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Signature:
Jennifer Whitmill

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Date

Comparing Total Fertility Rates by Education and Ethnicity in Niger

By

Jennifer Whitmill
MPH

Behavioral Sciences and Health Education

Delia Lang

_____

Committee Chair

Neil Mehta

_____

Committee Member

Richard Levinson

_____

Department Chair

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By

Jennifer Whitmill

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Thesis Committee Chair: Delia Lang, PhD, MPH

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Abstract

Comparing Total Fertility Rates by Education and Ethnicity in Niger
By Jennifer Whitmill

Background: The total fertility rate in Niger is 7.6, and will lead to unsustainable population growth in future decades. The demographic theory is utilized in the study as it describes the transition from high fertility to low fertility.
Objectives: This study has four objectives: 1) to determine the most recent TFR in Niger; 2) to examine whether education is associated with TFR in Niger; 3) to examine whether ethnicity is associated with TFR in Niger; 4) to determine whether education explains differences in TFR across the four major ethnic groups in Niger.
Methodology: The study was a secondary data analysis of a Demographic Health Survey database from Niger in 2006. Total fertility rates were calculated for Niger and each education group and ethnic group individually to meet objectives 1-3. Two ethnic groups were standardized by level of education attainment to meet objective 4.
Results: 1) The calculated TFR in Niger is 7.0 using 2006 data. 2) Education was associated with TFR at a secondary school level. 3) TFR varied by ethnicity and differed most between the Songhay and Hausa ethnic group. 4) Education explained very little difference between the Songhay and Hausa ethnicities.
Discussion: The TFR calculated in this study and education's association with fertility are consistent with previous literature. However, research indicates that the Kel Tamasheq should have a much lower TFR than calculated in this study. More research is needed to determine why the Kel Tamasheq TFR varied in this study. Research is also needed to explain the differences in TFR across ethnic groups.

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Introduction

Throughout the region of West Africa, national total fertility rates (TFRs) are high—the TFR in Burkina Faso is 5.9, in Mali is 6.1 and in Nigeria is 5.3 ("The World Factbook 2013," 2013). However, Niger has the highest TFR in the world. Currently, the TFR in Niger is 7.6 (Institute National de la Statistique [INS], 2012).

The high total fertility rate has important negative health consequences in Niger for three reasons. First, a high birth rate is associated with more maternal mortality (Diamond-Smith & Potts, 2011). Second, children born into large families do not have as many assets as children born into smaller families and are more likely to lack necessary and important resources (World Health Organization, 2010). Finally, Niger is slowly losing farmable land due to poor farming practices and climate change across the country (United States Agency of International Development [USAID], 2012). The current TFR in Niger could increase the population, and if the current rates continue, Niger is predicted to have a population over 50 million by 2050 (United Nations, 2007). The agriculture and meat industries within the country will not be able to support this large population growth (USAID, 2012). Therefore, it is imperative to address the high TFR within Niger to alleviate and prevent the macro morbidity and mortality that is occurring as a consequence of high fertility and is likely to occur from excessive population growth.

Demographic transition theory explains that countries and regions move from contexts of stable high fertility and mortality to contexts of stable low fertility and mortality (Kirk, 1996). In areas where modern contraception is rarely used, such as Niger, current fertility rates can largely be determined by other proximate determinants of

fertility, such as length of time spent breastfeeding and length of time in sexual unions (Bongaarts, 1983). Distal determinants of fertility affect the proximate determinants of fertility through creating cultural norms and ideologies that determine the proximate determinant behavior (Davis & Blake, 1956). This paper will first use education, a distal determinant of fertility, to provide insight into fertility rates in Niger. Second, a literature review of ethnic cultural norms (another distal determinant of fertility) will be used to understand differences in TFR between ethnic groups within Niger.

Female education can help reduce fertility rates in high fertility contexts and contribute to countries and regions moving through the demographic transition. Higher levels of female education are correlated with decreasing fertility rates worldwide, and in Africa specifically. Differences in education can explain as much as 70% of the reduction in average TFR but cannot explain the overall decline (Bongaarts, 2003; Shapiro, 2012). Levels of male education attainment are much less correlated with fertility rates (Snow, Winter, & Harlow, 2013).

In general, Nigeriens are wary of formal education (Murphy, 2005). Compounding cultural hesitance, sociocultural norms make it particularly difficult for girls to go to school (Greany, 2008), and parents prefer to informally educate girls at home in important aspects of life, such as homemaking and morality (Hartmann-Mahmud, 2011).

Further, previous research of fertility cultural norms among ethnicities in Niger indicates a potential difference in TFR between the ethnic groups, but there are no previous comparative studies and no quantitative ethnic-specific documentation of fertility rates since 1998 (Randall, 2004). The only direct calculation of TFRs by

ethnicity in the region was a study of the Kel Tamasheq in Mali in 1998 suggesting a TFR of 5.4 (Randall, 2004). Because the Kel Tamasheq in Mali have similar cultural norms to the Kel Tamasheq in Niger and the border between northern Mali and northern Niger is porous, one can assume the fertility rates in each country are similar (Chilson, 2002; Keeling, 2009; "The rise of Islamist militants in the Sahara," 2013). As the TFR in Niger is 7.6 (INS, 2012), one can also assume that comparing the TFR between the Kel Tamasheq and other ethnicities in Niger will be significantly different.

The high TFR in Niger must be addressed, as it will continue to lead to increased morbidity and mortality. This study will utilize the concept of distal determinants of fertility embedded within the larger demographic transition theory as a lens to understand high fertility rates in Niger. Specifically, this paper will focus on education and sociocultural norms, as approximated through ethnicity, to determine associations between these two distal determinants of fertility and the rates in Niger.

Literature Review

The Demographic Transition Theory

Demographic transition theory has explained the shift in population dynamics within regions and nations from higher mortality and fertility rates to lower mortality and fertility rates (Kirk, 1996). The theory was originally developed by Warren Thompson in 1929, but gained little political or academic support due to the sociopolitical agenda at the time (Szreter, 1993). In 1944, the theory was reintroduced and explained by Notestien as a way to predict population changes in a post-World War II setting (Szreter, 1993). Notestien (1945) argued that increased modernization in previously colonized areas would eventually decrease population size.

