), there is no significant association between religious affiliation and fertility outcomes.

We find that introduction of Sharia law has a statistically significant, positive effect on fertility outcomes and that the effect of Sharia changes over time. Before introduction of the law in Northern Nigeria (in our data – before 1990), there was negative effect of the variable on fertility outcome (around 13%). This indicates that the fertility was lower in the states in which the law was introduced later, if all other variables remain constant. However, in the period after the law was established (in data, 2003 and 2008) the effect of Sharia state changed significantly. Our results suggest that fertility increases by 12-14% for females who live in Sharia states in 2003 and 2008.

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Table 8 about here

Population Projections: Will Nigeria Become Majority Muslim Country?

We argue in the previous section that introduction of Sharia law can lead to persistent high fertility as a result of the protective role it plays in sustaining high fertility culture. High fertility of Muslim residing in Sharia law states keeps the overall fertility of Nigerian Muslims high as only 30% of Muslim population resides elsewhere (according to DHS 2008). The lack of convergence in Muslim-Christian fertility differentials will not only change the religious landscape of Nigeria, but can also affect overall population growth. If the greater fertility of Muslims is sustained, this will lead to faster population growth over time, particularly as the proportion of Muslims grows. However, if fertility rates for both Muslims and Christians were to converge and decline this would imply a lower population growth in the coming decades. We study the possible consequences of different fertility trajectories on religious composition in Nigeria using a demographic projection model that takes into account differences in fertility, intergenerational transmissions of religion, and age-distribution of religious beliefs (Skirbekk, Stonawski, Bonsang, & Staudinger, 2013; Stonawski, Skirbekk, KC, & Goujon, 2010).

The projection of population by age, sex, and religion in Nigeria is based on the demographic method of multi-state population projection that is widely accepted by technical demographers (KC et al., 2010). In order to illustrate the long term consequences of fertility differentials by religion on the religious landscape of the country, we introduce 4 scenarios in the period of 50 years, from 2010 to 2060. The scenarios only differ in terms of fertility assumptions (see figure 4):

a) in the first scenario - Fert(conv) - we assume slow convergence in fertility between Muslims and Christians from initial levels observed in 2010 that would lead to the same level and age-pattern for these groups by 2110. At each step of this scenario, TFR for the total population follows the UN medium assumptions (UN, 2011);
b) in the second scenario - Fert(c1990) – the assumption is that fertility by religion is constant during the whole projection period. This we estimate using fertility age-patterns based on the 1990 DHS and adjust them to meet baseline fertility level from the UN (UN, 2011);
c) similar to Fert(c1990) - Fert(c2008) - fertility is constant but on the level estimated from the 2008 DHS that are adjusted to be in line with the UN level in 2010-15;
d) the last scenario - Fert(o) - is designed to examine how religious composition would change if there was no difference in fertility between religious groups, and TFR of total population followed the UN medium scenario assumptions (UN, 2011).

Figure 4 about here

Because of a lack of empirical evidence on religion-specific mortality, we assume no mortality difference between religious groups. The course of change in mortality in 2010-2060 follows the 2010 UN medium assumptions. Baseline inflow and outflow of migrants in Nigeria are calculated using estimates of international migration bilateral flows (Abel, 2013). Religion of migrants was estimated using information from the Pew Research Forum's Faith on the Move project (Connor, 2012). In all scenarios we assume religious switching between Christians and Muslims. Evidence from the *Global Attitudes Project* of Pew Research suggests that around 3-4% of males and 1-2% females (both Muslims and

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Christians) convert during their life. We model this explicitly in the projections by introducing transition rates.

The results from our projection model suggest that constant fertility levels from the baseline could lead to a dramatic change in population size in Nigeria. During 50 years the population changes from 158 million in 2010 to 715 million if relative difference in fertility by religion is kept constant as observed in 2008 (Fert(c2008)), and to 678 million, if fertility differential from 1990 is used (Fert(c1990)). Fertility following the UN medium trajectory (UN, 2011) leads to 468 million people by 2060 (Fert(conv) and Fert(o)).

