



Ethnic Variation in Fertility Preferences in Sub-Saharan Africa

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Abstract

Research focusing on the role of ethnicity in shaping fertility preferences in sub-Saharan Africa (SSA) has been largely restricted to small-scale studies within specific groups, regions or countries, which makes it difficult to gain insight into the overall effects of ethnicity on fertility in the region. This study provides a broad comparative analysis of the variation in preferred family size among ethnic groups covering the whole SSA subcontinent. The relationship between ethnicity and family size preferences is analyzed for 500,000 women from 181 ethnic groups in 24 sub-Saharan countries using data from the Demographic and Health Surveys and via multilevel Poisson regression analyses. Fertility preferences vary considerably across ethnic groups. Major factors explaining this are gender-related cultural characteristics and educational level at the group level. Interaction analyses showed that the size and direction of these effects are moderated by the women's individual characteristics. The findings make clear that someone's ethnic background should be taken into account when looking at fertility patterns and designing policies aimed at changing fertility patterns in the SSA context.

Keywords Fertility preferences · Ethnicity · Sub-Saharan Africa

Introduction

Within Sub-Saharan Africa (SSA), fertility levels and a preference for large families are much higher than in most other regions of the developing world, even if we take socioeconomic position and the relatively low level of access to contraceptives into account (Bongaarts, 2011; Casterline, 2017; Dibaba & Mitike, 2016; United Nations Department of Economic & Social Affairs, 2020). One possible explanation for this is that in SSA, more than elsewhere, fertility behavior depends on the socio-cultural context in which people live (Cole & Geist, 2021;

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Johnson-Hanks, 2005; Longwe & Smits, 2013; Trinitapoli & Yeatman, 2018). This context determines to a large extent what information and resources individuals have access to. It constructs leading norms and values, which may include powerful ideals about what constitutes appropriate reproductive behavior for women (Kane et al., 2016; Munshi & Myaux, 2006).

An important aspect of the social context in SSA is ethnicity. Ethnicity is a complex social construct encompassing the cultural aspects of life that influences individuals' identity and group social relations (Airhihenbuwa, 2007; Ford & Kelly, 2005). Members of ethnic groups can possess shared attributes, including beliefs, customs and/or shared memories and experiences. The level of ethnic diversity in SSA is higher than in most other global regions, and individuals' loyalty towards their ethnic group is often stronger than their loyalty towards their country (Bates, 2000; Casterline, 2017; Easterly & Levine, 1997; Robinson, 2013).

A number of empirical studies have shown that ethnicity plays a major role in women's fertility behavior. Addai (1999) found clear ethnic differentials in the use of contraceptives in Ghana. Kane et al. (2016) reported that women's fertility behavior within the Fertit community in South Sudan corresponded to the social norm of having as many children as possible. Palamuleni (2014) found differences in fertility rates between six ethnic groups in Malawi, and Munshi et al. (2006) concluded that changing social norms within ethnic groups were predominantly responsible for observed changes in reproductive behavior in rural Bangladesh. As such, available evidence suggests that ethnicity plays an important role in shaping women's fertility behaviors. However, not much is known about the strength of this influence, what characteristics of ethnic groups are important, and how these relate to fertility preferences.

The current preference for high fertility has important consequences for fertility levels in SSA, as the spread of a preference for smaller families has been one of the major factors responsible for fertility decline in other parts of the world (Bongaarts, 2009; Coale & Watkins, 1986; Gerland et al., 2017). Given this preference for high fertility and its significance for any attempts to lower birth rates, gaining insight into the factors that influence it is of great importance. The current study focuses on the role of ethnicity in this respect, and aims to answer the following research questions:

- (1) *To what extent and in what ways do fertility preferences in SSA vary between ethnic groups?*
- (2) *How can this variation be explained by socioeconomic, demographic, and cultural characteristics of ethnic groups?*

Using data from the Demographic and Health Surveys (DHS; www.dhsprogram.com) with information on 500,000 women belonging to 181 different ethnic groups in 24 SSA countries, we study the relationship between ethnicity and family size preferences using multilevel Poisson regression models. In the next section, we provide an overview of the relevant literature regarding the relationships between ethnicity and fertility in the SSA.

Background

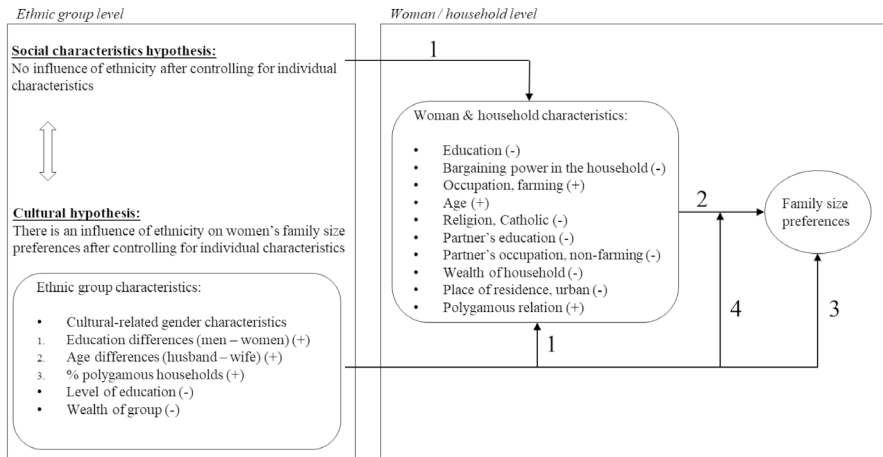
Theoretical Background to Fertility Preferences in SSA

Preference for high fertility in SSA is pronounced compared to developing regions in other parts of the world, such as Latin America and Asia (Alaba et al., 2017; Bongaarts & Casterline, 2013; Channon & Harper, 2019). Although preferred family size has diminished somewhat over the years from above 6 in a majority of countries to 4.6 in 2010, it was still much larger than in North Africa and the Middle East (3.2), Asia (2.7) and Latin America (2.7) (Bongaarts, 2011). An important reason for this preference lies in traditional pronatalist social, economic, and cultural practices (Bongaarts, 2011; Caldwell & Caldwell, 1987; Casterline, 2017; Hertrich, 2017). The pronatalist culture even implies a resistance to fertility decline that is absent in other developing regions (Bongaarts, 2017).

This preference for high fertility constitutes one factor, among others, that explains SSA's high fertility levels (Bongaarts, 2020; Bongaarts & Casterline, 2013; Ezeh et al., 2009; Westoff & Cross, 2006). Earlier studies have found that the spread of a preference for smaller families has been one of the major factors responsible for new fertility behavior and fertility decline in other parts of the world (Bongaarts, 2009; Casterline, 2001; Coale & Watkins, 1986; Easterlin & Crimmins, 1985; Gerland et al., 2017). Another important factor is the (lack of) access to family planning and related high unmet need for contraception (Sedgh & Hussain 2014; Cleland et al., 2006; Günther & Harttgen, 2016). The lack of access to family planning can make it more difficult for Africans to translate smaller family size preference into practice (Günther & Harttgen, 2016). However, given that the preference for large families is still extraordinarily high, the relationship between this preference and the deeply embedded culture of loyalty towards ethnic groups seems to offer a highly interesting topic for empirical analysis (Bates, 2000; Casterline, 2017; Easterly & Levine, 1997; Robinson, 2013).

