3-29-2018

Household Determinants of Teen Marriage and Childbearing: Sister Effects Across Four Low- and Middle-Income Countries

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Abstract

Using data from the "Young Lives" study of childhood poverty tracking a cohort of children from the ages of 8 to 19, this paper aims to investigate the household determinants of teen marriage and teen pregnancy in four low- and middle-income countries (LMICs), namely Ethiopia, India, Peru and Vietnam. Its contribution is twofold. First, we offer a descriptive and comparative overview of the prevalence of teen marriage and childbearing in geographically selected areas across the four countries of interest, together with their socio-demographic determinants. Second, we place a specific focus on the role of gender and sibling sex-composition in shaping the probability of getting married and/or having a child by age 19. We test the hypothesis that in contexts where resources are scarce and customs are rooted, parents tend to arrange their daughters' marriages in order, hence girls with older sisters face a lower risk of marrying early or giving birth, all else equal. We show that, while in most countries the presence and number of older sisters in the household is associated with a 10-to-30- percent lower likelihood of teen marriage and pregnancy, the evidence weakens – and somewhat reverses in Ethiopia – once a presumably causal effect is estimated. As such, our findings enrich and complement existing evidence on the role of sibling sex-composition on later-life outcomes in LMICs.

Keywords

Teen Marriage, Teen Childbearing, Older Sisters, Sibling Sex-Composition, LMICs, Low-Income Countries, Middle-Income Countries, Ethiopia, India, Peru, Vietnam, Pregnancy, Fertility, Poverty, Households, Parents, Sisters, Siblings, Young Lives, Child Marriage, Parents, Sex Selection, Son Preference, Infant Mortality, Child Mortality, Mortality

Disciplines

Demography, Population, and Ecology | Family, Life Course, and Society | Gender and Sexuality | Social and Behavioral Sciences | Sociology

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Sister Effects Across Four Low- and Middle-Income Countries

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Acknowledgments

The authors are grateful to Jere R. Behrman for helpful feedback and discussions. They are also grateful for useful comments from seminar participants at the 2017 Population Association of America (PAA), and the 2017 International Population Conference (IPC). Pesando acknowledges financial support from the School of Arts and Sciences at the University of Pennsylvania, and the Fulbright Commission.

Abstract

Using data from the "Young Lives" study of childhood poverty tracking a cohort of children from the ages of 8 to 19, this paper aims to investigate the household determinants of teen marriage and teen pregnancy in four low- and middle-income countries (LMICs), namely Ethiopia, India, Peru and Vietnam. Its contribution is twofold. First, we offer a descriptive and comparative overview of the prevalence of teen marriage and childbearing in geographically selected areas across the four countries of interest, together with their socio-demographic determinants. Second, we place a specific focus on the role of gender and sibling sex-composition in shaping the probability of getting married and/or having a child by age 19. We test the hypothesis that in contexts where resources are scarce and customs are rooted, parents tend to arrange their daughters' marriages in order, hence girls with older sisters face a lower risk of marrying early or giving birth, all else equal. We show that, while in most countries the presence and number of older sisters in the household is associated with a 10-to-30-percent lower likelihood of teen marriage and pregnancy, the evidence weakens – and somewhat reverses in Ethiopia – once a presumably causal effect is estimated. As such, our findings enrich and complement existing evidence on the role of sibling sex-composition on later-life outcomes in LMICs.

Keywords: Teen marriage; teen childbearing; older sisters; sibling sex-composition; LMICs

JEL classification: I24, J12, J16, O15

Introduction

Worldwide, more than 700 million women alive today got married before their 18th birthday, and more than 250 million entered into union before age 15 (UNICEF 2014). Although early marriage has decreased over the past 30 years, progress has spread unevenly across regions, and the practice remains pervasive across countries in Latin America and the Caribbean, South Asia, and sub-Saharan Africa (Koski, Clark, and Nandi 2017).[1] As of today, South Asia is home to almost half of all child brides worldwide (42 percent), and India alone accounts for one third of the global total (Vogelstein 2013). Yet sub-Saharan Africa is projected to overtake South Asia in having the world's highest number of teen brides by 2050. In this region, even doubling the current rate of decline would not be enough to reduce the absolute number of brides due to rapid population growth (UNICEF 2014).

Early marriage and childbearing are deeply interconnected phenomena, and child marriage is often identified as one key driver of early motherhood, particularly in South Asia and sub-Saharan Africa. Every year, over seven million girls below the age of 18 give birth in low- and middle-income countries (LMICs), with an overwhelming majority of these births – around 90 percent – occurring within marriage (UNFPA 2013). Estimates from Niger, the country with the highest child marriage rate in the world, suggest that by the time they turn 18, 76 percent of girls are married, and 51 percent have borne a child (UNICEF 2016). Women marrying in teenage years or younger have often little say in terms of when they marry and whom they marry (Jensen and Thornton 2003). As a result, teen brides might be unable to negotiate access to safe sex and medical care, leaving themselves vulnerable to health risks such as sexually transmitted infections and early pregnancies (Nour 2006). In some

[1] "Early marriage" (or "child marriage") is defined by the United Nations as the formal or informal marriage of a child under the age of 18.

contexts, the pressure to become pregnant once married is strong, and teen brides end up having many children to care for while still young, thereby stretching household resources and resulting in less investment per child. The interconnected nature of early marriage and childbearing has important implications both for girls themselves and for their offspring (Lloyd 2005).

Early marriage and childbearing are key areas of concern for development policy in LMICs. Although not the direct target of a Sustainable Development Goal (SDG) *per se*, reducing early marriage is critical to achieving at least half of the SDGs. For instance, girls from poorer families are more likely to marry early than girls from wealthier families (*SDG1: no poverty*), and early marriage disproportionately affects rural and disadvantaged girls creating cycles of poverty that reinforce inequalities (*SDG10: reduce inequalities*; Dahl 2010; Otoo-Oyortey and Pobi 2003). Child marriage also keeps girls in poverty by depriving them of opportunities such as education (*SDG4: inclusive and quality education*) and access to paid employment (*SDG8: economic growth*; Field and Ambrus 2008; Jensen and Thornton 2003; Parsons et al. 2015). Early marriage is associated with less power, agency, and autonomy for young women in the marital household, and a lower likelihood of full participation in society (*SDG5: gender equality*; Dahl 2010). An early age at marriage translates into a lower age at childbirth, prompting additional concerns because childbirth in teenage years correlates with worse birth outcomes for the child and worse pregnancy outcomes for the mother (*SDG3: good health and wellbeing*; Ashcraft and Lang 2006; Fraser et al. 1995; Ganchimeg et al. 2014; Raj 2010). Not least, families with food insecurity may marry their daughters early to have one mouth less to feed, and teen brides usually suffer high rates of malnutrition, due to early and frequent pregnancies (*SDG2: zero hunger*; Bunting, Lawrance, and Roberts 2016). Therefore, efforts to reduce early marriage and childbearing are critical to ensure a better future for girls, their children, their families, and countries.

The growing availability of longitudinal data across LMICs has made it possible to better understand these phenomena and trace the pathways that lead to the aforementioned outcomes.

Longitudinal data similarly permit shedding light on the early-life determinants of teen marriage and childbearing. Yet despite these developments, most socio-demographic research to date focuses on the implications of these life-course events for later-life outcomes (Dahl 2010; Glenn, Uecker, and Love Jr. 2010; Kane et al. 2013; Sekhri and Debnath 2014), rather than on their drivers or root causes. This paper seeks to fill this gap by comparatively exploring the household determinants of teen marriage and teen pregnancy – defined as marriage or childbearing occurring by the age of 19 – across four LMICs, namely Ethiopia, India, Peru, and Vietnam. We provide two main contributions. First, we document the prevalence of teen marriage and teen pregnancy in geographically selected areas across four LMICs, together with their associated factors. We do so by using comparative data from the Young Lives (YL) international study of childhood poverty tracking a cohort of children born around 1994-95 from ages 8 to 19. As the latest public-use round of data with information on marriage and childbearing has been recently released,[2] this is among the first YL studies shifting the focus from middle childhood and adolescence to early adulthood outcomes.[3]

Second, we contribute knowledge on how the family's continued influence over children's life-course decisions – such as marriage arrangements and early childbearing decisions – creates trade-offs among siblings, such that one sibling's presence in the family affects other siblings' outcomes. Specifically, capitalizing on a paper by Vogl (2013), we test the hypothesis that in resource-deprived

[2] Round 4, released in April 2016.

[3] Roest (2016), Singh and Espinoza Revollo (2016), and Singh and Vennam (2016) have carried out preliminary investigations of the core predictors of teen marriage and childbearing using YL data, yet their focus is exclusively on India. Similarly, Favara, Lavado and Sanchez (2016) have investigated childbearing, marriage, and cohabitation decisions using the YL Peruvian sample.

contexts with rooted social norms the presence and number of older sisters – and the sex composition of siblings more generally – might be a key determinant of early marriage and childbearing outcomes. We complement purely associational evidence with a "natural" experiment within the family that takes advantage of variation in younger siblings' sex. With this information, we examine the role of older sisters by testing whether a girl whose next-youngest sibling is a girl faces a higher cumulative risk of marrying early and/or experiencing early childbearing as compared to a girl whose next-youngest sibling is a boy (henceforth, "sister effects"). This hypothesis is consistent with the idea that parents tend to arrange their daughters' marriages in the exact birth order, hence older daughters should marry first – and similar effects would be observed on childbearing in contexts where teen marriage and childbearing are tied. In testing this hypothesis, we acknowledge that the countries of interest are different, and we do not expect the hypothesis to hold similarly across all contexts. Quite the contrary, we are interested in documenting the ensuing heterogeneity.

Competition among siblings has received much attention for its potential to have long-lasting impacts on children's outcomes. In high-income countries, the vast majority of studies on birth order and children's outcomes suggest that first-born children have better outcomes such as higher educational achievement, higher labor market earnings, higher likelihood of full-time employment, lower teenage fertility, choice of college major, etc. (Barclay, Hällsten, and Myrskylä 2017; Bertoni and Brunello 2016; Black, Devereux, and Salvanes 2005; Booth and Kee 2008; Conley and Glauber 2006). Conversely, in low-income countries studies suggest that later-born children achieve more years of schooling, spend more time studying, and engage less in child labor (Edmonds 2006; Emerson and Souza 2008; Ejrnaes and Pörtner 2004; Seid and Gurmu 2015). Albeit indirectly, the present work relates to scholarship on birth-order effects on early marriage and childbearing in LMICs. Yet, rather than asking whether firstborns are more likely to experience early marriage or childbearing than laterborns, we explore whether the presence of older sisters in the household shapes this same likelihood, thereby placing an exclusive focus on girls and their sibling(s)' sex-composition. In so doing, we shy away from the more traditional methodological concern of endogenous family size and attempt to estimate plausibly causal effects of the role of older sisters on early marriage and childbearing using variation in younger siblings' sex-composition. On a theoretical side, we complement the emphasis on the quality-quantity trade-off with dimensions such as parental control and institutions like arranged marriage.

Background

Parents are involved in their daughter's marriage and childbearing decisions in large parts of the developing world where resources are scarce and customs are rooted (Boyden, Crivello, and Morrow 2015). There are several ways in which parental involvement operates. One of them aligns with tradition, as parents often play a role in choosing their daughters' grooms. The other is more closely tied to parental preferences and suggests that parents tend to arrange their daughters' marriages in the exact birth order, hence the oldest daughter should marry first, then the second one, and so forth. Considering that siblings of the same sex participate in the same marriage market, and the search for a suitable spouse takes time, parents face a limited capability to find husbands for all their daughters on time, thus exacerbating siblings' rivalries. These constraints are even more severe in societies with high shares of arranged marriages (Vogl 2013). Two testable hypotheses follow: (1) girls with older sisters face a lower likelihood of teen marriage and childbearing relative to girls with no older sisters; (2) girls whose next-youngest siblings are female face a higher likelihood of teen marriage and childbearing relative to girls whose next-youngest siblings are male.

