Journal of Economic Behavior & Organization 144 (2017) 40–61

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

Research Paper

Child brides☆

Peter T. Leeson[a,*], Paola A. Suarez[b]

[a] Department of Economics, George Mason University, MS 3G4, Fairfax, VA 22030, United States
[b] Department of Economics, New York University, 19 W. 4th Street, 6FL, New York, NY 10012, United States

ARTICLE INFO

Article history:
Received 8 January 2017
Received in revised form
29 September 2017
Accepted 1 October 2017
Available online 8 October 2017

Keywords:
Child brides
Prepubescent female marriage
Marriage market
Son preference
India

ABSTRACT

This paper develops and empirically tests a theory of the market for "child brides"—prepubescent girls whose parents marry them to adult men. We argue that parental preference for sons over daughters creates a supply of, and demand for, prepubescent brides in impoverished societies. Evidence from India, one of the most son-preferring and child-bride populous nations in the world, supports our theory's predictions: stronger son preference is associated with the birth of more unwanted daughters, younger postpubescent-female age at marriage, and a higher incidence of prepubescent brides. Moreover, son preference has a stronger positive association with prepubescent brides where poverty is more extreme; prepubescent brides have lower quality husbands than postpubescent brides; and stronger son preference is associated with a higher ratio of traditional-marriage-aged males to females.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

In the developing world, millions of girls become wives before reaching puberty—married, by their parents, to husbands who reached puberty long ago.[1] The marriage of young postpubescent women is unsurprising where poverty, and thus short life expectancy, encourages unions that extend females' effective reproductive window. But the marriage of prepubescent girls, who are biologically incapable of reproduction and often years from becoming otherwise, presents a puzzle. What explains the surprising and, for most Westerners, disturbing institution of "child brides" in the developing world? Why are many parents in developing countries willing to marry their prepubescent daughters to adult men? And why are many adult men in the same countries willing to take prepubescent girls as wives?

To shed light on these questions, we develop and empirically test a theory of the market for child brides. Our theory is grounded in son preference: parental taste for sons over daughters, common in developing countries. In trying to produce sons, son-preferring couples sometimes produce daughters. To afford the sons they want, some of these couples must dispose of their unwanted daughters, one way of which is to marry them off prematurely, creating a supply of prepubescent brides.

☆ We thank the Editor, Laura Schechter, and two anonymous reviewers for helpful comments, and the Mercatus Center at George Mason University for financial support.

* Corresponding author.
E-mail addresses: PLeeson@GMU.edu (P.T. Leeson), PSR287@NYU.edu (P.A. Suarez).

[1] Since very few datasets contain information on ever-married women's ages at menarche, only a very crude estimate of the number of child brides globally is possible. Still, using DHS (1990–1999) data for all countries for which they are available in the 1990s, and relying on the most recent data for countries that were surveyed multiple times, c.1995, approximately 28.4 million females who had ever married did so by age 12. This is a conservative estimate, as average at menarche globally is 13.5 years (Palmert and Boepple, 2001).

https://doi.org/10.1016/j.jebo.2017.10.001
0167-2681/© 2017 Elsevier B.V. All rights reserved.

Son-preferring couples invest fewer resources in the care of their young daughters than their young sons, so more males survive to traditional marriage age than females. To find brides in the face of this sex ratio imbalance, some traditional-marriage-aged men must reach into younger female cohorts, requiring them where that imbalance is severe to reach into prepubescent cohorts, creating a demand for prepubescent brides.

To test our theory, we investigate the relationship between son preference and child brides in India, one of the most son-preferring and child-bride populous nations in the world. The results support our theory's predictions: stronger son preference is associated with the birth of more unwanted daughters, younger postpubescent-female age at marriage, and a higher incidence of prepubescent brides. Moreover, son preference has a stronger positive association with prepubescent brides where poverty is more extreme; prepubescent brides have lower quality husbands than postpubescent brides; and stronger son preference is associated with a higher ratio of traditional-marriage-aged males to females.

Outside of economics, a literature on early marriage considers possible contributors to young postpubescent-female marriage. These include poverty; low female education; low female labor-force participation; low female exposure to mass media; risk of sexual violence against females; and "culture," such as religion and the custom of dowry (see, for instance, Savitridina, 1997; Islam and Ahmed, 1998; Nour, 2006, 2009; Roy, 2008; Kamal, 2011; Bhanji and Punjani, 2014; Kamal and Hassan, 2015; Kamal et al., 2015). Each of these factors may also contribute to the distinctive practice of prepubescent female marriage. Indeed, in our theory, poverty plays a critical role in contributing to child brides, since only impoverished son-preferring parents must dispose of their unwanted daughters to afford the sons they seek. Further, while our empirical analysis considers many of the above factors, it does not consider dowries, and it does not identify causal effects. Our study provides only suggestive evidence for the theory we develop and cannot rule out other possible explanations for child brides.

Even so, by themselves at least, the above factors seem to leave much of the child bride phenomenon unexplained. For example, while a dearth of school or work opportunities for females could motivate parents to offer their daughters for marriage early, perhaps even before puberty, it is unclear why such a dearth would motivate adult men to take prepubescent girls as wives. With the possible exception of Judaism, no religion—including Hinduism—prescribes a minimum age at marriage younger than puberty, and Judaism is virtually nonexistent in developing countries, such as India, where prepubescent brides are prevalent (Sarkar, 2013). Dowries may incentivize early female marriage when they are lower for younger brides, but dowries are not a universal feature of prepubescent female marriage, and in India, they are not significantly lower for younger brides (Dalmia and Lawrence, 2005). Similarly, although risk of sexual violence could encourage parents to marry off their daughters sooner, in India, where the average prepubescent bride marries at age 12, more than 80% of female victims of sexual assault are victimized after age 12 (NFHS-3, 2007).

Our paper contributes to the literature on the economics of marriage, pioneered by Gary Becker (1973, 1974) and extended in a variety of directions by others (see, for instance, Posner, 1980; Cohen, 1987; Becker and Murphy, 1988; Allen, 1990; Brinig, 1990, 2007; Allen and Lu, 2017; Leeson and Pierson, 2016; Grossbard, 2015, 2016). It does so by analyzing an enormous but hitherto neglected marriage market: the market for prepubescent brides. Of special relevance is work that studies marriage timing and spousal age differences. Such work suggests, for instance, that where males earn more than females or have longer reproductive windows, females will marry at younger ages than males (see, for instance, Bergstrom and Bagnoli, 1993; Bergstrom and Schoeni, 1996; Siow, 1998; Hamilton and Siow, 2007; Coles and Francesconi, 2011; Díaz-Giménez and Giolito, 2013). It also finds, for example, that where traditional-marriage-aged males are more numerous than traditional-marriage-aged females, females marry at younger ages than males, and spousal age differences are larger (see, for instance, Becker, 1973, 1974, 1991; South and Trent, 1988; Brainerd, 2007; Abramitzky et al., 2011; Anukriti, 2013). Our analysis of prepubescent brides in India, where labor market opportunities for females are scant and traditional-marriage-age sex ratios are skewed toward males, is complementary to and supports these findings.