Ethnic Fertility Differentials

Attempts to understand ethnic fertility differentials have generally focused on two partly competing explanations: the social characteristics hypothesis and the cultural hypothesis. According to the *social characteristics hypothesis* (Fig. 1, arrow 1 and 2, ethnic fertility differentials are the result of compositional differences between groups, such as differences in socioeconomic, demographic, and cultural characteristics (Petersen, 1969). The basic assumption within this hypothesis is that individuals with similar characteristics may also show similar fertility preferences and behavior, irrespective of their ethnic background. Important characteristics in this respect are education (Shapiro and Tambashe 1997), especially of women (Bakibinga et al., 2016; Kebede et al., 2019), traditionalism regarding gender roles (Hindin, 2000; Withers et al., 2015), and religion (Caldwell & Caldwell, 1987). The social characteristics hypothesis therefore predicts that ethnic



Notes: The different arrows denote the tested hypotheses. Note that arrow 1 shows the same effect: ethnicity is associated with woman and household characteristics. The social characteristics hypothesis predicts a pathway of ethnic influences through 1 & 2 but not 3. The cultural hypothesis predicts a pathway of ethnic influences through arrows 1, 2 & 3. We further test for moderations between ethnic group characteristics and individual characteristics with arrow 4. The signs after the included variables denote whether we expect a positive or negative influence.

Fig. 1 Conceptual framework of hypotheses tested in this study. Notes: The different arrows denote the tested hypotheses. Note that arrow 1 shows the same effect: ethnicity is associated with woman and household characteristics. The social characteristics hypothesis predicts a pathway of ethnic influences through 1 & 2 but not 3. The cultural hypothesis predicts a pathway of ethnic influences through arrows 1, 2 & 3. We further test for moderations between ethnic group characteristics and individual characteristics with arrow 4. The signs after the included variables denote whether we expect a positive or negative influence

fertility differentials will completely disappear when individual characteristics are taken into account. Empirical evidence in favor of this hypothesis is presented by Addai (1999) who found that ethnic differentials in contraceptive acceptance and use in Ghana disappeared when individual socioeconomic and demographic characteristics were controlled for, and by Bakibinga et al. (2016) who found that ethnicity was not associated with women's attitudes towards acceptance and use of family planning in Kenya.

The second hypothesis, the *cultural hypothesis*, assumes an additional influence of ethnicity on fertility behavior (Fig. 1, arrow 1, 2 & 3; Caldwell & Caldwell, 1987). This hypothesis acknowledges the importance of individual socioeconomic and demographic characteristics in explaining ethnic fertility differentials, but emphasizes that norms and values of (ethnic) groups are important additional characteristics that influence fertility behavior. The cultural hypothesis is supported by several studies showing that fertility differences between ethnic groups remain after controlling for the individuals' socioeconomic and demographic characteristics (Kollehlon, 2010; Palamuleni, 2014).

To be able to distinguish between the social characteristics hypothesis and the cultural hypothesis, individual characteristics that are known or expected to

influence family size preferences should be taken into account to eliminate group compositional differences as far as possible. Important individual and household characteristics are women's education, their bargaining power within the household and their occupational resources (Bakibinga et al., 2016; Kebede et al., 2019; Atake & Ali 2019). Higher-educated women, women with more bargaining power and women with a non-farming occupation prefer fewer children. Other individual and household characteristics that are expected to be important are their partners' education and occupation, household wealth, place of residence, age, religion, and whether they practice polygamy (Matovu et al., 2017; Tomkinson, 2019; Lerch, 2019; Atake & Ali 2019; Kebede et al., 2019; Bongaarts, 2020; Shapiro & Tenikue, 2017). We expect that women prefer fewer children if they have partners with a higher level of education and a non-farming occupation, are wealthier, live in an urban setting, are younger, are Catholic and have monogamous relationships.

Mechanisms

If norms and values at the ethnic group level influence women's fertility behavior, they may do so through socialization and/or social contagion. Socialization implies that individuals' values—including those related to fertility preferences—are formed at an early age and become deeply rooted in personality structure (Afulani & Asunka, 2015; Kolk, 2014). Social contagion implies that fertility patterns are copied from relevant others (Lois & Becker, 2014). Individuals living in the same social context, such as members of the same ethnic group, mutually influence each other's behavior (Klärner & Bernardi, 2014; Levy & Nail, 1993). As such, women belonging to the same ethnic group are likely to end up showing similar fertility behavior.

According to Berndt et al. (2019), two mechanisms are important for socialization and social contagion: social pressure and social support. Social pressure results from anticipated rewards and punishments for compliance or non-compliance with the expectations of the social context (Bernardi, 2003). These expectations do not need to be particularly overt. Simply observing the behavior and choices of others within the same group may lead to an urge to reduce cognitive dissonance between one's own and the group's behavior (Festinger, 1954). Individuals generally do not want to differ too much from the group they feel attached to. So, if women observe that other women within their ethnic community prefer large families, they are more likely to do so as well.

Social support refers to the advancement a woman may achieve from being a member of a social group. Social networks offer social capital, defined as resources embedded within social relationships (Bourdieu, 1986; Putnam, 1993). Social capital can take different forms, such as financial, practical, and emotional support from other members of the group, including the potential to meet the cost of having children. Social pressure and social support separately or together may stimulate women to exhibit (fertility) preferences that are in line with the group's expectations.

Women's fertility preferences may also be affected by gender-related cultural characteristics within groups. In groups where there are larger gender differences,

women are often viewed as caregivers and as subservient to men, and their domain may be more strongly restricted to the private sphere (Gündüz-Hoşgör & Smits, 2008; Spierings et al., 2010). In such a context, having more children may be an important way of achieving social status (Casterline, 2017). As such, we predict that women prefer more children where there are larger gender differences (Fig. 1, arrow 3).

Level of education of group members may also be highly relevant to fertility preferences (Kravdal, 2012). Families are generally smaller in groups where individuals are more highly educated (Bakibinga et al., 2016; Kebede et al., 2019). This could imply less social pressure to prefer large families, and more social pressure to go to school. Both forms of social pressure are likely to lead to women preferring smaller families.

Moderating Effects

The effect of ethnic group characteristics cannot be expected to be the same for all women, as they are likely to be moderated by individual characteristics and the situation in which they are living (Fig. 1, arrow 4; Longwe & Smits, 2012; Maralani, 2008). This raises the question as to whether women's individual socioeconomic resources can be strong enough to overcome group pressure (called by Spierings et al. (2010) "individual dominance"), or whether group pressure overrides individual characteristics. If the latter, women may feel they have to adjust their family size preferences to the group norm independent of their own personal resources ("situational dominance").

The situational dominance and individual dominance hypotheses will be tested in relation to both the level of education and gender-related cultural characteristics of ethnic groups, as both group features are expected to affect women's family size preferences. Both features will be interacted with three essential factors at the individual level—women's education, their bargaining power within the household, and their occupational resources—which are all known to affect family size preferences (Bakibinga et al., 2016; Kebede et al., 2019; Atake and Ali 2019).

Data and Methods

Data

For this study, data from the Demographic and Health Surveys (DHS; www.dhsprogram.com) were used. DHS are large, nationally representative household surveys. For each survey, non-overlapping areas (often enumeration areas) were randomly selected. These areas (called "clusters" henceforth) are usually communities, villages, or city quarters. In the selected clusters, all households were listed, and a random selection of 25–30 households were selected for interviews. First, household surveys were conducted in which basic information was collected about all household members, and subsequently all women aged 15 to 49 and usually resident were

invited for an oral interview in which a large amount of information was obtained, including in-depth data on socioeconomic, demographic, and (reproductive) health-related issues.

The inclusion criteria for surveys in this study were that (1) at least two DHS surveys were available for a specific country since 1998, and that (2) information on women's ethnicity was a feature of these surveys. The second criterium in particular meant that we were not able to include all countries or some of the most recent DHS surveys, as ethnicity-related questions were not always included.

Information about women's ethnicity was asked in the household surveys. The question mostly commonly asked was "What is your ethnic group/tribe?". Respondents could choose from a number of predefined answer categories, or a category "Other" followed by "Specify". Groups with fewer than 30 observations within a country in a specific year were excluded. Online Appendix I (Table A1) provides additional information about the sample used in this study.