Since the theory's second inception, it has been fraught with political ties and debate (Szreter, 1993). After being used to support Reconstructionist policy post-World War II, the theory was used to further American efforts in preventing communism's spread. Notestien's emphasis on modernization and emphasis on high fertility rates and contraceptive use have been contested over several decades (Coale, 1984; Szreter, 1993). Despite its history, the theory is relatively simple; countries move through stages of transition as their mortality and fertility rates decline.

Stages of Transition

There are five stages in classical demographic transition theory. Pretransition, or stage one, is defined as countries that have not begun to transition yet; mortality and fertility rates are stable, high and equal with one another (Coale, 1984; Kirk, 1996). Niger is in this stage (Potts, Gidi, Campbell, & Zureick, 2011). During stage two, mortality rates decline, but fertility rates are still high, and during stage three, fertility rates begin to fall. In stage four mortality and fertility rates are stable and low. During this phase, the population size is still high as a reflection of the decreasing mortality rates. Young people are more likely to stay alive, and the population as a whole ages. In the final stage, the population ages significantly and may decrease in size (Coale, 1984; Kirk, 1996) .

The shift to a lower mortality during stage two has been relatively easy to explain through the spread of sanitation, access to clean water and decreased infant and maternal mortality. However, the shift in fertility has been difficult to predict because it is dependent on social, cultural and economic factors (Kirk, 1996). Much of the demographic transition theory uses improved economic conditions as a precursor to

explain the transition within countries and large regions (Notestien, 1945). Yet, economics alone cannot predict the movement through the transition's stages, and the demographic shift to smaller families is not solely dependent on macroeconomic factors (Bongaarts & Watkins, 1996). In more recent demographic shifts, the decline in mortality rates does not necessarily proceed or greatly proceed the fall in fertility rates (Blanc & Rutstein, 1994; Bongaarts & Watkins, 1996).

Proximate and Distal Determinants of Fertility

Fertility has historically been determined through two mechanism – proximate and distal determinants of fertility (Davis & Blake, 1956). Proximate determinants of fertility include age of first sexual union, time spent between sexual unions, frequency of intercourse, vigorousness of breastfeeding, contraception use and induced and spontaneous abortion (Davis & Blake, 1956). In areas where contraception is widely used, it is the predominant proximate determinant of fertility. However, even in these contexts, other proximate determinants, such as the age of sexual union initiation, factor into fertility and should not be ignored (Bongaarts, 1987).

Distal determinants of fertility affect fertility rates indirectly through influencing the proximate determinants of fertility. Distal determinants include sociocultural norms, socioeconomic status, environmental factors and education (Bongaarts, 1978, 1983). For example, if couples cannot afford to buy contraceptives, they are less likely to use contraception and therefore more likely to have higher fertility rates (Bongaarts, 1978; Potts et al., 2011). Similarly, if sociocultural norms dictate that women should get married at a young age, these women will spend more time in sexual unions and are subsequently more likely to have higher fertility rates (Davis & Blake, 1956).

In regions where modern contraceptives are not common, the number of children born to a woman depended on other proximate determinants of fertility and the distal determinants that contribute to the proximate behavior. In societies using traditional methods of contraception, vigorousness of breastfeeding is the most significant factor predicting fertility (Bongaarts, 1983); however other distal determinants should be considered (Bongaarts, 1978). Because few couples in Niger use contraception on a regular basis, these cultural factors may become important in explaining the difference in TFR.

Contraceptive Use in Niger

Contraceptive use is low in Niger. According to the most recent Demographic Health Survey (DHS) data, 14% of women aged 15-49 who were in an ongoing, sexual relationship were using some form of contraception. Approximately 12% of women reported using a modern method of contraception (intrauterine device, Depo-Provera injections, diaphragm/spermicide, condom or birth controls pills), and 2% reported using a tradition method (lactational amenorrhea method, withdrawal, natural family planning, or local traditional methods) (INS, 2012). Most often, women in Niger stated that they used contraception as a method for spacing children rather than decreasing the number of children per household (Cleland et al., 2006).

Community and national level interventions have been implemented in an attempt to decrease the TFR in Niger. As a result, contraception has been free throughout the country since 2002 (Potts et al., 2011). The government has widely broadcasted radio messages about family planning to reach a large number of women in both urban and rural areas (Sipsma, Bradley, & Chen, 2013). Yet, access to contraception is a problem

for many couples (Bossyns, Miye, & vLerberghe, 2002). Bossyns et. al (2002) attempted to address this issue through an intervention in Ouallam, an ethnically diverse city in central Niger. This study found that with increased knowledge and culturally appropriate explanations of contraception, uptake in family planning methods increased from 1% to 28.8% among women who participated in the intervention. Although the women were initially interested in increasing contraceptive use, the authors did not have the ability to track the longevity of contraceptive use among the study population. Bongaarts and Sinding (2009) reiterated a similar concept by noting that although contraceptive methods in Niger are free, they can still be too costly for women, as the women may have the time or money to travel long distances to health clinics to access them.

The lack of access to and use of contraception indicate that other social and cultural norms will determine fertility rates in the country. This paper will now explain two distal determinants of fertility to further the reader's understanding of differing fertility rates within Niger as a whole.

Education

As countries move through the demographic transition, education has been found to be an important distal determinant of fertility. Women with more education, compared to those with less education, are more likely to have fewer children or none at all at each stage of the transition (Bongaarts, 2003). However because education is a distal rather than proximate determinant of fertility, it is difficult to determine how education correlates with a decrease of fertility globally (Bongaarts, 1978).

Bongaarts (2003) discusses the importance of female education on fertility rates. In one paper, he disaggregated country level data on fertility by education level, and

compared women with the highest levels of education with those that had little or no education. He noted that regardless of where countries were in the demographic transition women with more education had fewer children than those with less education. However, the reason behind the difference in fertility rates varied based on what stage of the demographic transition the country was in. In countries earlier in the transition, women with more education wanted fewer children. As countries progressed through the transition, women with less education also wanted fewer children, but did not have the means to prevent the unwanted pregnancies.

There is some disagreement in the literature about the amount of female education that is correlated with decreased fertility rates. Research from developed countries indicates that increasing education by one year will decrease fertility rates by 2%-9% (Cygan-Rehm & Maeder, 2013; Grönqvist & Hall, 2013). However, in Britain, fertility rates initially decreased when secondary school became mandatory for all children (Lord & Rangazas, 2006). Research from developing world contexts generally argue that secondary school enrollment decreases fertility rates, mainly by delaying the onset of first birth (Jain & Ross, 2012). However, (Sujatha & Reddy, 2009) found that fertility trends decreased even with a middle school education.

