Birth order, Sex Composition and Risky Behaviour of Adolescent Girls in Nigeria

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Abstract

Sex and birth order of siblings are important determinants of an adolescent's risky behaviour and economic outcomes in later age. Both parental choices and "*peer-effect*" are the two possible mechanisms investigated in the literature. This paper studies the "*peer-effect*" to show how gender of preceding siblings shape risky sexual behaviour of teen girls in Nigeria, a context characterized by age and gender based hierarchy. Using individual data from the DHS surveys it shows that women born in families with a male firstborn are significantly less likely to have a premarital teen pregnancy. Such reduction is assessed to be as high as 33% when compared to their counterparts in female firstborn families. Additionally, the effect of a male firstborn is a function of age difference and his survival status, as well as the presence of the father in the household. The study underlines how gender roles and the birth order of siblings affect adolescents' risky behaviour.

1 Introduction

Almost 10% of girls in developing countries become mothers before reaching the age of 16 years and sub-Saharan Africa represents one of the highest rates with an adolescent fertility rate beyond higher than 123 live births per 1000 women (United Nation, 2009) and teenage pregnancy rate is of over 20% (ICF, 2012) in the region. In Nigeria, 23 percent of teen girls have started childbearing; 18 percent have had a child at the time of the interview while 5 percent were pregnant with their first child (NPC & ICF International,

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2014). Early childbearing generates important socio-economic consequences and can shape or alter the entire future life of a teen (United Nation, 2009;Panday et al. (2009); Singh (1998); Geronimus and Korenman (1993)). The determinants of the risky sexual behaviour of teens have not yet been fully elaborated. The literature in public health suggests a set of factors that drive teen pregnancy and they are organized around different levels: individual characteristics, group characteristics, the institutional and legal framework.[1] This paper contributes to the literature by investigating the role of birth order and its interaction with gender.

The idea that birth order can shape risky behaviour emerges from recent papers in social sciences. These papers show that the birth order of siblings shapes risky behaviour; older siblings act as role models for the younger ones or parents allocate less time to the latter. Given background characteristics, they find that later born siblings are greater risk takers than firstborns in terms of consuming tobacco, alcohol, marijuana and engaging in risky sexual behaviour (Ouyang (2004); Argys et al. (2006); Averett et al. (2011)). There are two main channels through which these effects prevail: parental supervision and peer effects. Firstborns are closely supervised by their parents as compared to later born siblings and the increased level of supervision is associated with lower risk. Averett et al. (2011) add to the the literature by concluding that the *"peer effect"* of siblings also persists as a second mechanism beyond parental supervision. This paper investigates the *"peer effect"* by accounting for gender roles in a patriarchal context. It argues that older brothers enjoy a comparative advantage as compared to older sisters in a context where networks are gender segregated; it stems from their closeness to networks of potential partners for younger sisters and hence can better supervise or serve as watchdogs.[2] There is widespread evidence on the behaviour of older siblings who undertake parenting roles vis-à-vis their younger siblings when household members are away for work. Similarly, older brothers also enjoy comparative advantage as compared to younger brothers because of their age distance from the potential partners. The averaged age gap among couples is around 8 years in Nigeria.

The joint effect of birth order and gender among siblings is related to the fact that, in Sub-Saharan Africa (SSA), many communities are patriarchal, characterized by gender-based power and kin relationships. A variety of male-favoring traditional practices and cultural norms such as gender-based differences in participation and specialization of income-

[1]Panday et al. (2009) provide a review of these factors and discuss how they are interrelated.

[2]For example, Weisner (1989) thoughrouly illustrates cross-cultural differences in sibling's caretaking behaviour. In developing countries, and specifically in SSA, older siblings have care-taking roles towards the younger ones who are often supervised by them for extended periods while parents are away or at work. Younger siblings are taught to respect their older siblings and cooperate; the relationship between them often end up interdependent and hierarchical, with responsibilities and authority like that of parents.

generating activities from an early age existed within various ethnic groups and countries (Murdock, 1967). Men often have control over the public sphere that legitimaze their role and define women's status, privileges and rights in society. Men also tend to exert control over female labor force participation, female reproduction and sexual life. In Nigeria particularly, the descent is patrilinear within Dorobo and Sandawe societies for which the ethnographic data exists from before their encounter with Europeans (Stark and Gray, 1999).