Other aspects of our analysis, however, provide new wrinkles to the literature on marriage timing and spousal age gaps. For example, existing research typically predicts that younger brides will attract higher quality husbands since younger females tend to be more fit/beautiful/fecund, and fitness/beauty/fecundity is assumed to decay monotonically with age (see, for instance, Bergstrom and Bagnoli, 1993; Siow, 1998; Coles and Francesconi, 2011). In contrast, our theory predicts that exceptionally young brides—those who are prepubescent—will attract lower quality husbands, and evidence from India suggests they do. This is not inconsistent with high quality males pairing with high quality females, since, as we discuss below, prepubescent brides tend to be lower quality. However, it does suggest that instead of assuming that females' marriage-market value declines monotonically as their age rises, it may be more appropriate to assume that below some female-age threshold—perhaps puberty—their marriage-market value increases as their age rises, declining as females get older only past that point.

2. Child brides and son preference in India

2.1. Indian child brides

Despite laws that mandate marriage-age minimums, prepubescent female marriage is widespread in the developing world. Child brides inhabit South Asia, Sub-Saharan Africa, South America, and North Africa, but they are most numerous in one country in particular: India. Since 1978, it has been illegal for females in India to marry before age 18. Still, in that

country, where the average age at menarche is 13.7 years, in 1993, an estimated 10.6 million females who had ever married did so by age 12—more than 37% of the world's population of such females.[2]

Marriage in India is typically arranged by a couple's parents, who share similar socioeconomic backgrounds. In the majority of cases, the bride, regardless of age, moves in with her husband immediately, usually into his parents' household. However, a minority of marriages in India follow a different process whereby the bride moves in with her husband, and thus begins actual marriage, only several years after the marriage ceremony, which merely weds the couple ritually. In our data, the marriages of approximately 28% of postpubescent brides and 37% of prepubescent brides followed this two-stage process.

Some females who marry in two stages have not yet reached puberty at the time of the first stage and begin the second stage once they do. Our study does not consider them child brides, since their actual marriages do not begin until after they have reached puberty. We count as child brides only females who were prepubescent at the time they began cohabiting with their husbands, whether their marriages involved two stages or not.

Girls who grow up in extreme poverty and suffer chronic illness or malnutrition often take longer to mature sexually (see, for instance, Kulin et al., 1982; Bhakhri et al., 2010; Soliman et al., 2014). As we discuss below, child brides disproportionately hail from the most socioeconomically disadvantaged families in India, which raises a question: Are these brides truly *child* brides or simply brides who marry at the same age as other females but happen to reach puberty later?

They are truly child brides. Appendix A presents the distribution of age at menarche and age at first marriage for pre- and postpubescent brides by Indian state and age cohort. In every state, and for every cohort, prepubescent brides reach puberty at an older age than postpubescent brides but nevertheless get married at a younger age. Average age at menarche among prepubescent brides is 14.3 years—about half a year older than for postpubescent brides, whose average age at menarche is 13.7 years. Yet, average age at marriage among prepubescent brides is only 12.4 years—more than four years younger than for postpubescent brides, whose average age at marriage is 16.8 years.

The grooms of both pre- and postpubescent brides in India are adults, men well past puberty. However, the age difference between spouses in child bride marriages is larger.[3] Whereas the average child bride's husband is 19.3 years old at marriage, nearly seven years older than his prepubescent wife, the average postpubescent bride's husband is 23.1 years old at marriage, approximately six years older than his postpubescent wife.[4]

Appendix A presents information on the distribution of child brides by Indian state (and age cohort). Prepubescent brides are most common in the northern and central regions of the country and less common in the south and northeast. In the northern state of Rajasthan, for example, in 1993, more than 17% of women who had ever married did so before puberty; in the southern state of Tamil Nadu, less than 0.5% did so.

This distribution corresponds to India's socioeconomic geography, which displays more underdevelopment in the north. Thus, unsurprisingly, prepubescent brides tend to be considerably poorer, less educated, and more likely to inhabit (hence to hail from) rural areas than postpubescent brides. For example, 57.4% of prepubescent brides reside in households that occupy the bottom two wealth quintiles in India, compared to only 37.2% of postpubescent brides. Average years of schooling among prepubescent brides is just 0.83 years, compared to 3.1 years for postpubescent brides. And more than 85% of prepubescent brides reside in rural areas, whereas 73% of postpubescent brides do so.

Further, prepubescent brides are more likely to belong to socioeconomically disadvantaged, or "scheduled," castes and tribes. More than 17% are members of a scheduled caste and nearly 11% are members of a scheduled tribe, compared to approximately 12% and 9%, respectively, for postpubescent brides. Religiously, however, pre- and postpubescent brides in India are similar. In both groups, Hinduism is by far the dominant religion—85% and 82%, respectively—with Islam making up most of the remainder.

2.2. Indian son preference

Like child brides, son preference is widespread in the developing world—and especially notable in India (Williamson, 1976; Cleland et al., 1983; Arnold, 1997). In 1993, the average ever-married woman in India expressed an ideal child bundle consisting of 1.56 sons and 1.05 daughters, an ideal son/daughter ratio of 1.48.[5] In the second and third most son-preferring

[2] In the world's second-most child-bride populous nation—Bangladesh—in 1993, an estimated 5.1 million females who had ever married did so by age 12. We calculate the estimate for India using data from NFHS-1 (1995) on the percentage of ever-married females and their ages at marriage in 1992–1993, and data on India's female population in 1991 from the Census of India (1991). We calculate the estimate for Bangladesh using data from DHS-Bangladesh (1994) on the percentage of ever-married females and their ages at marriage in Bangladesh in 1993–1994, and data on Bangladesh's female population in 1993 from the World Bank's (2014a) Gender Statistics. We calculate India's global share of ever-married women who married by age 12 by dividing the estimate for India, provided above, by the estimate for the world, provided in fn. 1.