Our study focuses on Ethiopia, India, Peru, and Vietnam, four very different countries with their own cultural specificities, norms and traditions. Even when it comes to the nature of marriage and the practices surrounding it, these countries show remarkable differences. For instance, to marry their daughters South Asian families pay dowries – net transfers from the bride's family – that often reach several times their annual income (Anderson 2007). Therefore, a family that is liquidity-constrained must delay its younger daughter's marriage in order to accumulate a second dowry. YL data show that customs and practices around dowry differ between sites. The practice is often cited as a key driver of child marriage and, indeed, YL has found instances where girls from poorer families are said to have been married younger because of the smaller dowry required for younger brides (Singh and Vennam 2016). Dowries have long been a custom in India and are presently an almost universal phenomenon (Rao 1993). Comparatively little research has explored marriage transfers in the rest of south Asia, though several studies point to dowry payments now occurring in Bangladesh, Pakistan, and Sri Lanka.

Brideprices – net transfers from the groom's family – are most prevalent in Africa; more than 90 percent of sub-Saharan societies traditionally made such marriage payments (Goody 1973; Murdock 1967). Oromia, one of the YL study sites in Ethiopia, provides evidence of a strong cultural practice that obliges girls to marry through the intervention of family and clans, where a large brideprice is involved (Tafere and Chuta 2016). Vietnam is an interesting country in that it combines both prevalence of dowry and brideprice depending on the region. Teerawichitchainan and Knodel (2012) recently documented a re-emergence of marriage payments in Vietnam as attesting to resilience of traditional values and the unraveling of the socialist agenda, and hypothesized that in the years to come brideprice, dowry, and bidirectional transfers will continue to be prevalent and culturally – rather than economically – functional. Conversely, in Latin America marriage payments disappeared towards the end of the colonial period in the nineteenth century (Nazzari 1991), and are nowadays virtually non-existent.

Peru is also different in its far lower prevalence of arranged marriage. Nonetheless, we share with Vogl (2013) the claim that the degree to which the family of origin controls marriage arrangements is continuous, rather than binary (arranged versus non-arranged).[4] In other words, even in societies that no longer formally adhere to arranged marriage, the family of origin may still influence marriage timing and spouse selection in several ways and to varying degrees (Goode 1970; Goody 1983; Caldwell et al. 1998). Therefore, although we expect weaker overall evidence of sister effects in Peru, we deem it useful to include all four YL countries in the analysis and document the ensuing heterogeneity.

Data and Methods

Data and measures

We use data from the Young Lives project, a unique longitudinal study of childhood poverty that follows the lives of 12,000 children in Ethiopia, India (Andhra Pradesh and Telangana), Peru and Vietnam over a time span of 15 years. YL has particularly rich information on the socio-economic background of children, household possessions, parental expectations, and detailed child-specific data. The study tracks two cohorts of children over five rounds of data collection since 2002. The latest round of data (Round 5 – R5) is not publicly available yet, hence our data cover a 12-year timeframe. In each country, ~1,000 children in the older cohort (OC, born in 1994-95) and ~2,000 children in the younger cohort (YC, born in 2001-02) were surveyed. The data are clustered and cover 20 sentinel sites in each country, selected to represent the diversity of each country across rural and urban lines. In each site, 100 older-cohort and 200 younger-cohort children were selected at random after enumerating all households containing a child of the required age. Even though the survey is not

[4] Demographers have shown that sisters disproportionately married in order of birth in several Western contexts too, and they have interpreted the reduction of this practice as evidence of declining parental authority in marriage decisions (Smith 1973).

nationally representative – it purposely oversamples poor areas – and cannot be used for monitoring welfare indicators over time in a way comparable to, for instance, the Demographic and Health Surveys (DHS) and the Welfare Monitoring Surveys (WMS), the YL sample is an appropriate and valuable medium for modelling, analyzing, and understanding the dynamics of child wellbeing in four different contexts (Outes-Leon and Sanchez 2008). For additional details on the sampling design see Wilson et al. (2006).

This study uses data from the older cohort (OC), according to which children were 8 to 9 years old in Round 1 (R1 - 2002), 11 to 12 years old in Round 2 (R2 - 2006), 14 to 15 years old in Round 3 (R3 - 2009), and about 18 to 19 years old in Round 4 (R4 - 2014). We restrict the focus to girls for the following reasons. First, as we are interested in uncovering how sisters' rivalries affect girls' probability to experience teen marriage and teen pregnancy, a focus on girls is more consistent with our theoretical framework. Second, the prevalence of teen marriage for boys is less than 2 percent in three out of the four countries, namely Ethiopia, India and Peru, and the prevalence of early childbearing is less than 1 percent in Ethiopia, India, and Vietnam. This choice significantly restricts the sample – from 3,722 children to 1,834 girls as of R1.[5] Of the 1,834 girls surveyed in R1, 168 dropped out of the study between R1 and R4. The analytical sample is hence 1,666 girls: 420 girls in Ethiopia, 487 in India, 294 in Peru, and 465 in Vietnam. Note that attrition in the data is relatively low over a 12-year period, compared to many longitudinal studies in developing countries – from 5.8 percent in India to 14.3 percent in Ethiopia. Attrition analyses reported in Appendix Table A.1 show that girls missing in R4 were only marginally statistically different from the 1,666 girls present in all rounds in terms of socio-demographic characteristics. In line with Barnett et al. (2013), girls who left

[5] The reason why the sample size is not 4,000 (1,000 per country) is due to a smaller initial sample in Peru (around 700 children).

the study were more likely to come from urban areas (p=0.023) and have lower-educated mothers (p=0.079). However, girls were not different in terms of the household composition variables of interest, thereby increasing confidence in the validity of the analytical sample. Due to small sample sizes, we report t-tests for the differences in means on the pooled sample (descriptive evidence from country-specific analyses is in line and available upon request).

The chosen dependent variables are two binary indicators for teen marriage – defined as marriage occurring by age 19 (*ever married*) – and teen pregnancy – defined as being pregnant or having had a birth by the same age (*ever pregnant or ever had a child*).[6] The definition of marriage adopted in this study includes cohabitation, a particularly important reality in Latin American countries. Also note that in India fertility questions were not asked to unmarried women as it was deemed culturally inappropriate, hence the sample does not include unmarried girls pregnant or with a child. We limit ourselves to these two variables due to incomplete retrospective data on age at marriage and age at childbearing. Following Singh and Espinoza Revollo (2016), we focus on teenage marriage and childbearing, rather than early marriage and childbearing (below 18 years old) as we aim to uncover the main drivers and determinants of these events, which we believe in these contexts are not closely tied to the legal status threshold of 18 years old. Also, adopting a teen marriage definition provides a more reliable measure given the YL survey design, which collects marital status information at the time of the last survey (i.e., ages 18 to 19). Given the limited information available on the exact timing of marriage and the risk of recall bias which plagues variables of this kind, measuring early marriage would lead to imprecise assessments. Figure 1 shows the prevalence of teen marriage (left panel) and

[6] In what follows, with the term "teen pregnancy" we refer to girls who got pregnant or had a birth by age 19. Similarly, "teen marriage" refers to marriage or cohabitation occurring any time before age 19. This share includes girls who got married before the age of 19 but then separated.

teen pregnancy (right panel) for girls in the four countries of interest. India stands out as the country with the highest proportion of girls married before age 19, around 0.37. Peru, Vietnam, and Ethiopia follow with shares around 0.27, 0.19, and 0.14, respectively. With reference to these estimates, it is important to note that while the inclusion of cohabitation is negligible in India and Vietnam, it increases the prevalence of teen marriage from 0.11 to 0.14 in Ethiopia, and from 0.07 to 0.27 in Peru. Appendix Table A.2 provides additional details on the characteristics of girls' marriage, and shows that the prevalence of arranged marriage is striking in Ethiopia and India, where parents were solely responsible for choosing their daughters' grooms in 65.3 and 43 percent of instances, respectively.[7] Prevalence of teen childbearing is similar in Ethiopia (0.10) and Vietnam (0.16), while it is higher in India (0.21) and Peru (0.25). Overall, while India stands out for its high prevalence of teen marriage, the case of Peru is remarkable in its high prevalence of teen motherhood.

[Figure 1 about here]

The relationship between these two life events is documented further in Figure 2, which provides summary information on the prevalence of teen pregnancy conditional on teen marriage (top panel), and the prevalence of teen marriage conditional on teen pregnancy (bottom panel). The corresponding figures in numbers are reported in Appendix Table A.3. Of the sample of girls who are married (top-right panel), about 58 and 68 percent ever got pregnant in India and Ethiopia, while pregnancy out of marriage (top-left panel) is an uncommon reality. Similar figures are observed in Vietnam, with 83 percent of married girls ever pregnant, and no unmarried girl pregnant. Out of the girls who are pregnant or had a child by age 19 (bottom-right), all of them are married in India (by

[7] Data on who chose the girl's partner/spouse are not available for Peru, yet the high shares of girls who report having known their partner/spouse for longer than a year (85.7%) suggest that arranged marriage might be less prevalent in this context.

sampling design) and Vietnam, while the share is lower in Ethiopia (95 percent), and even lower in Peru (84 percent), thereby suggesting that in the latter country out-of-wedlock childbearing is a more common reality. In sum – and somewhat reflected in Figure 1 too – teen marriage "without" teen pregnancy is prevalent in India, while teen pregnancy "without" teen marriage (and cohabitation) is a quite uncommon scenario. These patterns highlight interesting cross-country heterogeneity which further value our focus on the two outcomes of interest, together with the comparative nature of the study.

[Figure 2 about here]

We draw on the household roster to construct variables on the number of siblings, together with their sex and age.[8] With these, we construct the main predictors of interest, namely a dummy for whether the YL girl has any older sisters (versus not having older sisters, i.e., she is the eldest daughter in the household), a continuous variable for the number of older sisters, and dummy variables for whether her next-youngest and next-oldest siblings are female (1 if female; 0 if male). We also build a variable for the birth interval (in months) between the YL girl and her next-youngest and next-oldest siblings. This is essentially measured as their respective age difference (in months). The relevance of these dimensions for the current analysis will become clearer in the following sections. The sex of the next-youngest sibling and the related birth interval are only available for the 919 girls who report having any younger sibling, i.e. 276 girls in Ethiopia (66 percent of the girls' sample in Ethiopia), 269 in India (55 percent), 143 in Peru (49 percent), and 231 in Vietnam (50 percent). Similarly, the sex of the next-oldest sibling and the related birth interval are only available for the 1,068 girls who report

[8] These are co-resident siblings, but the analysis is robust to the inclusion of siblings who have moved out before R1.

having any older sibling, i.e. 297 girls in Ethiopia (71 percent), 315 in India (65 percent), 171 in Peru (58 percent), and 285 in Vietnam (61 percent).

Additional controls include the number of older brothers, the number of younger siblings, the age of the child (in months), the age and educational attainment of the mother, the wealth index, a dummy for urban residence (1 if urban; 0 if rural), a dummy for whether the child is enrolled in school at age 15 (R3), and a dummy for parental expectations on their children's age at marriage. This dummy – measured at age 12 (R2) – equals one if parents expect their children to get married before age 19. Except for the latter two variables, all predictors are measured in R1 for two reasons. First, the outcomes are only available in R4, hence we make use of the longitudinal nature of the data yet we cannot estimate fixed-effects panel models. Second, most predictors are time invariant (e.g., mother's education), or measured at a point in time in which little variation in household composition is likely to occur (e.g., sibling sex-composition).[9] Although missing values on covariates are rare – at most 5 percent of cases in some variables – we use data from subsequent rounds to fill up the missing.[10]

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[9] Note that the YL girl is 8 in Round 1, hence variations in household size or number of siblings are less likely to occur than if the girl was a newborn. For instance, the mean number of siblings on the pooled sample increases from 2.1 to 2.5 over four rounds of data. Furthermore, for the core of the analysis we use information on the sex composition of older siblings, which is time invariant in the absence of mortality or migration shocks. Lastly, child and mother's age increase by construction over rounds.

[10] For instance, if the age of the child in Round 1 is missing, while it is present in Round 2, we assume that the age in Round 1 (collected in 2002) is equal to the age in Round 2 (collected in 2006) minus four.

Lastly, for each YL girl we construct a variable that accounts for the permutations of older siblings by sex to more precisely capture the sex and sequencing of male and female births that occurred prior to the YL girl. For instance, a girl who reports having only one older sister is coded as "G", a girl who reports having only two older sisters is coded as "GG". Conversely, a girl who reports having three older sisters and one older brother – where the older brother is the firstborn – is coded as "BGGG".[11] A girl with no older siblings is coded as "N".