To our knowledge, this is the first research that looks at how gender and birth order jointly shape sexuality and reproductive behaviour of adolescent women with long-term consequences for their well-being. It contributes to the existing literature in two different ways. Firstly, it highlights how interactions among siblings affect child outcomes and well-being across many dimensions. In particular, it shows how the interaction of birth order and gender affects a sibling sexual behaviour. Secondly, there is a growing literature on son preference in SSA in line with the analysis of missing women in Asia.[3] Different motivations have been put foward to explain gender bias in fertility preference in SSA, among which patrilinearity of property inheritance and especially that of land (Murdock, 1967). [4] Nigerian women have a higher preference for boys because it strengthens the relationship between them and their husbands by ensuring the continuation of his lineage while alos securing the mother's inheritance in her older age.[5] This paper extends this literature by providing further explanation of the *"demand for son"* in Africa. Male members of the family, firstborn in particlar, not only reduce the direct family costs of being pregnant, they also create positive externalities for female members of the household by reducing costs associated with the teen pregnancy of sisters.

The paper is based on two Demographic and Health Surveys (DHS) collected in Nigeria in 2007 and 2013. The identification strategy uses a simple "natural experiment" within the household. Parents decide to have a child but do not choose the gender of their firstborn. The gender of the firstborn is thus exogenous to any behavioural choice made by secondborns. Our findings suggest that teen girls are 1.5 percentage points less likely to be pregnant if born in male firstborn families where older brothers function as watchdogs in their transition to adulthood. In relative terms, this corresponds to a reduction of almost 33 percent. Survival analysis of the age at first birth suggests that, having a male firstborn delays the timing of a teen's out-of-wedlock pregnancy. For robustness checks, we investigate differences between

[3]For missing women in Asia, we refer to the extensive literature on sex ratio and selective abortion brought out by different authors such as Sen (1990). For sex preference in SSA, we refer to Anderson et al. (2012); Milazzo (2014).

[4]There is an extensive literature on how marriage, inheritance and institutions affect women's well-being in SSA. See for example Guyer, 1988.

[5]Milazzo (2014) finds that maternal mortality among adult women in Nigeria is also driven by the pressure these women feel for producing a boy.

a firstborn's effect against other male members, the role played by age distance with the preceding male brother and the presence of the father within the household.

The paper starts by drawing a general picture on age based hierarchy and gender bias among siblings in patriarchal SSA in Section 2. It also discusses teens social life and the attitudes of parents towards premarital sex. In Section 3, we describe data and empirical strategy while results are presented in Section 4. We address mechanisms and alternative confounding factors on the role of male brothers as "*watch-dogs*" alongside our concluding remarks in Section 5.

2 Age, Gender Roles and Teen Pregnancy in SSA

Texts in anthropology and sociology have shown how age-based hierarchy is widespread in SSA. Older siblings have responsibilities towards the younger ones which is accompanied by some form of authority. For example, Heritier (1981) discuss this factor:

« .... *Le rapport aîné/cadet, même lorsqu'il s'exerce entre hommes, peut être traduit en termes de génération, comme s'il s'agissait d'un rapport de père fils et non un rapports entre frères* » (F Heritier 1981 cited by Abélès and Collard (1985), p207)

"The relationship between firstborn/younger siblings, even among men only, can be interpreted in terms of generation, as if the relation is between father/son and not among brothers". The author puts the emphasis on the age based hierarchy and parenting among siblings in many patriarchal societies of SSA countries where apart from age, sex also constitutes authority. In fact, in Abélès and Collard (1985):

«*.... l'ordre sexuel prime : si deux jumeaux de sexes différents naissent et que la fille se présente la première, on pense que le garçon va mourir parce qu'il ne pourra pas supporter l'offense; même s'ils sont plus jeunes que leurs sœurs, les garçons sont toujours servis en premier.*» (Abélès and Collard (1985), p208)

"Gender-based order dominates: if twins of different sexes are born and the daughter is born first, it is believed that the boy will die because he cannot bear the insult; even when they are younger than their sisters, boys are always served first". These forms of hierarchy can also be seen in terms of land inheritance (including livestock):

« *En ce qui concerne les animaux, l'aîné reçois trois fois plus que les autres fils aînés des autres épouses du père...* » (Abélès and Collard (1985), p210)

"As regards animals, the oldest boy receive three times more than firstborns of the other wives of the father".In domestic relations, older siblings have similar authority to that of parents. In Cicirelli (1995), the author underlines that care-giving of siblings serve as a backup system in the event that parents do not survive up to a certain age. The relationship is more than just custodial because it is combined with an educational mission to socialize and

train younger siblings to become functioning members of society. Indeed, younger siblings are taught to respect and obey older siblings as they would have to for their parents (Cicirelli, 1995). The relationship between siblings is further shaped by marriage negotiations as, for example brideprice, given they depend on one another to generate the wealth necessary for building their own family and increasing the household's wealth. We learn that male firstborns are the most dominant figures with the greatest seniority:

« *. . . dans le contexte des relations des individus considérés dans leur appartenance à des unités domestiques, celui qui domines est l'aîné, celui qui est dominé est le cadet. . . . . Il n'y a d'aîné et de cadet que d'hommes ; les femmes apparaissent comme des instruments de domination des ainés sur les cadets.* » (Gruénais (1985), pg 221)[6].