The relationship between male education and fertility rates has been less significant globally. In Pakistan, Ethiopia and Tanzania, men with higher levels of education either had or wanted fewer children overall (Malik, 2011; Snow et al., 2013). However, in Germany, higher levels of male education were correlated with an insignificant, positive increase in the number of children (Cygan-Rehm & Maeder, 2013). In Sweden, more education did not decrease the likelihood of teenage pregnancy among

men (Grönqvist & Hall, 2013), and in Uganda, Zambia and Rwanda, attending school did not affect the number of children men wanted (Snow et al., 2013). However, in East Africa, a woman's education level was correlated with her husband wanting fewer children (Snow et al., 2013).

The hypotheses for education's correlation with fertility are widespread. Secondary education often delays the onset of pregnancy and increases the average age of first birth (Cygan-Rehm & Maeder, 2013). In Germany and Moldova when the delay occurred, women who were educated did not catch up with their peers by having more children later, leading to lower fertility overall (Cygan-Rehm & Maeder, 2013; Ryabov, 2010). The dual responsibilities found in motherhood/childrearing and in pursuing an education can be difficult for women and girls in high fertility contexts to navigate. In countries where the average age of first marriage is relatively young, women were less likely to be in school (Esteve, Spijker, Riffe, & Garcia, 2012).

Education could potentially decrease the under-five mortality rate because women have more knowledge and agency to help sick children—if young children do not die, women may not feel the need to replace them (Ahmed, 2010). Education has also been hypothesized to increase women's agency in decision-making, finances and amounts of autonomy (Ryabov, 2010; Sujatha & Reddy, 2009). Finally, education can also provide economic opportunities for women, giving them more incentive to have fewer children, and therefore more opportunity to work (Ahmed, 2010; Ryabov, 2010).

Throughout the world and the continent of Africa specifically, TFRs and education have been negatively correlated (Ahmed, 2010; Cygan-Rehm & Maeder, 2013; Ezeh, Mberu, & Emina, 2009; Grönqvist & Hall, 2013; Malik, 2011; Shapiro, 2012).

Because the correlation between education and fertility has been so widespread, this paper will seek to understand the association between female education levels and TFR in Niger.

Education in Niger

In Niger 45% of male children and 31% of female children were enrolled in primary school in 2002. Secondary school enrollment dropped to 7% of males and 5% of females. Throughout the country, 20% of men and 9% of women over the age of 15 were literate at this time (UNICEF, 2012).

Problems within the education system are one of the factors contributing to the low school attendance and literacy rates in Niger. A recent change initiated by the government of Niger to make education more affordable has left teachers underpaid and under supported (Murphy, 2005). Niger began hiring a number of contracted teachers, which decreased job security and salaries (Bourdon, Frolich, & Michaelowa, 2010; Murphy, 2005). Also most schools teach only in French, rather than a combination of French and the local language in an area (Nikièma, 2011). In West Africa more broadly, teaching solely in French has led to larger dropout rates and decreased literacy after attending school (Nikièma, 2011). In multilingual schools in Niger, dropout rates are substantially lower than in the classical education schools (Nikièma, 2011).

Perceptions about the weaknesses in formal education have contributed to the low enrollment rate in both primary and secondary school for boys and girls (Murphy, 2005). However, gender norms make it particularly difficult for girls to attend school (Greany, 2008; Hartmann-Mahmud, 2011). Parents are concerned that girls who receive a formal education will become prostitutes or become pregnant outside of a marriage relationship,

as it is perceived that chastity can only be taught in non-formal home settings (Hartmann-Mahmud, 2011). If a girl receives an education, Nigeriens believe it will likely make her a bad wife because she has more opinions and agency (Greany, 2008). Even with a formal education, people believe that girls will be unable to get a job, making arguments for female education being useless. (Greany, 2008).

However, perceptions about education are changing in the country, as girls and parents begin to see the benefits of attending more school. Female students are seeking more education as a means to obtain work and agency in their lives (Greany, 2008; Hartmann-Mahmud, 2011).

Ethnicity

After looking at national trends in contraception use and the role of education in understanding potential future changes in family size, it is important to consider the differences between ethnicities in contraceptive use and fertility norms.

Ethnicity has been complicated to determine and define (Ibrahim, 1994; King, 2006). This paper will utilize Naroll's (1964) definition, which uses four criteria to determine if two or more groups of people are ethnically different. First, ethnic groups tend to practice endogamous marriage systems. Second, ethnic groups have uniform cultural norms and rituals that are easily understood by everyone in the group. Third, individuals within an ethnic group communicate with the same language. Finally, and most importantly, ethnicity is both internally and externally defined; individuals will identify with a specific ethnicity and outsiders will identify them with the same ethnicity. If ethnic groups do not meet the first three criteria, but meet the final one, they are considered a separate ethnicity.

Ethnic Groups in Niger

Niger is one of the most racially diverse countries in West Africa (Fuglestad, 1983; Hall, 2011). However, the nation has fewer ethnicities than most other countries in the region (Fuglestad, 1983). This paper will only consider the four major ethnic groups in Niger, which compose 94.2 % of Niger's total population (The world factbook, 2001). A number of smaller ethnic groups live in Niger, but they will not be discussed due to their small sample size .

The Songhay live in the southwest corner of the country and parts of Mali (Sanou & Aikman, 2005); they constitute approximately 21% of Niger's total population (The world factbook, 2001). The Songhay are descendants of a large Islamic empire coving much of French Sudan in the 16th century (Basedau & Stroh, 2011). They are traditionally farmers or fishermen (Fuglestad, 1983).

The Hausa comprise 55.4% of the population in Niger (The world factbook, 2001). People in this ethnic group predominantly live in the southern region of the country or the northern region of Nigeria ("Hausa People," 2008). By Hasua tradition, the ethnic group originated from a king with six sons. Each of these sons ruled a city to form a vast empire (King, 2006). The Hausa farmed small, subsistent plots of land until the French arrived and colonized the region (Hall, 2011). At this time, they began harvesting peanuts and cotton as cash crops (Adebayo, 1991; Fuglestad, 1983).