We included all fertile women (aged 15–49) with a valid response to the variable preferred family size and for whom the ethnic group was known. Cases with missing data on ethnicity and/or preferred family size, and some unrealistic cases (together 6,7%), were removed from the dataset. Women who gave a non-numeric response (5.4%) such as "It is up to my husband" or "It is up to God", or who did not know how many children they would prefer (8.0%) were excluded. Women preferring more than 12 children (1.2%) were also removed, as we believe that it is unusual for women to give birth to more than 12 children (although it is physically possible).

Missing values on women's education, household wealth and partner's education were addressed by the dummy variable adjustment procedure (Allison, 2001; Little & Rubin, 2002). Missing characteristics on the categorical variables were addressed using an additional "missing" category. The resulting dataset contains information on 499,339 women from 181 ethnic groups living in 24 sub-Saharan countries.

Fig. 2 Sample overview of included countries ($N=24$) and number of ethnic groups ($N=181$) for each country

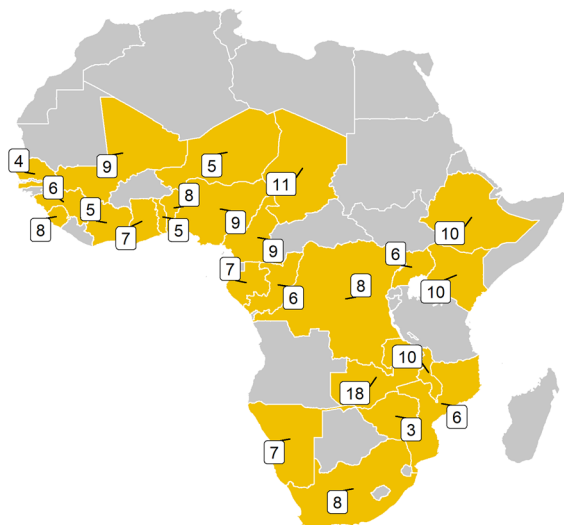


Figure 2 shows which countries and the number of ethnic groups per country are included.

To get a representative sample of the countries, we used the women weights provided by DHS. We denormalized the women weights and subsequently normalized them according to the national population size of women aged 15–49 for each survey following the standards of ICF International (2012). In this way, a representative sample of the female population aged 15–49 in the 24 countries was created.

Methods

To analyze the data, multilevel Poisson regression was used with ethnic group-specific random effects. Multilevel Poisson regression is convenient for count variables, and it provides the opportunity to address the nesting of women within ethnic groups and study the role of factors at the ethnic group level. Fixed effects country dummies were included to control for clustering and confounding at the national level, such as for differences in infrastructure and climate. We use the “variance partition coefficient” (VPC) to describe the share of individuals’ total variation in family size preferences that is attributable to the ethnic group level. We calculate the “median rate ratio” (MRR) as described in Austin et al. (2018) to show the effect size of clustering at ethnic group level.

Four models are estimated. Model 0 shows the clustering at ethnic group level (VPC) without controlling for compositional differences between groups. In Model 1, the group composition is considered by adding characteristics of women and their households. In Model 2, the ethnic group characteristics are added. The final model, Model 3, presents the results of the interaction analysis in which gender-related cultural characteristics of the ethnic group and the group’s level of education are interacted with women’s individual level of education, position within the household and occupation. Furthermore, the ethnic group’s characteristics are interacted with the calendar year.

Variables

The dependent variable “preferred family size” is a count variable indicating how many children women wish to have. In the surveys women were asked: “*If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?*”. To ensure that our results were not driven by the social desirability of a match between reached parity and family size preferences, we conducted a robustness analysis in which we reran our analysis based on women aged 15–25 (Online Appendix Table A5). Women of this age are less likely to have already reached their full parity, so they are less likely to give a preference based on their reached parity. The results are similar regarding direction and significance, which makes it unlikely that preference was simply based on reached parity.

The independent variables consist of variables measured at household level and ethnic group level. At household level, we control for women's education, their partner's education, women's marital status, women's bargaining power in the household, women's occupation, their partners' occupation, household wealth, place of residence, age, religion, and whether polygamy is practiced.

The education of the woman and of her partner (if available) is measured in years of education completed. A woman's marital status is measured using 4 categories: (1) married or living together, (2) widowed, (3) divorced or not living together, and (4) never married. To indicate a woman's bargaining power in the household, we use the age difference between husband and wife, following earlier studies (e.g. Schrijner & Smits, 2018; Spierings et al., 2010). We used 3 categories: (1) equally aged, (2) wife is between 4 and 9 years younger, (3) wife is more than 10 years younger. Women's occupation is measured via a categorical variable indicating whether the woman worked last week (1) in a farming occupation, (2) in a lower non-farming occupation, (3) in an higher non-farming occupation, or (4) did not have an occupation aside from her housework. Occupation of the partner is measured using the same categories. Household wealth is measured by using the International Wealth Index (IWI; Smits & Steendijk, 2015), which is a comparative asset-based wealth index. IWI indicates to what extent households own a basic set of assets valued highly by people across the world (like a TV, refrigerator, phone, or car), have access to basic services (water and electricity) and live in a good-quality home. The place of residence is either (0) urban or (1) rural. Religion is categorized as (1) Catholic, (2) Protestant, (3) Muslim, (4) traditional, (5) Christian not specified, (6) no religion and atheist, and (7) other. Women's age is measured by an interval variable. Whether women are in a polygamous relationship is measured with a dummy variable (0=no, 1=yes). To measure the effect of time, we included the calendar year of the surveys in our models.

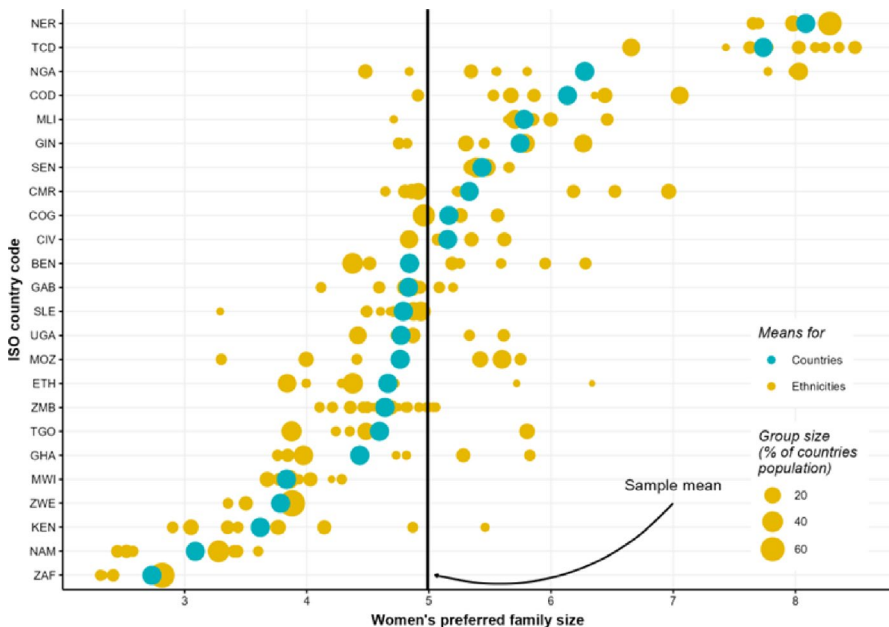
At the ethnic group level, we include gender-related cultural characteristics and socioeconomic and demographic characteristics. Given that for SSA countries hardly any indicators are available at the ethnic group level, we follow earlier studies that created context variables by aggregating women and household level variables (e.g. Kravdal, 2006; Schrijner & Smits, 2018). We calculated the aggregated mean over all ethnic group members using the household and women weights to create representative indicators for each group. The gender-related cultural characteristics of ethnic groups are measured by the mean age difference between spouses (husband-wife) within the group, by the mean educational differences (men-women) between group members, and by the share of polygamous households. The educational level of the ethnic groups is measured by the mean years of education of group members aged 20–39. The wealth level of groups is indicated by the mean of the International Wealth Index (IWI) of their households. Given that this index at the national level is highly correlated with GDP per capita and the Human Development Index (Smits & Steendijk, 2015), it is expected to be a valid indicator at the ethnic group level as well. The relative size of ethnic groups is measured as their percentage of a country's total population. This variable is meant to control for the possibility that fertility preferences are influenced by relative group size (compare Goldscheider & Uhlenberg, 1969).