Descriptive statistics

Table 1 provides descriptive statistics on the girls' sample (N=1,666). The data show that the mean birth interval between the YL girl and her next-youngest sibling is lowest in India (32.4 months) and highest in Vietnam (48.3 months), while the share of next-youngest siblings who are female is rather homogeneous across countries. Consistently with the larger mean household sizes observed in sub-Saharan Africa, the number of siblings is higher in Ethiopia, followed in turn by India, Peru, and Vietnam. Conversely, while Ethiopia stands out for the highest mean number of older sisters and brothers, the remaining countries do not follow any specific ordering. All children were around 8 years old (95-96 months) when they were surveyed in Round 1, hence there is neither within-country nor cross-country variation in the age of the child. There is little variation in mother' age too, except for India, where mothers are on average four years younger. Mean educational attainment of the mother shows remarkable variability across countries, with Ethiopia and India averaging 2.7 grades, and Peru and Vietnam approaching 6.7 grades completed. The majority of girls live in rural areas in Ethiopia, India, and Vietnam, while 74 percent of them live in urban areas in Peru.[12] Moreover, while 91-93 percent of girls are enrolled in school at age 15 in Ethiopia and Peru, this percentage declines to 80

[11] Hence, the first letter corresponds to the oldest sibling.

[12] The sample in Peru is overwhelmingly urban by design.

and 73 percent in Vietnam and India, respectively. In India 41 percent of parents expect their children to get married before age 19. This percentage is much less, 8 to 10 percent, in the remaining countries. Lastly, at the bottom of Table 1 we report the four most common configurations of older siblings observed in each country, from the first most common (left) to the fourth most common (right). In all countries, the most common configuration is one in which the YL girl reports having no older siblings, followed by one older sister in Ethiopia (G), and one older brother in India, Peru, and Vietnam (B). Due to the largest mean household size and the highest number of older siblings documented above, the most complex configurations of older siblings by sex are observed in Ethiopia.

[Table 1 about here]

Methodology

Our methodological approach proceeds as follows. First, we explore the socio-demographic determinants of teen marriage and teen pregnancy using a linear probability model (LPM), and provide robustness checks using logistic regression in the Appendix. We model the probability of being married (including cohabitation) and the probability of having a birth by age 19 as follows:

$$Y_{ij} = \alpha + \delta_j + \beta_1 sisters_{ij} + \beta_2 sisters_{ij} * country_j + \gamma x_{ij} + \varepsilon_{ij} \quad (1)$$

where Y_{ij} is a dummy variable that takes the value of 1 if girl *i* born in country *j* has ever been married or has ever had a birth, and takes the value of 0 if the girl has never been married or has never had a birth. We model these two outcomes separately. The term $sisters_{ij}$ captures the association between the role of older sisters and the probability of experiencing these two events. We provide two specifications per outcome. In specification (1), $sisters_{ij}$ is a dummy variable for whether the YL girl has any older sisters (1 if the girl has at least one older sister, 0 otherwise); in specification (2), $sisters_{ij}$ is a continuous variable measuring the number of older sisters. $Sisters_{ij} * country_j$ captures the interaction of either of these variables with the country fixed effect, which accounts for cross-country heterogeneity. The term $\mathrm{x_{ij}}$ is a vector of observable characteristics of the child, mother and family, and ε_{ij} is an error term. Country fixed-effects are accounted for by the term δ_j. Given the limited sample size, we report pooled estimates with country fixed effects and country interactions to allow for country variation in the predictors of interest. Specifications by country are reported in the Appendix.

The vector $\mathrm{x_{ij}}$ includes all socio-demographic determinants other than the presence and the number of older sisters, namely the number of older brothers, the number of younger siblings, age of the child, mother's age and education, the wealth index, a dummy for urban residence, a dummy for enrollment in school at age 15, and a dummy for parents' expectations on children's age at marriage as defined in the previous section. Although in this first stage of the analysis we make no claim of causality, we use as predictors characteristics that are either time-invariant or recorded in earlier rounds of the survey. This modeling choice guards against obvious sources of reverse causality.

Second, to delve into the role of gender and sibling sex-composition in shaping the probability of getting married and/or having a child by age 19 – and provide estimates that could be deemed causal – our identification strategy takes advantage of variation in younger siblings' genders, in a spirit similar to Vogl (2013). We exploit the idea that, conditional on a girl having at least one younger sibling, the gender of her sibling may be taken as random. In a more general scenario, conditional on a girl having at least x younger siblings, the gender of her x^{th} younger sibling can be taken as random in the absence of sex selection. A comparison of girls with next-born sisters to those with next-born brothers thus identifies the effect of next-born sibling's gender, allowing for a more causal interpretation. As before, we model the probability of being married and the probability of having a birth by age 19 as follows:

$$Y_{ij} = \alpha + \delta_j + \beta_1 sex\_next\_youngest_{ij} + \beta_2 sex\_next\_youngest_{ij} * country_j + \gamma x_{ij} + \varepsilon_{ij} \qquad (2)$$

where the term $sex\_next\_youngest_{ij}$ varies between 0 for a next-youngest brother and 1 for a next-youngest sister. We provide, as before, two specifications per outcome, where (1) controls for the number of older sisters and the number of older brothers, while (2) replaces these two controls with dummies for the exact permutation of older siblings by sex (e.g., B, G, BB, BG, BGB, etc.) in an effort to capture not only the overall number of older brothers and sisters, but also the exact sex-sequencing. This is crucial to account for parental preferences for a specific offspring sex-composition, and to partly address endogeneity concerns related to son preference and sex selection. As a matter of fact, while the outcome of a given birth is random in ideal circumstances, it may be correlated with pre-birth characteristics. This threat to identification is mostly due to sex-selective abortion and sex-related investments, which are prevalent in some LMICs, particularly in South Asia (Arnold, Kishor, and Roy 2002; Bhalotra and Cochrane 2010). The likelihood of sex selection declines in the number of older brothers due to a demand for sons, and it increases in the birth interval as longer birth intervals allow for more terminated pregnancies between births (Pörtner 2015). While we address the issues of sex selection and sex-related investments in additional analyses, in specification (2) we control for the exact permutation of older siblings by sex to assuage the above concern.

As this specification is estimated on the sample restricted to girls who have at least one younger sibling, the number of observations is reduced from 1,666 to 919.[13] Given that we control for fixed effects that are unique to each permutation of older siblings, we purposely reduce the number of other

[13] We run these same analyses keeping the overall sample of 1,666 girls and recoding the sex of the next-youngest sibling variable into 0 (male), 1 (female), and 2 (no younger siblings), hence using this variable as a categorical one. Results are fully in line and therefore not reported (available upon request).

controls included to preserve enough degrees of freedom.[14] The vector $\mathrm{x_{ij}}$ here includes the birth interval (in months) between the YL girl and her next-youngest sibling, the age of the child, mother's age and education, and a dummy for urban residence. We provide pooled estimates with country fixed effects and country interactions, and report country-specific analyses in the Appendix.

Results

Socio-demographic determinants of teen marriage and teen pregnancy

Table 2 provides estimates from a LPM predicting the probability of teen marriage and teen pregnancy as in Eq. 1. Ethiopia is the country of reference, hence the coefficients on presence (1) and number (2) of older sisters shown in Table 2 pertain to Ethiopia. The linear combinations with point estimates for each country are shown in Figure 3. Country-specific estimates are provided in Appendix Table A.4. First, teen marriage is significantly more likely to occur in India and Peru relative to Ethiopia, while teen pregnancy is significantly higher in India, Peru, and Vietnam, with a coefficient on Peru that is three times as large relative to the other countries (Table 2). These estimates are consistent with Figure 1. The number of older brothers and the number of younger siblings are not significantly predictive of teen marriage and teen pregnancy, and show opposite signs. In terms of socio-economic

[14] By the same token, whenever the YL girl reports more than four older siblings, we truncate the permutations of older siblings by sex to the first four births if the sex composition of these births is mixed. For instance, a girl with "GGBBG" and another girl with "GGBBGGGBG" are assigned the same coding "GGBB". In so doing, we are assuming that parental preferences for offspring sex-composition in these two scenarios are similar. This assumption is reasonable and permits the reduction of the number of fixed-effects from 98 to 31 configurations. Also, results from this specification are robust to the inclusion of the additional controls included in Eq. 1.

characteristics, both mother's education and the wealth index are negatively associated with the outcomes, suggesting that teen marriage and teen pregnancy disproportionately affect girls from more disadvantaged households. Interestingly, while mother's education turns out to be a stronger predictor of teen pregnancy, household wealth is more negatively associated with teen marriage. Country-specific estimates from Table A.4 further suggest that the negative association with wealth is mainly driven by Peru and Vietnam. Enrollment in school at age 15 turns out to be the strongest predictor of the two outcomes, with same magnitudes across specifications. Specifically, being enrolled in school at age 15 is associated with a decline in the probability of teen marriage and teen pregnancy by 42 and 32 percentage points, respectively. Lastly, girls whose parents believe they should get married before age 19 are 10 percentage points more likely to enter into marriage while – as might be expected given that the expectation pertains to marriage only – there is no significant association with the pregnancy outcome.

[Table 2 about here]

Point estimates by country reported in Figure 3 show that the presence of older sisters (left) and the number of older sisters (right) deliver similar findings, yet focusing on the latter delivers more precise estimates. Slight differences emerge in Ethiopia and Peru, where the number of older sisters is significantly associated with a lower likelihood of teen marriage, yet the mere presence of older sisters in the household is not. Focusing on teen marriage, an increase in the number of older sisters by one unit is associated with a statistically significant decline in the likelihood of teen marriage by 2.4 percentage points in Ethiopia, 7 in India, 4.8 in Peru, and 5.4 in Vietnam. Conversely, the number of older sisters is negatively associated with teen pregnancy in India and Vietnam only, irrespective of specification. In both countries, a one-unit increase in the number of older sisters is associated with a decline in the likelihood of teen pregnancy by about 4.5 percentage points.[15] Estimated odds ratios from analogous logit specifications are in line (reported in Appendix Figure A.1). To summarize, estimates from Table 2 and Figure 3 suggest that the number of older sisters is a significant negative predictor of teen marriage in all countries, even after controlling for the number of older brothers and the number of younger siblings in the household, while the negative association with teen pregnancy emerges only in India and Vietnam. Note that for this and subsequent specifications we test the robustness of the findings using household composition variables (number of older and younger siblings, sex of siblings, etc.) as measured in later rounds. Results are aligned and available upon request. Overall – and consistently with Vogl (2013), Singh and Espinoza Revollo (2016), and Singh and Vennam (2016) – this preliminary analysis suggests that there is something inherent in having older sisters that correlates with better outcomes in later-life.[16] But to what extent can we trust this purely associational evidence? Is the presence and number of older sisters indeed conducive to lower teen marriage and teen pregnancy? We explore this question in the following sub-section.

[Figure 3 about here]

Sibling sex-composition and sister effects

Table 3 provides estimates from a LPM predicting the probability of teen marriage and teen pregnancy. However, the presence and number of older sisters are replaced by a dummy for the sex of the next-youngest sibling (1 if female), as in Eq. 2. Ethiopia is again the reference country, hence the coefficient

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[15] Out of a base prevalence of 0.21 (India) and 0.16 (Vietnam), this corresponds to a percentage decline of 21 percent in India and 28 percent in Vietnam.

[16] In line with Singh and Vennam (2016) is also the finding that the positive association between having an older brother and early marriage and childbearing fades with control for parental characteristics.

on the sex of the next-youngest sibling pertains to Ethiopia. The linear combinations with point estimates for each country are shown in Figure 4. Country-specific estimates are provided in Appendix Table A.5. Specification (1) controls for the number of older sisters and brothers, while specification (2) replaces these two controls with permutations of older siblings by sex (dummies). As in Table 2, the number of older sisters emerges as a significant predictor of teen marriage and teen pregnancy, while the number of older brothers does not. Estimated coefficients on the remaining controls are in line with Table 2 too.

