Firstborn Girls and Family Structure: Evidence from sub-Saharan Africa

Garance Genicot* and Maria Hernandez-de-Benito†

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This paper examines the impact of son preferences on family structure in sub-Saharan Africa using Demographic and Health Surveys data. We investigate how having a first-born daughter, as opposed to a son, affects women's likelihood of ever being married, being in a polygamous relationship, and remaining married. Our findings reveal distinct family outcomes for women with a firstborn daughter. They experience higher long-term marriage rates, a reduced likelihood of marrying the father in out-of-wedlock births, increased divorce rates, and more frequent entry into polygamous unions. Additionally, they tend to have more children. Using regression discontinuity analysis along matrilineal-patrilineal ethnic borders, we identify patrilineal tradition as a significant explanatory factor for these outcomes.

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*Georgetown University. † Universidad de Alicante. Correspondence: garance.genicot@georgetown.edu and mhernandezdebenito@gmail.com.

1 Introduction

A majority of societies exhibit some degree of son preference (Williamson 1976). Much has been written on the roots and consequences of son preference in South and East Asia. Recent studies in India highlight the profound impact of a child's gender on various aspects, including future fertility (Jayachandran and Kuziemko 2011), sex-selective abortion (Anukriti, Bhalotra, and Tam 2016), and disparities in parental time investment, access to healthcare, and nutrition (Rose 1999,Jayachandran and Kuziemko 2011, Jayachandran and Pande 2017). High-income countries also experience gender-related effects on family dynamics, such as changes in marital formation, divorce rates, and custody arrangements (Lundberg and Rose 2003,Lundberg, McLanahan, and Rose 2007,Dahl and Moretti 2008,Ichino, Lindstrom, and Viviano 2014,Blau et al. 2017,Kabatek and Ribar 2020).

Emerging evidence suggests that son preference is also present in sub-Saharan Africa, particularly in North, West, and Central African nations with significantly skewed desired sex ratios (Bongaarts 2013). Although there is little evidence of missing girls at birth, Anderson and Ray (2017) reveal notable excess women mortality across the continent, except in Southern Africa. Studies on birth spacing, such as Rossi and Rouanet (2015) confirm strong son preference in North Africa and its absence in South Africa, while Norling (2018), examining fertility patterns, underscores the diversity of gender preferences.

However, much less is known about the effects of son preference on family structure in sub-Saharan Africa. Dahl and Moretti (2004) looking at Kenya in their working paper, and Milazzo (2014) in research on Nigeria , found that women with a female firstborn have more children, are more likely to be separated, and more likely to end up in a polygamous union. In Senegal, Lambert, de Walle, and Villar (2017) describes how female divorcees with a son from a previous union have a lower remarriage rate.

This paper examines how a child's gender influences family structure in sub-Saharan Africa, specifically its impact on their mother's marital status. We analyze data from over 100 DHS surveys conducted in more than 30 countries.

When gender preferences affect fertility choices, families with girls may differ significantly

from those with boys. To address this, we focus on the sex of the firstborn child, given that concerns related to sex-selective abortion are generally not applicable in sub-Saharan Africa (Anderson and Ray 2017; Chao et al. 2019). Our identification strategy treats the sex of the firstborn child as an exogenous event, especially among young women, where concerns about differential mortality based on children's gender composition do not apply (Milazzo 2014).

First, we analyze the likelihood of subsequent marriages among a subset of women whose initial childbirth occurred prior to any formal marital commitment. While women with a firstborn daughter exhibit similar short-term marriage rates to those with sons, there is a notable increase in the probability of marriage for these women over the long term, ranging from 0.8 to 1 percentage point (equating to a 1-2% difference). We find that these women are more likely to be currently married, and this trend cannot be primarily attributed to a higher incidence of shotgun marriages. In fact, mothers of an out-of-wedlock female firstborn appear to be less inclined to marry the father of the firstborn child.

Next, we show that among women whose initial child was born after entering a marital union, those with a firstborn daughter exhibit a 0.2 percentage point increase in the likelihood of current divorce, representing a 5-7% higher likelihood. Additionally, they are 0.5 percentage points more likely to have experienced divorce at some point, reflecting a 4% higher likelihood. Women with a female firstborn are also 0.5 percentage points more likely to be in a polygamous marriage, a 2% higher likelihood. Lastly, they tend to have a higher number of children.

Naturally, behind these average effects on marriage patterns, divorce rates, polygamy, and fertility hides substantial heterogeneity across countries.

In recent years, there has been a growing body of literature examining the impact of traditional practices, including patrilineality, patrilocality and dowry customs. These practices have often been associated with the cultivation of cultural preferences for sons and the perpetuation of gender discrimination against daughters (Gupta et al. 2003, Sundaram and Vanneman 2008, Rossi and Rouanet 2015, Jayachandran 2015, Rammohan and Vu 2018). We anticipate that any practice that raises the relative value of sons will accentuate the effects of a female firstborn. In particular, we hypothesize that the patrilineal

or matrilineal nature of a society will exert a particularly pronounced influence on family structure. This is because women in matrilineal societies experience fewer setbacks in the event of divorce, as they do not typically forfeit land or custody of their children, in contrast to their counterparts in patrilineal societies (Clignet 1970, Poewe 1978, Holden, Sear, and Mace 2003).

It is important to to note that traditional practices are not exogenous and are closely associated with geographic and agricultural factors (Tene 2023, Alesina, Giuliano, and Nunn 2013, Alesina, Brioschi, and Ferrara forthcomingBecker, Enke, and Falk 2020, Alsan 2015). For this reason, we employ geographic regression discontinuity designs to explore heterogeneity along patrilineal versus matrilineal practices, as well as patrilocality and the absence of a bride price.

Our findings indeed reveal substantial heterogeneity. The impact of a firstborn daughter on family structure, as described earlier, is particularly strong in patrilineal areas, especially in terms of its effect on marriages for women who have a child prior to their first union and on fertility. Along ethnic borders, we observe a 3.7 percentage point decrease in the likelihood of initially unmarried women in patrilineal areas who had a firstborn daughter in the last five years getting married, compared to those with sons. However, as the number of years since the birth increases, these women are just as likely, if not more likely, to get married. This is in stark contrast to women on the matrilineal side of the ethnic border, who are 3 percentage points more likely to marry if they have a firstborn daughter, even in the short term. Furthermore, despite the marital and separation effects, the increase in fertility following the birth of a firstborn daughter is predominantly observed in patrilineal areas.