Results

Descriptive Statistics

Figure 3 shows the mean preferred family size for each ethnic group (blue dots) and country (yellow dots). The mean number for women's preferred family size in our sample is 4.99 children. Women in Niger and Chad prefer on average the most children (a mean preferred family size of around 8) and women in South Africa the fewest (a mean preferred family size of below 3). We also observe that the mean preferred family sizes vary substantially between ethnic groups within the countries.

Table 1 shows the descriptive statistics of all the variables included in our models. The mean number of years' education for women is 5.2, while it is 5.4 for their partners. Most women are married or living together (64%), 28% never married, 3% are widowed and 6% are divorced or no longer living together. Of the married women, most women are between 4 and 9 years younger than their partner (40%), followed by 35% more than 10 years younger. Most women are not working (38%),



Notes: Mean preferred family size (x-axis) for ethnic groups (yellow dots), countries (blue dots) and the total population (vertical black line). The y-axis denotes the ISO code of the different countries. The size of the dots denotes the group size within the countries as a percentage of the countries' population. N ethnic groups=181, N countries=24, N sample=499,339.

Fig. 3 Mean preferred family size for ethnic groups, countries and the total sample. Notes: Mean preferred family size (x-axis) for ethnic groups (yellow dots), countries (blue dots) and the total population (vertical black line). The y-axis denotes the ISO code of the different countries. The size of the dots denotes the group size within the countries as a percentage of the countries' population. N ethnic groups = 181, N countries = 24, N sample = 499,339

Table 1 Descriptive statistics: Means and percentages of variables included in this study

Variables	Mean, %	SD	% Missing
Preferred family size (dep. var.)	4.99	2.57	
Women and household characteristics			
Education woman	5.18	4.56	0.39
Education partner	5.38	5.03	
Marital status			0.17
Married, living together	63.61%		
Widowed	2.58%		
Divorced, not living together	5.79%		
Never married	27.85%		
Age difference husband-wife			2.73
Wife equally aged	21.98%		
Wife between 4 and 9 years younger	40.08%		
Wife > 10 years younger	35.21%		
Occupation woman			2.17
Farming	23.94%		
Lower non-farming	32.14%		
Higher non-farming	3.46%		
Not working	38.29%		
Occupation partner			2.38
Farming	41.12%		
Lower non-farming	39.41%		
Higher non-farming	9.39%		
Not working	7.70%		
Wealth of household	36.15	25.65	0.05
Place of residence is rural	59.72%		
Age	28.14	9.29	
Religion			6.45
Catholic	16.86%		
Protestant	22.21%		
Muslim	30.39%		
Traditional	2.57%		
Christian, not specified	18.00%		
No religion, atheist	2.27%		
Other	1.25%		
Woman lives in polygamous household	9.82%		0.00
Ethnic group characteristics			
Years of education	5.29	2.82	
Education differences (men-women)	1.62	1.03	
Age differences (husband-wife)	7.80	2.18	
Percentage polygamous households	6.08	0.08	
Average wealth level	33.78	14.88	
Share of population	21.98	17.95	
Time			
Year	2011	4.84	

Table 1 (continued)

Source: 1998–2018 DHS (www.dhsprogram.com). N women = 499,339, N ethnic groups = 181, N countries = 24

followed by 32% with a lower non-farming occupation, while most men have a lower non-farming occupation (39%). The average wealth level for each household is 36 on a scale ranging from 0 to 100, and most households (60%) live in rural areas. Women's mean age is 28.1. Most women are Muslim (30%) followed by Protestant (22%). Almost 10% of women live in a polygamous household.

The descriptive statistics at ethnic group level show that the average number of years of education of group members is 5.3. The mean difference in years of education between men and women in the group (men – women) is 1.6 years and the mean age difference between spouses (husband – wife) is 7.8 years. The mean percentage of polygamous households is 6.1%. The mean wealth level (IWI) of the groups is 33.8. The smallest ethnic group comprises 0.3% of a country's total population and the largest 83.8%. The average ethnic group size comprises 22.0% of the country's population.

Regression Results

Model 0 (Table 2) tests whether fertility preferences vary between ethnic groups. We observe a significant clustering of women's preferred family size at the ethnic group level. The VPC indicates that 7.4% of the variance in women's preferred family size is due to systematic differences between the ethnic groups. The MRR for this model is 1.12, indicating that women coming from an ethnic group with relatively large family preferences desire at the median 12% more children than women coming from an ethnic group with relatively small family preferences. As such, the results are consistent with our expectations that family size preferences differ between ethnic groups.

Model 1 (Table 2) tests whether the variation between ethnic groups is a consequence of variation in socioeconomic, demographic, and cultural characteristics at the individual and household level, as proposed by the social characteristics hypothesis. Both the Poisson regression coefficients (B) and the rate ratios (RR) are presented. The RR can be most easily interpreted. For example, a RR of 0.94 for women's education means that if women's education increases by 1 standard deviation, the preferred number of children decreases by a factor of 0.94.

The coefficient of the women's and household characteristics are largely in line with previous studies (e.g. Atake & Ali 2019; Bongaarts, 2020; Kebede et al., 2019; Lerch, 2019; Matovu et al., 2017; Tomkinson, 2019). Women prefer fewer children when they or their partners have a higher level of education, when they are not married, are the same age as their partner, when they or their partners have a non-farming occupation, their households are wealthier, they live in urban areas, they are younger, they are Catholic, and when they are not living in a polygamous relationship.

Table 2 Standardized coefficients of multilevel Poisson regression analyses on women's preferred family size

Variables	Model 0			Model 1			Model 2		
	B	SE	RR	B	SE	RR	B	SE	RR
Intercept	1.657 ***	0.044	5.242	1.551 ***	0.031	4.717	1.517 ***	0.033	4.559
Year	-0.012 ***	0.001	0.988	0.004 *	0.002	1.004	0.004 *	0.002	1.004
Woman and household characteristics									
Education woman				-0.061 ***	0.001	0.941	-0.062 ***	0.001	0.940
Education partner				-0.005 ***	0.001	0.995	-0.004 ***	0.001	0.996
Marital status, ref. = Married									
Widowed				-0.049 ***	0.004	0.953	-0.045 ***	0.004	0.956
Divorced, not living together				-0.092 ***	0.003	0.912	-0.088 ***	0.003	0.916
Never married				-0.092 ***	0.003	0.912	-0.087 ***	0.003	0.916
Age difference (husband-wife), ref. = equally aged									
Wife between 4 and 9 years younger				0.017 ***	0.002	1.017	0.016 ***	0.002	1.016
Wife > 10 years younger				0.016 ***	0.002	1.016	0.015 ***	0.002	1.015
Occupation woman, ref. = farming									
Lower non-farming				-0.034 ***	0.002	0.966	-0.035 ***	0.002	0.966
Higher non-farming				-0.053 ***	0.004	0.948	-0.054 ***	0.004	0.947
Not working				-0.031 ***	0.002	0.970	-0.031 ***	0.002	0.970
Occupation partner, ref. = farming									
Lower non-farming				-0.012 ***	0.002	0.988	-0.015 ***	0.002	0.985
Higher non-farming				-0.016 ***	0.003	0.984	-0.019 ***	0.003	0.981
Not working				-0.017 ***	0.005	0.983	-0.022 ***	0.005	0.978
Wealth of household				-0.038 ***	0.001	0.962	-0.037 ***	0.001	0.963
Place of residence, ref. = urban				0.048 ***	0.002	1.050	0.049 ***	0.002	1.050
Age				0.078 ***	0.001	1.081	0.079 ***	0.001	1.082
Religion, ref. = Catholic									