[Table 3 about here]

Point estimates by country reported in Figure 4 provide the plausibly causal effect of interest of sex of next-youngest sibling on teen marriage (top panel) and pregnancy (bottom panel). We plot estimates from specifications (1) and (2) for the sake of comparison, yet take specification (2) as more reliable. Our findings show that in three out of four countries, namely India, Peru, and Vietnam, there is no effect of sex of next-youngest sibling on both teen marriage and pregnancy. In other words, there is no evidence that girls whose next-youngest sibling is a girl are more "disadvantaged" in terms of risk of marriage or childbearing. Most coefficients are in fact reversed in sign suggesting that, if anything, the effect would be negative. This is indeed what we observe in Ethiopia – the country in which the association between the number of older sisters and the outcomes shown in Figure 3 was the weakest in terms of magnitude – where a girl with a next-youngest sister is about 7.1 and 6.3 percentage points less likely to experience teen marriage and teen pregnancy compared to a girl with a next-youngest brother, respectively. In terms of sign, Vietnam is the only country in which Vogl's predictions of parental control and sisters' rivalry seems to hold, yet the coefficient is far from conventional significance levels. Estimated odds ratios from analogous logit specifications are in line (reported in Appendix Figure A.2). We thus conclude that once a better identification strategy is adopted, there is no evidence in the Young Lives sample of a negative causal effect of older sisters on teen marriage and pregnancy.

[Figure 4 about here]

Son preference and sex-selective abortion

For these estimates to be credible, however, we need to provide evidence that sex-selective abortion is not an issue of concern in our sample. We do so by implementing two different strategies. First, following Seid & Gurmu (2015) we use the whole sample – boys and girls – to check whether the birth intervals with the next-youngest and next-oldest siblings differ based on the proportion of boys in the household. The idea is that if parents selectively abort female fetuses, then the proportion of boys in the household is endogenous. If it is the case that parents abort female fetuses, birth spacing is expected to be higher for families with higher proportion of boys, as the higher proportion of boys is partly driven by sex-selective abortion – and longer birth intervals allow for more terminated pregnancies between births. Table 4 hence compares birth spacing by proportion of boys in the households, where this proportion is computed as the ratio between male siblings (including the YL child if he is a boy) over the sum of male and female siblings (the latter including the YL child if she is a girl). The variable is then dichotomized to equal 1 if the proportion is greater or equal to 0.50. The table shows that there are no statistically significant differences in the average length of the birth interval by proportion of boys in the household. Although averages are more balanced when using the birth interval with the next-youngest sibling, the higher birth intervals observed in Ethiopia, India, and Vietnam when the proportion of boys equals or exceeds 0.50 using the birth interval with the next-oldest sibling are not significantly higher. The case of Peru is different, in that when the proportion of boys exceeds half we observe birth intervals that are in fact shorter by about 5 months.

[Table 4 about here]

Second, switching back to the sample of girls who have at least one younger sibling, in Table 5 we run regressions of the next-youngest sibling's sex on the birth interval, the number of older sisters and older brothers (replaced in specification (2) by the exact permutations of older siblings by sex), and some child and maternal characteristics. The idea is that if the number and/or sex composition of older siblings, together with the length of the birth interval with the next-youngest sibling, and parental characteristics more generally significantly predict the probability of a female birth, then the sex of the next-youngest sibling might not be randomly determined. Our results reveal little reason to believe that sex selection will bias the results in Ethiopia, Peru, and Vietnam. As for India, the non-significant coefficient on the birth interval is reassuring in itself, yet the negative and significant coefficient on the number of older sisters suggests that one additional older sister is associated with a 14-percentage point reduction in the probability of a female birth. Additionally, the joint F-test on India suggests that all variables together are significant predictors of the sex of the next-youngest sibling (p=0.003 and p=0.044), i.e., we reject the null hypothesis that the coefficients are jointly equal to zero. Evidence from Tables 4 and 5 together hence suggests that sex-selective abortion is not an issue of concern in Ethiopia, Peru, and Vietnam, while it cannot be completely ruled out in the Indian context, although quantitatively small. Estimates from India should hence be interpreted with more caution.

[Table 5 about here]

Differential infant and child mortality by gender

An additional threat to the validity of the estimates relates to the likelihood of differential infant and child mortality by gender. In other words, if mortality patterns systematically vary across gender, the observed gender mix in the household not only reflects parents' effort to achieve their desired gender mix, but also differential mortality rates. There is widespread literature about sex-related investments in health and nutrition of children that might imply differential mortality and thus not survival until the survey round (Behrman 1988; Das Gupta 1987; Rosenzweig and Schultz 1982). Since information on mortality is poorly recorded in YL data, in Appendix Table A.6 we show that there are no systematic gender differentials – or that patterns are similar across countries – in child anthropometrics and parental investments using data from the YL younger cohort (R1-R3), thereby suggesting no evidence of a female disadvantage.[17] Birth weight is about 100-200 grams lower for girls in every country, in line with the literature (Van Vilet, Liu, and Kramer 2009), while prevalence and duration of breastfeeding are equal for male and female births.[18] Similarly, Body Mass Index (BMI) and weight-for-age (z-score) show no evidence of discriminatory investments favoring boys.

Overall, the literature on the topic is mixed and somewhat aligns with our findings. For instance, using YL data Dercon and Singh (2013) find limited evidence of boys doing better than girls across nutritional indicators. Actually, where significant differences in these indicators exist, they are more likely to favor girls. From a review of more than 50 datasets from sub-Saharan Africa, Svedberg (1990) also finds no evidence that girls are at a disadvantage to boys in terms of child nutrition. Similarly, drawing information from 306 surveys on child nutrition, Marcoux (2002) reports that results from 227 of these display no evidence of any sex differentials across stunting, wasting, and underweight. This is not to say that gender biases do not exist across other types of indicators or at

[17] We still attempted to retrieve some information on child mortality looking at children from the household roster (below age 8, age 5, and 1) who die between rounds. Although the absolute numbers are too small to allow conclusive statements, there is no evidence of higher mortality for girls. If anything, the data suggest that more boys than girls die between rounds, at least in Ethiopia and India.

[18] For most women, breastfeeding was still occurring at the time of the survey, so the duration measure is not representative of terminal breastfeeding.

different (likely, later) ages. For instance, Dercon and Singh (2013) document a clear pro-boy bias in cognitive achievement in Ethiopia and India which is not apparent at an early age, but most pronounced by the age of 12 and 15 (quite the opposite is observed in Peru). Aurino (2017) also documents widening gaps at later ages. These are important findings which deserve careful consideration, yet they are observed in domains – or across ages – that are not indicative of differential infant/child mortality by gender (which in turn could affect observed sibling sex- composition).

Sex of next-oldest sibling

Because endogenous fertility confounds comparisons based on the sex composition of older siblings, we carried out the second part of the analysis choosing the sex of the next-youngest sibling (rather than oldest) as the main predictor of interest. Nonetheless, if the sisters' rivalry framework holds, we might expect older and younger sisters to have opposite effects on the outcomes. In other words, if a girl with a next-youngest sister faces a higher likelihood of getting married relative to a girl with a next-youngest brother, then we would expect a girl with a next-oldest sister to have a lower risk of early marriage relative to a girl with a next-oldest brother. In what follows, we thus re-estimate Eq. 2 using the sex of the next-oldest sibling as predictor.[19] Point estimates by country reported in Figure 5 confirm the null effects shown in Figure 4, with reversed signs (as expected) in Ethiopia, Peru, and Vietnam. These estimates provide some evidence of the robustness of our findings, strengthening the conclusion of a lack of a causal effect of older sisters on teen marriage and childbearing. However,

[19] Note that in this case, in specification (1) we replace the number of older sisters and the number of older brothers with the number of sisters and brothers born before next-oldest, respectively. This prevents double-counting of the next-oldest sibling. By the same token, in specification (2) we replace permutations of older siblings by sex with permutations of siblings born before next-oldest by sex.

keeping in mind that mean differences between girls with older brothers and girls with older sisters might reflect selective fertility rather than the effects of older siblings (Vogl 2013), we deem specifications based on the sex of the next-youngest sibling (Table 3 and Figure 4) as more reliable.

[Figure 5 about here]

Summary and Discussion

The purpose of this study was to contribute knowledge on the determinants of teen marriage and teen pregnancy across four low- and middle-income countries, and shed light on the role of gender and sibling sex-composition as key drivers. Using data from the Young Lives study of childhood poverty tracking a sample of children from the ages of 8 to 19 in Ethiopia, India, Peru, and Vietnam, we provided a comparative overview of the prevalence of these phenomena, and sought a better understanding of how the family's continued influence over children's life-course decisions creates trade-offs among siblings in resource-deprived settings. We tested the hypothesis that in contexts where strong social norms exist, along with gender- and age-based hierarchies, the presence and/or number of older sisters in the household reduces girls' likelihood to experience teen marriage and childbearing. We found that teen marriage and childbearing are prevalent across all four countries. For instance, 37 percent of girls are married by the age of 19 in India, and 25 percent had a birth by the same age in Peru. Moreover, our findings suggest a negative association between the presence and number of older sisters (stronger with the latter predictor) and the likelihood of teen marriage in all countries, while having older sisters is negatively associated with teen pregnancy in India and Vietnam only. However, these associations disappear in India, Peru, and Vietnam once a plausibly causal effect is estimated, and deliver weakly significant estimates in Ethiopia, although reversed in sign. Coefficients from Ethiopia suggest that a girl with a next-youngest sister is about 7.1 and 6.3

percentage points less likely to experience teen marriage and teen pregnancy compared to a girl with a next-youngest brother, respectively.

These findings enrich and complement existing scholarship on the role of gender and sibling sex-composition on later-life outcomes. First, research on the issue is not extensive, particularly in LMICs. Second, related research is either concerned with outcomes other than teen marriage and teen pregnancy (e.g., educational achievement, labor market earnings, etc.), or focused on a single country. By adopting a comparative perspective, we have in no way claimed that the four countries of interest are similar, nor set the expectation that the hypothesis tested would hold across all contexts. Quite the contrary, we set out this investigation intrigued by the idea of documenting the heterogeneity in the role played by older sisters across contexts. Still, we found a good degree of cross-country homogeneity in the negative association between older sisters and teen marriage and childbearing. This is particularly the case for India and Vietnam, the two countries in the sample that are closest in terms of cultural norms, customs and traditions, while more dissimilarities emerge for Peru, the setting that departs the most in terms of the nature of marriage, the influence of parental control, and the prevalence of arranged marriage.

The reversed sign on the next-youngest sister coefficient in Ethiopia stands at odds with the hypothesis that the presence of younger sisters hastens the marriage or childbearing of their older sisters, yet it aligns with the mixed evidence on siblings' rivalry and later-life outcomes documented in Africa (Garg and Morduch 1997; Vogl 2013). Although more research is needed, evidence from Ethiopia is more consistent with a scenario in which sisters – regardless of whether they are younger or older – are beneficial for the outcomes of children in the household (Parish and Willis 1993; Kaestner 1997). The underlying idea is that in economies that have a pro-male bias, sons are favored by parents. Given that households face constraints in the time or financial resources available for children, this sets in motion rivalries for scarce resources (mainly education) which yield gains to having relatively more sisters than brothers (Morduch 2000).[20] Yet the literature is not conclusive on whether African countries effectively exhibit a pro-male bias (Svedberg 1990; Klasen 1996; Marcoux 2002), hence more research is needed to untangle this finding.