Besides the strong population growth, it is likely that Nigeria's population will undergo significant changes in religious composition (Figures 5 and 6). A shift away from the current balance between Muslims and Christians seems inevitable, placing the country on a clear path towards becoming a majority Muslim country in the coming decades. Even if there were no differences in fertility between the two religious groups (Fert(o) scenario), the proportion of Christians would decrease from 49.3% in 2010 to 47.7% in 2060, whereas Muslims would gain 1.6 percentage points and for the first time in the history of a united Nigeria reach a majority of 50.4%. In this scenario the differences in population structure, migration, and religious switching between Muslims and Christians have a minor impact on religious composition (Fert(o)).

Figure 5 about here

Other scenarios suggest a more dramatic change in the Muslim population and greater majority dominance. If the relative difference in fertility is projected from the 1990 level, when the differential was small, the proportion of Christians drops to 44.2% and Muslims rise to 53.6%. In a situation of more pronounced and slowly diminishing fertility gap (Fert(conv)), the share of Muslims increases to almost 60% of Nigeria's population and Christians drops to 38% in 2060. Finally, the scenario with the most pronounced fertility gap at the level of the 2008 DHS and constant fertility – Fert (c2008) TFR: Muslims-6.6, Christians-4.4] – shows that Muslim population can reach as much as 65% whereas Christians can decline to as little as 32.7%.

Figure 6 about here

We assume in our scenarios, conservatively, that the fertility differentials between Christians and Muslims could decrease or remain constant at baseline level. However, it is also possible that in the future the fertility of Christians will decrease following the demographic transition trajectory, whereas Muslim fertility would stagnate on the current level (e.g. because of lack of modernization and sustained high fertility culture). Such a divergence would lead to absolute dominance of Muslims in religious landscape of Nigeria – reaching as high as 70-80% by 2060.

Conclusion

We find that Nigeria is most likely going to become a majority Muslim country in no more than couple decades unless the differential between the Muslim and Christian fertility quickly converges in the near

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future. However, this is not likely to happen given the high fertility ideals, low prevalence of family planning, and slow educational improvements in the Muslim-dominated Northern states. Quite to the contrary, legal implementation of Sharia may sustain the high fertility culture by preventing modernization as a result of opposition towards the Western influence and increased tendencies to preserve cultural difference towards the rest of Nigeria's population.

In this regard, the institutionalization of Sharia law should be viewed as a symptom of societal preferences that have long been present throughout Northern Nigeria. It is likely however that the ongoing normalization of Sharia law will lead to greater societal pressure to conform to underlying tenets, thus reinforcing many practices contributing to higher fertility while forming a bulwark against Western influences conducive to lower fertility (on normalization, see e.g.,May & Finch, 2009). In Nigeria we are therefore witnessing the confluence of distinctly pronatalist traditions in sub-Saharan Africa (Bongaarts & Casterline, 2013) with a conservative religious ideology, a synthesis which will likely continue to result in high ideal family size and sustained higher fertility.

Nigeria is an outstanding case due to the unique balance of the two main religions and the clear divergence in demographic trends between the two. The high relevance of religion within the Nigerian context further underscores usefulness of considering religion in demographic studies. According to the 2008 Afrobarometer, both Muslims and Christians claim that religion is *very important* in their life (95% of Muslims and 88% of Christians stated so). Nigerian society is divided across the religious, ethnic and regional lines (identities) with a long history of rivalry between the Muslim dominated North and recently mostly Christian South. Moreover, religion is most frequently cited reason of violent conflict in Nigeria, besides the land disputes, according to Afrobarometer (2001 and 2003). Religious conflict has intensified since the time of the survey; Boko Haram began committing atrocities in 2008 and therefore it is likely that religion has become an even more important driver of political instability.