"In the context of intra-household relationships, the ruler is the eldest son, he dominates the younger siblings ...Elder and younger sibling's relationship exist only among males; women are seen as instruments of domination by firstborns over younger ones".

Premarital pregnancy of younger siblings is undesired by family members because of the associated costs. *First*, opportunity costs from schooling if the likelihood of attending school after puberty is low; *second*: the parenting time and economic cost of raising the child; *third*, being forced into early marriage when possible; *fourth*: difficulties in finding partners who will take both the girl and the child in her charge in a male-dominated economy; *fifth:* those teens who value the returns from education might decide to have an abortion which is often illegal and unsafe. Last but not least, adolescent pregnancy is found to be associated with higher rates of morbidity and mortality for both the mother and the child.

"Parents exercise control over teenagers. The widespread belief is that a teenager's bad behaviour may damage the families name and reputation. Parents tend to be harder on girls, always warning them to avoid premarital sex and manners that would cost them prospective husbands" (Teen life in Africa. Falola (2004) p4).

"*Social life is active as teenagers meet one another to play and share experiences.... Boys have more freedom than girls and tend to socialize more outside of their homes and with many more people. Parents are always anxious to know the friends with whom their daughter socializes. In cultures where virginity is much valued, socialization can lead to premarital sex which is condemned"* (Teen life in Africa. Toyin Falola,2004-p6).

Male firstborns have an advantage in protecting younger female siblings from potentially undesirable partners in their transition to adulthood. The main comparative advantage stems from two characteristics of male firstborns: gender role and age based hierarchy. *Firstly*, gender roles allow older brothers to socialize more outside the household and, given that networks are gender biased in patriarchal societies, they are likely to be closer to the

[6]Gruénais (1985), « Aînés, aînées ; cadets, cadettes les relations ainés/cadets chez les Mossi du centre» dans A&C1985)

network of potential partners as compared to older sisters. *Secondly*, in these societies the age-gap between partner is high and such inter-generational sexual relations have also been emphasized in the HIV/AIDS literature, given its correlation with transactional sex.[7] Compared to younger brothers, male firstborns have a higher probability of being closer to the network of potential partners for their younger sisters.

3 Data and Empirical Strategy

Descriptive Statistics

While DHS data is availabe for many African countries, the paper uses the Nigeria dataset because past evidence suggests a prevalence of the gender role among firstborns with behavioural consequences within the household (Milazzo, 2014).[8] The DHS collects an important set of characteristics on women of childbearing age (15-49); we exploit information on their siblings from biological mothers, including gender, age, mortality and number of children. In order to increase the statistical power and sampling, the analysis merges two DHS surveys and both provide a similar picture of the country (Table 1). The average age at first birth for a woman in Nigeria is 17 and 55% of the population give birth before reaching the age of 19, both within and out-of-wedlock. As we will clarify in the next section, our identification strategy relies mainly on the behaviour of secondborns.

We need a suitable variable to measure risky sexual behaviour of teens. The DHS data provides self-reported information such as the number of sexual partners and the use of a condom/contraception. These variables are often under-reported. We then opt for using teen premarital pregnancy that lead live birth (which is almost non sensisitive to reporting error) as a measure of risky behaviour. This definition of teen pregnancies excludes all aborted pregnancies and given that abortion is illegal in Nigeria[9], it might present challenges if under-reported (Calvès, 2002; Leibowitz et al., 1986). However, abortion is also costly, illegal and unsafely practiced in Nigeria and we expect the extent of under-reporting by teens to be low as compared to alternative measurements of a teen risky behaviour. In Table 1 we find that

[7]Prevalence of sugar daddies and risk of HIV/AIDS infection has been put in evidence in several studies. See for example Dupas *et al.* (2009)

[8]The DHS program was originally developed by the US Agency for International Development (USAID). Since 1984, DHS programs have collected, analyzed and disseminated accurate and representative data for more than 200 surveys in more than 75 countries in the world. DHS data is collected with the support of ICF Macro, based in the United States. The samples are representative at national and sub-national levels. DHS survey methodologies and questionnaires are standardized so that data are comparable across countries. http://www.measuredhs.com/

[9]In Nigeria, abortion is permitted only to save the life of the woman or to preserve physical and mental health.

terminated pregnancies range between 4-5% and do not differ according to the gender of the firstborn.[10] Teen pregnancy is a relevant variable of interest because it generates important socio-economic consequences for girls both in the short and long term(Diaz and Fiel, 2016).