[3] For the average male, puberty is reached at approximately 14 years (Palmert and Boepple, 2001).

[4] NFHS-1 (1995) does not ask husbands' age at marriage directly. To determine it here, we use information on husbands' ages at the time of the survey and the number of years since ever-married women's first marriages. We consider only the husbands of currently married women who have been married once, since it is not possible with this information to determine age at marriage for husbands who are married to women who are separated from their husbands, have been married more than once, are widowed, or are divorced. We exclude husbands whose calculated age at marriage indicates respondent misreporting and/or NFHS-1 miscoding (e.g., husbands with negative ages at marriage).

[5] This ratio does not include children in ever-married women's ideal child bundles toward whose sex they are indifferent; however, the son preference measure our empirical analysis uses, described below, does include them.

nations in the world, Pakistan and Bangladesh, the average ever-married woman's ideal son/daughter ratios were 1.44 and 1.27, respectively (Arnold, 1997: 9).[6] Also like child brides, son preference in India is most pronounced in the north and least pronounced in the south. In the northern state of Rajasthan, for example, in 1993, the average ever-married woman's ideal son/daughter ratio was nearly 1.7; in the southern state of Tamil Nadu, it was just 1.15.

The origins of son preference in India are debated (see, for instance, Rosenzweig and Schultz, 1982; Arnold, 1997; Mutharayappa et al., 1997; Das Gupta et al., 2003; Pande and Malhotra, 2006; Pande and Astone, 2007; Chakraborty and Kim, 2010; Vanneman et al., 2012; Gupta, 2014; Mitra, 2014; Klaus and Tipandjan, 2015).[7] However, the gender-biased outcomes of that preference are not. As a large literature documents, these outcomes include excess young-female mortality—the result of parents underinvesting in their young daughters' healthcare and wellbeing (see, for instance, Das Gupta, 1987; Arnold, 1997; Rose, 1999; Pande and Malholtra, 2006; Tarozzi and Mahajan, 2007; Oster, 2009; Jayachandran and Kuziemko, 2011; Barcellos et al., 2012; Bharadwaj and Lakdawala, 2013); sex-selective abortion—to prevent the birth of daughters; and in rare cases, female infanticide—to terminate daughters after they are born (see, for example, Miller, 1987; Das Gupta and Bhat, 1997; Arnold et al., 1998; Sudah and Rajan, 1999; Sekher and Hatti, 2005; Arnold and Parasuraman, 2009). Still another gender-biased outcome of son preference in India, however, has gone unnoticed: prepubescent female marriage.

3. A theory of the market for child brides, with special reference to India

3.1. Supply

Consider a society of child-seeking, son-preferring couples, all of whom are poor but some of whom are poorer than others. To simplify our discussion, suppose that each couple's ideal child bundle consists of a single son of a given quality and that a couple's child-bundle utility decreases monotonically in reductions in that quality. Suppose also that the financial cost of giving birth to and subsequently supporting a child of a given quality is positive and the same regardless of its sex.[8]

When fetal-sexing technology is available, a couple can use sex-selective abortion to achieve its ideal bundle by preventing the birth of unwanted daughters it conceives.[9] Today, three such technologies are available in India: amniocentesis, introduced in the 1970s; chorionic villus sampling, introduced in the 1980s; and ultrasound, the most popular method, also introduced in the 1980s (Arnold et al., 2002; Retherford and Roy 2003: 14; Bhakat 2013: 1827). Access to this technology, however, did not grow rapidly until the mid-1990s (Khanna, 1997; Bhalotra and Cochrane, 2010; Akbulut-Yuksel and Rosenblum, 2012). Before then, sex-selective abortion was not widely available in India.

To reflect this fact, suppose that sex-selective abortion is also unavailable in the society in question. Pregnancy therefore produces a son approximately half the time. In that event, a couple achieves its ideal child bundle and stops attempting to conceive. But in the near-equally likely event that pregnancy produces an unwanted daughter, the couple faces a choice: raise the daughter to young adulthood, when she would traditionally leave home, or dispose of her before that.

Both options are costly. Although the couple does not want the daughter, disposing of her is emotionally painful; no parents, even strongly son-preferring ones, are untroubled by discarding a young child. Raising the daughter, however, uses resources, which the couple cannot devote to raising a future son. If the couple is wealthy enough, it may still be able to achieve its ideal child bundle even if it raises the daughter to young adulthood. But if the couple is sufficiently poor, doing so will preclude it in the future from being able to afford any son at all. The poorer the couple is, the more costly it therefore finds raising the daughter; hence, the more likely it is to dispose of her instead.

One way to do that is to kill her—overt daughter termination or, closely related, abandonment (Saravanan, 2002). In India, reliance on female infanticide to dispose of unwanted daughters has been documented as far back as the late eighteenth century (Wilson, 1855; Cave Browne, 1857). No data exist on the extent of female infanticide in contemporary India, but killing one's daughter (or abandoning her) is surely the least appealing means of disposing of her and thus considered only as a last resort (Das Gupta and Bhat, 1997: 314). We therefore assume that the psychic cost of killing/abandoning their unwanted daughters is prohibitive for at least some couples who choose daughter disposal.

Yet, these couples can dispose of their daughters before they reach adulthood in only one other way: by finding parties who are willing to take in prepubescent girls. Perhaps the most obvious, and from a couple's perspective, desirable, means of doing that is adoption—finding another couple that will take its prepubescent daughter as that couple's own. But in a society populated by son-preferring couples, couples do not want even their own daughters, let alone those of others.[10] They must

[6] China, which is also well known for strong son preference, was not included among the countries surveyed by the DHS between 1990 and 1995 and thus is not included in the countries compared in Arnold (1997).

[7] Much of this literature suggests that, rather than being an intrinsic preference, son preference is driven at least in part by economic factors, for example the custom of dowry, which reduces the desirability of daughters relative to sons.

[8] In fact, because of the custom of dowry, in India, the cost of raising daughters may be higher than the cost of raising sons (of a given quality). Since assuming as much would only strengthen the effects of son preference that our theory identifies—daughters, in this case, being even more undesirable relative to sons—to simplify the discussion that follows, we assume that the cost of raising a child of either sex is the same.

[9] Although abortion has been legal in India since 1971, sex-selective abortion has not. In 1976, India's government banned sex-determination tests in public facilities, and in 1994, it banned them in all facilities, public and private, nationwide. Despite this, today, sex-selective abortion is practiced.