By the same token, the non-significant coefficient on the sex of the next-youngest sibling in India stands at odds with Vogl (2013), who finds girls with next-youngest sisters in Bangladesh, India, Nepal, and Pakistan to be about 3 percentage points more likely to leave their natal homes – a proxy for marriage – than their counterparts with next-youngest brothers. Several factors may lie behind this discrepancy, likely related to the YL sampling design, the sample size, and the chosen outcomes. As a matter of fact, the YL study oversamples poor areas, hence the data are not nationally representative and cannot be compared with DHS data used by Vogl. Moreover, while Vogl focuses on parental co-residence and age at marriage, due to data restrictions we chose as outcomes the probability of being married and having a child by age 19. It would be desirable to run parallel analyses using alternative variables such as the age at first marriage and the age at first childbearing, together with measures of spousal quality, yet the comparative nature of the work – and the lack of precise information in all

[20] This hypothesis is somewhat confirmed by the weaker association between older sisters and teen marriage in Ethiopia shown in Figure 3. To provide further support, we estimate a linear probability model following Eq. 2, replacing the sex of the next-youngest sibling with a dummy for whether the girls lives with only brothers (dummy =1 if the girl lives with only brothers; 0 if she lives with only sisters, or with a mix of brothers and sisters). Point estimates reported in Appendix Figure A.3 show that Ethiopia is the only country in which there is a positive and statistically significant association between living with only brothers and teen marriage. In Ethiopia, a girl living with only brothers is about 14 percentage point more likely to be married by age 19 relative to a girl living with only sisters, or with both brothers and sisters, all else equal.

four countries – prevents us from doing so. New YL data from upcoming rounds will make some of these additions possible.[21]

On top of the ones mentioned above, this study has other limitations that lay the ground for subsequent research. First, due again to the YL sampling design, the prevalence figures presented in this study are not necessarily in line with country-level statistics on the prevalence of teen marriage and childbearing – though they are consistent with official YL reports and studies (Favara, Lavado, and Sanchez 2016; Roest 2016; Singh and Espinoza Revollo 2016; Singh and Vennam 2016). For instance, Favara, Lavado, and Sanchez (2016) compare estimates of teen marriage and childbearing between YL and the latest DHS from Peru (2015), finding that 13.6 percent of female teenagers has had at least one child born alive, and 16.4 percent is or has been married or cohabiting between ages 15 to 19 – far lower figures than the ones we report. These discrepancies need to be kept in mind when thinking about generalizability of the results. Second, a methodological limitation has to do with the fact that the causal specification that relies on variation in younger siblings' sex (Eq. 2) may reflect a negative (positive) effect of a younger sister on teen marriage or childbearing, a positive (negative) effect of a younger brother, or some combination of the two. Twins data would permit investigating this possibility further, yet YL data were not designed to include twins (as only one child per household was selected). With twin girls, one could estimate the effect of having two younger sisters rather than one, which would – differently from twin younger brothers – generate upstream marriage pressure (Vogl 2013). Future research should pick up on this important point. Third, evidence of sex-selection in the Indian sample, although quantitatively small, raises concerns on the reliability of the estimates. Alternative strategies should be considered to reduce this potential bias. Lastly, we acknowledge that our work leaves aside important factors such as religion and caste, polygamy, or access to modern

[21] The fifth round of data (R5) will be released in June 2018.

contraception. Yet comparative research always entails trade-offs between comparability and level of detail. In this work, we have prioritized the former component, highlighting the value of a rich – and quite underused – longitudinal dataset for answering new questions on sibling rivalry and adolescent wellbeing. Country-specific studies might be better suited to provide additional contextual details.

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Tables

Table 1: Descriptive statistics on girls' sample (N=1,666)

	Pooled (N=1,666)		**Ethiopia** (N=420)		**India** (N=487)		**Peru** (N=294)		**Vietnam** (N=465)	
	Mean (SD)	Obs.	Mean (SD)	Obs.	Mean (SD)	Obs.	Mean (SD)	Obs.	Mean (SD)	Obs.
Outcomes										
Married/cohabited by age 19	0.245 (0.430)	1,666	0.143 (0.350)	420	0.368 (0.483)	487	0.272 (0.446)	294	0.191 (0.394)	465
Pregnant/had birth by age 19	0.176 (0.381)	1,666	0.102 (0.304)	420	0.214 (0.410)	487	0.248 (0.433)	294	0.159 (0.366)	465
Predictors										
Sex of next-youngest sibling (1 if female)	0.504 (0.500)	919	0.514 (0.501)	276	0.517 (0.501)	269	0.531 (0.501)	143	0.459 (0.499)	231
Birth interval with *next-youngest* sibling (months)	40.61 (20.11)	919	41.49 (18.70)	276	32.37 (15.92)	269	41.94 (20.16)	143	48.33 (22.55)	231
Sex of next-oldest sibling (1 if female)	0.494 (0.500)	1,068	0.545 (0.499)	297	0.492 (0.501)	315	0.427 (0.496)	171	0.484 (0.501)	285
Birth interval with *next-oldest* sibling (months)	40.71 (30.02)	1,068	39.95 (28.77)	297	40.40 (33.11)	315	38.11 (31.92)	171	43.41 (26.26)	285
Presence of older sisters (Ref.: No older sisters)	0.422 (0.494)	1,666	0.555 (0.498)	420	0.374 (0.484)	487	0.364 (0.482)	294	0.389 (0.488)	465
# Older sisters	0.639 (0.913)	1,666	0.976 (1.141)	420	0.505 (0.772)	487	0.541 (0.849)	294	0.535 (0.774)	465
# Older brothers	0.646 (0.903)	1,666	0.969 (1.157)	420	0.511 (0.705)	487	0.595 (0.884)	294	0.527 (0.760)	465
# Younger siblings	0.781 (0.856)	1,666	1.067 (0.987)	420	0.766 (0.828)	487	0.653 (0.785)	294	0.619 (0.730)	465
# Siblings	2.074 (1.592)	1,666	3.012 (2.082)	420	1.803 (1.123)	487	1.799 (1.472)	294	1.684 (1.190)	465
Age (months)	95.88 (3.758)	1,666	95.10 (3.549)	420	96.38 (3.836)	487	95.59 (3.855)	294	96.24 (3.675)	465
Mother's age (years)	33.31 (6.849)	1,666	34.41 (7.584)	420	30.61 (6.178)	487	34.06 (6.755)	294	34.68 (6.048)	465
Mother's education	4.546 (4.528)	1,666	2.656 (4.110)	420	2.748 (4.189)	487	6.632 (4.263)	294	6.817 (3.728)	465
Urban residence (Ref. Rural)	0.341 (0.474)	1,666	0.371 (0.484)	420	0.230 (0.421)	487	0.741 (0.439)	294	0.176 (0.382)	465
Wealth index	0.380 (0.218)	1,666	0.221 (0.164)	420	0.405 (0.205)	487	0.471 (0.229)	294	0.438 (0.192)	465
Enrolled at age 15	0.831 (0.375)	1,666	0.912 (0.284)	420	0.733 (0.443)	487	0.932 (0.252)	294	0.796 (0.404)	465
Marriage expectation at age 12	0.188 (0.391)	1,666	0.100 (0.300)	420	0.413 (0.493)	487	0.078 (0.269)	294	0.103 (0.305)	465
Permutations of older siblings by sex:										
Four most common configurations	N - B - G - GB		N - G - B - BB		N - B - G - GB		N - B - G - GB		N - B - G - GG	
Most complex configuration(s)	BBBGBGBB - BBGBGGGB		BBBGBGBB - BBGBGGGB		BBGGGG		BBGGBGG		BBBGB - GBBGB - GGBGB	

* Reports from left to right the sex composition of older siblings. For instance, BGGG means that the oldest sibling (i.e., the first born) is a boy, followed by three girls. Therefore, the YL girl has three older sisters and one older brother, distributed that way. "N" refers to the configuration in which the YL girl has no older siblings.

Table 2: Socio-demographic determinants of teen marriage and teen pregnancy, pooled LPM estimates

	Marriage		Pregnancy	
	(1)	(2)	(1)	(2)
Country (Ref.: Ethiopia)				
India	0.155***	0.158***	0.077*	0.081*
	(0.042)	(0.038)	(0.036)	(0.033)
Peru	0.189***	0.212***	0.203***	0.212***
	(0.042)	(0.039)	(0.039)	(0.036)
Vietnam	0.046	0.056	0.089*	0.089**
	(0.040)	(0.037)	(0.037)	(0.034)
Presence of older sisters (Ref.: No)	-0.048		-0.022	
	(0.035)		(0.030)	
India*Presence of older sisters	-0.057		-0.033	
	(0.051)		(0.046)	
Peru*Presence of older sisters	0.027		0.022	
	(0.062)		(0.060)	
Vietnam*Presence of older sisters	-0.014		-0.040	
	(0.047)		(0.042)	
# Older sisters		-0.024*		-0.014
		(0.012)		(0.011)
India*Older sisters		-0.047+		-0.032
		(0.025)		(0.022)
Peru*Older sisters		-0.024		-0.003
		(0.031)		(0.032)
Vietnam*Older sisters		-0.030		-0.031
		(0.024)		(0.022)
# Older brothers	0.004	0.003	0.014	0.013
	(0.012)	(0.012)	(0.011)	(0.011)
# Younger siblings	-0.012	-0.013	-0.006	-0.006
	(0.012)	(0.012)	(0.011)	(0.011)
Age (months)	0.003	0.003	0.004+	0.004+
	(0.003)	(0.003)	(0.002)	(0.002)
Mother's age	-0.002	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Mother's education	-0.003	-0.003	-0.005+	-0.005*
	(0.003)	(0.003)	(0.002)	(0.002)
Wealth index	-0.213**	-0.221**	-0.175**	-0.180**
	(0.068)	(0.068)	(0.063)	(0.063)
Urban residence (ref. Rural)	-0.019	-0.018	0.001	0.002
	(0.027)	(0.027)	(0.025)	(0.025)
Enrolled in school at age 15	-0.424***	-0.425***	-0.319***	-0.320***
	(0.032)	(0.032)	(0.032)	(0.032)
Marriage expectation at age 12	0.099**	0.098**	0.037	0.037
	(0.031)	(0.030)	(0.028)	(0.028)
Constant	0.438+	0.409	0.111	0.102
	(0.249)	(0.249)	(0.228)	(0.227)
Obs.	1,666	1,666	1,666	1,666

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 3: Sex of the next-youngest sibling and teen marriage and teen pregnancy, pooled LPM estimates

	Marriage		Pregnancy	
	(1)	(2)	(1)	(2)
Country (Ref.: Ethiopia)				
India	0.186***	0.164**	0.018	0.009
	(0.054)	(0.055)	(0.047)	(0.048)
Peru	0.011	0.003	0.218***	0.215***
	(0.049)	(0.049)	(0.062)	(0.062)
Vietnam	0.080	0.069	0.061	0.053
	(0.051)	(0.052)	(0.050)	(0.049)
Sex of next-youngest sibling (1 if female)	-0.066+	-0.071+	-0.057	-0.063+
	(0.039)	(0.040)	(0.036)	(0.037)
Country (Ref.: Ethiopia)				
India*Sex of next-youngest sibling (1 if female)	0.059	0.067	0.062	0.067
	(0.069)	(0.070)	(0.059)	(0.060)
Peru*Sex of next-youngest sibling (1 if female)	0.042	0.045	0.037	0.048
	(0.061)	(0.062)	(0.082)	(0.082)
Vietnam*Sex of next-youngest sibling (1 if female)	0.100	0.109+	0.095	0.106+
	(0.065)	(0.066)	(0.060)	(0.061)
Birth interval with *next-youngest* sibling (months)	-0.001	-0.001	-0.001+	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
# Older sisters	-0.043**		-0.035*	
	(0.015)		(0.014)	
# Older brothers	0.003		-0.004	
	(0.016)		(0.016)	
Age (months)	0.005	0.004	0.008**	0.008*
	(0.003)	(0.003)	(0.003)	(0.003)
Mother's age	0.002	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Mother's education	-0.017***	-0.017***	-0.017***	-0.018***
	(0.004)	(0.004)	(0.004)	(0.004)
Urban residence (ref. Rural)	-0.118***	-0.116***	-0.097***	-0.094***
	(0.027)	(0.028)	(0.026)	(0.027)
Constant	-0.229	-0.202	-0.584+	-0.617*
	(0.317)	(0.330)	(0.302)	(0.307)
Permutations of older siblings by sex	No	Yes	No	Yes
Obs.	919	919	919	919

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 4: Birth intervals (in months) by proportion of boys in the household

	Ethiopia		India		Peru		Vietnam	
	<50%	>=50%	<50%	>=50%	<50%	>=50%	<50%	>=50%
Birth interval with *next-youngest* sibling (mean, months)	40.57	40.76	33.45	32.85	42.76	41.83	45.83	45.19
(SE)	(1.090)	(0.889)	(1.057)	(0.940)	(1.892)	(1.219)	(1.655)	(1.341)
Obs.	252	433	228	296	109	252	172	267
p-value	0.893		0.674		0.676		0.765	
Birth interval with *next-oldest* sibling (mean, months)	39.41	41.31	36.18	39.64	40.69	35.84	41.13	43.69
(SE)	(1.513)	(1.384)	(1.778)	(1.505)	(2.892)	(1.820)	(1.604)	(1.302)
Obs.	280	456	236	422	134	287	227	386
p-value	0.373		0.152		0.145		0.223	