Table 2 (continued)

Variables	Model 0			Model 1			Model 2		
	B	SE	RR	B	SE	RR	B	SE	RR
Protestant				0.027 ***	0.003	1.028	0.027 ***	0.003	1.028
Muslim				0.083 ***	0.003	1.087	0.083 ***	0.003	1.086
Traditional				0.091 ***	0.005	1.096	0.092 ***	0.005	1.096
Christian, not specified				0.002	0.002	1.002	0.002	0.002	1.002
No religion, atheist				0.049 ***	0.006	1.050	0.050 ***	0.006	1.051
Other				0.048 ***	0.008	1.049	0.047 ***	0.008	1.048
Woman lives in polygamous household				0.023 ***	0.002	1.023	0.025 ***	0.002	1.025
Ethnic group characteristics									
Years of education							- 0.029 ***	0.007	0.971
Education differences (men-women)							0.033 ***	0.003	1.034
Age differences (husband-wife)							- 0.025 ***	0.005	0.975
Percentage polygamous households							- 0.004	0.004	0.996
Average wealth level							0.012	0.006	1.012
Share of population							0.029 ***	0.004	1.029
Variance of random intercept	0.015			0.007			0.007		
Deviance	2,091,315			2,030,763			2,030,627		
VPC	0.074			0.033			0.033		
MRR	1.124			1.085			1.086		

* $p < .05$, ** $p < .01$, *** $p < .001$; N women=499,339, N ethnic groups= 181. The continuous variables are standardized. Both models include the full set of country-level fixed effects dummies to control for clustering at the national level (Online Appendix I)

A surprising finding is that the year coefficient is positive, suggesting that women have come to prefer more children in recent years. The bivariate relationship between time and family size preferences is negative (see Model 0). The coefficient becomes positive only after adjusting for other factors. Further explorations showed that this happened when women's education and household wealth were included. The positive year coefficient is thus likely to be the result of an increase in women's education and wealth over time.

After inclusion of women's and household characteristics, the VPC decreased from 7.4% to 3.3%. Visual comparison of mean predicted preferred family sizes for ethnic groups of Model 1 with Model 0 (Fig. 4) shows a decrease in variance of ethnic group means around the country means. As such, the variance between ethnic groups from model 0 is partly explained by compositional differences between ethnic groups, but a substantial difference in family size preferences between ethnic groups remains. The MRR decreased to from 1.12 to 1.09. Hence, women from a group with relatively large family preferences desire 9% more children at the median than women from a group with relatively small family preferences when compositional differences are taken into account.

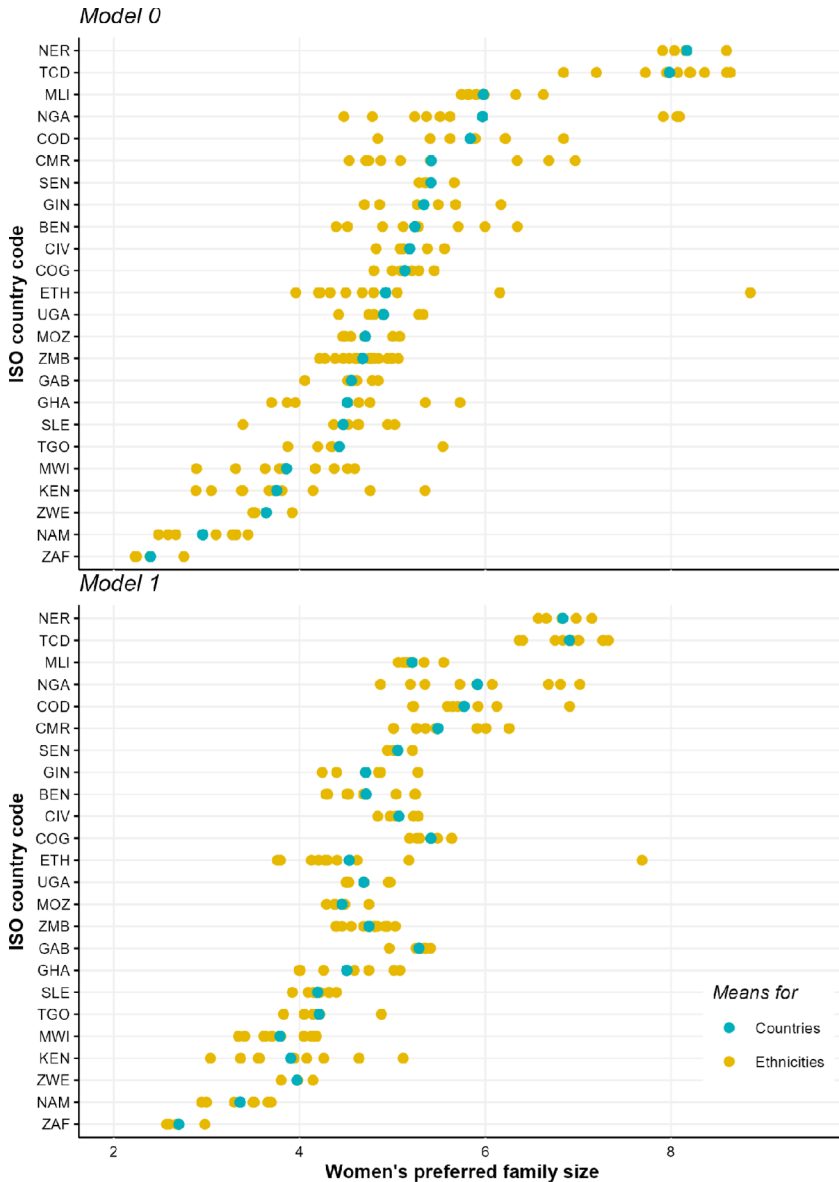
Ethnic Group Characteristics

Model 2 adds ethnic group characteristics to test to what extent these predict women's preferred family size. The inclusion of ethnic group characteristics is a significant improvement on the previous model. The deviance of Model 2 versus Model 1 is significant smaller ($X^2(6,N)=170,0, p<0.001$). As such, ethnic group characteristics are associated with women's preferred family size.

The coefficients of the group characteristics (Model 2, Table 1) show that women prefer fewer children when they are members of a group with an average higher level of education. This finding is in line with our expectation that, independent of one's own level of education, the group's level of education has an additional influence. Women prefer larger families when they live in groups with larger education differences (men–women) at the ethnic group level, while women prefer smaller families when they live in groups with larger age differences between spouses (husband–wife). Women's preferred family size is not influenced by the percentage of polygamous households at the group level, so polygamy seems only to influence women's preferences at the household level. These findings show mixed evidence for our hypotheses, as we expected these gender-related cultural characteristics to be positively related to family size preferences. The average level of wealth is not significantly related to family size preferences, but the relative size of the group within the country is positively related to family size preferences. Women prefer more children when they are members of a group that is relatively large compared to other groups within the country.

Moderations

Model 3 (Table 3) shows the results of our interaction analysis in which we test whether the effects of socioeconomic and demographic characteristics of women at



Notes: Mean predicted preferred family sizes (x-axis) for ethnic groups (yellow dots) and countries (blue dots). The y-axis denotes the ISO code of the different countries. The upper graph shows the predicted values from model 0, and the lower graph shows the predicted values from model 1 where the ethnic groups show less variance around the country means. N groups=181, N countries=24.