[10] Consider, for instance, the experience of China, where son preference is strong and, in the 1980s and 1990s, it was discovered that orphanages and abandoned-baby havens (so-called "baby hatches") were overflowing with girls—disposed of by their parents and unwanted by other couples (see, for

therefore find parties who will take in their prepubescent daughters in a different role. As we explain below, these parties are adult men, who are willing to take prepubescent girls as wives. Thus, parents who seek to dispose of their unwanted daughters but are unwilling to murder/abandon them supply their prepubescent girls on the marriage market as brides.

3.2. Demand

Demand for child brides is also driven by son preference. Son-preferring couples invest fewer resources in the care of their young daughters than their young sons, so more males survive to puberty than females. Assuming a constant rate of population growth, the result is a larger number of traditional-marriage-aged males than females.[11]

To find brides in the face of this sex ratio imbalance, some traditional-marriage-aged men must reach into younger female cohorts. The stronger son preference is, the more severe the resulting imbalance; hence, the younger the female cohorts are into which such men must reach. If son preference is sufficiently strong, and thus the imbalance is sufficiently severe, some men will be forced to reach into prepubescent cohorts to find brides. When wife-seeking males are heterogeneous in quality, these men will be those who would make lower quality husbands—men whose inferior socioeconomic status prevents them from competing successfully for the limited number of traditional-marriage-aged females available, who are taken by higher quality potential husbands.

How young the prepubescent-female cohorts are into which lower quality men must reach to find brides is determined by the same forces that determine how young the postpubescent-female cohorts are into which men more generally must reach to find brides: the strength of son preference and the severity of the traditional-marriage-age sex ratio imbalance this preference generates. Even in India, son preference is only strong enough to create a demand for brides who about eight years old at the youngest (NFHS-1, 1995). Thus, while couples who seek to dispose of their unwanted daughters would like to do so as soon as possible to maximally conserve the resources available to them for future sons, they are constrained in their ability to marry off their daughters at increasingly early ages by wife-seeking men's willingness to take increasingly young females as brides. Son preference, as observed in India and elsewhere in the developing world, therefore generates marriage markets that contain prepubescent brides who are children but not toddlers or infants.

Our theory yields several testable predictions: stronger son preference should be associated with the birth of more unwanted daughters, younger postpubescent-female age at marriage, and a higher incidence of prepubescent brides. Additionally, son preference should have a stronger positive association with prepubescent brides where poverty is more extreme; prepubescent brides should have lower quality husbands than postpubescent brides; and stronger son preference should be associated with a higher ratio of traditional-marriage-aged males to females.

4. Data

4.1. Data description

To test these predictions, we use data from the 1992–1993 National Family Health Survey of India (NFHS-1, 1995). The NFHS is nationally representative and asks nearly 90,000 ever-married women, ages 13–49, and the heads of their households about their marriages, ages at menarche, child-gender preferences, fertility, knowledge and practice of family planning, and household demographics and composition.[12] For our purpose, these data have two critical advantages: they consist of women born and interviewed before sex-selective abortion became widely available in India, and they allow both son preference and prepubescent brides to be measured directly.[13]

We exploit the fact that survey respondents inhabit different parts of India and vary widely by age to create a panel with which to investigate our theory. The cross-sectional dimension divides respondents and their household members into 25 states.[14] The temporal dimension divides them into six age groups, consisting of four- or five-year cohorts: ages 23–26, 27–30, 31–34, 35–39, 40–44, and 45–49.[15] The resulting panel consists of 150 state-cohort observations and allows us to

example, Thurston, 1996; Johnson, 1993; Russell, 2007; Hui and Blanchard, 2014). In India, too, girls appear more likely to be abandoned in orphanages than boys (Howard, 2012).

[11] From 1960–1999, India's population grew at an average rate of 2.1% per year; from 1999 to 2014, at an average rate of 1.4% per year (World Bank, 2014b).

[12] The state of Sikkim and the union territories of Andaman and Nicobar Islands, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Lakshadweep, and Pondicherry were not surveyed by NFHS-1. The National Capital Territory of Delhi, which attained statehood in 1992, was included among the 25 states surveyed by NFHS-1.

[13] The youngest ever-married women surveyed by NFHS-1 were born in 1980; the youngest ever-married women included in our empirical analysis were born in 1970.

[14] In 1991, 27.4% of people in India were within-country migrants—people living outside the communities in which they were born. Forty-five percent of such people who migrated between 1981 and 1991, nearly all of whom were female, did so for reasons related to marriage; namely, their husbands (more precisely, their husbands' parents) resided in different communities from those in which they were born (Census of India, 2001). The vast majority of within-country migration was between subdistricts or districts within the same state. In contrast, in 1991, less than 12% of India's within-country migrants had migrated outside their states of birth (Census of India, 2001). This suggests that, geographically, the boundaries of an individual Indian marriage market extend across subdistricts and districts but are contained within a single state.

[15] More than 97% of ever-married women in our data married by age 23; thus, beginning the youngest cohort here ensures that women in our sample cohorts are representative of ever-married women in each cohort in general and not merely in our sample due to early selection into marriage.

estimate the key relationships our theory predicts using state- and cohort-fixed effects, which help account for unobserved cultural differences relating to son preference or marriage practices between people in different states and between older people and younger ones.

4.2. Variables

The NFHS asks ever-married women without living children, "If you could choose exactly the number of children to have in your whole life, how many would that be?" and asks those with living children, "If you could go back to the time you did not have any children and choose exactly the number of children to have in your whole life, how many would that be?" It then asks both sets of women, "How many of these children would you like to be boys, how many would you like to be girls, and for how many would it not matter?" Our son preference variable uses responses to this third question to measure women's average number of ideal sons per ideal daughter, treating each child in a woman's ideal bundle whose sex she indicates "does not matter" as equal to 0.5 ideal sons and 0.5 ideal daughters.

Our unwanted daughters variable uses the responses of women in completed families[16] to the above question, which asks their ideal number of daughters, and their responses to a question that asks the total number of daughters they have actually birthed to measure women's average number of undesired daughters (actual – ideal) per desired daughter, again treating each child in their ideal bundles toward whose sex they are indifferent as 0.5 ideal sons and 0.5 ideal daughters.[17]

Our postpubescent-female age at marriage variable uses ever-married women's responses to questions that ask their age at menarche and their age when they began cohabiting with their first husband to measure the average age at first marital cohabitation of females who began marital cohabitation after reaching puberty.[18] Our child brides variable uses the same responses to measure the percentage of females who began marital cohabitation before reaching puberty.