We are interested in premarital pregnancy of adolescent girls and hence we restrict data analysis to women aged between 15 to 24. The 24-upper bound limit is appropriate because, from that threshold onwards, most women had been in union at least once (80%).[11] Table 1 shows the descriptive statistics of our sample. The average age at first birth is 17 and many women (55%) have their first birth between the age of 15 and 19, whether within or out-of-wedlock. Similar to age at first birth, the average age at first marriage is also low, 16 years, and more than 71% of women get married before the age of 20. The prevalence of out-of-wedlock pregnancies is 5% among women aged 15 to 24. It is worth observing that the entities "premarital pregnancy" and *"teen"*-premarital pregnancy are identical implying that premarital pregnancy is a phenomenon that affects teenage girls most. The average age at first sex is 16 and almost all women in the sample (98%) had their first sexual encounter before the age of 19. Table 1 further illustrates that, on average, women have 7 completed years of education and that more than 40% of women in the sample have been married at least once.

Empirical Strategy

The empirical strategy is based on the quasi-random variation of gender of firstborns. Gender of the firstborn among siblings is likely exogenous to household characteristics. While the household takes the decision to have a child, it has no control over the gender of the child. This is particularly true in sub-Saharan countries where selective abortion (based on sex) is inaccessible to mothers.[12] The main outcome of interest is risky sexual behaviour of teens as measured by out-of-wedlock pregnancy. We opted for this specific measure because it is easily computable and reliable; other self reported information on sexual behaviour can be subject to reporting bias especially for younger subjects. We compute premarital live births of representative women aged between 15 and 24.

The estimates are from regressions of the following form:

$$y_{ih} = \alpha + \beta male_{ih} + X'_{ih}\gamma + \lambda_r + Survey_r + \varepsilon_{ih} \tag{1}$$

[10] This suggest that terminated pregnancies are not correlated with the gender of the firstborn.

[11] We did a sensitivity analysis by increasing this limit up to the age of 30 and the result, which is available upon request, did not change.

[12] To our knowledge, there are no prenatal sex detection technologies in Sub-Saharan Africa that can put in question the validity of the inference as is the case in Asia (Arnold *et al.*, 2002)

where y_{ih} is premarital pregnancy encountered by woman i in household h and region r, *male* takes the value one if the teen is born in a household with a male firstborn based on the birth history of the biological mother and zero otherwise. In some specifications, a male takes ordinal values that take into account the number of preceding males. X_{ih} represents individual and household characteristics and λ_r are regional dummies. The variable Survey is the survey year dummy. Age and regional fixed effects control for all other factors that are specific to cohorts in a region. For ease of interpretation and analysis, we omit families with twin births. Intracluster correlation within households might alter standard errors, hence all regressions are clustered at household level.

Our main analysis is based on the behaviour of secondborns *i.e.* equation 1 is estimated on a sample of secondborns. Given that the gender of the firstborn child is exogeneous, the β provides a causal relationship between gender of older sibling and risky behaviour. If gender role and age-based hierarchy shape behaviour in Nigeria, the coefficient on male firstborn is negative and significant..

To keep it in comparable terms, we run the cox hazard regression on secondborns and estimate the timing of age at first premarital birth.

$$h_i(t) = h_0(t)exp(\beta_1 x_{i1} + .. + \beta_k x_{ik}) \tag{2}$$

where $h_0(t)$ is the baseline hazard at time t and X_{ik} are the covariates or risk factors that determine premarital pregnancy, including the variable of interest that is families with male firstborn. Here as well, the estimated effect of having a male older brother is to decrease the hazard of out-of-wedlock childbearing.

Balancing test

The validation of the identification strategy rests upon the assumption that gender of the firstborn is exogenous. While parents do not choose the gender of their first child, events, such as gender difference in child mortality might affect resource allocation for siblings in subsequent years after their birth (Pongou, 2013; Pongou et al., 2015; Milazzo, 2014). In Table 2, we check whether there is a systematic difference between women born in families with a male versus female firstborn. The table considers both the sample of all women aged 15 to 24 and the sample of secondborns. We separate these two samples because selection is more severe for the former than for the latter. The reduced selection on the sample of secondborns is driven by the fact that all families have at least two children and the sex allocation of secondborns (male vs female) is random. When the sample includes all women aged 15-24, more imbalances are observed across the gender divisions of the firstborn. These