These findings have implications both in terms of methodology and welfare considerations. In terms of methodology, a body of research has been dedicated to examining birth order effects and heterogeneous effects based on the gender composition of offspring (Jakiela et al. 2020,Washington 2008, Glynn and Sen 2015, Cronqvist and Yu 2017, Shafer and Malhotra 2011). Our results underscore the necessity of considering sample selection due to family structure when attempting to establish causal links between the gender of older siblings and the outcomes of younger children.

For instance, researchers finding a positive correlation between having a female eldest sister and the educational attainment of younger siblings might be tempted to attribute a causal interpretation to this effect, assuming the exogeneity of the firstborn's gender. However, if having a female firstborn child increases the likelihood of divorce or polygamy, resulting in more children living with mothers, and if the survey of interest primarily registers sons and daughters living with the head of the household (who are typically male), then any ordinary least squares (OLS) model would yield biased estimates if parental characteristics associated with divorce or polygamy are also correlated with the educational outcomes of younger siblings (e.g., parental time allocation, gender attitudes, etc.).

Similar concerns may arise in studies exploring the impact of children's gender on parental outcomes. Attention must be paid if the study focuses on a subsample of the population that could itself be affected by family structure, such as gender attitudes among judges or politicians.

Secondly, our findings may have welfare implications. Studies conducted in developed countries consistently demonstrate advantages in terms of educational and economic outcomes for children raised in households with two married biological parents compared to those raised in single-parent homes (Kearney and Levine 2017 for example). In contrast, in Africa, child fostering is a common practice and is often considered beneficial. There is suggestive evidence that fostering responds to demands for child labor (Ainsworth 1992 in Cte d'Ivoire, Milazzo 2014 in Nigeria). Additionally, fostering can serve as an investment in a child's education or as a response to economic shocks (Akresh 2009 in Burkina Faso, Zimmerman 2003 in South Africa). Penglase (2020) found little evidence of intra-household consumption inequality between foster and non-foster children in Malawi. Consequently, the overall impact of fostering on education and living standards appears to be ambiguous and context-specific.

Nonetheless, there is substantial evidence that family structure significantly affects the well-being of both adults and children. Brown and van de Walle (2019) discovered higher poverty rates among female-headed households, especially when the female head is unmarried (Brown and van de Walle 2019). For women, the cost of being unmarried is notably steep, as evidenced by significant excess female mortality in unmarried individ-

uals in Africa, as found by Anderson and Ray (2015). Furthermore, Van De Walle and Djuikom (2018) uncovered lower nutritional status among widowed and divorced women in Africa compared to married women in their first union.

The paper is organized as follows. Section 2 describes the data and main identification strategy. The effect of a female firstborn on family structure are shown in Section 3. Section 4 presents the heterogeneity results by traditional ethnic practice, including the regression discontinuity results. Finally, Section 5 concludes.

2 Data

2.1 Data Sources

To study women's outcomes, we utilize data from the Demographic and Health Surveys (DHS) conducted by USAID in sub-Saharan Africa post-1994. These nationally-representative household surveys provide data for a wide range of household- and individual-level outcomes.[1] We specifically use surveys for which geo-located cluster data is available, totaling 94 DHS surveys from 32 countries. You can find the list of DHS waves used in the analysis in Table A1.

The main analytical sample comes from the DHS Woman's Questionnaire, which is administered to women aged 15-49, collecting data on a large variety of outcomes, including the woman's birth history. This information is used to list all children (alive or dead) that the respondent has given birth to, with information on the child's sex, date of birth, survival status, and mother's coresidence.

The DHS surveys provide geographic coordinates for each DHS cluster, with random displacements of 0 to 2 km for urban clusters and 0 to 5 km for rural clusters. To match households' locations to specific geographic areas, we utilize the Stata function *geoinpoly*[2].

[1]The data and detailed information on the sampling procedure and variable definitions can be found at http://dhsprogram.com/data/Data-Variables-and-Definitions.cfm.

[2]Robert Picard, 2015. "GEOINPOLY: Stata module to match geographic locations to shapefile polygons," Statistical Software Components S458016, Boston College Department of Economics, revised 16 Aug 2015.

We perform this matching process for both historic ethnic group areas (Murdock 1959) and current administrative boundaries. The information on subnational administrative areas come from the DHS geographic data and GIS data available at DIVA-GIS.

2.2 Identification Strategy and Descriptive Statistics

Our analytical sample includes all women who have ever given birth. Our primary identification strategy treats the sex of the firstborn child as a random event, assuming that in the absence of selective mortality of the fetus or the mother, natural male-to-female birth ratios should average between 1.03 and 1.06 (Anderson and Ray 2010).

Consistent with prior research in Sub-Saharan Africa (Anderson and Ray 2017, Chao et al. 2019), we find no abnormal birth sex ratios among firstborn children in our sample, with an average sex ratio of 1.04 and minimal evidence of geographic or cohort heterogeneity. We considered the possibility of geographic heterogeneity due to genetic factors (Anderson and Ray 2010) and cohort heterogeneity arising from extreme events such as famines or natural disasters (Tan et al. 2009, Song 2012, Nandi, Mazumdar, and Behrman 2018). However, in our sample, geographic-cohort effects explain very little, accounting for up to 3% of the observed variation, even when controlling for current administrative areas and historic ethnic boundaries (see Table A2).

While we observe no significant birth ratio distortions on average, we must consider the possibility of non-random heterogeneity in women's characteristics that could be correlated with family structure outcomes. One potential concern for identification is the idea that having a female firstborn child, as opposed to a male, might influence the selection of women into our sample due to selective mortality. For instance, if having a girl leads to negative health outcomes for women, it could result in higher mortality rates among women with a female firstborn.

In line with findings from Nigeria (Milazzo 2014) using 2008 DHS survey data, Figure A1 illustrates the probability of a female firstborn child against the current age of women in our sample. Notably, after age 40, the male-to-female birth ratio begins to decline, indicating that selective mortality may be a concern in our sample. However, as shown in

Table A2, once we control for year of the firstborn's birth fixed effects, the difference by women's age disappears.

To err on the side of caution, we will exclude women aged 40 and above from the main analytical sample.