We also use the NFHS data to create a variety of control variables, including many of the factors suggested as contributors to young postpubescent-female marriage. These are: average wealth (measured using a DHS-defined index described in Appendix B); average years of female schooling; the percentage of females who earn money from employment; the percentage of females who are regularly exposed to mass media; the percentage of individuals living in rural areas; and the percentage of Hindus, Muslims, Christians, and Sikhs. Additionally, we create control variables for: ideal fertility—the average number of children in ever-married women's ideal bundles; the percentage of ever-married women who know of at least one contraceptive method; the percentage of individuals who belong to a scheduled caste; the percentage of individuals who belong to a scheduled tribe; ever-married women's average age at menarche; and the percentage of ever-married women who had two-stage marriages.

Finally, we create a control variable for sex ratio at birth, which measures the number of males per 100 females born to ever-married women. In the unlikely event that any women in our sample had access to sex-selective abortion, our sex ratio at birth variable will account for this. Provided that women who have resorted to female infanticide do not report the births of infant daughters they have killed, our sex ratio at birth variable will also account for that practice.[19] Appendix B compiles definitions and sources for all our variables; Table 1 presents summary statistics.

Although the NFHS data have critical advantages for testing our theory, they are not perfect. Ideally, for each state-cohort, they would furnish information on each individual couple's son preference and its births of unwanted daughters, its married daughters' ages at marriage, and whether any of its daughters were married before reaching puberty. Instead, as described above, for each state-cohort, the NFHS data furnish information on average son preference, average births of unwanted daughters, average age at marriage, and prepubescent bride incidence among ever-married females.

5. Empirical analysis

5.1. Evidence for the son preference theory of child brides at a glance

Figs. 1–3 depict the relationships between son preference and unwanted daughters, postpubescent-female age at marriage, and child brides, respectively, in the raw data. As our theory predicts, stronger son preference is associated with the birth of more unwanted daughters, younger postpubescent-female age at marriage, and a higher incidence of child brides.

[16] A family is completed if its wife wishes to have no more children or if its wife or husband is sterilized (Clark, 2000). The fraction of women in each cohort in our sample who have completed families is as follows: age 23–26: 43.5%; age 27–30: 65.8%; age 31–34: 78.9%; age 35–39: 83.5%; age 40–44: 83.8%; age 45–49: 76.6%. We also create a version of our unwanted daughters variable for women who are menopausal/infecund or have been sterilized and find similar results.

[17] An unavoidable limitation of relying on responses to survey questions about realized and ideal fertility, as we do, is that respondents' realized fertility may influence their answers to questions about ideal fertility. There is, unfortunately, no way to ascertain the extent of such influence or to address it if it exists.

[18] For 1605 ever-married females (of the 89,777 surveyed), NFHS-1 misreports age at first marriage. Our data correct this error following the DHS-indicated remedy. See: http://userforum.dhsprogram.com/index.php?t=msg&th=328&start=0&S=28ff9fb93e90bc4e4480bf877d7db968.

[19] However, if women are likely to report the births of their infant daughters who they have killed, for instance because pregnancies and births are observable in the community, or because the interview may have been conducted within earshot of others, and thus an untruthful answer is difficult to hide, controlling for sex ratio at birth will not account for female infanticide.

Table 1
Summary Statistics, NFHS Data.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Child brides (%)	150	4.787	5.528	0	26.251
Unwanted daughters	150	0.526	0.39	−0.203	1.741
Postpubescent-female age at marriage	150	17.89	1.481	14.936	21.714
Traditional-marriage-age sex ratio	24	101.747	11.494	84.418	136.46
Son preference	150	1.373	0.186	0.99	1.743
Birth year	24	1955.166	6.112	1941.119	1966.043
Ideal fertility	150	3.155	0.809	1.995	5.886
Age at menarche	150	13.86	0.539	12.743	14.994
Sex ratio at birth	150	107.795	7.216	87.586	130.453
Two-stage marriage (%)	150	16.9	20.105	0	66.169
Wealth	150	0.089	0.441	−0.532	1.614
Female education	150	3.665	1.755	0.619	8.471
Rural (%)	150	68.937	16.699	5.114	90.26
Female labor-force participation (%)	150	24.491	12.298	3.426	63.393
Female media exposure (%)	150	58.503	17.312	20.833	90.543
Female contraceptive knowledge (%)	150	93.336	12.453	31.746	100
Scheduled caste (%)	150	9.633	8.963	0	31.196
Scheduled tribe (%)	150	21.562	31.038	0	99.045
Hindu (%)	150	69.601	28.35	0.993	97.663
Muslim (%)	150	8.319	7.067	0	28.506
Christian (%)	150	15.171	28.406	0	98.421
Sikh (%)	150	3.277	11.504	0	61.813
Forced sexual act (%)	150	0.742	1.18	0	8.286
Harassment (%)	150	20.621	19.418	0	86.985
Ideal sons > Ideal daughters (%)	150	38.477	13.079	9.211	61.963
Ideal sons/Ideal children > 0.5 (%)	150	37.393	12.897	9.211	61.35
Son-preference index	150	1.336	0.168	0.86	1.601

Notes: Traditional-marriage-age sex ratio and birth year variables are defined for states only. Summary statistics for all other variables are defined for state-cohorts. For data sources and detailed variable definitions, see Appendix B.

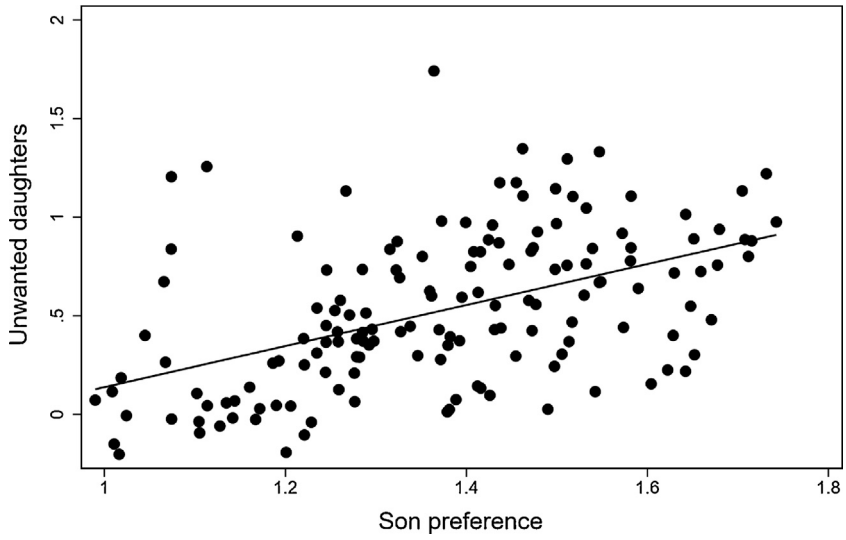

Fig. 1. Son Preference and Unwanted Daughters.