Table 5: Predictors of next-youngest sisters, LPM estimates by country

	Sex of next-youngest sibling (female=1)							
	Ethiopia		**India**		**Peru**		**Vietnam**	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Birth interval with next-youngest sibling (months)	-0.000	-0.001	0.001	0.002	0.003	0.002	0.001	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
# Older sisters	-0.036		-0.139***		-0.022		-0.011	
	(0.030)		(0.038)		(0.057)		(0.051)	
# Older brothers	-0.013		-0.017		-0.015		0.021	
	(0.031)		(0.065)		(0.056)		(0.064)	
Age (months)	-0.000	-0.002	0.008	0.009	0.009	0.014	-0.003	-0.005
	(0.009)	(0.009)	(0.008)	(0.008)	(0.010)	(0.011)	(0.009)	(0.010)
Mother's age	-0.003	-0.001	0.017*	0.017*	0.003	0.002	-0.007	-0.010
	(0.005)	(0.005)	(0.007)	(0.007)	(0.009)	(0.010)	(0.009)	(0.011)
Mother's education	0.007	0.006	-0.011	-0.010	-0.014	-0.016	0.004	0.005
	(0.008)	(0.009)	(0.008)	(0.008)	(0.012)	(0.013)	(0.010)	(0.011)
Urban residence (ref. Rural)	0.010	0.003	0.012	0.013	0.009	0.024	0.059	0.074
	(0.076)	(0.080)	(0.077)	(0.080)	(0.104)	(0.113)	(0.109)	(0.116)
Constant	0.675	0.753	-0.685	-0.893	-0.472	-0.837	0.912	1.196
	(0.832)	(0.900)	(0.774)	(0.795)	(1.020)	(1.119)	(0.912)	(1.020)
Permutations of older siblings by sex	No	Yes	No	Yes	No	Yes	No	Yes
Joint F-test (*p-value*)	0.656	0.974	0.003	0.044	0.684	0.487	0.960	0.927
Obs.	276	276	269	269	143	143	231	231

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Figures

Figure 1: Prevalence of teen marriage and teen pregnancy, by country

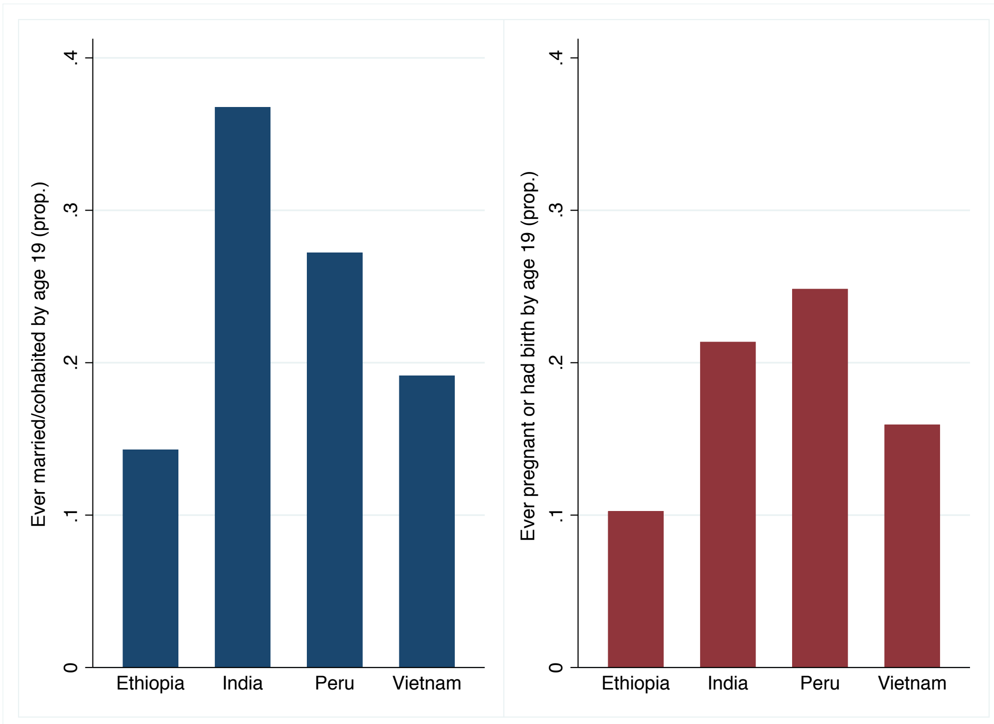


Figure 2: Descriptive statistics on girls' early pregnancy, conditional on marriage status (top panel) and girls' early marriage, conditional on pregnancy status (bottom panel)

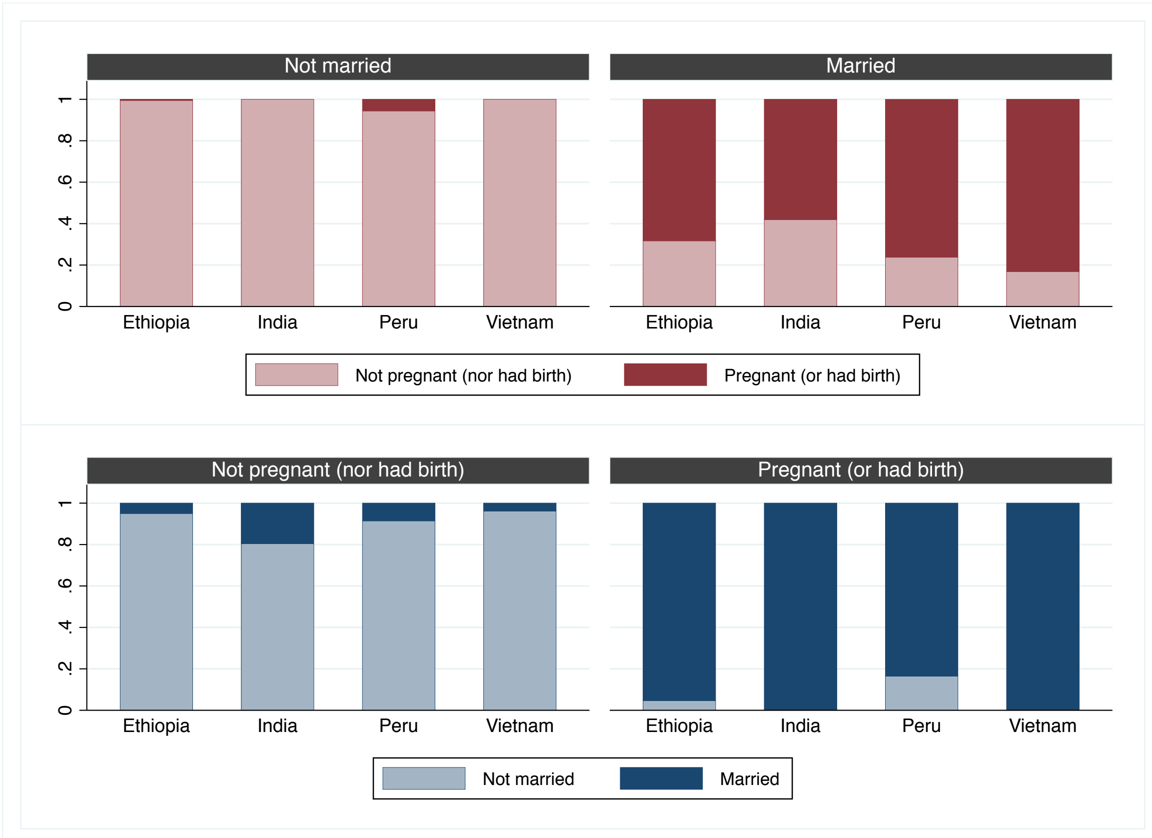


Figure 3: Association between presence and number of older sisters and teen marriage (top) and pregnancy (bottom), pooled LPM estimates

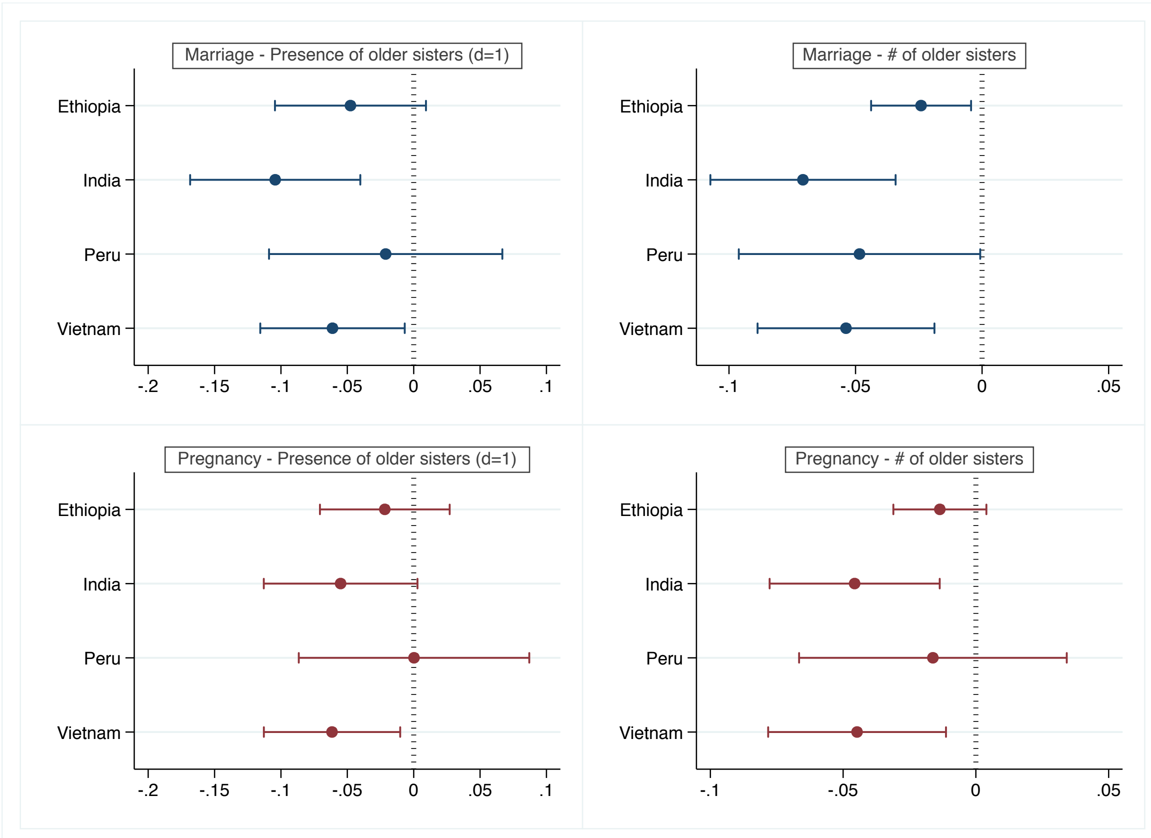


Figure 4: Sex of next-youngest sibling and teen marriage (top) and pregnancy (bottom), pooled LPM estimates