Table 1 presents summary statistics for all women in our sample who are aged 40 and below. On average, women are 29 years old. Three quarters of the women attended primary education or less and 21% of them had their first child before their first marriage or cohabitation, if any. In terms of geographic location, 70% of the women live in rural areas and in ancestral patrilineal ethnic areas, while 84% live in patrilocal ethnic areas and 76% in areas where bride price was traditionally practiced. Finally, in some surveys, we can observe how long the woman has lived in her current residence. We see that 43% of the women have always lived in the residence reported at the time of the survey.

The sex of the firstborn child is largely uncorrelated with women's observable characteristics. In Table 1, columns (4)-(7) present regression coefficients with the outcome variable indicating whether the firstborn child is female as opposed to male. These models control for geographic and cohort fixed effects, and we also report joint tests for the significance of all covariates simultaneously.

Notably, women living in rural and patrilocal areas appear to have a slightly smaller probability of having a female firstborn child in our sample. However, this association becomes statistically insignificant when we control for women's migration status in column (7).

Finally, a potential concern could be recall bias, if unobserved characteristics of women that affect the probability of misremembering the sex of their firstborn are correlated with women's family structure outcomes. Generally, we believe it is fairly unreasonable that a large enough proportion of women would misreport the sex of their firstborn child to the extent that it would impact the conclusions drawn from the empirical analysis. Additionally, the limitation of excluding women aged 40 and above should alleviate concerns about this potential source of sample selection bias.

Table 1: Women's Descriptive Statistics and Balance Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Female firstborn == 1			
	Mean	St. dev.	Obs.	β	p-value	β	p-value
Age	28.83	6.36	671,455	–0.001	0.53	–0.001	0.61
Primary/less education	0.74	0.44	671,455	0.001	0.37	0.002	0.44
Secondary/higher education	0.26	0.44	671,455				
First child born before union	0.21	0.40	671,454	0.001	0.63	0.001	0.78
Rural	0.68	0.47	671,455	–0.003	0.04	–0.002	0.13
Patrilineal area	0.68	0.47	671,455	–0.001	0.74	0.003	0.34
Matrilineal area	0.14	0.34	671,455	–0.001	0.81	0.001	0.86
Patrilocal area	0.85	0.35	666,688	–0.005	0.09	0.001	0.86
Matrilocal area	0.04	0.19	666,688	–0.005	0.31	–0.004	0.17
Bride price area	0.76	0.42	671,455	0.001	0.69	–0.003	0.18
Always in current residence	0.43	0.49	434,041			0.000	0.77
Joint equality test (p-value)				0.369		0.638	
Outcome mean				0.489		0.490	
Country FE				Yes		Yes	
Survey year FE				Yes		Yes	
Firstborn's year of birth FE				Yes		Yes	
Woman's year of birth FE				Yes		Yes	
Observations				666,687		430,562	

Notes: This Table presents summary statistics of all women included in this paper's analytical sample. Columns (1) to (3) present sample mean, standard deviation, and number of observations. Columns (4) and (5) present the coefficient and correspondent p-value, respectively, of an OLS regression of an indicator variable equal to one of the womans firstborn child was female regressed on womens observable characteristics. Columns (6) and (7) include an additional covariate accounting for whether the woman has always lived in her residence at the time of the survey, information not collected by all the DHS surveys. Standard errors are clustered at the ethnic area level.

3 Effect of Firstborn Girls on Family Structure

3.1 Empirical Strategy

This section tests whether the sex of the firstborn child has effects on the mother's family structure. The main regression model is specified as follows:

$$y_{iec} = \beta \textit{Female firstborn}_i + X_i'\Gamma + Z_i'\Omega + \alpha_c + \delta_t + \lambda_e + \epsilon_{iec}, \tag{1}$$

where y_{iec} is the outcome of interest for woman i residing in ethnic area e and country c. $\textit{Female firstborn}_i$ is an indicator variable equal to one if her firstborn's sex is female, and zero otherwise. X_i is a vector of covariates of woman's i's firstborn including age, age squared, and an indicator variable equal to one if the child is no longer alive; Z_i is a vector of covariates for woman i including age, age squared, education, and year of birth and religion fixed effects. We also include country α_c, ethnic area λ_e, and survey year δ_t fixed effects. We will also control for a set of geographic controls at the DHS cluster level including a rural dummy, the log of population, log of the average purchasing power parity, and travel time to the nearest city. The regressions including religion fixed effects have a fewer number of observations because not all DHS surveys collect this information.[3] Standard errors are clustered at the ethnic-area level.

In addition to presenting the estimated coefficient of interest, $\hat{\beta}$, we will also adopt the approach of Dahl and Moretti (2008) to report the male firstborn baseline. This baseline is calculated as the average predicted outcome variable for women with a male firstborn child using the estimated coefficients on the control variables. We will also report the 'percent effect,' represented by the ratio of $\hat{\beta}$ to the male firstborn baseline, which is equivalent to the odds ratio minus 1.

We typically partition the regression sample into two subsamples: 1. Women whose first child was born before their first union, if applicable. 2. Women whose firstborn child was born after their first union.

[3]The surveys for which religion affiliation of the respondents is not available are the following: Lesotho 2004, Senegal 1997, Tanzania 2010, and Tanzania 2015-2016.

Table 2: Effect of Female Firstborn on Subsequent Marriage

			Years since Firstborn's Birth			
			< 5		≥ 5	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	0.01***	0.01***	-0.00	-0.00	0.01***	0.01***
	(0.00)	(0.00)	(0.81)	(0.63)	(0.00)	(0.00)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓
Geographic controls		✓		✓		✓
Male firstborn baseline	0.65	0.65	0.30	0.30	0.80	0.81
Percent effect	0.86	1.13	-0.30	-0.74	1.01	1.39
Observations	139,790	98,658	42,792	30,079	96,953	68,523

Notes: This Table presents OLS regressions where the dependent variable is an indicator variable = 1 if the respondent ever got married after the birth of their firstborn. The sample is limited to women whose firstborn child was born before ever been in a union. Columns (3)-(6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. Columns (2), (4), and (6) also control for women's religion fixed effects and DHS-cluster geographic controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

3.2 Results

We first examine the subsample of women, which accounts for 21% of the sample, whose firstborn child was born before the date of their first marriage or cohabitation. We estimate that the proportion of women who got pregnant of their firstborn child before union is higher at 37% of the sample. Of these, 44% entered a union during the pregnancy. However, we do not observe any differential impact of the sex of the firstborn child on the probability of entering a union during pregnancy (Table A3). Therefore, to assess the impact of the firstborn's sex on the probability of a union, we focus on the subsample of women whose first child was born before their first union took place.