Our projections show that should this fertility gap remain constant, the convergence scenario projects that Nigerian Muslims will have a clear 60% majority by 2060, making it one of the largest Muslim states in the world. However, it's very likely that the gap in fertility can grow even further leading to a higher share of Muslims in Nigerian society. This discrepancy can ultimately bring significant change to democratic outcomes, redefine the political dynamics between traditionally comparable religious groups, and potentially call into question power sharing agreements such as the rotating presidency. Indeed, within the context of an ethnically and religiously diverse country such as Nigeria, a newfound emphasis on religious identity coupled with religion-specific fertility differentials could very well be precursors to future sectarian conflict and carry significant political and economic implications for the region and the world.

Looking forward, there are a number of areas in which future research can cast light on the demographic situation we now see in Nigeria. Given the growing role of religion in Nigerian society, what would facilitate fertility decline in the Sharia states? In the case of Islam, the *ulema* or Islamic religious scholars have often opposed family planning and birth control. As such, international donors and relief organizations target Islamic religious leaders for advocacy and sensitization on the efficacy of accepting programs that target reproductive health issues. In contrast with Islamic opposition to birth

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control, these organizations endorse policies to reduce maternal mortality, address maternal health issues, and promote birth spacing (Gwarzo, 2011). In the case of Nigeria, it appears that more conservative strains of Islam coupled with traditional patriarchy and pronatalism will lead to sustained high fertility among Northern Sharia states. Here, our study highlights the importance of considering religion-specific demographic trends for assessing potential population growth and societal changes.

As sectarian violence and underlying distrust intensifies, viable policy options are becoming increasingly limited. The administration of Goodluck Jonathan has recently reached out to influential imams in an attempt to emphasize a less militant form of Islam and bring disaffected young men back in their communities; while Boko Haram is feared by many, the Nigerian army has developed a reputation for heavy-handed responses and is feared by many Nigerians in the North ("Worse and worse," 2014). With the growing threat of the Boko Haram insurgency, what are the implications for access to education and contraception? Educational programs explicitly designed in 1989 to target to nomadic peoples have had limited success (Aderinoye, Ojokheta, & Olojede, 2007). In the long run, more female autonomy and empowerment through education can lead to greater influence in fertility outcomes, and higher age at marriage alone implies lower fertility and a reduction in fertility gap between Muslims and Christians. From a pragmatic perspective, scaling back the current rate of population growth will allow Nigeria to pursue a more sustainable development in the future. Given the scope and multifaceted nature of the issue, it is clear that effective public policy will need to take into account a wide variety of societal factors that influence fertility outcomes in present-day Nigeria.

[1] In 1931 census, which is the earliest reliable data source we found, 38.7% of Nigeria's total population was Muslim, 37.9% Animist and mere 4.5% Christian. In 1952-53 census, the proportion of Muslims rose to 45.3% and in 1963 census to 47.2% while Christianity gain dominance over Animism (34.5% of Christians in 1963). Muslims clearly dominated in the Northern region and amounted to about 70% of the population there in 1952-53 and 1963 censuses (Mi, 1987, p. 32).

[2] We base our analysis on Demographic and Health Survey 1990, 2003 and 2008. DHS 1999 was excluded because of the oversampling and underreporting of recent births in the order of about 15% and a sample bias towards the more educated women (DHS report 1999). Thus the results of the 1999 survey diverge from the trends obtained using three other waves.

[3] TFR estimations were done using tfr2 STATA module (Schoumaker, 2013)

[4] Gross enrollment rate (GER) at primary increase from 35 to 85% in 1970-2010 and GER at secondary level rose from 5 to 44% (UNESCO - UIS database). GER are not available by regions but differences in educational attainment point towards nearly universal primary school enrollment in the Christian dominated South.

[5] In contrast, the mean age at first marriage has increased from 18 to 20 years among Christians.