Notes: Data from NFHS-1 (1995).

Below, we investigate these relationships econometrically. However, it is important to keep in mind that our analysis does not identify causal effects and cannot rule out other possible explanations for child brides. Our estimates may be affected by endogeneity or reflect spurious correlation; they provide only suggestive evidence for the son-preference theory of prepubescent female marriage.

5.2. Primary results

Table 2 investigates the relationship between son preference and unwanted daughters. Unless otherwise noted, all results here and in the tables that follow are estimated using OLS with state- and cohort-fixed effects and calculate robust standard

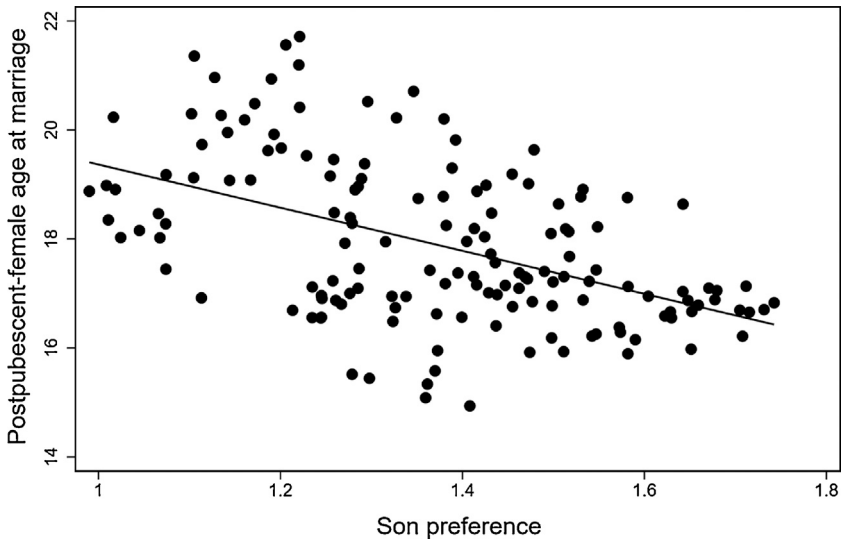

Fig. 2. Son Preference and Postpubescent-Female Age at Marriage.

Notes: Data from NFHS-1 (1995).

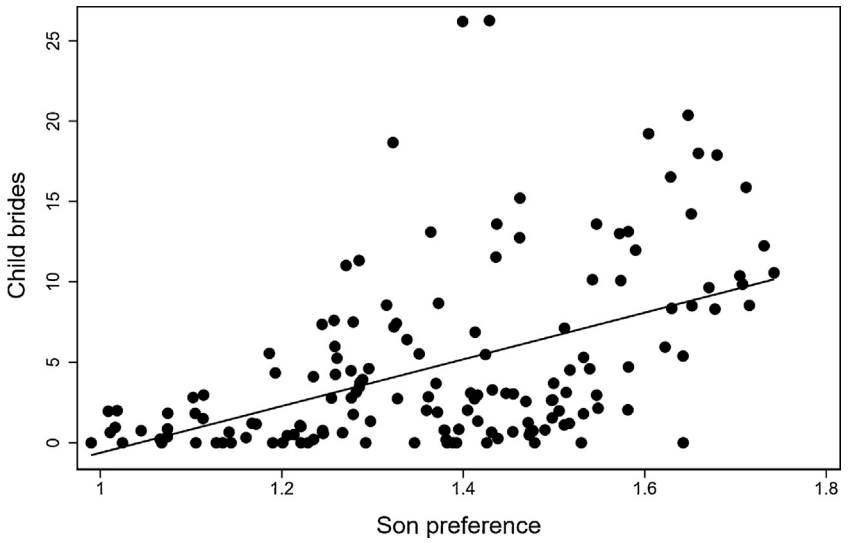

Fig. 3. Son Preference and Child Brides.

Notes: Data from NFHS-1 (1995).

errors clustered at the state level. Column 1 includes no controls. Column 2 controls for ideal fertility, sex ratio at birth, and includes two-way fixed effects. Column 3 adds demographic controls for wealth, female education, and percent rural. Column 4 adds "modernity" controls: female labor-force participation, female media exposure, and female contraceptive knowledge. Column 5 adds "cultural" controls: caste, tribe, and religious composition. Finally, in column 6, we re-estimate the specification in column 5, which uses our full battery of controls, but without wealth and female education, which may be endogenous.

Stronger son preference is associated with the birth of more unwanted daughters. Depending upon the column one considers, moving from an ideal child bundle consisting of one son and one daughter to an ideal child bundle consisting of two sons and one daughter is associated with the birth of approximately 0.8–1.1 additional undesired daughters for every desired daughter.

Ideal fertility, sex ratio at birth, and wealth also exhibit a consistent and significant relationship to unwanted daughters. As expected, all three are relationships negative: in state-cohorts where women desire more children and reside in wealthier households, women have fewer unwanted daughters. The coefficient on sex ratio at birth is negative but nearly zero, supporting the suggestion that reliance on sex-selective abortion and/or female infanticide in our data is rare.

Table 2
Son Preference and Unwanted Daughters.