Table 2 presents the results of estimating equation (1) with an outcome variable equal to one if the respondent ever entered a marriage or cohabitation. The results indicate that the probability increases by 0.9-1% when comparing a woman whose first child was female to a woman whose first child was male.

These results however mix the probability of what is often called a "shotgun marriage", defined as marrying the father of the child shortly after the birth, and future marital decisions of the mother. To try to distinguish "shotgun" from subsequent marriages, columns (3) to (4) show the effect on shotgun marriage by restricting the sample to women whose first child was born no more than five years ago from the time of the survey, while columns (5)-(6) show the effect of a female firstborn on the likelihood of becoming ever married among women whose first born was born more than five years ago. We see that having a daughter only increases the probability of subsequent marriage in the long-term.

We then examine the subsample of women whose firstborn child was born after the date of their first marriage or cohabitation. Table 3 presents the results on postmarital family structure outcomes. In columns (1) to (4), the dependent variable is an indicator variable equal to one if the respondent is currently in a polygamous marriage, with columns (3) and (4) restricting the sample to women currently in a union. The results indicate that the probability of being in a polygamous marriage increases by 1.1-1.3% when comparing a woman whose first child was female to a woman whose first child was male. In columns (5)-(6), we show that the probability of currently being divorced increases by 4.6-4.8%. Finally, limiting to those surveys that provide past marital history, we find consistent results when the outcome variable is "ever divorced" (columns (7)-(8)).

Finally, Table 4 presents the results of estimating equation (1) with the number of children the woman has given birth to at the time of the survey. We see that women with having a firstborn daughter have 0.02 more births on average compared to women with a firstborn son. This difference amounts to about a three percent increase in fertility compared to the male firstborn baseline. We also see the results hold up consistently, regardless of whether we narrow our focus to women whose first child was born before or after their first union.

Table 3: Effect of Female Firstborn on Polygamy and Divorce

	Polygamous marriage				Divorced			
			Currently in union		Currently		Ever	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female firstborn	0.003**	0.003**	0.003***	0.004***	0.001***	0.001**	0.005**	0.005**
	(0.015)	(0.023)	(0.004)	(0.006)	(0.004)	(0.018)	(0.021)	(0.025)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓		✓
Geographic controls		✓		✓		✓		✓
Male firstborn baseline	0.23	0.24	0.25	0.27	0.03	0.03	0.14	0.14
Percent effect	1.13	1.14	1.34	1.34	4.64	4.88	3.56	3.42
Observations	531,654	402,745	480,262	366,175	531,654	402,745	96,828	84,267

Notes: This Table presents OLS regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage (columns (1)-(4)), currently divorced (columns (5)-(6)), and ever divorced (columns (7)-(8)). The sample is limited to women whose firstborn child was born after been in a union. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. Columns (2), (4), (6), and (8) also control for women's religion fixed effects and DHS-cluster geographic controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

Table 4: Effect of Female Firstborn on Fertility

	All		Firstborn born before union		Firstborn born after union	
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn	0.019***	0.021***	0.020***	0.017*	0.020***	0.021***
	(0.000)	(0.000)	(0.008)	(0.067)	(0.000)	(0.000)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Religion FE		✓		✓		✓
Geographic controls		✓		✓		✓
Male firstborn baseline	3.41	3.54	2.90	3.03	3.54	3.66
Percent effect	0.57	0.59	0.68	0.57	0.57	0.59
Observations	671,455	501,414	139,791	98,658	531,654	402,745

Notes: This Table presents OLS regressions where the dependent variable is the number of children the female respondent ever gave birth to. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. Columns (2), (4), and (6)also control for women's religion fixed effects and DHS-cluster geographic controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

4 Traditional Practices Heterogeneity: Patrilineality vs. Matrilineality

4.1 Motivation

We have just seen that a female firstborn child influences marriage patterns, divorce rates, polygamy, and fertility. Naturally, these average effects hide substantial heterogeneity across countries. Identifying the determinants of these effects may help us better understand these differences.

Some of these effects, such as higher rates of separation and polygamy following the birth of a daughter as opposed to a son, clearly suggest a form of son preference. However some other effects, such as a higher ultimate rate of marriage for women with a girl as opposed to a boy firstborn may be harder to explain purely based on a taste-based son preference. These results could reflect hardship for women without husband nor son.

In recent years, a substantial body of literature has emerged, delving into the impact of traditional practices, including patrilineality, patrilocality, dowry customs, and more. These practices have often been associated with fostering cultural preferences for sons and perpetuating discrimination against daughters (Gupta et al. 2003, Sundaram and Vanneman 2008, Rossi and Rouanet 2015, Jayachandran 2015, Rammohan and Vu 2018).

Patrilineal societies, where kinship and inheritance are traced through men, stand in contrast to matrilineal societies, where the same is traced through women, resulting in the heightened value attributed to boys (Rossi and Rouanet 2015). Highly correlated with patrilineality is patrilocality which dictates the residence of newlywed couples close to the husband's family. This residence determine the potential support available for parents based on the gender of their offspring (Bau 2021). Furthermore, the exchange of dowries or significant bride prices during marriage influences the relative parental value assigned to girls versus boys (Ashraf et al. 2020, Khalifa 2023).

These traditional practices are likely to significantly impact son preferences and, by extension, the dynamic interplay between the gender of the firstborn and the structure of families. Among these, it is reasonable to expect that the patrilineal or matrilineal nature

of a society may have a particularly pronounced effect on family structure. This is because women in matrilineal societies experience fewer losses in the event of divorce, as they do not forfeit land or custody of their children, in contrast to patrilineal societies (Clignet 1970, Poewe 1978, Holden, Sear, and Mace 2003). In patrilineal societies, women without a husband or a son often have limited claims to land. Researchers have found that in matrilineal societies (15% in SSA) children are healthier, the gender gap in education and political participation is lower, the incidence of domestic violence are reduced is reduced (Lowes 2021, Lowes 2022, Robinson and Gottlieb 2019) though there is less cooperation between husband and wives and higher rates of aids (Lowes 2022, Loper 2022).