The Fulani account for 8.5% of Niger's population (The world factbook, 2001) and live throughout the Sahel in West Africa (Adebayo, 1991). Anthropologists and historians believe the Fulani slowly moved westward from what is now Sudan, but they have no emic story of origin (Njeuma, 2012). The Fulani are the newest ethnic group in

southern Niger, and they are racially whiter than their Hausa counterparts living in the same region (Fuglestad, 1983). Fulani are traditionally pastoralists, although historical texts suggest that some have become more sedentary, living in towns and cities (Delancey, 2012). Fulani traditional pastoralists still exist (Adebayo, 1991; Roncoli et al., 2009), and many perceive themselves superior to those who have become more sedentary (Adebayo, 1991). Since the 15th century, the Hausa and Fulani have lived close together, often intermarrying and sharing cultural rituals (Njeuma, 2012).

Finally, the Kel Tamasheq live in western Niger, northern Mali, and southern Algeria (Randall, 2004). They comprise 9.3% of Niger's population (The world factbook, 2001). This ethnic group is composed of semi-nomadic chiefdoms in the Sahara and northern Sahel (Brachet, 2004; Keeling, 2009). Kel Tamasheq are Berber descendants from North Africa (Loughran, 2003). Previously, they traveled through the Sahara from the Mediterranean coast to the Sahel in trade caravans (Chilson, 2002; Rasmussen, 2002) and as pastoralists (Keeling, 2009).

Current Fertility Trends by Ethnic Group

Cultural practices and norms create differences in fertility by ethnic group within Niger. Although there have been no formal studies comparing the fertility rates by ethnicity within the country, there is a substantial amount of qualitative and quantitative research indicating that there are significant differences in TFR across ethnicities. Group specific cultural norms and practices could account for observed differences in these rates.

Hausa/Fulani. In the literature on family planning, the Hausa and Fulani were not differentiated within studies (Izugbara & Ezeh, 2010; Izugbara, Ibisomi, Ezeh, &

Mandara, 2010). They live in the same communities in Niger and Nigeria, and historically relationships between these two ethnic groups have been amiable (Adebayo, 1991). Multiple qualitative studies have attempted to discern the underlying reasons for high birth rates among these ethnicities in Nigeria because the predominate regions where they reside have a significantly higher TFR compared to the rest of the country (Population Council, 2009). However, due to the similarities in culture and language (Hausa people, 2008), as well as a historically porous border between Nigeria and Niger (Fuglestad, 1983), conclusions can be assumed to be similar between these two groups.

Among the Hausa/Fulani, multiple marriages are a measurement of prestige and financial stability; therefore, men will want to marry four wives if they can afford to do so (Izugbara et al., 2010). Although husbands do not want a large family, they often cite few numbers of children as an excuse to marry other women (Izugbara & Ezeh, 2010). To prevent their husbands from taking more wives, women feel the need to have as many children as possible (Izugbara & Ezeh, 2010; Izugbara et al., 2010). Reports suggest that women may hide family planning methods from their husbands so that their husbands will not have an excuse to marry again (Izugbara & Ezeh, 2010; Sipsma et al., 2013). Further, if a husband does marry additional wives, the woman who has the most children is allocated the most resources from her husband (Izugbara & Ezeh, 2010). Generally speaking, women indicated that they wanted multiple children prior to their marriage (Izugbara et al., 2010), but the number of children they actually bore exceeded their original desired amount (Izugbara & Ezeh, 2010).

Men interested in family planning had similar difficulties when discussing the issue with their spouse. Husbands feared that their wives would perceive a discussion

about contraceptive use to be motivated by a desire to take another wife. Further, men were concerned that their wives would divorce them because they were no longer producing children (Izugbara et al., 2010). Divorce is very shameful in Hausa and Fulani cultures and places a large burden on the husband because he is required to either take care of the children or send them to his parents (Izugbara & Ezeh, 2010).

There are also religious reasons for high fertility rates among the Islamic Hausa and Fulani. Women noted that having many children is honoring to Allah because they are creating more people to worship him (Izugbara & Ezeh, 2010). Imams and holy leaders teach a similar message: couples should never limit the number of children they have for economic reasons; instead, they should trust in Allah to provide (Gwarzo, 2011). Although these Imams felt that contraceptives used as a health benefit for women and children were permissible, they did not agree with mass campaigns informing couples of their options, as this could potentially lead to promiscuity (Gwarzo, 2011). The particular felt needs and social norms among the Hausa and Fulani ethnicities provide insight into the lack of family planning use in southern Niger.

Kel Tamasheq. The Kel Tamasheq had a TFR of 5.4 in Mali in 1998 (Randall, 2005). It is important to note that the Kel Tamasheq social norms are very different than the Hausa, Fulani and Songhay (Rasmussen, 2010). The Kel Tamasheq are generally not polygamous (Rasmussen, 2010), and men tend to marry at an older age (Randall, 2004). Because men marry older, women spend less time in sexual unions, and therefore, do not have the same opportunity to become pregnant as the Hausa/Fulani. As only 1.5% of women in the population are currently using contraceptives (Randall, 2005), these two social norms provide insight into the lower TFR among the Kel Tamasheq.

Recent socioeconomic shifts in the southern Sahara could potentially cause an increase in TFR for nomadic and semi-nomadic groups in the region. The Kel Tamasheq are semi-nomadic. According to demographic theory, cultures that are shifting from a nomadic lifestyle to a more sedentary lifestyle tend to experience an initial increased birth rate (Meir, 1986). Kel Tamasheq chiefdoms are in different stages of transitioning to a less nomadic lifestyle, which could affect the overall birthrate among the population (Rasmussen, 2010). Further, the Kel Tamasheq have experienced intermittent violence since the 1960s (Randall, 2004). Generally, violence and conflict tend to increase birth rates either during the conflict or immediately following the conflict (Agadjanian & Prata, 2002; Urdal & Che, 2013). However, a recent study among the Malian Kel Tamasheq found the birth rates have not increased despite recent conflict (Randall, 2004, 2005).

The Kel Tamasheq who live in the Sahel are more likely to be sedentary and have positive relationships with Hausa and Songhay communities (Gosselain, 2008; Rasmussen, 2010). As the Hausa, Fulani, and Songhay practice polygamy, it is more likely for women in more ethnically diverse areas to accept this practice for social and religious reasons (Keenan, 2008; Rasmussen, 2010). An increase in polygamy among the Kel Tamasheq will likely increase birth rates (Randall, 2005). Although the Kel Tamasheq have had a very stable TFR, recent and upcoming shifts in cultural norms could cause this rate to change.