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[6] Part of DHS questionnaire inspecting the presence and kind of family planning facilities in the proximity of women's place of residence was discontinued since DHS III (2003) and therefore we could not address this issue.

[7] We tested several regressions for count variables. Based on assessment of goodness of fit we chose the Poisson model.

[8] in STATA software, we use Poisson regression with exposure option.

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Tables

Table 1 Total fertility rates by religion by states in Nigeria in 1990 and 2008

Year	Sharia law states		Non-Sharia law states		Nigeria
	Christians	Muslims	Christians	Muslims	
1990	*	6.4	6.0	6.4	6.3
2008	5.5	7.8	4.7	5.4	5.8

Table 2 Ideal number of children by religion and residence (%), women 15-49, DHS 2003 and 2008

Ideal number of children	Christians		Muslims Non-sharia		Muslims - Sharia	
	2003	2008	2003	2008	2003	2008
3 to 4	35.3	39.1	29.6	33.3	6.0	4.9
5 to 9	52.5	46.0	46.9	44.2	38.9	29.0
10+	5.6	5.2	13.7	10.3	35.1	35.6
Any/God's will	4.6	5.0	8.4	3.8	18.7	16.1

Table 3 Mean years of schooling of women 15-49 by religion and region

Year	**1990**	**2003**	**2008**
Nigeria	3.1	5.1	6.1
Christians	**5.2**	**7.9**	**8.8**
non-Sharia state	*5.3*	*8.0*	*8.9*
Sharia state	*3.0*	*6.9*	*7.5*
Muslims	**1.2**	**2.5**	**2.9**
non-Sharia state	*3.7*	*5.4*	*6.2*
Sharia state	*0.4*	*1.8*	*1.6*
Christians - Muslims	4.0	5.4	5.9

Table 4 Decomposition of TFR change into educational change and fertility change

Religion	TFR		TFR change	Educational change	Fertility change
	1990	2008			
Christians	6.1	4.7	-1.3	-0.8	-0.5
Muslims	6.4	7.1	0.7	-0.2	0.9

Source: own calculations based on data from DHS 1990 and 2008[9]; computed for 5-year period prior survey.

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Table 5 Trend in % of married or cohabiting women using no contraceptive method, by religion and age

Year	All married women			Christians			Muslims in Sharia			Muslims in non-Sharia		
	15-34	35-49	***15-49***	15-34	35-49	***15-49***	15-34	35-49	***15-49***	15-34	35-49	***15-49***
1990	94.7	92.5	***94.0***	89.3	86.3	***88.3***	99.1	99.3	***99.2***	92.8	90.1	***91.8***
2003	88.2	86.1	***87.4***	77.8	73.9	***76.2***	95.5	97.5	***96.1***	83.0	82.7	***82.9***
2008	86.8	83.0	***85.4***	76.4	73.4	***75.2***	97.7	97.9	***97.8***	82.3	76.1	***80.0***

Table 6 Trends in the intentions not to use contraception among the married women not using any method to prevent pregnancy, by religion

Year	Christian	Muslim non-sharia	Muslim-Sharia	All married women
1990	55	54	81	68
2003	46	54	76	64
2008	40	49	69	55

Table 7 Attitudes towards contraception, Women aged 15-34 years

Response	Christians		Muslims (Sharia)		Total*	
	2003	2008	2003	2008	2003	2008
Wants as many children as possible	20.5	12.9	51.9	25.4	43.3	21.0
Opposed to using contraception	24.5	28.2	16.5	37.6	19.4	34.7
respondent opposed	*18.3*	*21.5*	*12.1*	*22.4*	*14.7*	*21.7*
husband opposed	*6.2*	*5.5*	*4.4*	*15.0*	*4.7*	*11.9*
others opposed	*0.0*	*1.2*	*9.0*	*0.2*	*0.0*	*1.1*
religious prohibition	5.8	2.7	9.0	9.9	8.0	8.7
Attitudes and values-related	***50.8***	***43.7***	***77.4***	***72.9***	***70.7***	***64.4***
Knowledge-related reasons	8.2	11.0	11.4	9.4	10.9	10.5
Method-related reasons	20.1	31.9	6.3	7.2	9.6	14.4
Barriers-related	***28.3***	***42.9***	***17.7***	***16.6***	***20.5***	***24.9***
Other reasons*	***8.7***	***9.1***	***2.0***	***7.7***	***3.9***	***7.6***
Does not know	***12.2***	***4.1***	***3.0***	***2.4***	***4.9***	***2.7***