It is important to acknowledge that traditional practices themselves are not exogenous. Recent research links the prevalence of matrilineality to regions conducive to hoe agriculture, where conditions are less favorable for the domestication of large animals (Tene 2023). Conversely, patrilineality tends to be more prevalent in areas where plowing techniques dominate (Alesina, Giuliano, and Nunn 2013; Alesina, Brioschi, and Ferrara forthcoming), and where large animals have been successfully domesticated (Becker, Enke, and Falk 2020, Alsan 2015).

This endogeneity is the reason why, following the lead of Lowes (2022), we will use a geographic regression discontinuity design along the so-called 'matrilineal belt' of sub-Saharan Africa to investigate heterogeneity in the impact of a female firstborn within matrilineal and patrilineal societies.[4] Additionally, we will undertake a similar analysis to explore the influence of patrilocality and the presence of substantial bride prices.

4.2 Empirical strategy: OLS and Geographic Regression Discontinuity

To explore the heterogeneity by ancestral kinship structure on the effect of having a female versus a male firstborn, we first estimate equation (1) adding the interaction $Female\ firstborn_i * Patrilineal_e$, where $Patrilineal_e$ is an indicator variable equal to one if the woman lives in a DHS cluster located inside an ancestral patrilineal ethnic area, and zero if they are in a matrilineal ethnic area. We limit to ethnic areas that are of either

[4]The 'matrilineal belt' of sub-Saharan Africa intersects Angola, the Republic of Congo, DRC, Gabon, Malawi, Mozambique, Namibia, Tanzania, and Zambia.

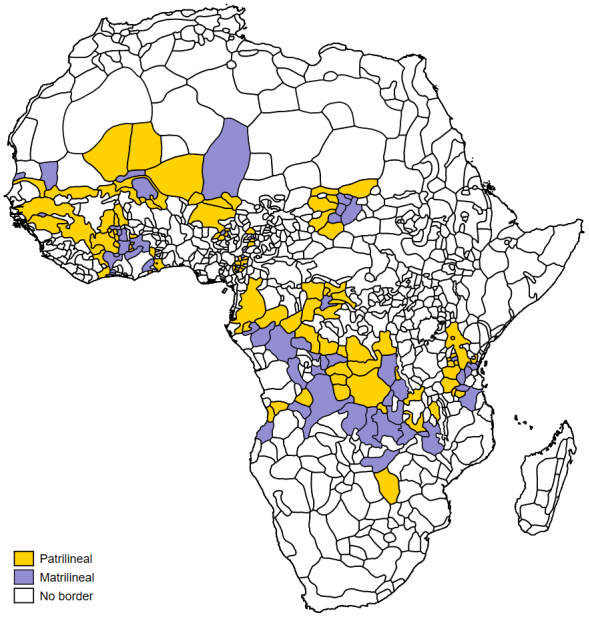

Figure 1: Patrilineal-Matrilineal Ethnic Border from Lowes (2022)

patrilineal (69.37% of the overall sample) or matrilineal descent (13.40% of the sample).[5]

To address identification concerns, we estimate a geographic regression discontinuity model that takes advantage of ethnic groups that border each other but differ in their practice of matrilineal or patrilineal kinship, following the methodology outlined in Lowes (2022). Specifically, we identify all pairs of ethnic groups denoted as p where a patrilineal community shares a border with a matrilineal community, as illustrated in Figure 1, and we proceed to estimate a geographic regression discontinuity (RD) using this dataset.

The rationale behind this geographic RD specification is rooted in the idea that the demarcation of matrilineal belt boundaries coincides with the borders of multiple matrilineal and patrilineal ethnic groups. These boundaries are inherently arbitrary in nature, with the regions adjacent to these borders sharing are similar in terms of geography, historical background, and cultural attributes. Our estimation is based on the following specification:

[5]The remaining 17.23% of the sample live in ethnic areas classified by Murdock (1967) as of duolateral (6.98%), quasi-lineages(0.26%), ambilineal (2.33%), bilateral (1.47%), mixed (5.63%), or unknown descent (0.56%).

Table 5: Patrilineal vs. Matrilineal Kinship: Ever Married among Premarital Firstborns

	OLS			RD		
	Years since birth			Years since birth		
	< 5	≥ 5	Overall	< 5	≥ 5	Overall
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	-0.005	-0.001	-0.002	-0.070**	-0.025*	-0.037***
	(0.625)	(0.766)	(0.756)	(0.011)	(0.073)	(0.007)
Female firstborn	-0.002	0.013***	0.008*	0.033*	0.035***	0.029***
	(0.777)	(0.001)	(0.081)	(0.078)	(0.001)	(0.009)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	-0.008	0.012***	0.006**	-0.037*	0.009	-0.008
	(0.206)	(0.000)	(0.035)	(0.058)	(0.374)	(0.309)
Observations	26,712	60,007	86,762	6,317	13,609	19,941

Notes: This Table presents OLS and geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent ever got married after the birth of their firstborn. The sample is limited to women whose firstborn child was born before ever been in a union. Columns (1), (2), (4), and (5) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

$$\begin{aligned} y_{idep} =& \theta_p + \beta Female\ firstborn_i + \gamma Female\ firstborn_i * Patrilineal_e + \\ & f(location_{idep}) + X_i'\Gamma + Z_i'\Omega + \delta_t + \lambda_e + \epsilon_{idep}, \end{aligned} \tag{2}$$

where y_{iepcy} is the outcome of interest for woman i from ethnic area e in ethnic pair p. θ_p is an ethnicity pair fixed effect; ethnic pairs are adjacent ethnic groups in which one group practices matrilineal kinship and the other group practices patrilineal kinship. f($location_{idep}$) is the RD polynomial, which controls for a smooth function of the geographic location of DHS cluster for ethnic pair p, in the baseline specification we use a local linear specification using latitude and longitude of the DHS cluster as the running variables (Dell and Querubin 2018; Lowes 2022). Standard errors are clustered at the ethnic-area level. We restrict the sample to observations within 200 km of the ethnic pair border, we will discuss robustness RD specifications below and in the Appendix.