Songhay. There is very little research available about current Songhay marriage customs, sexual practices and birth rates. The Songhay practice polygamy (Rasmussen, 2010); however, no previous studies articulate the time, place and reasoning for

polygamous unions within this ethnic group. The region where the Songhay live is incredibly ethnically diverse, consisting of Hausa, Fulani, Kel Tamasheq and other smaller tribes (Gosselain, 2008).

Conclusion

As only 14% of Nigerien women use contraceptives (INS, 2012) this paper examines current TFR in Niger, a country that is headed toward fertility rates that are unsustainable. Demographic transition theory states that regions move from areas of high fertility to low fertility, and distal determinants of fertility, such as education and cultural norms affect the fertility rates within groups of people. It is vital to understand the association between the distal determinants of fertility and the fertility trends within Niger in light of the high TFR in this country.

Several studies have contributed to understanding the context of ethnicity and education and fertility rates in Niger, and other interventions have contributed to decreasing the high fertility rates in Niger and the surrounding area. However, no study has compared TFR across education attainment level or ethnic groups in Niger nor has a study attempted to use education to explain the differences in fertility rate across ethnic groups.

This paper seeks to 1) determine the most recent TFR in Niger; 2) examine whether education is associated with TFR in Niger; 3) examine whether ethnicity is associated with TFR in Niger; 4) determine whether education explains differences in TFR across the four major ethnic groups in Niger.

Methodology

This paper utilizes Demographic Health Survey (DHS) data gathered in Niger. The data are publically accessible from the DHS website and can be downloaded from the Internet. DHS staff in Niger completed all sampling and collection in 2006. The data analysis presented below was conducted through previously gathered research.

Sampling and Recruitment

10,000 women aged 15-49 were sampled throughout the country of Niger in 2006. A two-tiered sampling methodology was used to ensure generalizable results.

The first level of sampling utilized clusters previously determined in a 2001 census. Although the clusters were generally evenly divided among the 8 ethnolingual regions in Niger, they reflected the proportion of population in each region. To ensure the entire country was sampled adequately, the DHS survey added another village or multiple villages to their sampling frame, which comprised of 3.5% of Niger's rural and nomadic population. Because one area within the Agadez region could not be included due to the inability to access the villages, only 99.85% of Niger's total population was included in the overall sampling frame. In total, there were 8007 clusters in the first stage of the sampling frame.

Each of the clusters was designated as urban, rural or nomadic to reflect the population that lived in the cluster. Clusters were randomly selected within each region to reflect the correct proportion of urban, rural and nomadic populations in the region. After the clusters were selected, houses in each of the chosen clusters were numbered and the number of women aged 15-49 living in each household was indicated. The final

sample then included a random selection of the households numbered in the chosen clusters.

Women were asked to participate in the survey on the household level, and every woman within a selected household that met the age inclusion criteria was asked to take the survey. In total, 7,824 households were selected and identified for the survey and 7,660 households participated.

Data Collection

A complete pilot test of the survey was conducted in and around Niamey in July and August of 2005. The DHS survey in Niger was derived from the general DHS survey format used throughout the world. Therefore, it was important for staff to ensure questions were understood and culturally appropriate. The survey was altered and appropriately translated with the help of 140 Nigeriens in late 2005.

One hundred twenty staff received a 4-week training about conducting the survey. The training included information about topics that were part of the survey, such as reproductive health, HIV/AIDS and nutrition. Some staff were also trained in collecting anthropometric data; hemoglobin levels and HIV tests were conducted as part of the survey. Other staff members were given additional training as team leaders. After the training, individuals were placed on teams of four: one male and one female survey conductor, one individual to collect anthropometric data and a team lead.

The survey was conducted from January through May 2006. Surveys were conducted in French or any of the Nigerien local languages. As the surveys were being conducted, 30 staff in Niamey entered the data using the Census and Survey Processing System.

Data Analysis

Part 1. All data analysis was done using SAS version 9.3. The analysis began with the calculation of the TFR for Niger as a whole. TFRs were calculated using the age (month, year) of a woman and her birth history for the prior three years (Schoumaker, 2012). As the survey was conducted from January to June 2006, the month the survey was conducted for each woman was necessary to accurately determine the three-year time period and birth history. The three-year time period was defined as the month the survey took place through 36 months prior to the survey. As a woman could live in two different five-year age groups in 36 months, exposure in each group was taken into consideration by determining the number of months she spent in the most recent age group and subtracting the number of months lived from 36 to determine the amount of time she spent in the age group she was previously in. Some women spent 36 months in the most recent age group and this extra exposure calculation did not need to be conducted.

Live births, within the time period of interest, were counted by five-year age groups at the time of the birth. The age (month, year) of the child was subtracted from the time of the interview to obtain the child's age in months at the time. Only children 36 months old or less were included. To obtain the mother's age at the time of birth, the child's age was subtracted from the mother's age, and the birth was counted in one of the five-year age groups based on her age at the birth of the child.

When calculating person-years and the number of birth variables necessary to complete the life-table, both variables were weighted. From the life-table, age-specific fertility rates (ASFR) were calculated for five-year age groups ranging from 15-49. The total fertility summed the ASFR and multiplied this number by five.

Parts 2 and 3. TFRs were calculated in the same way as question 1. However, the rates were calculated for each ethnic group and each level of education attainment individually by creating a dataset with only the indicator of interest.

Part 4. After calculating the TFR by ethnicity and then by education, a Chi Square test was used to determine if education level varied by ethnic group. A demographic standardization analysis was then conducted for the two largest ethnic groups. Due to small sample sizes in the secondary school education group, the Kel Tamasheq and Fulani were not included in the analysis.

Standardization was calculated by determining the proportional weight of each ASFR for every education group for both ethnicities. The proportional weight of each education group was averaged with the equivalent education group of the other ethnicity to obtain a standardized weight. The standardized weight was then multiplied by the ASFR for the specific age group/educational group, which produced a standardized sum product. A new ASFR was calculated by summing the three standardized sum-products for each ethnic group.

The calculation described above was completed for each age group. The 45-49 age group was dropped for this analysis due to the small sample of educated women for both ethnicities. A new TFR was calculated for each ethnic group by adding each ASFR and multiplying by 5.