* All married (or cohabiting) women not using any method to prevent pregnancy who do not intend to start using any contraception in the future

** Including other fertility-related reasons such as infertility, infrequent intercourse etc.

Note: it was not possible to show results for Muslims in non-sharia states because of small cell size. We did not use DHS 1990 because of different categories of reasons presented to the respondents.

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Table 8 Poisson regression. Dependent variable – number of children born to a female during the 5-year period before the time of interview

	Model 1 exp(b)	Model 2 exp(b)	Model 3 exp(b)
Religion			
Christians	1		1
Muslims	1.478***		1.004
Others	1.399***		1.059
Year			
1990	1	1	1
2003	0.882***	0.899***	0.901***
2008	0.918***	0.925***	0.927***
Sharia			
Non-sharia state		1	1
Sharia state		0.865***	0.868***
Interactions			
Sharia*2003		1.307***	1.303***
Sharia*2008		1.308***	1.303***
Age			
15-19		0.548***	0.548***
20-24		1.159***	1.159***
25-29		1.347***	1.347***
30-34		1.246***	1.246***
35-39		1	1
40-44		0.637***	0.637***
45-49		0.308***	0.308***
Marital Status			
Non married		1	1
Married		6.214***	6.210***
Education			
No education		1	1
Primary		1.038**	1.041**
Secondary and more		0.842***	0.845***
Geography			
Urban		1	1
Rural		1.079***	1.079***
N	49770	49770	49770
Log-likelihood	-60040	-50025	-50023
Chi2	1199	12024	12040
d.f.	4	15	17

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Figures

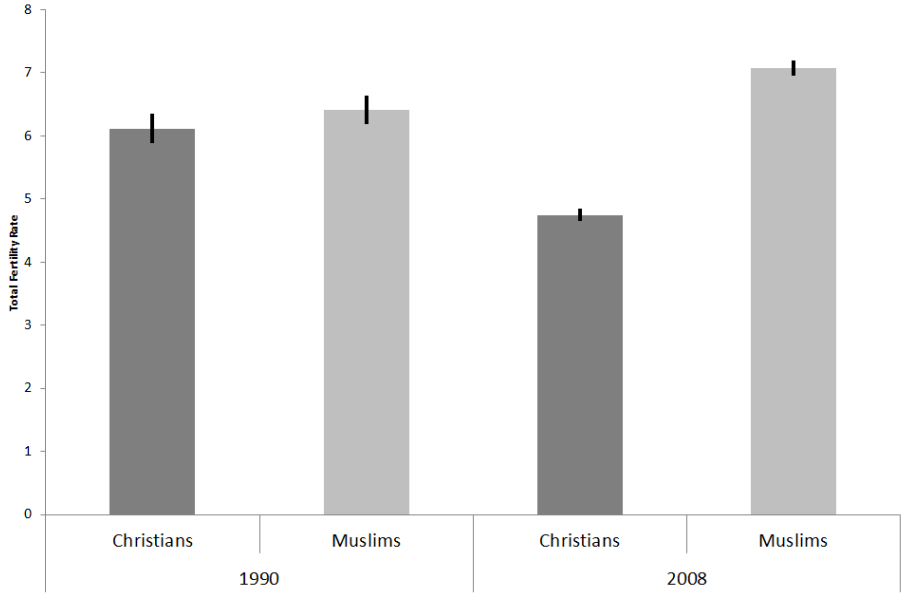

Fig. 1 Total Fertility Rate among Christians and Muslims in Nigeria in 1990 and 2008. *Note:* own estimates computed for 5-year period prior survey based on DHS 1990 and 2008; thick black lines indicate 95% confidence interval