4.3 Heterogeneity Results

We begin by revisiting a specific subgroup of women who gave birth to their first child before entering into their initial marriage or cohabitation. According to the OLS specifi-

Table 6: Patrilineal vs. Matrilineal Kinship: Postmarital Outcomes

	OLS			RD		
	Polyg./div. (1)	Polyg. (2)	Div. (3)	Polyg./div. (4)	Polyg. (5)	Div. (6)
Female firstborn × Patrilineal	0.002	0.001	0.001	0.007	0.009	-0.003
	(0.466)	(0.704)	(0.656)	(0.402)	(0.241)	(0.359)
Female firstborn	0.002	0.001	0.001	0.001	-0.006	0.006**
	(0.492)	(0.688)	(0.755)	(0.938)	(0.362)	(0.012)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.004***	0.003*	0.002***	0.007*	0.003	0.004**
	(0.004)	(0.083)	(0.000)	(0.074)	(0.440)	(0.011)
Observations	353,806	353,806	353,806	98,337	98,337	98,337

Notes: This Table presents OLS and geographic RD regressions where the dependent variable is an indicator variable = 1 if the respondent is currently in a polygamous marriage, currently divorced, or either of them. The sample is limited to women whose firstborn child was born after been in a union. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

cations (the first three columns of Tables 5), among patrilineal societies, women who had a firstborn daughter, as opposed to a son, display a 1.2 percentage point increase in the probability of ever being married for five years or more following the birth. However, in the short term, they seem to be less likely to be in a union.

Focusing on the matrilineal-patrilineal ethnic borders (the RD specifications in the last three columns of Tables 5), we observe a significant 3.7 percentage point decline in the likelihood of marriage within the first five years for women who had a firstborn daughter compared to a son in patrilineal areas. Remarkably, women who had their first child more than five years prior are, if anything, more likely to have ever been married if that first child was a girl.

In sharp contrast, within matrilineal regions, the presence of a firstborn child increases the likelihood of being married by 3 percentage points.

Next, we consider the remaining women, who had their first child after their first union. Table 6 shows that the increased likelihood in polygamy following a firstborn daughter compared to a firstborn son tends to be more pronounced in patrilineal areas. In contrast, the effect on divorce rates tend to be more pronounced in matrilineal ares where marriages are less stables (Lowes 2022, Loper 2022).

Finally looking at heterogenous on fertility, Table 7 reveals that the effect of a firstborn daughter as opposed to a son is concentrated in patrilineal areas.

Table 7: Patrilineal vs. Matrilineal Kinship: Fertility

	OLS			RD		
		Firstborn born before/after union			Firstborn born before/after union	
		Before	After		Before	After
	(1)	(2)	(3)	(4)	(5)	(6)
Female firstborn × Patrilineal	0.030***	0.027	0.030***	0.061**	0.051	0.060**
	(0.001)	(0.141)	(0.002)	(0.013)	(0.274)	(0.030)
Female firstborn	-0.005	-0.007	-0.004	-0.028	-0.009	-0.030
	(0.493)	(0.568)	(0.624)	(0.183)	(0.746)	(0.219)
Country FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Ethnic area FE	✓	✓	✓	✓	✓	✓
Mother and firstborn controls	✓	✓	✓	✓	✓	✓
Female firstborn+Female firstborn*Patrilineal	0.025***	0.019	0.026***	0.033***	0.042	0.030**
	(0.000)	(0.129)	(0.000)	(0.010)	(0.258)	(0.018)
Observations	440,578	86,762	353,806	118,279	19,941	98,337

Notes: This Table presents OLS and geographic RD regressions where the dependent variable is the number of children the female respondent ever gave birth to. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

5 Conclusion

In conclusion, this study has explored the impact of a firstborn girl on family structure in sub-Saharan Africa, specifically on marriage patterns, divorce rates, polygamy, and fertility.

We found that women with a female firstborn child tend to have different family outcomes compared to those with sons. They are more likely to marry over the long term, less inclined to marry the father of the firstborn child in the case of out-of-wedlock births, and more likely to experience divorce and enter polygamous unions. Additionally, they tend to have a higher number of children. Using regression discontinuity analysis along matrilineal-patrilineal ethnic borders, we identify patrilineal tradition as a significant explanatory factor for these outcomes

These findings highlight the complexity of family dynamics in sub-Saharan Africa and the importance of considering gender preferences in the context of fertility and marriage choices.

From a methodological perspective, this research underscores the importance of considering sample selection due to family structure when establishing causal links between the gender composition of offspring and various outcomes.

Furthermore, our findings has welfare implications for children in sub-Saharan Africa, as family structure is likely to significantly affects the well-being of both adults and children.

References

Ainsworth, M. 1992. "Economic aspects of child fostering in Cote d'Ivoire." *Research in population economics* 8:25–62.

Akresh, Richard. 2009. "Flexibility of Household Structure: Child Fostering Decisions in Burkina Faso." *Journal of Human Resources* 44 (4).

Alesina, Alberto, Benedetta Brioschi, and Eliana La Ferrara. forthcoming. "Violence Against Women: A Cross-cultural Analysis for Africa." *Economica* .

Alesina, Alberto, Paola Giuliano, and Nathan Nunn. 2013. "On the Origins of Gender Roles: Women and the Plough." *The Quarterly Journal of Economics* 128 (2):469–530.

Alsan, Marcella. 2015. "The Effect of the TseTse Fly on African Development." *American Economic Review* 105 (1):382–410.

Anderson, Siwan and Debraj Ray. 2010. "Missing Women: Age and Disease." *Review of Economic Studies* 77 (4):1262–1300.

———. 2015. "Missing Unmarried Women." Working Paper 21511, National Bureau of Economic Research.

———. 2017. "Excess female mortality in Africa." In *Towards Gender Equity in Development*, edited by Siwan Anderson, Lori Beaman, and Jean-Philippe Platteau. Oxford University Press.

Anukriti, S, Sonia R. Bhalotra, and Hiu Tam. 2016. "On the Quantity and Quality of Girls: New Evidence on Abortion, Fertility, and Parental Investments." IZA Discussion Papers 10271, Institute of Labor Economics (IZA).

Ashraf, Nava, Natalie Bau, Nathan Nunn, and Alessandra Voena. 2020. "Bride Price and Female Education." *Journal of Political Economy* 128 (2):591–641.