Results

Sample Characteristics

In total, 9,223 women participated in the survey. A total of 25.3% (n= 2335) were Songhay, 42.9% (n=3956) were Hausa, 6.9% (n=636) were Fulani, 13.2% (n=1216)

were Kel Tamasheq and 11.7% (n=1,090) were part of another ethnic group. Women were 28.46 (sd=9.24) years old on average. Overall, women had a mean of 3.73 (sd=3.27) children. The average age of first marriage was 15.77 (sd=3.11) and the average age of first birth was 18.02 (sd=3.36).

A total of 7079 (76.75%) had never been enrolled in any type of formal education, 1171 (12.70%) attended no more than primary school, 973 (10.55%) attended secondary school or higher. 7502 (81.94%) women were illiterate, 462 (5.05%) could partially read, and 1191 (13.01%) were literate. Table 1 provides a brief overview of the descriptive statistics of interest.

Table 1

Demographics

Variable	N (%) or Mean (SD)
Age	28.46 (9.24)
Ethnicity	
Songhay	2335 (25.32%)
Hausa	3956 (42.89%)
Fulani	636 (6.90%)
Kel Tamasheq	1216 (13.18%)
Education Attainment	
No formal education	7079 (76.75%)
Primary education only	1171 (12.70%)
Secondary or higher	973 (10.55%)
Literacy	
Illiterate	7502 (81.94%)
Some literacy	462 (5.05%)
Literate	1191 (13.01%)
Number of children	3.73 (3.27)
Age at first birth	18.02 (3.36)

TFR in Niger

Overall, the TFR in Niger is 7.0 according to this study's calculation based on the DHS database. Table 2 provides the overall ASFRs in Niger used to calculate the TFR.

Table 2

Age specific fertility rates for Niger

Age Group	Person Years	Number of Births	ASFR	TFR
15-19	5577.835	1110.09	0.199	
20-24	5428.088	1634.86	0.301	
25-29	5033.408	1493.67	0.297	
30-34	3559.672	946.294	0.266	
35-39	3285.173	676.496	0.260	
40-44	2240.44	205.709	0.092	
45-49	898.5391	33.7243	0.038	6.99

Education and TFR

Total fertility rates varied by education attainment. Women with at least some secondary school education (or higher) had a TFR of 4.76, women with some primary school education had a TFR of 6.91, and women with no primary school education had a TFR of 7.19. Likewise, women who were literate had a TFR of 5.70 in comparison with illiterate women's TFR of 7.18. Figure 1 graphs the ASFR by education, and table 3 shows ASFR by education.

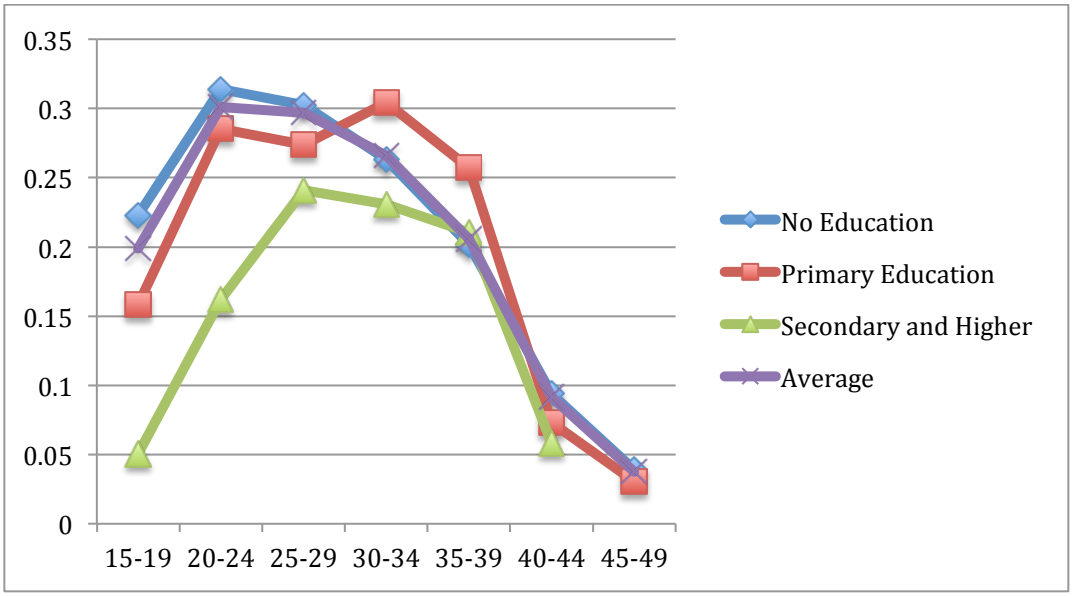

Figure 1: Age specific fertility rates by education attainment

Table 3

Age specific fertility rates by level of education attainment

Education Attainment	Age Group	Person Years	Number of Births	ASFR	TFR
No Education					
	15-19	4358.37	971.54	0.223	
	20-24	4488.63	1409.00	0.314	
	25-29	4314.08	1304.36	0.302	
	30-34	2996.84	788.85	0.263	
	35-39	2921.89	589.09	0.202	
	40-44	2038.72	191.91	0.094	
	45-49	807.56	31.58	0.039	7.19
Primary School					
	15-19	715.44	113.15	0.158	
	20-24	597.07	170.47	0.286	
	25-29	486.10	133.11	0.274	
	30-34	374.43	113.98	0.304	
	35-39	235.62	60.53	0.257	
	40-44	135.94	9.96	0.073	
	45-49	69.91	2.15	0.031	6.91
Secondary or Higher					
	15-19	504.03	25.40	0.050	
	20-24	342.39	55.38	0.162	
	25-29	233.23	56.20	0.241	
	30-34	188.40	43.47	0.231	
	35-39	127.66	26.87	0.210	
	40-44	65.78	3.84	0.058	
	45-49	21.07	0	0	4.76

Ethnicity and TFR

Total fertility rates and age specific fertility rates also varied by ethnic group in Niger. Songhay women had a TFR of 6.41, Hausa had a TFR of 7.43, Fulani had a total fertility rate of 6.78 and Kel Tamasheq had a TFR of 6.67. Figure 2 shows a graph of the age specific fertility rates (ASFR) that compose the TFR for each ethnic group and compare it to the overall TFR. Table 4 shows the ASFR for each ethnic group.