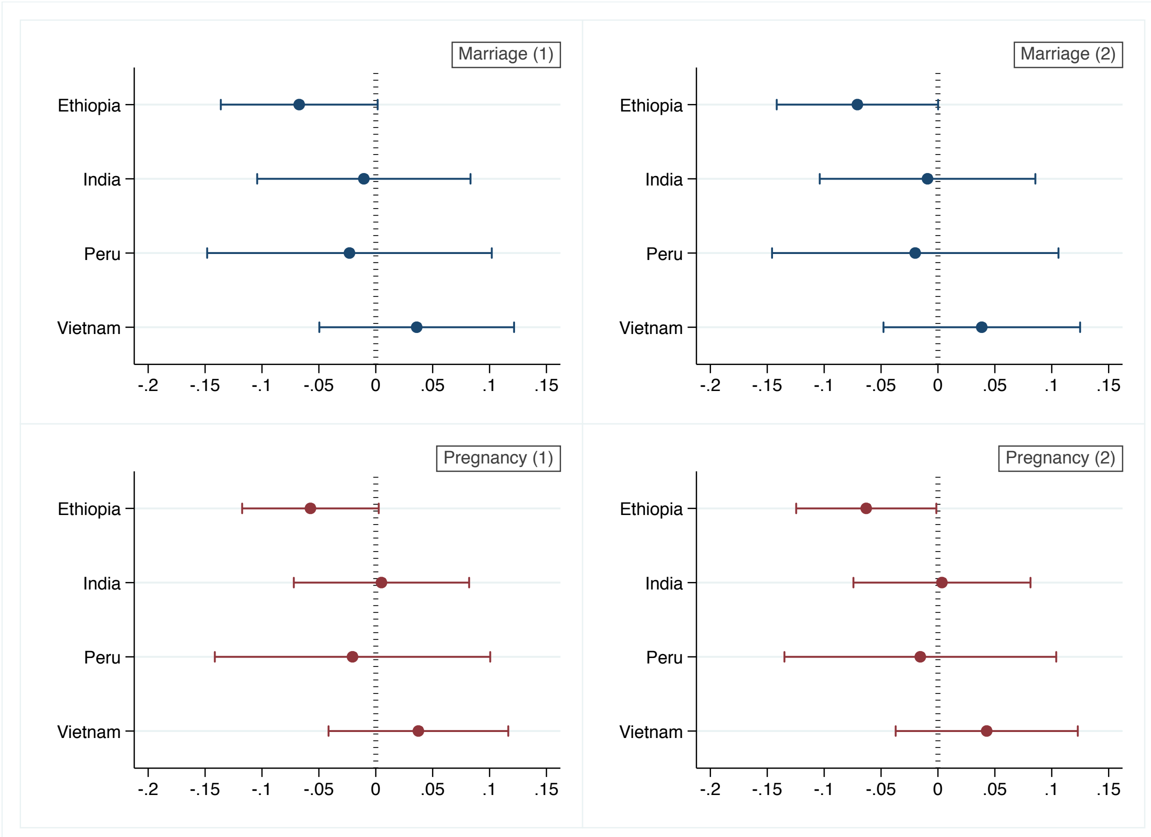
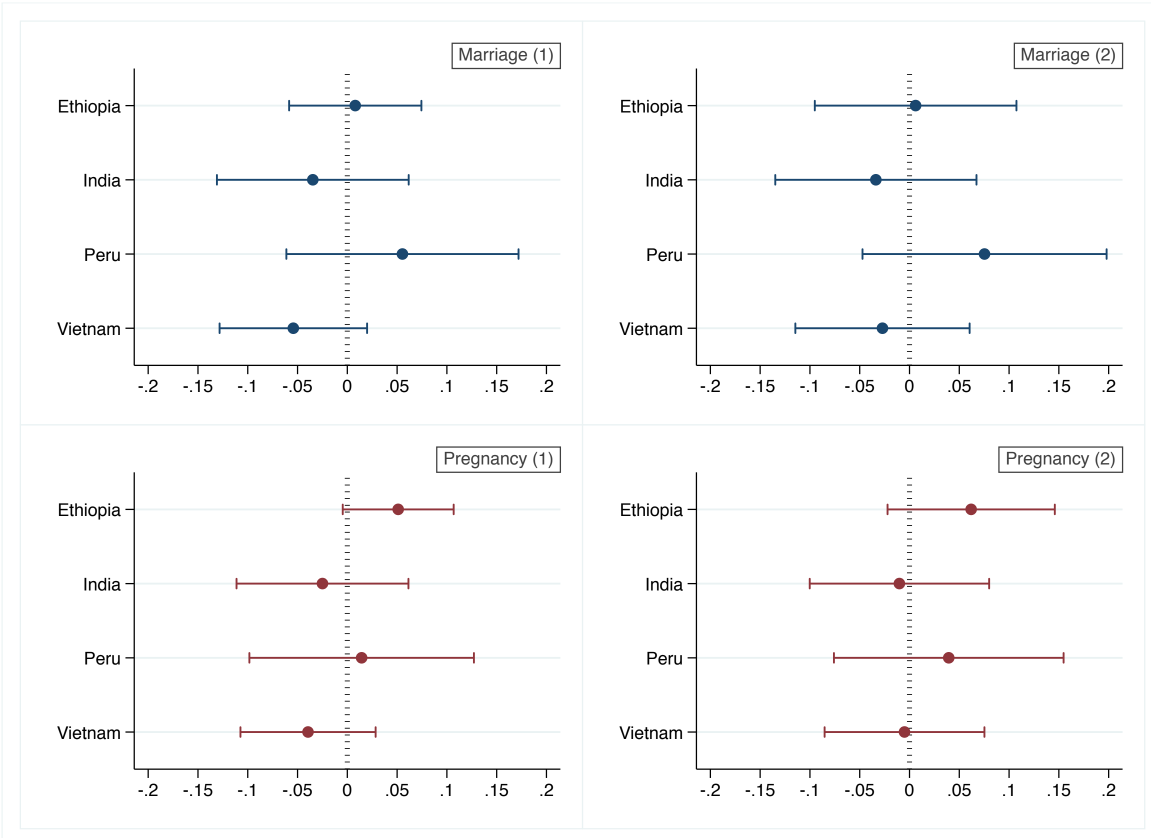


Figure 5: Sex of next-oldest sibling and teen marriage (top) and pregnancy (bottom), pooled LPM estimates



Appendix

Table A.1: Attrition analysis

	Present in R1 and R4 (N=1,666)	**Dropping out between R1 and R4 (N=168)**	**Diff.**	**P-value**
Sex of next-youngest sibling (1 if female)	0.504	0.478	0.026	0.129
Birth interval with *next-youngest* sibling (months)	40.61	37.26	3.352	0.144
Sex of next-oldest sibling (1 if female)	0.494	0.519	-0.025	0.629
Birth interval with *next-oldest* sibling (months)	40.71	42.31	-1.600	0.608
Presence of older sisters (Ref.: No older sisters)	0.422	0.458	-0.036	0.364
# Older sisters	0.639	0.631	0.008	0.917
# Older brothers	0.646	0.744	-0.098	0.187
# Younger siblings	0.781	0.774	0.007	0.919
# Siblings	2.074	2.149	-0.075	0.567
Age (months)	95.88	95.87	0.012	0.968
Mother's age	33.31	33.30	0.009	0.987
Mother's education	4.546	3.905	0.641+	0.079
Urban residence (Ref. Rural)	0.341	0.429	-0.089*	0.023
Wealth index	0.380	0.358	0.022	0.219

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table A.2: Characteristics of girls' marriage by country

	Ethiopia	India	Peru	Vietnam
How long had you known your spouse/partner before marrying him?				
On wedding day only	18.4%	43.6%	.	.
Less than a year	44.9%	9.9%	.	52.3%
More than one year	34.7%	20.9%	85.7%	47.7%
Since childhood	2.0%	25.6%	14.3%	.
Total	*100%*	*100%*	*100%*	*100%*
Who chose your spouse/partner?				
Child himself/herself	30.6%	9.9%	.	79.6%
Child and parents/relatives together	4.1%	47.1%	.	6.8%
Parents/relatives alone	65.3%	43.0%	.	13.6%
Total	*100%*	*100%*	.	*100%*

Table A.3: Descriptive statistics on girls' early pregnancy, conditional on marriage status (left panel) and girls' early marriage, conditional on pregnancy status (right panel)

					Ethiopia				
	Panel a					Panel b			
Married by age 19	No		Yes		Pregnant/birth by age 19	No		Yes	
	0.86		0.14			0.90		0.10	
Pregnant/birth by age 19	No	Yes	No	Yes	Married by age 19	No	Yes	No	Yes
	0.99	0.01	0.32	0.68		0.95	0.05	0.05	0.95
					India				
	Panel a					Panel b			
Married by age 19	No		Yes		Pregnant/birth by age 19	No		Yes	
	0.63		0.37			0.79		0.21	
Pregnant/birth by age 19	No	Yes	No	Yes	Married by age 19	No	Yes	No	Yes
	1.00	0.00	0.42	0.58		0.80	0.20	0.00	1.00
					Peru				
	Panel a					Panel b			
Married by age 19	No		Yes		Pregnant/birth by age 19	No		Yes	
	0.73		0.27			0.75		0.25	
Pregnant/birth by age 19	No	Yes	No	Yes	Married by age 19	No	Yes	No	Yes
	0.94	0.06	0.24	0.76		0.91	0.09	0.16	0.84
					Vietnam				
	Panel a					Panel b			
Married by age 19	No		Yes		Pregnant/birth by age 19	No		Yes	
	0.81		0.19			0.84		0.16	
Pregnant/birth by age 19	No	Yes	No	Yes	Married by age 19	No	Yes	No	Yes
	1.00	0.00	0.17	0.83		0.96	0.04	0.00	1.00

Table A.4: Socio-demographic determinants of teen marriage and teen pregnancy, LPM estimates by country

	Ethiopia				India				Peru				Vietnam			
	Marriage		Pregnancy		Marriage		Pregnancy		Marriage		Pregnancy		Marriage		Pregnancy	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Presence of older sisters (Ref.: No)	-0.065+		-0.024		-0.104*		-0.058		0.021		0.012		-0.034		-0.030	
	(0.036)		(0.030)		(0.042)		(0.039)		(0.059)		(0.058)		(0.035)		(0.032)	
# Older sisters		-0.035**		-0.017		-0.066**		-0.047*		-0.033		-0.011		-0.037		-0.027
		(0.013)		(0.011)		(0.025)		(0.022)		(0.031)		(0.034)		(0.023)		(0.022)
# Older brothers	-0.019	-0.020	-0.013	-0.013	0.001	0.000	0.038	0.036	0.024	0.022	0.024	0.023	0.040	0.038	0.032	0.031
	(0.015)	(0.015)	(0.014)	(0.014)	(0.032)	(0.032)	(0.030)	(0.030)	(0.033)	(0.033)	(0.033)	(0.033)	(0.027)	(0.027)	(0.026)	(0.026)
# Younger siblings	-0.004	-0.005	-0.001	-0.001	-0.030	-0.030	-0.030	-0.031	-0.001	-0.006	0.007	0.005	0.008	0.008	0.004	0.004
	(0.018)	(0.018)	(0.016)	(0.016)	(0.025)	(0.025)	(0.022)	(0.022)	(0.038)	(0.038)	(0.037)	(0.037)	(0.026)	(0.026)	(0.026)	(0.026)
Age (months)	0.005	0.005	0.005	0.005	0.003	0.003	0.001	0.001	0.005	0.005	0.009	0.009	0.000	0.000	0.003	0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.007)	(0.007)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)
Mother's age	0.006*	0.007*	0.003	0.004	-0.004	-0.003	-0.001	-0.000	-0.008+	-0.006	-0.002	-0.001	-0.007*	-0.007+	-0.008*	-0.008*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Mother's education	-0.003	-0.004	-0.007*	-0.008*	-0.004	-0.004	-0.006	-0.006	-0.002	-0.002	0.003	0.003	-0.003	-0.003	-0.007	-0.007
	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Wealth index	-0.103	-0.088	0.037	0.046	-0.005	-0.022	0.051	0.042	-0.273+	-0.282+	-0.265+	-0.269+	-0.383**	-0.382**	-0.399***	-0.400***
	(0.120)	(0.120)	(0.097)	(0.097)	(0.139)	(0.139)	(0.125)	(0.124)	(0.150)	(0.152)	(0.142)	(0.142)	(0.119)	(0.119)	(0.118)	(0.118)
Urban residence (ref. Rural)	-0.066	-0.066	-0.067+	-0.067+	-0.127*	-0.123*	-0.069	-0.065	0.092	0.087	0.049	0.046	0.056	0.054	0.090+	0.089+
	(0.040)	(0.040)	(0.036)	(0.036)	(0.058)	(0.058)	(0.051)	(0.051)	(0.077)	(0.077)	(0.075)	(0.075)	(0.051)	(0.051)	(0.049)	(0.049)
Enrolled in school at age 15	-0.384***	-0.379***	-0.354***	-0.351***	-0.457***	-0.453***	-0.308***	-0.306***	-0.401***	-0.428***	-0.330**	-0.341**	-0.367***	-0.372***	-0.262***	-0.265***
	(0.085)	(0.085)	(0.084)	(0.085)	(0.049)	(0.049)	(0.050)	(0.050)	(0.113)	(0.108)	(0.123)	(0.121)	(0.056)	(0.056)	(0.052)	(0.052)
Marriage expectation at age 12	0.031	0.032	-0.030	-0.029	0.105*	0.103*	0.035	0.032	0.099	0.110	-0.009	-0.004	0.112	0.113	0.124+	0.124+
	(0.059)	(0.059)	(0.044)	(0.044)	(0.046)	(0.046)	(0.041)	(0.041)	(0.108)	(0.105)	(0.097)	(0.097)	(0.073)	(0.073)	(0.072)	(0.072)
Constant	-0.117	-0.138	-0.126	-0.138	0.577	0.562	0.382	0.383	0.496	0.475	-0.177	-0.184	0.875+	0.847+	0.504	0.491
	(0.438)	(0.439)	(0.393)	(0.393)	(0.513)	(0.514)	(0.464)	(0.462)	(0.683)	(0.675)	(0.583)	(0.580)	(0.465)	(0.463)	(0.434)	(0.434)
Obs.	420	420	420	420	487	487	487	487	294	294	294	294	465	465	465	465