Bau, Natalie. 2021. "Can Policy Change Culture? Government Pension Plans and Traditional Kinship Practices." *American Economic Review* 111 (6):1880–1917.

Becker, Anke, Benjamin Enke, and Armin Falk. 2020. "Ancient Origins of the Global Variation in Economic Preferences." *AEA Papers and Proceedings* 110:319–23.

Blau, Francine D, Lawrence M Kahn, Peter Brummund, Jason Cook, and Miriam Larson-Koester. 2017. "Is There Still Son Preference in the United States?" Working Paper 23816, National Bureau of Economic Research.

Bongaarts, John. 2013. "The Implementation of Preferences for Male Offspring." *Population and Development Review* 39 (2):185–208.

Brown, Caitlin and Dominique van de Walle. 2019. "Headship and Poverty in Africa." Tech. rep.

Chao, Fengqing, Patrick Gerland, Alex R. Cook, and Leontine Alkema. 2019. "Systematic assessment of the sex ratio at birth for all countries and estimation of national imbalances and regional reference levels." *Proceedings of the National Academy of Sciences* 116 (19):9303–9311.

Clignet, Remi P. 1970. "Many wives, many powers: Authority and power in polygynous families."

Cronqvist, Henrik and Frank Yu. 2017. "Shaped by their daughters: Executives, female socialization, and corporate social responsibility." *Journal of Financial Economics* 126 (3):543–562.

Dahl, Gordon B and Enrico Moretti. 2004. "The Demand for Sons: Evidence from Divorce, Fertility, and Shotgun Marriage." Working Paper 10281, National Bureau of Economic Research.

Dahl, Gordon B. and Enrico Moretti. 2008. "The Demand for Sons." *Review of Economic Studies* 75 (4):1085–1120.

Dell, Melissa and Pablo Querubin. 2018. "Nation building through foreign intervention: Evidence from discontinuities in military strategies." *The Quarterly Journal of Economics* 133 (2):701–764.

Glynn, Adam N. and Maya Sen. 2015. "Identifying Judicial Empathy: Does Having Daughters Cause Judges to Rule for Women's Issues?" *American Journal of Political Science* 59 (1):37–54.

Gupta, Monica Das, Jiang Zhenghua, Li Bohua, Xie Zhenming, Woojin Chung, and Bae Hwa-Ok. 2003. "Why is Son preference so persistent in East and South Asia? a cross-country study of China, India and the Republic of Korea." *The Journal of Development Studies* 40 (2):153–187.

Holden, Clare Janaki, Rebecca Sear, and Ruth Mace. 2003. "Matriliny as daughter-biased investment." *Evolution and Human Behavior* 24 (2):99–112.

Ichino, Andrea, Elly-Ann Lindstrom, and Eliana Viviano. 2014. "Hidden consequences of a first-born boy for mothers." *Economics Letters* 123 (3):274–278.

Jakiela, Pamela, Owen Ozier, Lia C. Fernald, and Heather Ashley Knauer. 2020. "Big Sisters." Policy Research Working Paper Series 9454, The World Bank.

Jayachandran, Seema. 2015. "The Roots of Gender Inequality in Developing Countries." *Annual Review of Economics* 7:63–88.

Jayachandran, Seema and Ilyana Kuziemko. 2011. "Why Do Mothers Breastfeed Girls Less than Boys? Evidence and Implications for Child Health in India." *The Quarterly Journal of Economics* 126 (3):1485–1538.

Jayachandran, Seema and Rohini Pande. 2017. "Why Are Indian Children So Short? The Role of Birth Order and Son Preference." *American Economic Review* 107 (9):2600–2629.

Kabatek, Jan and David C Ribar. 2020. "Daughters and Divorce." *The Economic Journal* 131 (637):2144–2170.

Kearney, Melissa S. and Phillip B. Levine. 2017. "The Economics of Nonmarital Childbearing and the Marriage Premium for Children." *Annual Review of Economics* 9 (1):327–352.

Khalifa, Suzanna. 2023. "Female Genital Cutting and Bride Price." Working paper, AMSE.

Lambert, Sylvie, Dominique Van de Walle, and Paola Villar. 2017. "Marital trajectories, women?s autonomy and women?s wellbeing in Senegal." In *Towards Gender Equity in Development*, edited by Siwan Anderson, Lori Beaman, and Jean-Philippe Platteau, chap. 2. Oxford University Press.

Loper, Jordan. 2022. "Women's Position in Ancestral Societies and Female HIV: The Long-Term Effect of Matrilineality in Sub-Saharan Africa." Working paper.

Lowes, Sara. 2021. "Kinship structure, stress, and the gender gap in competition." *Journal of Economic Behavior and Organization* 192 (C):36–57.

———. 2022. "Kinship Structure and the Family: Evidence from the Matrilineal Belt." NBER Working Papers 30509, National Bureau of Economic Research, Inc.

Lundberg, Shelly, Sara McLanahan, and Elaina Rose. 2007. "Child gender and father involvement in fragile families." *Demography* 44 (1):79–92.

Lundberg, Shelly and Elaina Rose. 2003. "Child gender and the transition to marriage." *Demography* 40 (2):333–349.

Milazzo, Annamaria. 2014. "Son preference, fertility and family structure : evidence from reproductive behavior among Nigerian women." Policy Research Working Paper Series 6869, The World Bank.

Murdock, George Peter. 1967. *Ethnographic Atlas*. Pittsburgh: University of Pittsburgh Press.

Murdock, G.P. 1959. *Africa: Its Peoples and Their Culture History*. Africa: Its Peoples and Their Culture History. McGraw-Hill.

Nandi, Arindam, Sumit Mazumdar, and Jere R Behrman. 2018. "The effect of natural disaster on fertility, birth spacing, and child sex ratio: evidence from a major earthquake in India." *Journal of Population Economics* 31:267–293.

Norling, Johannes. 2018. "Measuring heterogeneity in preferences over the sex of children." *Journal of Development Economics* 135 (C):199–221.

Penglase, Jacob. 2020. "Consumption Inequality Among Children: Evidence from Child Fostering in Malawi." *The Economic Journal* 131 (634):1000–1025.

Poewe, Karla. 1978. "Matriliny in the Throes of Change: Kinship, Descent and Marriage in Luapula, Zambia." *Africa* 48:353 – 367.