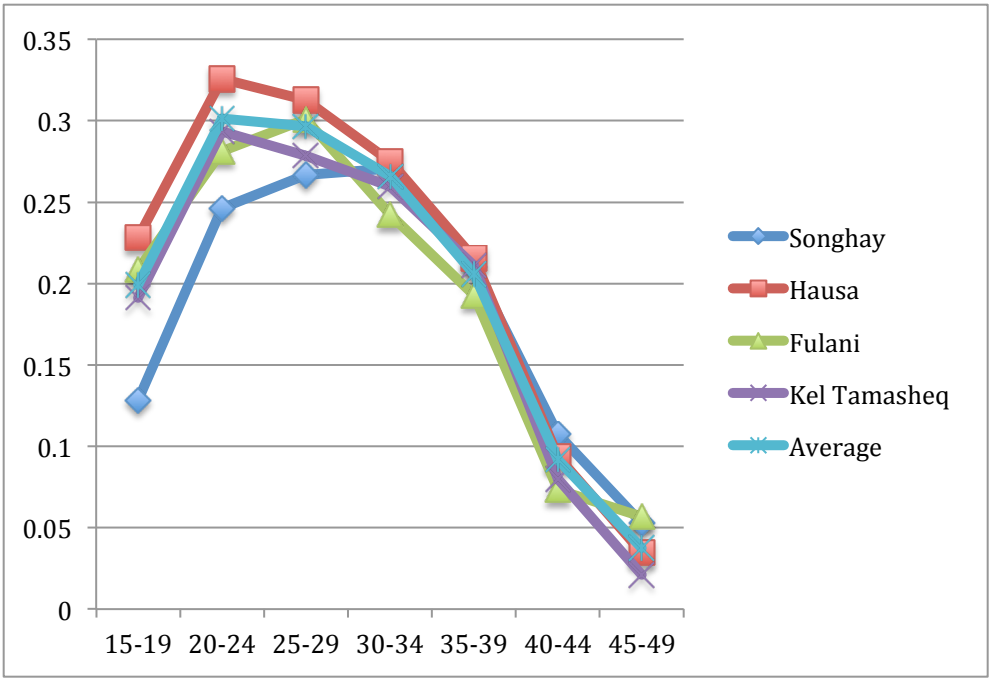

Figure 2: Age specific fertility rates by ethnic group

Table 4

Age specific fertility rates by ethnic group

Ethnic Group	Age Group	Person Years	Number of Births	ASFR	TFR
Songhay					
	15-19	1209.38	155.08	0.128	
	20-24	1150.92	283.53	0.246	
	25-29	1035.42	276.27	0.267	
	30-34	763.16	206.52	0.271	
	35-39	679.62	142.88	0.210	
	40-44	466.28	50.05	0.107	
	45-49	188.47	9.947761	0.053	6.41
Hausa					
	15-19	2923.07	666.52	0.228	
	20-24	2975.95	969.47	0.326	
	25-29	2728.89	853.54	0.313	
	30-34	1848.56	508.27	0.275	
	35-39	1715.36	369.81	0.216	
	40-44	1198.92	112.18	0.094	
	45-49	433.48	15.05	0.035	7.43
Fulani					
	15-19	334.71	69.83	0.209	
	20-24	303.19	85.26	0.281	
	25-29	362.80	109.21	0.301	
	30-34	292.61	70.88	0.242	
	35-39	207.16	39.97	0.193	
	40-44	142.92	10.46	0.073	
	45-49	60.34	3.43	0.057	6.78
Kel Tamasheq					
	15-19	633.72	121.13	0.191	
	20-24	579.50	170.07	0.293	
	25-29	484.34	134.94	0.279	
	30-34	366.83	95.21	0.260	
	35-39	412.74	87.056	0.211	
	40-44	239.02	19.15	0.080	
	45-49	124.27	2.63	0.021	6.67

Education as an Explanation of Ethnic TFR

The Chi Square test to determine if education varied by ethnic group was significant (N=8461.76, df=6, p<0.0001). Table 5 shows the results from the Chi Square test. The results for this test are weighted.

Table 5

Cross tabulation of education attainment level by ethnic group

Education level	Ethnicity				
	Songhay	Hausa	Fulani	Kel Tamasheq	Total
None	1423.3	4209.0	533.8	914.4	7080.6
Primary	311.5	461.4	40.3	63.5	876.8
Secondary or higher	219.2	223.3	28.2	33.8	504.5
Total	1954.1	4893.6	602.4	1011.7	8461.8

However, the standardization analysis demonstrated that education explains very little of the TFRs. The standardized TFR for the Songhay was 6.29 (compared to 6.15), and the standardized TFR for the Hausa was 7.20, compared to the unstandardized rate of 7.25. It is important to note that the unstandardized TFRs differ from the previous analysis because the 45-49 age group was not included. Table 6 presents the standardized ASFRs. Figure 6 shows the unstandardized and standardized TFR meant to show the similarities between the unstandardized and standardized TFR for the Hausa and Songhay and the differences between the ethnic groups' TFR.

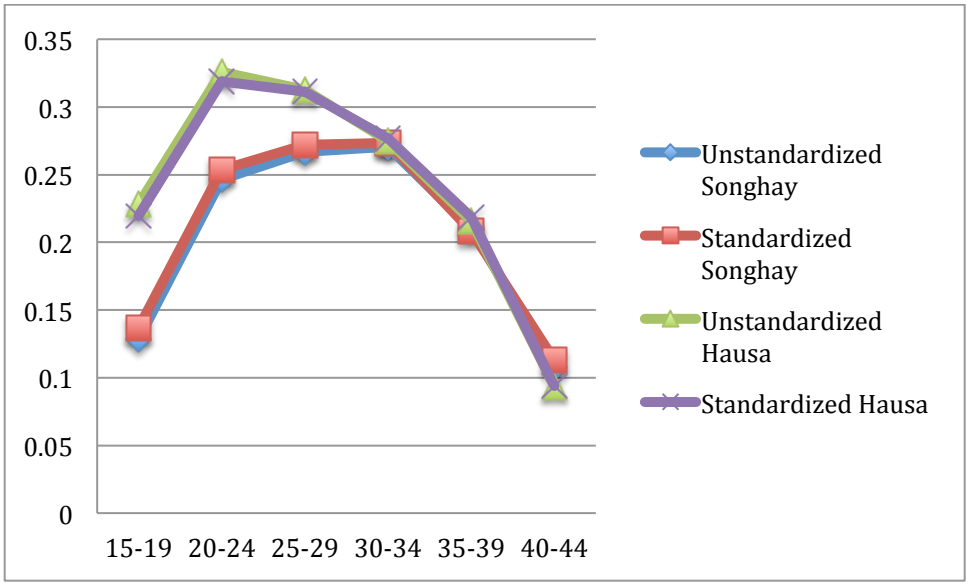

Figure 3. *Standardized and Unstandardized for Hausa and Songay*

Table 6

Weighted age specific fertility rates by ethnicity

Ethnic Group	Age Group	ASFR	TFR
Songhay			
	15-19	0.137	
	20-24	0.254	
	25-29	0.272	
	30-34	0.273	
	35-39	0.208	
	40-44	0.113	6.29
Hausa			
	15-19	0.220	
	20-24	0.319	
	25-29	0.311	
	30-34	0.277	
	35-39	0.218	
	40-44	0.094	7.20