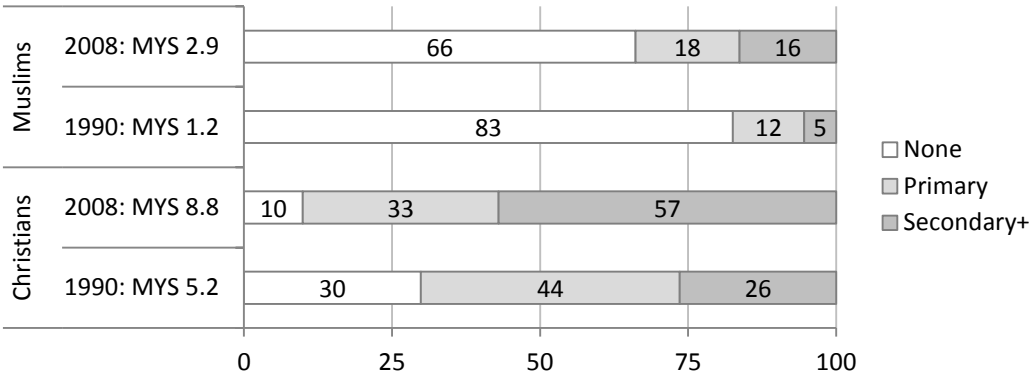

Fig. 2 Educational characteristics of women aged 15-49 by religion in 1990 and 2008. *Note:* MYS stands for mean years of schooling. The indicator was computed using duration of schooling in single years of the respondents. Secondary and higher education means that the person completed at least 9 years of schooling (lower secondary completed).

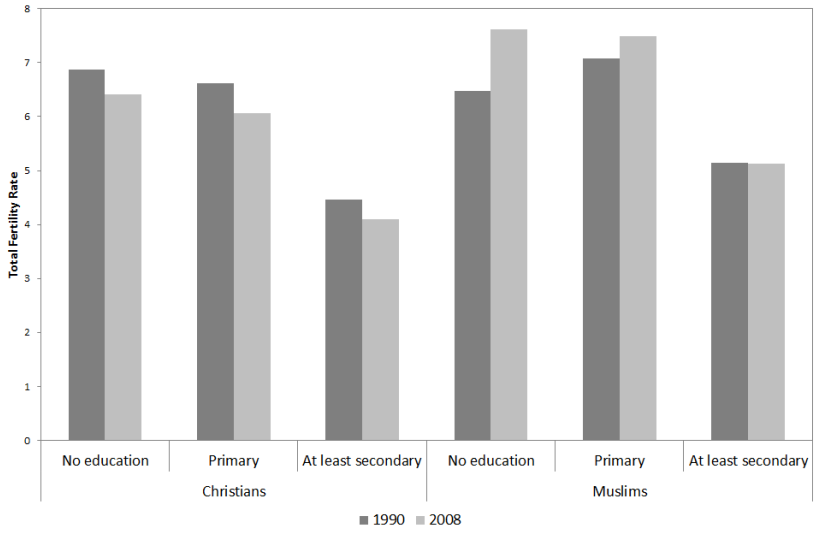

Fig. 3 Total fertility rate by education among Christians and Muslims in Nigeria in 1990 and 2008