Dependent variable: Unwanted daughters	(1)	(2)	(3)	(4)	(5)	(6)
Son preference	1.040***	0.807***	1.120***	0.996***	1.016***	1.006***
	(0.148)	(0.238)	(0.288)	(0.288)	(0.322)	(0.317)
Ideal fertility		−0.449***	−0.466***	−0.458***	−0.481***	−0.477***
		(0.156)	(0.127)	(0.127)	(0.147)	(0.142)
Sex ratio at birth		−0.006***	−0.005***	−0.005***	−0.006***	−0.006***
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Wealth			−1.014***	−0.965***	−0.931***	
			(0.245)	(0.274)	(0.273)	
Female education			0.072	0.063	0.055	
			(0.047)	(0.049)	(0.052)	
Rural (%)			0.008	0.006	0.005	0.016**
			(0.006)	(0.006)	(0.007)	(0.007)
Female labor-force participation (%)				−0.004	−0.002	−0.006
				(0.005)	(0.005)	(0.006)
Female media exposure (%)				−0.008	−0.008	−0.009*
				(0.005)	(0.005)	(0.005)
Female contraceptive knowledge (%)				0.013	0.016	0.016
				(0.008)	(0.010)	(0.011)
Scheduled caste (%)					−0.004	−0.000
					(0.011)	(0.008)
Scheduled tribe (%)					0.006	0.015
					(0.009)	(0.010)
Hindu (%)					0.012	0.021
					(0.015)	(0.016)
Muslim (%)					0.013	0.027
					(0.020)	(0.019)
Christian (%)					−0.008	−0.003
					(0.010)	(0.009)
Sikh (%)					0.006	0.012
					(0.020)	(0.017)
Adj. R^2	0.24	0.89	0.92	0.92	0.92	0.91
Obs.	150	150	150	150	150	150
State- and cohort-FEs?		X	X	X	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. Son preference is mean [ideal sons/ideal daughters]; unwanted daughters is mean [(actual daughters − ideal daughters)/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters.

Table 3 considers the relationship between son preference and postpubescent-female age at marriage. Column 1 includes no controls. Column 2 controls for age at menarche, sex ratio at birth, the percentage of two-stage marriages, and includes two-way fixed effects. Columns 3–5 add demographic, modernity, and cultural controls, respectively, and column 6 re-estimates column 5, excluding wealth and female education.

Stronger son preference is associated with younger postpubescent-female age at marriage. Moving from an ideal child bundle consisting of one son and one daughter to an ideal child bundle consisting of two sons and one daughter is associated with an approximately 2.2- to 4-year reduction in postpubescent-female age at first marriage.[20]

Predictably, older age at menarche is associated with older postpubescent-female age at marriage. Unexpectedly, a higher percentage of females with contraceptive knowledge and a higher percentage of Christians is associated with younger postpubescent-female age at marriage. The percentage of two-stage marriages is negatively related to postpubescent-female age at marriage but rarely significant. And while wealth, female education, female labor-force participation, and female media exposure have the expected signs, they are insignificant.

Table 4 examines the relationship between son preference and child brides. All columns are the same as above. Stronger son preference is associated with a higher incidence of prepubescent brides. Moving from an ideal child bundle consisting of one son and one daughter to an ideal child bundle consisting of two sons and one daughter is associated with an approximately 14.5–18.9 percentage point increase in prepubescent brides.

Similar to in Table 3, sex ratio at birth, wealth, female education, female labor-force participation, and female media exposure are insignificant. Here, however, all the culture variables, including caste, tribe, and religion, are insignificant too. Besides son preference, only female contraceptive knowledge reliably exhibits a significant relationship to child brides, and consistent with Table 2, where it is associated with younger postpubescent-female age at marriage, in Table 4, it is associated with a higher incidence of prepubescent brides.

[20] We also check the relationship between son preference and age at first marriage for females in general—i.e., including both pre- and postpubescent brides. As expected, that relationship is also negative and stronger still.

Table 3
Son Preference and Postpubescent-Female Age at Marriage.

Dependent variable: Postpubescent-female age at marriage	(1)	(2)	(3)	(4)	(5)	(6)
Son preference	−3.955***	−2.502**	−2.426*	−2.244*	−2.362*	−2.540*
	(0.463)	(1.202)	(1.337)	(1.238)	(1.295)	(1.294)
Age at menarche		2.027**	1.989***	1.848***	1.827***	1.887***
		(0.749)	(0.686)	(0.513)	(0.530)	(0.568)
Sex ratio at birth		0.009	0.010*	0.007	0.009	0.008
		(0.006)	(0.006)	(0.005)	(0.005)	(0.005)
Two-stage marriage (%)		−0.037**	−0.046**	−0.023	−0.022	−0.013
		(0.017)	(0.022)	(0.020)	(0.021)	(0.017)
Wealth			0.547	0.961	0.499	
			(1.351)	(1.127)	(1.196)	
Female education			0.143	0.123	0.150	
			(0.120)	(0.101)	(0.127)	
Rural (%)			0.005	0.018	0.016	0.008
			(0.029)	(0.026)	(0.026)	(0.018)
Female labor-force participation (%)				0.011	0.022	0.018
				(0.013)	(0.013)	(0.013)
Female media exposure (%)				0.023	0.018	0.021
				(0.015)	(0.014)	(0.015)
Female contraceptive knowledge (%)				−0.074***	−0.068***	−0.069***
				(0.019)	(0.022)	(0.023)
Scheduled caste (%)					0.010	−0.010
					(0.032)	(0.032)
Scheduled tribe (%)					−0.047	−0.052
					(0.036)	(0.036)
Hindu (%)					−0.062	−0.055
					(0.069)	(0.066)
Muslim (%)					−0.083	−0.082
					(0.075)	(0.074)
Christian (%)					−0.090**	−0.091**
					(0.037)	(0.033)
Sikh (%)					−0.054	−0.042
					(0.081)	(0.072)
Adj. R^2	0.25	0.93	0.94	0.95	0.95	0.95
Obs.	150	150	150	150	150	150
State- and cohort-FEs?		X	X	X	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. Son preference is mean [ideal sons/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters; postpubescent-female age at marriage is mean age at first marital cohabitation among females who began marital cohabitation after reaching puberty.

Although it is not possible to match brides to their parents in the NFHS data, bride-parent matching is possible in different data, which are from the 1999 Rural and Economic Demographic Survey (REDS, 1999). With them, we can examine the relationship between an individual couple's son preference and, if the couple has a married daughter, the probability that the couple married her off before she reached puberty. The REDS data contain sociodemographic information on 7424 household heads, the fertility histories of their spouses, and the timing of their daughters' marriages. Matching household heads to their spouses and their married daughters yields 3244 bride-parent pairs. Table 5 presents summary statistics.

Unlike the NFHS data, the REDS data do not contain information on women's preferred number of sons or daughters, so we must measure son preference with a proxy: the number of daughters a couple has had who have died. Also unlike the NFHS data, the REDS data do not contain information on age at menarche, so we must also measure child brides with a proxy: an indicator variable that equals one if the couple's married daughter began marital cohabitation before reaching the average age at menarche in India, i.e., by age 13, and equals zero if she did not.