Fig. 4 Mean predicted family size preferences for ethnic groups and countries. Notes: Mean predicted preferred family sizes (x-axis) for ethnic groups (yellow dots) and countries (blue dots). The y-axis denotes the ISO code of the different countries. The upper graph shows the predicted values from model 0, and the lower graph shows the predicted values from model 1 where the ethnic groups show less variance around the country means. N groups = 181, N countries = 24

Table 3 Standardized interaction coefficients between major group and individual characteristics

	Model 3		
	<i>B</i>	<i>SE</i>	<i>RR</i>
Education differences (men-women) at group level <i>*Individual characteristics</i>			
Level of education woman	0.010 ***	0.001	1.010
Occupation woman: lower non-farm	- 0.007 **	0.002	0.993
Occupation woman: higher non-farm	- 0.028 ***	0.005	0.973
Occupation woman: not working	- 0.012 ***	0.002	0.988
Age difference: wife between 4 and 9 years younger	- 0.005 *	0.002	0.995
Age difference: wife > 10 years younger	- 0.007 ***	0.002	0.993
Year	0.003 **	0.001	1.003
Age differences (husband-wife) at group level <i>*Individual characteristics</i>			
Level of education woman	0.009 ***	0.001	1.009
Occupation woman: lower non-farm	- 0.009 ***	0.003	0.991
Occupation woman: higher non-farm	- 0.040 ***	0.005	0.960
Occupation woman: not working	- 0.007 **	0.002	0.993
Age difference: wife between 4 and 9 years younger	- 0.023 ***	0.002	0.977
Age difference: wife > 10 years younger	- 0.019 ***	0.002	0.981
Year	0.010 ***	0.001	1.010
Years of education at group level <i>*Individual characteristics</i>			
Level of education woman	0.000	0.001	1.000
Occupation woman: lower non-farm	- 0.014 ***	0.002	0.986
Occupation woman: higher non-farm	- 0.033 ***	0.006	0.968
Occupation woman: not working	- 0.008 ***	0.002	0.992
Age difference: wife between 4 and 9 years younger	- 0.020 ***	0.002	0.980
Age difference: wife > 10 years younger	- 0.016 ***	0.002	0.984
Year	0.000	0.001	1.000
Variance of random intercept	0.007		
Deviance	2,029,714		
VPC	0.031		
MRR	1.083		

* $p < .05$, ** $p < .01$, *** $p < .001$; N women = 499,339, N ethnic groups = 181. The continuous variables are standardized. The model includes the full set of women- and household characteristics, ethnic group characteristics and country-level fixed effects dummies (presented in Online Appendix I)

the household level are moderated by the level of education and gender-related cultural characteristics at the group level.

We find that the negative effect of women's individual education on their preferred family size is stronger in groups where the gender differences in education and the age differences between husbands and wives are smaller. This means that the effect of education is reduced for women living with greater gender differences,

as predicted by the situational dominance hypothesis. The effects of having a non-farming occupation are also significantly related to ethnic group characteristics, but in the opposite direction: they are stronger if the differences are greater. This shows that women's occupation is especially important where there are larger gender differences, which is in line with the individual dominance hypothesis. We further find that the effect of age difference between spouses at the household level is smaller in groups with larger age differences. The positive effect of age difference at household level is therefore reduced where there are greater gender differences, as proposed by the situational dominance hypothesis.

The effect of women's education on family size preferences is not moderated by the years of education at group level, but women's occupation and households' age differences is. The negative effects of having a non-farming occupation are stronger in groups that are on average more highly educated, which supports the situational hypothesis. The positive effects of household age differences are weaker if groups are on average more highly educated, which is line with the individual dominance hypothesis. Finally, we see that the positive effect of education difference has become greater in more recent years. The negative effect of age difference at ethnic group level has lessened in recent years, whereas the effect of years of education at the group level has remained stable.

Discussion

The present study aimed to ascertain to what extent women's family size preferences are influenced by ethnicity and what specific characteristics are important. Based on 500,000 women aged 15–49, belonging to 181 ethnic groups within 24 sub-Saharan countries, we found broad evidence that ethnicity is associated with women's preferred family size. Our analyses revealed that the influence of ethnicity almost halved (from 7 to 3%) when individual characteristics were taken into account, but that there remained a substantial structural influence. Ethnic group characteristics that were found to be important were gender-related cultural characteristics and the mean level of education. The size of these effects were found to be moderated by women's individual characteristics. We therefore conclude that ethnicity has a substantial influence on women's preferred family size.

Regarding the way in which fertility outcomes are influenced by ethnicity, two major hypotheses were tested: the *social characteristics hypothesis*, which assumes ethnic fertility differentials to be solely due to compositional differences between groups (Addai, 1999; Bakibinga et al., 2016; Petersen, 1969) and the *cultural hypothesis*, which assumes that besides compositional differences, norms and values at the ethnic group level are also important for fertility outcomes (Caldwell & Caldwell, 1987; Kollehlon, 1989; Palamuleni, 2014). Our findings, which showed a substantial association between ethnic group characteristics and family size preference, are in line with the cultural hypothesis. This adds to the growing body of evidence indicating that ethnicity influences women's fertility behavior through group pressure and social support (Lois & Becker, 2014; Levy & Nail, 1993; Berndt et al., 2019; Adedini et al., 2015).

Results for our expectations regarding the direction of the effect of gender-related cultural characteristics were mixed. While we expected that larger educational differences, larger age differences and a greater number of polygamous relationships would relate to larger family size preferences, we only found this effect for educational differences. We found the opposite effect for larger age differences, and we did not find an effect in relation to polygamous relationships. Although surprising, this finding is in line with earlier studies that have reported inconsistent effects of gender-related cultural characteristics on fertility behavior (Upadhyay et al. 2014; Upadhyay & Karasek, 2012; Moursund & Kravdal, 2003).

Our interaction analysis revealed that the influence of women's individual characteristics depended to a certain extent on characteristics of their ethnic group. The negative relation between women's education and larger families is weaker in ethnic groups with greater gender differences in terms of education and age difference between spouses. This outcome is in line with the situational dominance hypothesis, which predicts that individual characteristics can be less important in groups with greater gender differences. This is in line with earlier findings of Spierings et al. (2010) which examined the potential for women to be gainfully employed in patriarchal countries. At the same time, we found evidence for the individual dominance hypothesis, as our results showed that the effect of a non-farming occupation and women's bargaining power in the household is stronger in groups with greater gender differences.

Given our findings, we recommend that policy-makers in this field examine their policy target and look not only at women's individual characteristics but also at the circumstances in which they are living, including those of the ethnic group to which they belong. For example, our finding that women's education has a larger influence in groups where gender-related cultural differences are smaller indicates that policies need to incorporate the social context as well. More detailed information on interactions between individual characteristics and the social context will be especially beneficial, as this would inform policy-makers as to which individual characteristics are important to focus on in specific contexts.

Some caution is required regarding our conclusions. First, with respect to the data, some ethnic groups did not have sufficient respondents in the DHS surveys and as such, could not be included in our analysis. Nevertheless, our study is a major improvement on previous studies, as we included many more ethnic groups than others have done so far. Second, we must bear in mind that the strength of ethnic identity might vary between individuals and that ethnicity is not the only characteristic with which women identify. Characteristics such as social class, religion, and national identity are also likely to be important. Third, we should be aware that a woman's ideal family size is often a response to the dynamics of her current situation, such as change in marital status (divorce, widowhood, and new marriage) (e.g. Sennott & Yeatman, 2012; Trinitapoli & Yeatman, 2018). Moreover, the lives of African women are often unpredictable, which could be reflected in dynamic fertility preferences over time (Johnson-Hanks, 2005; Johnson-Hanks et al., 2011). As such, fertility preferences should not be seen as the basis for a feasible plan for the future but rather as a reflection of that specific moment, and care should be taken not to draw conclusions regarding fertility rates from these preferences.

In sum, this study provides evidence that ethnic groups have a substantial influence on women's family size preferences, even after controlling for group composition. Compared with earlier studies, our research constitutes a major improvement because it provides—for the first time—a broad comparative analysis of the variation in preferred family size between ethnic groups. The findings clearly indicate that ethnic background should not be forgotten when designing policies that aim to affect fertility (preferences).

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11113-023-09804-z>.