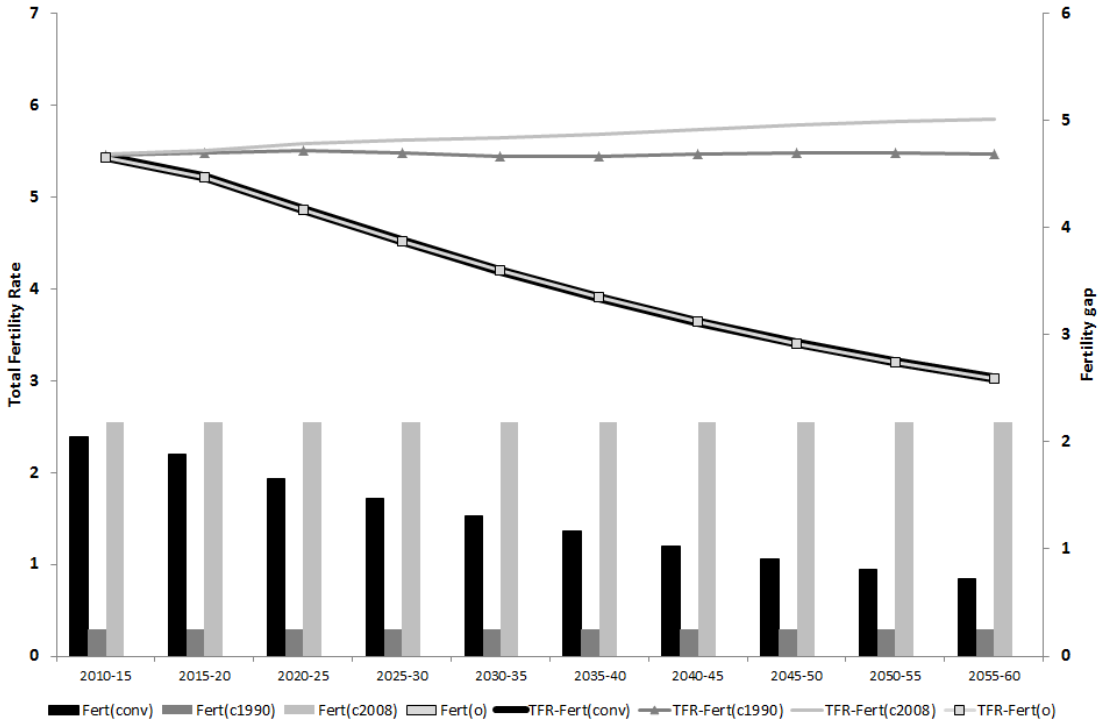

Fig. 4 Total fertility rate and fertility gap between Muslims and Christians in Nigeria in 2010-2060 by scenario. *Note:* Fertility gap = TFR(Muslims)-TFR(Christians)