Rammohan, Anu and Patrick Vu. 2018. "Gender Inequality in Education and Kinship Norms in India." *Feminist Economics* 24 (1):142–167.

Robinson, Amanda Lea and Jessica Gottlieb. 2019. "How to Close the Gender Gap in Political Participation: Lessons from Matrilineal Societies in Africa." *British Journal of Political Science* :1–25.

Rose, Elaina. 1999. "Consumption Smoothing and Excess Female Mortality in Rural India." *The Review of Economics and Statistics* 81 (1):41–49.

Rossi, Pauline and Lea Rouanet. 2015. "Gender Preferences in Africa: A Comparative Analysis of Fertility Choices." *World Development* 72 (C):326–345.

Shafer, Emily Fitzgibbons and Neil Malhotra. 2011. "The Effect of a Child's Sex on Support for Traditional Gender Roles." *Social Forces* 90 (1):209–222.

Song, Shige. 2012. "Does famine influence sex ratio at birth? Evidence from the 1959–1961 Great Leap Forward Famine in China." *Proceedings of the Royal Society B: Biological Sciences* 279 (1739):2883–2890.

Sundaram, Aparna and Reeve Vanneman. 2008. "Gender Differentials in Literacy in India: The Intriguing Relationship with Women's Labor Force Participation." *World Development* 36 (1):128–143.

Tan, Cong E, Hong Jun Li, Xian Geng Zhang, Hui Zhang, Pei Yu Han, Qu An, Wei Jun Ding, and Mi Qu Wang. 2009. "The impact of the Wenchuan earthquake on birth outcomes." *PLoS One* 4 (12):e8200.

Tene, Eva. 2023. "On the Historical Roots of Gender Norms: Evidence from Matrilineal Societies in Sub-Saharan Africa." *Unpublished* .

Van De Walle, Dominique and Marie Albertine Djuikom. 2018. "Marital shocks and women's welfare in Africa." Policy Research Working Paper Series 8306, The World Bank.

Washington, Ebonya L. 2008. "Female Socialization: How Daughters Affect Their Legislator Fathers." *American Economic Review* 98 (1):311–332.

Williamson, Nancy E. 1976. In *Sons Or Daughters: Cross Cultural Survey Parent Preferences*, vol. 31. SAGE Publications.

Zimmerman, Frederick J. 2003. "Cinderella Goes to School: The Effects of Child Fostering on School Enrollment in South Africa." *Journal of Human Resources* 38 (3).

A Appendix

A.1 Data and Variables

Table A1: List of DHS Surveys

Country	DHS Years
Angola	2015, 2016
Benin	1996, 2001, 2011, 2012, 2017, 2018
Burkina Faso	1998, 1999, 2003, 2010
Burundi	2010, 2011, 2016, 2017
Cameroon	2004, 2011, 2018, 2019
Car	1994, 1995
Chad	2014, 2015
Cote D'Ivoire	1994, 1998, 1999, 2011, 2012
DCR	2007, 2013, 2014
Eswatini	2006, 2007
Ethiopia	2000, 2005, 2011, 2016
Gabon	2012
Ghana	1998, 1999, 2003, 2008, 2014
Guinea	1999, 2005, 2012, 2018
Kenya	2003, 2008, 2009, 2014, 2022
Lesotho	2004, 2005, 2009, 2010, 2014
Liberia	2006, 2007, 2013, 2019, 2020
Madagascar	1997, 2008, 2009, 2021
Malawi	2000, 2004, 2005, 2010, 2015, 2016
Mali	2001, 2006, 2012, 2013, 2018
Mozambique	2011
Namibia	2000, 2006, 2007, 2013
Niger	1998
Nigeria	2003, 2008, 2013, 2018
Rwanda	2005, 2010, 2011, 2014, 2015, 2019, 2020
Senegal	1997, 2005, 2010, 2011, 2012, 2013, 2015, 2018, 2019
Sierra Leone	2008, 2013, 2019
Tanzania	1999, 2009, 2010, 2015, 2016
Togo	1998, 2013, 2014
Uganda	2000, 2001, 2006, 2011, 2016
Zambia	2007, 2013, 2014, 2018, 2019
Zimbabwe	1999, 2005, 2006, 2010, 2011, 2015

A.2 Additional Sample Characteristics

Table A2: Women's age and Probability of Female firstborn

	(1)	(2)	(3)	(4)	(5)
21-30	0.002	0.002	0.002	0.002	0.002
	(0.273)	(0.227)	(0.283)	(0.491)	(0.364)
31-40	-0.001	0.001	0.000	-0.000	-0.000
	(0.624)	(0.743)	(0.904)	(0.899)	(0.980)
+40	-0.004*	0.001	0.001	-0.001	0.000
	(0.057)	(0.851)	(0.847)	(0.771)	(0.914)
Constant	0.489***	0.487***	0.487***	0.488***	0.488***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Country FE	✓	✓			
Year of firstborn birth FE		✓			
Country × Year of firstborn birth FE			✓		
Ethnic area × Year of firstborn birth FE				✓	
Administrative area 1 × Year of firstborn birth FE					✓
R-squared	0.000	0.000	0.002	0.030	0.024
Observations	821,156	821,156	821,136	818,206	817,507

Notes: ...

Table A3: Effect of Female Firstborn on Marriage During Pregnancy

	(1)	(2)
Female firstborn	0.00	0.00
	(0.91)	(0.25)
Country FE	✓	✓
Year FE	✓	✓
Ethnic area FE	✓	✓
Mother and firstborn controls	✓	✓
Religion FE		✓
Geographic controls		✓
Male firstborn baseline	0.44	0.45
Percent effect	0.05	0.51
Observations	249,860	180,016

Notes: This Table presents OLS regressions where the dependent variable is an indicator variable = 1 if the respondent is estimated to have gotten married during pregnancy. The sample is limited to women that became pregnant before their first union. Columns (3)-(6) restrict the sample based on the number of years since the firstborn child was born relative to the time of the survey. All regressions include firstborn and mother controls, and country, year, and ethnic area fixed effects. Columns (2), (4), and (6) also control for women's religion fixed effects and DHS-cluster geographic controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values reported in parentheses. Standard errors are clustered at the ethnic area level.

Figure A1: Proportion of Female firstborn by Mother's Age