Data availability The data that support the findings of this study are available from DHS. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author(s) with the permission of DHS.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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References

- Addai, I. (1999). Ethnicity and contraceptive use in Sub-Saharan Africa: The case of Ghana. *Journal of Biosocial Science*, 31(1), 105–120. <https://doi.org/10.1017/S0021932099001054>
- Adedini, S. A., Odimegwu, C., Imasiku, E. N. S., & Ononokpono, D. N. (2015). Ethnic differentials in under-five mortality in Nigeria. *Ethnicity and Health*, 20(2), 145–162. <https://doi.org/10.1080/13557858.2014.890599>
- Afulani, P., & Asunka, J. (2015). Socialization, adaptation, Transnationalism, and the reproductive behavior of Sub-Saharan African migrants in France. *Population Research and Policy Review*, 34(4), 561–592. <https://doi.org/10.1007/s11113-015-9360-2>
- Airhihenbuwa, C. O. (2007). *Healing our differences*. Rowman & Littlefield Publishers Inc.
- Alaba, O. O., Olubusoye, O. E., & Olaomi, J. O. (2017). Spatial patterns and determinants of fertility levels among women of childbearing age in Nigeria. *South African Family Practice*, 59(4), 143–147. <https://doi.org/10.1080/20786190.2017.1292693>
- Allison, P. D. (2001). *Missing Data*. Sage.
- Atake, E. H., & Ali, P. (2019). Women's empowerment and fertility preferences in high fertility countries in Sub-Saharan Africa. *BMC Women's Health*. <https://doi.org/10.1186/s12905-019-0747-9>
- Austin, P. C., Stryhn, H., Leckie, G., & Merlo, J. (2018). Measures of clustering and heterogeneity in multilevel poisson regression analyses of rates/count data. *Statistics in Medicine*, 37(4), 572–589. <https://doi.org/10.1002/sim.7532>
- Bakibinga, P., Mutombo, N., Mukiira, C., Kamande, E., Ezeh, A., & Muga, R. (2016). The influence of religion and ethnicity on family planning approval: A case for women in rural Western Kenya. *Journal of Religion and Health*, 55(1), 192–205. <https://doi.org/10.1007/s10943-015-0030-9>

- Bates, R. (2000). Ethnicity and development in Africa: A reappraisal. *The American Economic Review*. <https://doi.org/10.1257/aer.90.2.131>
- Bernardi, L. (2003). Channels of social influence on reproduction. *Population Research and Policy Review*, 22(5–6), 427–555. <https://doi.org/10.1023/b:popu.0000020892.15221.44>
- Berndt, J.O., Stephanie C. R., and Ingo J. T. (2019). Social Contagion of Fertility: An Agent-Based Simulation Study. In: *Proceedings—Winter simulation conference*, 2018-December:953–64. Institute of electrical and electronics engineers Inc. <https://doi.org/10.1109/WSC.2018.8632331>.
- Bongaarts, J. (2009). Human population growth and the demographic transition. *Philosophical Transactions of the Royal Society B*, 364(1532), 2985–2990. <https://doi.org/10.1098/rstb.2009.0137>
- Bongaarts, J. (2011). Can family planning programs reduce high desired family size in Sub-Saharan Africa? *International Perspectives on Sexual and Reproductive Health*, 37(4), 209–216. <https://doi.org/10.1363/3720911>
- Bongaarts, J. (2017). Africa's unique fertility transition. *Population and Development Review*, 43, 39–58.
- Bongaarts, J. (2020). Trends in fertility and fertility preferences in Sub-Saharan Africa: The roles of education and family planning programs. *Genus*, 76(1), 32. <https://doi.org/10.1186/s41118-020-00098-z>
- Bongaarts, J., & Casterline, J. (2013). Fertility transition: Is Sub-Saharan Africa different? *Population and Development Review*, 38(Suppl 1), 153–168. <https://doi.org/10.1111/j.1728-4457.2013.00557.x>
- Bourdieu, P. (1986) *The Forms of Capital*. Edited by J.G. Richardson. New York: Greenwood Press
- Caldwell, J. C., & Caldwell, P. (1987). The cultural context of high fertility in Sub-Saharan Africa. *Population and Development Review*, 13(3), 409. <https://doi.org/10.2307/1973133>
- Casterline, J.B. (2001) Ready, willing, and able: A conceptualization of transitions to new behavioral forms
- Casterline, J. B. (2017). Prospects for fertility decline in Africa. *Population and Development Review*, 43, 3–18. <https://doi.org/10.1111/padr.12055>
- Channon, M. D., & Harper, S. (2019). Educational differentials in the realisation of fertility intentions: Is sub-Saharan Africa different? *PLoS ONE*, 14(7), e0219736.
- Cleland, J., Bernstein, S., Ezeh, A., Faundes, A., Glasier, A., & Innis, J. I. (2006). Family planning: The unfinished agenda. *The Lancet*, 368(9549), 1810–1827.
- Coale, A.J., and Susan Cotts Watkins. (1986) The Decline of Fertility in Europe, 484.
- Cole, W. M., & Geist, C. (2021). Conceiving of contraception: World society, cultural resistance, and contraceptive use, 1970–2012. *Social Forces*, 99(4), 1394–1431. <https://doi.org/10.1093/sf/soaa077>
- Dibaba, B., & Mitike, G. (2016). Factors influencing desired family size among residents of Assela Town. *Journal of Women's Health Care*. <https://doi.org/10.4172/2167-0420.1000342>
- Easterlin, R.A., and Crimmins E.M. (1985) The fertility revolution: A supply-demand analysis, 209
- Easterly, W., & Levine, R. (1997). Africa's growth tragedy: policies and ethnic divisions. *Quarterly Journal of Economics*, 112(4), 1203–1250. <https://doi.org/10.1162/003355300555466>
- Ezeh, A. C., Mberu, B. U., & Emina, J. O. (2009). Stall in fertility decline in Eastern African countries: Regional analysis of patterns, determinants and implications. *Philosophical Transactions of the Royal Society B*, 364(1532), 2991–3007. <https://doi.org/10.1098/rstb.2009.0166>
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2), 117–140. <https://doi.org/10.1177/001872675400700202>
- Ford, M. E., & Adam, K. P. (2005). Conceptualizing and categorizing race and ethnicity in health services research. *Health Services Research*, 40, 1658–1675.
- Gerland, P., Biddlecom, A., & Kantorová, V. (2017). Patterns of Fertility decline and the impact of alternative scenarios of future fertility change in Sub-Saharan Africa. *Population and Development Review*, 43, 21–38. <https://doi.org/10.1111/padr.12011>
- Goldscheider, C., & Uhlenberg, P. R. (1969). Minority group status and fertility. *American Journal of Sociology*, 74(4), 361–372.
- Gündüz-Hoşgör, A., & Smits, J. (2008). Variation in labor market participation of married women in Turkey. *Women's Studies International Forum*, 31(2), 104–117. <https://doi.org/10.1016/J.WSIF.2008.03.003>
- Günther, I., & Harttgen, K. (2016). Desired fertility and number of children born across time and space. *Demography*, 53(1), 55–83. <https://doi.org/10.1007/s13524-015-0451-9>
- Hertrich, V. (2017). Trends in age at marriage and the onset of fertility transition in sub-Saharan Africa. *Population and Development Review*, 43, 112–137.