Discussion

The TFR of 6.99 calculated for the country of Niger as a whole is similar to DHS calculations from the same year (INS, 2007). There was variation in TFR when comparing across education attainment levels. There was also variation in TFR across ethnic groups, with the largest difference between the Hausa and the Songhay. Finally, although education attainment varied significantly across ethnic groups, when the TFR for the two largest ethnic groups was standardized by education, education explained a negligible difference in the TFR. The results from this study bring up several points of discussion.

First, consistent with previous literature, there was noticeable variation based on levels of education attainment. Specifically, any amount of secondary education or above decreases TFRs substantially. The largest difference in ASFRs occurs at the younger age groups, indicating that attending secondary school delays births.

These finding are consistent with some of the previous literature. Jain and Ross (2012) found that attending secondary school delayed the onset of first birth. Likewise in Sweden and Germany, extending education into later teen years delayed first birth and decreased teenage pregnancies ((Cygan-Rehm & Maeder, 2013; Grönqvist & Hall, 2013). Esteve et al. (2012) discuss that when a high proportion of 16-18 year old women are in school, first births and marriages are delayed. However Sujatha and Reddy's (2009) research stated that women who reached middle school had lower fertility rates than those who received a primary school education.

There is not enough information to fully understand why some studies found different degrees of education contributing to lower fertility rates. One explanation for

this difference could be cultural norms (Bongaarts & Watkins, 1996) or community levels of education contributing to lower birth rates overall (Derose & Kravdal, 2007). It is likely that applying the research in Sweden and Germany to a developing setting like Niger will be less effective than research from other developing contexts because there are so many fertility differences between developing and developed countries (Bongaarts, 2003; Cygan-Rehm & Maeder, 2013; Grönqvist & Hall, 2013; Jain & Ross, 2012).

Second, there was variance in the TFRs by ethnic groups. This was the first study to compare TFRs by ethnic group in Niger, and the findings indicated that more information is needed to describe the differences in cultural practices as a distal determinant of fertility among these groups.

Further, the TFR calculated for the Kel Tamasheq ethic group differs from previous studies. Randall found a TFR of 5.4 in 1998 in her study (Randall, 2004). As her research consisted of a large sample size in Mali, there could be larger differences in country variation than originally anticipated based on the literature review. Although Randall's study is over 10 years old, research indicates that the Kel Tamasheq TFR has been noticeably low since colonialism (as cited in Randall, 2004). Both Randall's sampling methodology and the sampling methodology employed by DHS were generalizable in nature, making it unlikely that the methodology contributed to the large difference in TFR. Because different information was collected by Randall and DHS, it is difficult to compare potential variances in the populations aside from country of origin.

Finally, education did not explain the differences in ethnic TFRs although education attainment has been used to explain differences in fertility in the past (Bongaarts, 2003; Ezeh et al., 2009; Shapiro, 2012). The TFRs of the two ethnic groups

studied in this question were noticeably different before and after the standardization for education. Other proximate factors of fertility, such as contraceptive use or length of time spent in sexual unions could contribute to the differences in fertility rate. Different degrees of breastfeeding could contribute to the differences in TFR if women are breastfeeding exclusively for the first six months after birth. Women will intentionally breastfeed to prevent pregnancies in Niger, but the breastfeeding behavior is inadequate and not exclusive (Moussa Abba, De Koninck, & Hamelin, 2010; Sipsma et al., 2013).

Distal determinants of fertility, such as urban/rural place of residence or household income or couple communication strategies about family planning, could also be contributing factors. As there was little information about Sonhay marriage and childbearing practices in the literature, more information is needed to understand the differences in these fertility rates.

Strengths and Limitations

The sampling methodology utilized in this study make the results generalizable to Niger as a whole and each ethnic and education group specifically. As previously mentioned this was the first study to look at TFR by ethnicity in Niger, and thus provides a starting point for further research. The research also utilized previous literature and an understanding of TFR and education correlates to attempt to explain the differences in TFR in each ethnic group.

However, the small sample size for the Fulani, makes the results for this ethnic group less accurate. When analyzing the explanation of education attainment in each ethnic group, the Kel Tamasheq and the Fulani could not be included due to their small sample size. Likewise, the sample size of women aged 45-49 who had attended primary

school, secondary school or beyond was small. Also, separating women who had attended secondary school from those who had continued beyond secondary school would have been ideal, but these categories were collapsed due to the sample size.

Implications

There are several implications to the findings in this study. From a programmatic perspective, the high and differing fertility rates throughout the country point to a greater need for resources and family planning efforts. The family planning programs should be culturally competent, focused to specific ethnic groups, as the needs are high and varied for each group. Second, resources should be used to increase the rates of female enrollment in secondary school. Increasing female education will likely delay the onset of first birth and decrease fertility overall.

Further research is also needed to determine differences in fertility rates by ethnic group in Niger. First, the TFR among the Kel Tamasheq varies greatly from previous research (Randall, 2004), but the causes of these differences remain unclear. Second, there is very little qualitative or quantitative research articulating Songhay fertility rates, marriage norms and ideal family size. The Songhay have the lowest TFR in the study, but there is no information as to why. Research is also needed to further explain TFRs and their association with education. The findings in this study show women with more education delaying first birth, but qualitative research discussing why these women chose to wait and quantitative research about other characteristics of waiting women, such as household income and family size, will provide more nuance to the data described here. Finally, more research is needed about why girls choose not to go to school in Niger.

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