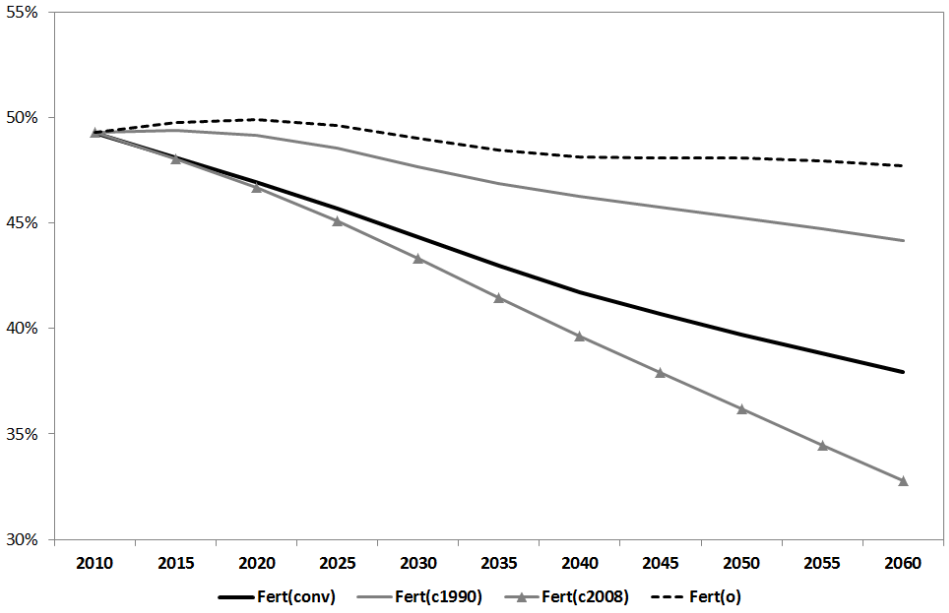

Fig. 5 Proportion of Christians in Nigeria in 2010-2060 by scenario

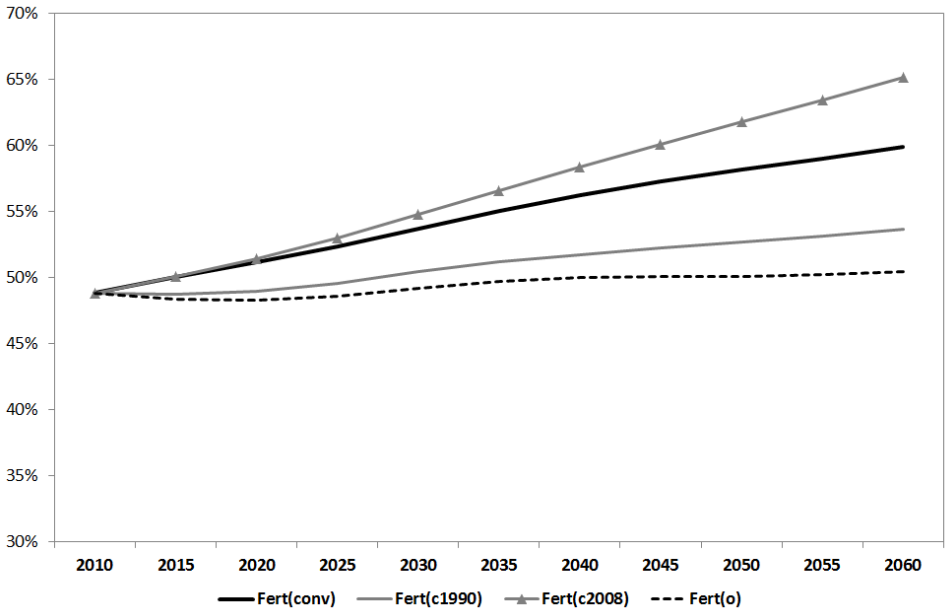

Fig. 6 Proportion of Muslims in Nigeria in 2010-2060 by scenario

Appendix

A1. Decomposition method for disentangling fertility change from educational change

Two components: (1) educational change, (2) fertility change

$$\Delta TFR = TFR(t+h) - TFR(t) = 5\sum_{a,e} ASFR_{a,e}\,(t+h) \cdot \frac{w_{a,e}(t+h)}{w_a(t+h)} - 5\sum_{a,e} ASFR_{a,e}\,(t) \cdot \frac{w_{a,e}(t)}{w_a(t)}$$

$$= 5\sum_{a,e}\left[\left(\frac{ASFR_{a,e}(t+h) + ASFR_{a,e}(t)}{2}\right)\left(\frac{w_{a,e}(t+h)}{w_a(t+h)} - \frac{w_{a,e}(t)}{w_a(t)}\right)\right]$$

$$+5\sum_{a,e}\left[\left(\frac{\frac{w_{a,e}(t+h)}{w_a(t+h)} + \frac{w_{a,e}(t)}{w_a(t)}}{2}\right)\left(ASFR_{a,e}(t+h) - ASFR_{a,e}(t)\right)\right]$$

where: $ASFR_{a,e}$ (t+h) – age specific fertility rate at age *a* and educational group *e* at time *t+h* , $w_{a,e}(t+h)$ - number of females at age *a* and education *e* at time *t+h*,

[9] We use smoothed fertility schedules by education (no education, primary, at least secondary) applying quadratic spline smoothing (Schmertmann, 2003)

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