imbalances are mostly related to behavioural responses to the presence of the male firstborn in the household. Women with a male firstborn tend to delay first sexual relation, first marriage and first birth. We have already noted that these variables might reveal some under-reporting problems. If that is the case, women with a male firstborn have a higher tendency to under-report age at first sexual relation, marriage and birth. We also observe that firstborn women grow up in larger families and it is in line with the "demand for a son" hypothesis which suggests that having one older male sibling is correlated with family size and other socio-economic characteristics. Finally, male births display higher mortality rates and consequently we control for the survival of the firstborn in the empirical analysis. The sample for secondborn women is more balanced across the gender of the firstborn. The significant difference, as in the overall sample, suggests that secondborn women from female firstborn families grow up with a higher number of siblings, indicating that "son preference" is prevalent, as emphasized by Milazzo, 2014. To account for all non-balanced factors, we control for the number of siblings and other characteristics.

4 The Effect of a Male Firstborn on Risky Sexual Behaviour

Table 3 illustrates OLS estimates of male firstborns on teen pregnancy for secondborns.[13] From column (1) to column (6), the coefficient for male firstborn is stable, even when covariates that takes into account the different socio-economic characteristics of the households are included. Relative to the average pregnancy rate of their counterparts in female firstborns, i.e. 0.06, being born in a male firstborn family reduces premarital pregnancy by almost .02 points. This corresponds to a 33% decrease in relative terms. The stability of the coefficient across all columns suggest exogeneity of parental characteristics on secondborns. A descriptive visualization of the negative effect is illustrated through the use of kernel density distribution of age at first birth separately by gender of the firstborn in Figure 1. It shows that women from male firstborn families are less likely to have premarital pregnancies as teens.

Survival analysis of the incidence of child birth gives similar results. Having an older brother reduces the hazard of out-of-wedlock childbearing. Table 4 shows the magnitude of the effect with results based on cox hazard regressions. Being secondborn in male firstborn families reduce the hazard ratio by approximately 34%.

[13]Results based on a sample of women from 15-24 give similar coefficients. These are the youngest cohorts of the sample and potentially report an accurate information on older sibling's sex composition.

Parental resource allocation driven by preference for sons would imply that parents devote less resources, including time, to a teen girl with an older brother and hence might increase their propensity to becoming pregnant. This would, however, not affect the main conclusion of the paper. Parents might also decide to anticipate the marriage of the teen who has an older brother. In the data-set, there is no evidence of an association between the gender of an older sibling and the probability of getting married as a teen nor positive a association with the age of marriage.

In general, inferring from teen pregnancy is challenging due to under-reporting of risky sexual behaviour. Unfortunately, we have no data to test the extent of such bias. However, the literature suggests that under-reporting of teen pregnancies is related to education (Calvès, 2002; Leibowitz et al., 1986). We therefore include education as a control variable and find that results in Table 3 are not altered.

Older Brothers as "watch-dogs"

There are two theories to how older siblings influence the younger ones: the role and the opportunity model. The role model states that younger siblings tend to imitate older ones; in the second mechanism, older siblings influence younger ones by providing information and opportunities (friends and settings) which might include substance abuse and sexual intercourse. The above results can be driven by the role model if women from female firstborn families are likely to have imitated older sisters with premarital pregnancy. At the same time, having an older sister with premarital pregnancy could also deter a teen from taking a similar risk. The net effect of these opposite influences needs further empirical investigation. In the case of Nigeria, the data shows no correlation between firstborn and secondborn premarital pregnancies. As regards the opportunity model, older male and female siblings provide younger sisters with opportunities that affect sexual risky behaviour, either positively or negatively. For example, older siblings might discuss condom use or any other family planning with their youger sisters. The DHS contains information on family planning and information sharing. It appears that in Nigeria teen girls often discuss family planning with friends as opposed to family members. The mechanism brought out by this paper highlights a different channel in which gender and age based hierachy interact to shape teen behaviour.