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table A.5: Sex of the next-youngest sibling and teen marriage and pregnancy, LPM estimates by country

	Ethiopia				India				Peru				Vietnam			
	Marriage		Pregnancy		Marriage		Pregnancy		Marriage		Pregnancy		Marriage		Pregnancy	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Sex of next-youngest sibling (1 if female)	-0.073+	-0.081+	-0.063+	-0.067+	-0.012	-0.011	0.004	0.001	-0.004	0.016	-0.003	0.028	0.033	0.036	0.033	0.047
	(0.041)	(0.044)	(0.036)	(0.038)	(0.058)	(0.059)	(0.048)	(0.048)	(0.079)	(0.083)	(0.076)	(0.076)	(0.051)	(0.052)	(0.045)	(0.046)
Birth interval with next-youngest sibling	-0.003*	-0.003*	-0.003**	-0.003**	-0.001	-0.001	0.001	0.001	-0.004*	-0.005*	-0.004*	-0.004**	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
# Older sisters	-0.062***		-0.046**		-0.046		-0.026		-0.005		0.026		-0.043		-0.033	
	(0.018)		(0.017)		(0.041)		(0.034)		(0.048)		(0.054)		(0.040)		(0.034)	
# Older brothers	-0.019		-0.013		0.033		0.035		0.002		-0.008		0.031		0.025	
	(0.020)		(0.018)		(0.062)		(0.055)		(0.052)		(0.050)		(0.053)		(0.051)	
Age (months)	0.006	0.004	0.010+	0.010+	0.004	0.005	0.006	0.006	0.000	0.002	0.012	0.014	0.010	0.010	0.012+	0.013+
	(0.005)	(0.006)	(0.005)	(0.006)	(0.008)	(0.008)	(0.006)	(0.006)	(0.010)	(0.012)	(0.009)	(0.009)	(0.007)	(0.007)	(0.006)	(0.007)
Mother's age	0.011**	0.012***	0.006*	0.007*	0.005	0.005	0.007	0.007	-0.010	-0.013	-0.002	-0.006	-0.005	-0.006	-0.010+	-0.009
	(0.003)	(0.004)	(0.003)	(0.003)	(0.006)	(0.007)	(0.006)	(0.006)	(0.008)	(0.009)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)
Mother's education	-0.007	-0.009+	-0.009**	-0.012**	-0.017*	-0.017+	-0.011	-0.010	-0.019+	-0.018	-0.008	-0.005	-0.042***	-0.039***	-0.045***	-0.044***
	(0.005)	(0.005)	(0.003)	(0.004)	(0.009)	(0.009)	(0.008)	(0.008)	(0.010)	(0.011)	(0.010)	(0.011)	(0.007)	(0.008)	(0.007)	(0.007)
Urban residence (ref. Rural)	-0.115**	-0.108*	-0.096***	-0.086*	-0.228***	-0.226***	-0.117*	-0.113*	-0.045	-0.049	-0.086	-0.100	-0.176**	-0.188**	-0.115+	-0.129*
	(0.039)	(0.044)	(0.027)	(0.034)	(0.067)	(0.067)	(0.054)	(0.054)	(0.093)	(0.102)	(0.089)	(0.095)	(0.065)	(0.069)	(0.062)	(0.064)
Constant	-0.508	-0.463	-0.724	-0.839+	-0.018	-0.122	-0.540	-0.619	0.888	0.811	-0.555	-0.641	-0.337	-0.315	-0.399	-0.573
	(0.510)	(0.573)	(0.467)	(0.507)	(0.730)	(0.745)	(0.582)	(0.606)	(1.008)	(1.109)	(0.821)	(0.884)	(0.685)	(0.722)	(0.633)	(0.658)
Permutations of older siblings by sex	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Obs.	276	276	276	276	269	269	269	269	143	143	143	143	231	231	231	231

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table A.6: Child characteristics and parental investments by sex of the child (younger cohort)

Younger cohort			Ethiopia		India		Peru		Vietnam	
	Round	Age	Male	Female	Male	Female	Male	Female	Male	Female
Birth weight (grams)	R1	1	3,263	3,009	2,792	2,730	3,235	3,165	3,147	3,050
Breastfeeding (any)	R1	1	0.983	0.981	0.973	0.974	0.995	0.988	0.987	0.994
Breastfeeding (months)	R1	1	17.24	17.29	16.90	16.86	16.97	16.98	17.06	17.18
Diarrhea (prev. 24 hrs)	R1	1	0.255	0.244	0.093	0.095	.	.	0.063	0.058
Body Mass Index (BMI)	R1	1	15.99	15.61	15.47	15.08	17.96	17.76	16.28	15.84
	R2	5	14.70	14.34	13.93	13.76	16.53	16.28	15.16	14.79
	R3	8	14.24	13.86	13.98	13.87	17.04	16.67	15.30	14.82
Weight-for-age (z-score)	R1	1	-1.579	-1.279	-1.639	-1.441	-0.288	-0.107	-1.032	-0.890
	R2	5	-1.327	-1.396	-1.896	-1.832	-0.461	-0.615	-0.997	-1.130
	R3	8	-1.678	-1.596	-1.958	-1.767	-0.308	-0.396	-1.117	-1.152

Figure A.1: Association between presence and number of older sisters and teen marriage (top) and pregnancy (bottom), pooled logit estimates (odds ratios reported)

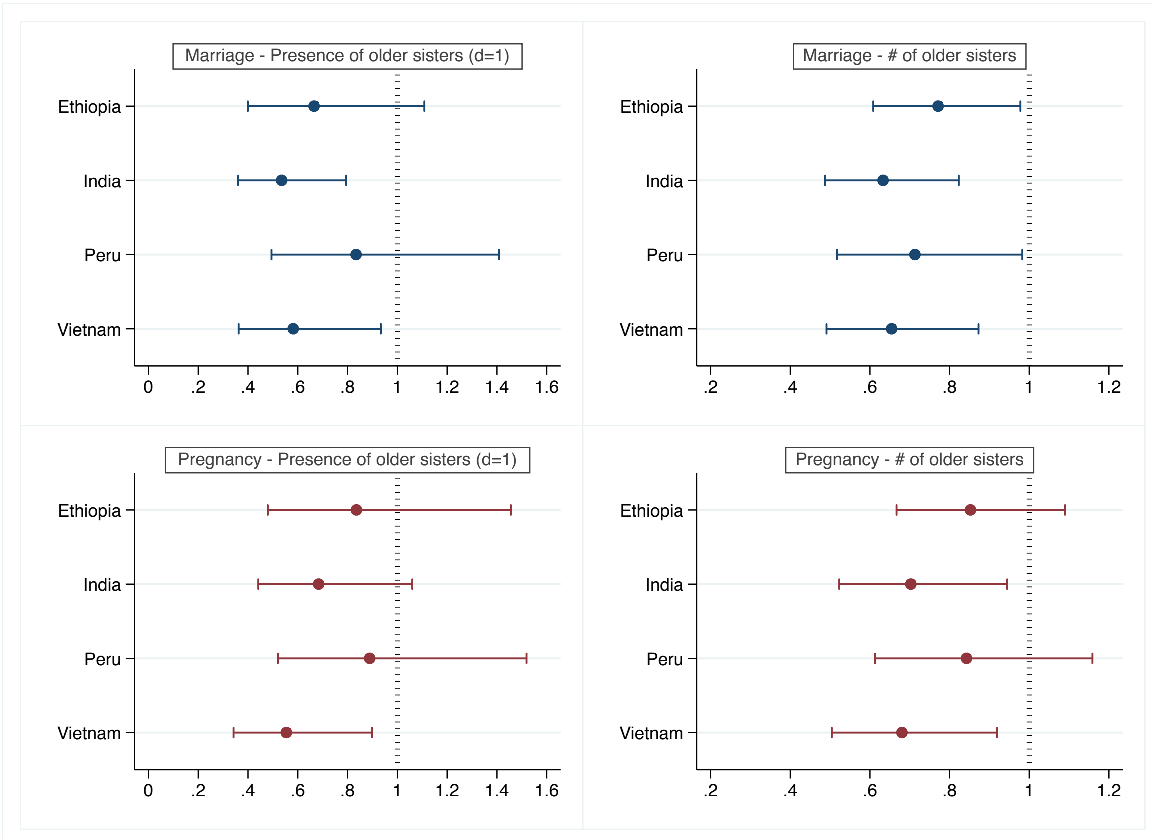


Figure A.2: Sex of next-youngest sibling and teen marriage (top) and pregnancy (bottom), pooled logit estimates (odds ratios reported)

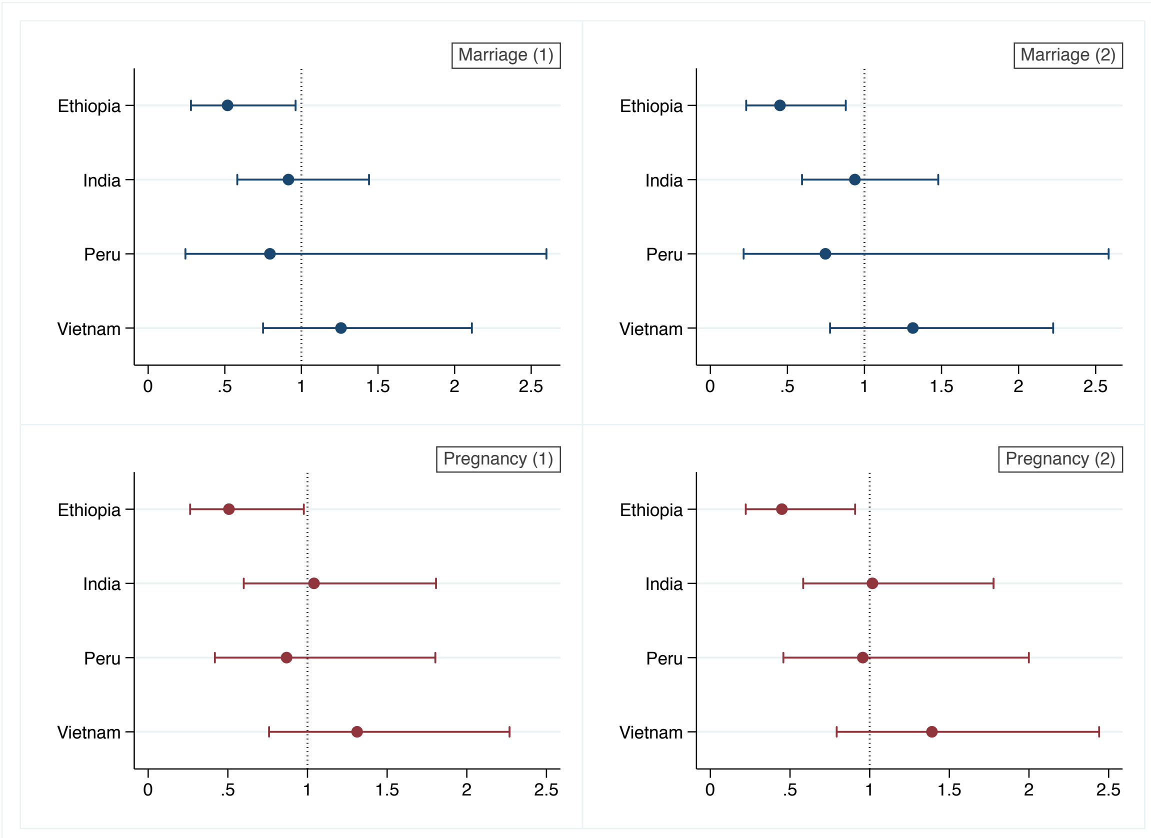


Figure A.3: Association between living with only brothers (versus living with only sisters or with both brothers and sisters) and teen marriage (top) and pregnancy (bottom), pooled LPM estimates