- Hindin, M. J. (2000). Women's autonomy, women's status and fertility-related behavior in Zimbabwe. *Population Research and Policy Review*, 19(3), 255–282. <https://doi.org/10.1023/A:1026590717779>
- International ICF (2012). Demographic and health survey sampling and household listing manual. ICF International Calverton, Maryland, USA.
- Johnson-Hanks, J. (2005). When the future decides: uncertainty and intentional action in contemporary cameroon. *Current Anthropology*, 46(3), 363–385. <https://doi.org/10.1086/428799>
- Johnson-Hanks, J. A., Bachrach, C. A., Morgan, S. P., & Kohler, H. P. (2011). *Understanding family change and variation: Toward a theory of conjunctural action*. Springer.
- Kane, S., Kok, M., Rial, M., Matere, A., Dieleman, M., & Broerse, J. E. W. (2016). Social norms and family planning decisions in South Sudan. *BMC Public Health*, 16(1), 1–12. <https://doi.org/10.1186/s12889-016-3839-6>
- Kebede, E., Goujon, A., & Lutz, W. (2019). Stalls in Africa's fertility decline partly result from disruptions in female education. *Proceedings of the National Academy of Sciences of the United States of America*, 116(8), 2891–2896. <https://doi.org/10.1073/pnas.1717288116>
- Kläerner, A., & Bernardi, L. (2014). Social networks and fertility laura bernardi table of contents. *Demographic Research*, 30(22), 641–670. <https://doi.org/10.4054/DemRes.2014.30.22>
- Kolk, M. (2014). Understanding transmission of fertility across multiple generations—socialization or socioeconomics? *Research in Social Stratification and Mobility*, 35, 89–103. <https://doi.org/10.1016/j.rssm.2013.09.006>
- Kollehlon, K. T. (1989). Ethnicity and fertility in Liberia: A test of the minority group status hypothesis. *Social Biology*, 36(1–2), 67–81. <https://doi.org/10.1080/19485565.1989.9988720>
- Kollehlon, K. T. (2010). 'Biodemography and social biology ethnicity and fertility in Nigeria. *Social Biology*, 2013, 37–41. <https://doi.org/10.1080/19485565.2003.9989072>
- Kravdal, Ø. (2006). A simulation-based assessment of the bias produced when using averages from small DHS clusters as contextual variables in multilevel models. *Demographic Research*, 15, 1–20. <https://doi.org/10.4054/DemRes.2006.15.1>
- Kravdal, Ø. (2012). Further evidence of community education effects on fertility in Sub-Saharan Africa. *Demographic Research*, 27, 645–680. <https://doi.org/10.4054/DemRes.2012.27.22>
- Lerch, M. (2019). Fertility decline in urban and rural areas of developing countries. *Population and Development Review*, 45(2), 301–320. <https://doi.org/10.1111/padr.12220>
- Levy, D., & Nail, P. (1993). Contagion: A theoretical and empirical review and reconceptualization. *Genetic, Social and General Psychology Monographs*, 119(2), 253–283.
- Little, R. J. A., & Rubin, D. B. (2002). *Statistical Analysis with Missing Data*. John Wiley & Sons.
- Lois, D., & Becker, O. A. (2014). Is fertility contagious? Using panel data to disentangle mechanisms of social network influences on fertility decisions. *Advances in Life Course Research*, 21, 123–134. <https://doi.org/10.1016/j.alcr.2013.10.001>
- Longwe, A., & Smits, J. (2012). Family planning outcomes and primary school attendance in Sub-Saharan Africa. *Studies in Family Planning*, 43(2), 127–134. <https://doi.org/10.1111/j.1728-4465.2012.00310.x>
- Longwe, A., & Smits, J. (2013). The impact of family planning on primary school enrolment in sub-national areas within 25 African Countries. *African Journal of Reproductive Health*, 17(2), 23–38.
- Maralani, V. (2008). The changing relationship between family size and educational attainment over the course of socioeconomic development: Evidence from Indonesia. *Demography*, 45(3), 693–717. <https://doi.org/10.1353/DEM.0.0013>
- Matovu, J. K., Makumbi, F., Wanyenze, R. K., & Serwadda, D. (2017). Determinants of fertility desire among married or cohabiting individuals in Rakai, Uganda: A cross-sectional study. *Reproductive Health*, 14(1), 1–11. <https://doi.org/10.1186/s12978-016-0272-3>
- Moursund, A., & Kravdal, Ø. (2003). Individual and community effects of women's education and autonomy on contraceptive Use in India. *Population Studies*, 57(3), 285–301. <https://doi.org/10.1080/0032472032000137817>
- Munshi, K., & Myaux, J. (2006). Social norms and the fertility transition. *Journal of Development Economics*, 80(1), 1–38. <https://doi.org/10.1016/J.JDEVECO.2005.01.002>
- Palamuleni, M. E. (2014). Social and economic factors affecting ethnic fertility differentials in Malawi. *International Journal of Development and Sustainability*, 3(1), 70–88.
- Petersen, W. (1969) *Population*. 2nd ed. [New York] ;London: Macmillan ;Collier-Macmillan.
- Putnam, R. D. (1993). The prosperous community. *The American Prospect*, 4(13), 35–42.

- Robinson, A. L. (2013). National versus ethnic identification in Africa: Modernization, colonial legacy, and the origins of territorial nationalism. *World Politics*. <https://doi.org/10.1017/S0043887114000239>
- Schrijner, S., & Smits, J. (2018). Grandmothers and children's schooling in Sub-Saharan Africa. *Human Nature*, 29(1), 65–89. <https://doi.org/10.1007/s12110-017-9306-y>
- Sedgh, G., & Hussain, R. (2014). Reasons for contraceptive nonuse among women having unmet need for contraception in developing countries. *Studies in Family Planning*, 45(2), 151–169. <https://doi.org/10.1111/j.1728-4465.2014.00382.x>
- Sennott, C., & Yeatman, S. (2012). Stability and change in fertility preferences among young women in Malawi. *International Perspectives on Sexual and Reproductive Health*, 38(1), 34–42. <https://doi.org/10.1363/3803412>
- Shapiro, D., & Oleko Tambashe, B. (1997). Education, employment, and fertility in kinshasa and prospects for changes in reproductive behavior. *Population Research and Policy Review*, 16(3), 259–287. <https://doi.org/10.1023/A:1005761504449>
- Shapiro, D., & Tenikue, M. (2017). Women's education, infant and child mortality, and fertility decline in Urban and Rural Sub-Saharan Africa. *Demographic Research*, 37(1), 669–708. <https://doi.org/10.4054/DemRes.2017.37.21>
- Smits, J., & Steendijk, R. (2015). The international wealth index (IWI). *Social Indicators Research*, 122(1), 65–85. <https://doi.org/10.1007/s11205-014-0683-x>
- Spierings, N., Smits, J., & Verloo, M. (2010). Micro-and macrolevel determinants of women's employment in six Arab Countries. *Journal of Marriage and Family*, 72(5), 1391–1407. <https://doi.org/10.1111/j.1741-3737.2010.00772.x>
- Tomkinson, J. (2019). Age at first birth and subsequent fertility: The case of adolescent mothers in France and England and Wales. *Demographic Research*. <https://doi.org/10.4054/DEMRES.2019.40.27>
- Trinitapoli, J., & Yeatman, S. (2018). The flexibility of fertility preferences in a context of uncertainty. *Population and Development Review*, 44(1), 87–116. <https://doi.org/10.1111/padr.12114>
- United Nations Department of Economic and Social Affairs. 2020. 'World Fertility and Family Planning 2020: Highlights'.
- Upadhyay, U. D., Gipson, J. D., Withers, M., Lewis, S., Ciaraldi, E. J., Fraser, A., Huchko, M. J., & Prata, N. (2014). Women's empowerment and fertility: A review of the literature. *Social Science & Medicine*, 115, 111–120. <https://doi.org/10.1016/j.socscimed.2014.06.014>
- Upadhyay, U. D., & Karasek, D. (2012). Women's empowerment and ideal family size: An examination of DHS empowerment measures in sub-Saharan Africa. *International Perspectives on Sexual and Reproductive Health*, 38(2), 78–89. <https://doi.org/10.1363/3807812>
- Westoff, C.F., and A.R. Cross. 2006. 'The Stall in the Fertility Transition in Kenya'. Calverton, MD.
- Withers, M., Dworkin, S. L., Onono, M., Oyier, B., Cohen, C. R., Bukusi, E. A., & Newmann, S. J. (2015). Men's Perspectives on their role in family planning in Nyanza Province, Kenya. *Studies in Family Planning*, 46(2), 201–215. <https://doi.org/10.1111/j.1728-4465.2015.00024.x>

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