The interaction of gender and birth order (age based hierarchy) are both necessary conditions for shaping risky behaviour. It is motivated by the (lack of) effect of a younger brother on the premarital pregnancy of a female firstborn. [14] Column (1) of table 5 shows that premarital pregnancy is not affected by the sex of a younger sibling. A further analysis

[14]The gender of the first child is likely to affect the family size over a woman's lifecycle. However, conditional on being pregnant, the gender of a younger sibling is exogenous to the individual.

of all non firstborn women aged between 15 and 25 has the risk of being jeopardized by the selection on household characteristics. Using a set of different covariates as controls, the paper investigates whether the number of preceding male siblings have a negative effect on risky behaviour. The "demand for son" hypothesis suggests that having an older male sibling is correlated with family size and other socio-economic characteristics. Column (5) of table 5 shows that having one additional male preceding brother would reduce the likelihood of premarital pregnancy by 0.2 percentage points. In column (6), having at least one male older brother would similarly reduce the likelihood of premarital pregnancy. The magnitude of the estimated effect is 1%, i.e. not far from the 1.5% obtained in the sample of secondborn women (Table 3). In the context of intra-household relationships, the ruler is the eldest son, he dominates over younger siblings and women are seen as instruments of domination by this firstborn (Gruénais, 1985). The paper further shows that male firstborns have a negative effect in male headed families or when the biological father is living in the houshold. We run similar regressions on the restricted sample of secondborn women aged 15 to 24 living with their father. Column (3) of table 5 shows that the estimated negative effect is negative and significant when we control for the presence of the father.

5 Conclusion

Though the age at marriage is increasing due to important progress in schooling, girls access to education also increases exposure of teen girls to premarital sex and pregnancy. Indeed, in many SSA countries age at first birth is concentrated during teenage years with important implications for well-being. Using data from a population based survey at the individual level from Nigeria, we show the role of brothers in patriarchal societies. We reveal how the sex composition of preceding siblings shapes choices in strong patriarchal societies. In contexts where an age-based hierarchy prevails among siblings and gender roles are biased towards males, the study finds that being born in a family with a male firstborn reduces the likelihood of premarital pregnancy during teenage years.

The study exploits a simple natural experiment on the sex of firstborns to assess its causal impact on premarital pregnancy. Male firstborns, who are closer to the networks of younger sisters' potential partners reduce teen pregnancy by about 1.5 percentage points, which is equivalent to a 33% reduction in relative terms. Gender alone does not drive this behaviour; birth order is an important gradient in shaping risky behaviour allowing older brothers to serve as watch-dogs. The findings also hold for additional preceding males in the household.

This study extends the literature on the role of birth order on risky behaviour of teens. While previous studies found that being a non firstborn increases the likelihood of engaging in

risky behaviour like smoking tobacco, marijuana and risky sexual behaviour (see for example Ouyang (2004); Argys et al. (2006); Averett et al. (2011)), this study adds to the literature by showing how both sex composition and birth order of the preceding siblings shape the risky behaviour of adolescent non-firstborns in patriarchal contexts.

The study also contributes to the existing literature on son preference in developing countries. Economic outcomes such as inheritance are found to be driving forces of a strong preference for sons in developing countries. This study provides evidence of the role the gender of the firstborn has in reducing costs associated with women's premarital pregnancy.

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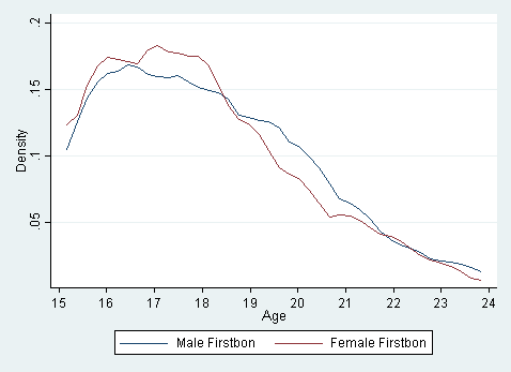
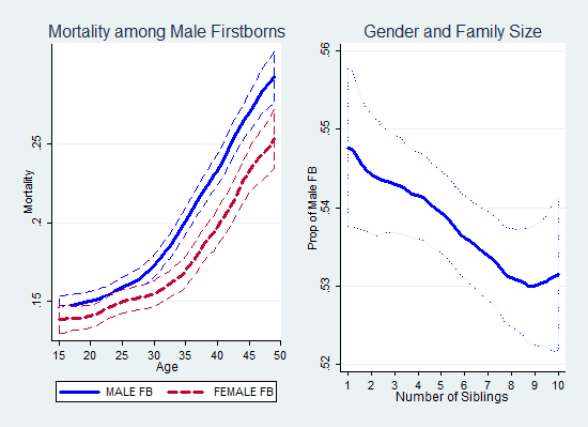
Figures

Figure 1: Kernel Distribution of Age at First Premarital Birth



Notes: The figure plots age at first birth of premarital pregnancy by gender of the firstborns. The sample includes secondborn women aged between 15-24.

Figure 2: **Gender of Firstborn and Family Characteristics**



Notes: The figure uses local polinomial regressions to plot gender and mortality of the firsborn, alongside its family size. Male firstborns families die earlier and are smaller in size on average.

Tables

Table 1: Descriptive Statistics

Women of Age Group 15-24						
	DHS 2008			DHS 2013		
	Mean	SD	Obs	Mean	SD	Obs
Years of education	6,64	*6,09*	12694	7,06	*5,46*	14619
Total Num of Siblings	5,48	*2,59*	12694	5,38	*2,59*	14619
Ever Married	0,47	*0,50*	12694	0,44	*0,50*	14619
Poligamous Union	0,26	*0,44*	5729	0,25	*0,43*	6167
Total Pregnancy/woman	0,83	*1,19*	12694	0,76	*1,12*	14619
Age at first Marriage	15,9	*2,63*	5947	16,1	*2,64*	6433
% First Marriage while Teen	0,83	*0,37*	5947	0,82	*0,39*	6433
Age at first Birth	17,3	*2,51*	5432	17,6	*2,44*	5990
% First Birth while Teen	0,70	*0,46*	5432	0,67	*0,47*	5990
Age at first Sex	16,09	*2,42*	8348	16,13	*2,46*	9141
% Teen Sex	0,84	*0,37*	8348	0,83	*0,38*	9141
% Premartial Pregnancy	0,05	*0,23*	12694	0,05	*0,22*	14619
% Teen Premarital Pregnancy	0,05	*0,23*	12694	0,05	*0,22*	14619

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2: Balance Test by Gender of Firstborn

	All Women - aged 15-24						Secondborn Women - aged 15-24					
Variable	Female FB (1)	Male FB (2)	(2)-(1)	***	P-Val	Obs	Female FB (1)	Male FB (2)	(2)-(1)	***	P-Val	Obs
Ever had pre-marital child	0.05	0.05	0		0.201	16707	0.05	0.05	-0.01	*	0.061	4683
Age	19.18	19.08	-0.1	**	0.012	16707	19.03	19.01	-0.02		0.421	4683
Weatlh Index	738.86	-3034.49	-3773.35	***	0.006	16707	3215.24	2344.97	-870.27		0.384	4683
Tot Num of children	6.29	6.25	-0.04		0.118	16705	4.67	4.5	-0.17	***	0.005	4683
Ever married	0.46	0.45	-0.01	**	0.042	16707	0.45	0.43	-0.01		0.187	4683
Years of Education	6.8	6.75	-0.05		0.25	16687	6.83	6.82	-0.01		0.463	4679
Male headed HH	0.8	0.8	0		0.691	16707	0.8	0.82	0.02		0.963	4683
Ever terminated pregnancy	0.05	0.04	0		0.35	16707	0.04	0.04	0		0.584	4670
Age at first intercourse	16.21	16.08	-0.13	***	0.002	10703	16.07	16.09	0.02		0.585	2915
Age at first Marriage	16.12	15.93	-0.18	***	0.001	7584	16	15.89	-0.11		0.179	2059
Age at first Birth	17.59	17.4	-0.19	***	0.001	7024	17.4	17.38	-0.02		0.445	1908
Poligamous Marriage	0.25	0.25	0		0.557	7302	0.25	0.27	0.02		0.878	1967
Num of Premarital Children	0.06	0.06	0		0.14	16707	0.07	0.05	-0.01	**	0.041	4683
Num of Extramarital Partners	0.17	0.17	0		0.279	16656	0.17	0.16	0		0.408	4669
Num Preceding Siblings	0.85	0.84	-0.01	**	0.027	16652	0.87	0.88	0.01		0.734	4673
Num Siblings who have died	0.89	0.91	0.02		0.824	16707	0.57	0.55	-0.02		0.247	4683

Note: *** p<0.01, ** p<0.05, * p<0.10

Table 3: OLS estimates on the effect of male firstborns on teen pregnancy of Secondborns

VARIABLES	1	2	3	4	5	6	7	8
Male Firstborn	-0.0156*	-0.0151*	-0.0160**	-0.0161**	-0.0162**	-0.0162**	-0.0167**	-0.0157**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
URBAN		-0.0185*	-0.0218**	-0.0210**	-0.0207**	-0.0187*	-0.0186*	-0.0179*
		(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Tot num Siblings		-0.0023	-0.0048	-0.0046	-0.0053	-0.0043	-0.0044	-0.0054
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Ever Married			0.0682***	0.0757***	0.0718***	0.0839***	0.0836***	0.0838***
			(0.013)	(0.014)	(0.015)	(0.016)	(0.016)	(0.016)
Years of Education				-0.0021	-0.0021	-0.0008	-0.0008	-0.0011
				(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Household Members					0.0014	0.0012	0.0012	0.0011
					(0.001)	(0.001)	(0.001)	(0.001)
Age at first sex						0.0137***	0.0138***	0.0134***
						(0.003)	(0.003)	(0.003)
Survival of Firstborn							-0.0138	-0.0133
							(0.013)	(0.013)
Education of HH head								0.0012
								(0.001)
Constant	0.0663***	0.6244**	0.6875***	0.7278***	0.7094***	0.9573***	0.9565***	0.9178***
	(0.006)	(0.246)	(0.244)	(0.244)	(0.242)	(0.247)	(0.248)	(0.249)
Observations	4,683	4,683	4,683	4,683	4,683	4,683	4,673	4,605
R-squared	0.011	0.039	0.047	0.048	0.048	0.055	0.055	0.054

Notes: OLS estimates of male firstborn on teen pregnancy of secondborn women aged between 15-19. The standard errors are clustered at the household level. The sample is based on women in singleton families and other controls include age dummies, total number of siblings, squared, income index, regional dummy and survey year. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Cox Hazard Estimates on Age at First Birth

	(1)	(2)	(3)
Male Firstborn	0.8047*	0.8007*	0.7685**
	(0.100)	(0.099)	(0.093)
URBAN		0.3981***	0.7551
		(0.065)	(0.138)
Wealth index			1.0000***
			(0.000)
Tot num Siblings			0.9832
			(0.102)
Ever married			0.2918***
			(0.062)
Education in years			0.9585*
			(0.021)
Num of HH members			1.0490***
			(0.017)
Age at first sex			0.8342***
			(0.023)
Survival of firstborn			0.6907**
			(0.128)
Education of HH Head			1.0030
			(0.005)
Observations	4,682	4,682	4,672

Notes: The sample includes women aged between 15-24 who are secondborns in singleton birth families. The standard errors are clustered at household level and the coefficients are the proportional hazard ratios. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Preceding and Succeeding Males on Premarital Pregnancy

VARIABLES	1 Firsborn girl	2 Secondborn girl	3 Firstborn girl and Father in HH	4 Aged 15-24 non firstbon	5 Aged 15-24 non firstbon	6 Aged 15-24 non firstbon
post_male	0.0071					
	(0.007)					
Male Firstborn		-0.0169**	-0.0344***	-0.0070*		
		(0.008)	(0.013)	(0.004)		
Age difference with firstborn		0.0025		0.0008**		
		(0.002)		(0.000)		
# of preceding males					-0.0023*	
					(0.001)	
One preceding male						-0.0105**
						(0.005)
Survival of Firstborn		-0.0138	0.0009	-0.0073		
		(0.013)	(0.022)	(0.006)		
URBAN	-0.0091	-0.0124	-0.0330**	-0.0041	-0.0038	-0.0037
	(0.010)	(0.009)	(0.014)	(0.005)	(0.005)	(0.005)
Income Index	-0.0000***	-0.0000***	-0.0000	-0.0000***	-0.0000***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tot num Siblings	-0.0060	-0.0034	-0.0165	-0.0053	-0.0039	-0.0038
	(0.007)	(0.007)	(0.016)	(0.003)	(0.003)	(0.003)
Ever Married	-0.0907***	-0.1716***	-0.1783***	-0.1837***	-0.1841***	-0.1841***
	(0.014)	(0.021)	(0.047)	(0.010)	(0.010)	(0.010)
Years of Education	-0.0029**	-0.0020	-0.0011	-0.0028***	-0.0027***	-0.0027***
	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)
Household Members	0.0002	0.0028***	0.0010	0.0028***	0.0026***	0.0026***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age at first sex	-0.0126***	-0.0086***	-0.0253***	-0.0093***	-0.0093***	-0.0093***
	(0.003)	(0.003)	(0.009)	(0.001)	(0.001)	(0.001)
Education of HH head	0.0002	0.0018*	-0.0007	0.0002	0.0001	0.0001
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Observations	5,226	4,683	1,582	21,339	21,339	21,339
R-squared	0.064	0.092	0.160	0.098	0.097	0.098

Notes: The sample is based on non firstborns and never married women aged between 15-49 in singleton families. Column(1)-(4) are OLS estimates for the number and proportion of preceding males. From Column (5) to (6), the sample is further restricted to women with at least one younger sibling where estimates for younger succeeding brother in illustred. I restrict the sample to female firstborn families to evaluate preceding number of males in Column (7) and (8). The last two columns look at third born girls and sex composition of the first two siblings. Controls include regional, income, age, number of siblings, rank and urban regional fixed effect. Rank is omitted in the last two columns where sample is restricted to third born girls. Standard errors are clustered at the household level.