Table 6 presents results, which are consistent with those in Table 4: the stronger parents' son preference is, the more likely it is that their married daughters were married before reaching the average age at menarche.

5.3. Subsidiary results and robustness

Next, we test our theory's subsidiary predictions. Table 7 investigates how the positive relationship between son preference and child brides that we find Table in 4 may depend on the extremity of poverty. We re-estimate the most complete specification in that table using two subsamples: one consisting of only the poorest 50% of state-cohorts, the other of only the wealthiest 50 percent. For comparison, we also reproduce our results using the full sample. Consistent with our theory, the coefficient on son preference is largest and significant in the poorest subsample, second-largest and significant in the full sample, and small and insignificant in the wealthiest subsample.

Table 8 examines the relationship between the child-bride status of wives and the quality of their husbands. Although the NFHS data preclude bride-parent matching, they allow us to identify husband-wife pairs. To measure a husband's quality,

Table 4
Son Preference and Child Brides.

Dependent variable: Child brides (%)	(1)	(2)	(3)	(4)	(5)	(6)
Son preference	14.513***	18.883*	17.329*	17.278*	16.814**	16.844**
	(1.717)	(9.150)	(8.895)	(8.505)	(7.960)	(7.523)
Age at menarche		4.947	5.068	5.668*	5.719*	5.721*
		(3.273)	(3.289)	(3.137)	(3.080)	(3.148)
Sex ratio at birth		0.035	0.035	0.047	0.047	0.048
		(0.047)	(0.050)	(0.052)	(0.056)	(0.050)
Two-stage marriage (%)		0.051	0.043	−0.016	−0.011	−0.011
		(0.068)	(0.108)	(0.116)	(0.122)	(0.082)
Wealth			−0.532	−2.311	−1.965	
			(6.617)	(6.485)	(7.155)	
Female education			0.112	0.111	0.033	
			(1.034)	(0.965)	(1.022)	
Rural (%)			−0.118	−0.142	−0.142	−0.118
			(0.143)	(0.134)	(0.141)	(0.101)
Female labor-force participation (%)				−0.035	−0.069	−0.073
				(0.060)	(0.092)	(0.120)
Female media exposure (%)				−0.006	0.003	0.001
				(0.059)	(0.062)	(0.065)
Female contraceptive knowledge (%)				0.190**	0.171*	0.169*
				(0.078)	(0.088)	(0.088)
Scheduled caste (%)					−0.004	0.010
					(0.211)	(0.191)
Scheduled tribe (%)					0.084	0.103
					(0.154)	(0.158)
Hindu (%)					0.297	0.311
					(0.243)	(0.314)
Muslim (%)					0.178	0.202
					(0.260)	(0.290)
Christian (%)					0.263	0.271
					(0.269)	(0.297)
Sikh (%)					0.241	0.246
					(0.384)	(0.417)
Adj. R^2	0.24	0.87	0.87	0.87	0.87	0.87
Obs.	150	150	150	150	150	150
State- and cohort-FEs?		X	X	X	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. Son preference is mean [ideal sons/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. Child brides is percentage of ever-married females who began marital cohabitation before reaching puberty.

Table 5
Summary Statistics, REDS Data.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Married daughter wed by age 13	3244	0.051	0.22	0	1
Dead daughters	3244	0.146	0.508	0	6
Dead sons	3134	0.155	0.524	0	6
Live children	3244	4.84	1.933	0	11
Daughter's birth order	3244	2.732	1.76	1	11
Daughter's birth year	3244	1971.804	6.666	1932	1997
Ln household income	3244	3.292	0.844	1.099	6.909
Husband alive	3236	0.934	0.248	0	1
Wife's education	3244	1.738	2.985	0	18
Husband's education	3244	4.193	4.368	0	25
Daughter's education	3244	4.6	4.490	0	20
Hindu	3244	0.902	0.297	0	1
Muslim	3244	0.055	0.228	0	1
Sikh	3244	0.019	0.137	0	1
Christian	3244	0.013	0.114	0	1
Buddhist	3244	0.008	0.089	0	1
Jain	3244	0.001	0.03	0	1
Upper caste	3244	0.32	0.467	0	1
Scheduled caste	3244	0.12	0.325	0	1
Scheduled tribe	3244	0.063	0.243	0	1
Other backward caste	3244	0.391	0.488	0	1

Notes: Observations are bride-parent pairs. For data sources and detailed variable definitions, see Appendix B.

Table 6
Using Bride-Parent Pairs.

Dependent variable: Married daughter wed by age 13	(1)	(2)	(3)	(4)	(5)
Dead daughters	0.038***	0.029**	0.029**	0.027**	0.027**
	(0.012)	(0.010)	(0.010)	(0.011)	(0.011)
Dead sons		0.001	0.001	−0.000	−0.001
		(0.003)	(0.003)	(0.003)	(0.002)
Live children		0.002	0.002	0.001	0.001
		(0.003)	(0.003)	(0.003)	(0.003)
Daughter's birth order		0.000	0.000	0.001	0.000
		(0.003)	(0.003)	(0.003)	(0.003)
Ln household income			−0.003	−0.001	−0.002
			(0.005)	(0.005)	(0.004)
Husband alive			0.008	0.007	0.006
			(0.013)	(0.014)	(0.015)
Wife's education				−0.002	−0.003*
				(0.001)	(0.001)
Husband's education				0.002**	0.002*
				(0.001)	(0.001)
Daughter's education				−0.002**	−0.003***
				(0.001)	(0.001)
Hindu					0.082***
					(0.010)
Muslim					0.048**
					(0.020)
Sikh					0.110***
					(0.014)
Christian					0.072***
					(0.018)
Buddhist					0.065***
					(0.017)
Jain					0.037*
					(0.020)
Upper caste					−0.002
					(0.014)
Scheduled caste					−0.002
					(0.020)
Scheduled tribe					−0.034*
					(0.017)
Other backward caste					0.005
					(0.012)
Adj. R^2	0.01	0.16	0.16	0.17	0.17
Obs.	3244	3134	3126	3126	3126
State- and birth year-FEs?		X	X	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from REDS (1999). Observations are bride-parent pairs. OLS with robust standard errors clustered by state in parentheses. Dead daughters is wife-reported number of dead female children in a couple's fertility history. Married daughter wed by age 13 is an indicator variable that equals one if a couple's married daughter began marital cohabitation by age 13 and zero if she did not.

Table 7
Poor and Wealthy Subsamples.

Dependent variable: Child brides (%)	Full sample	Poorest 50%	Wealthiest 50%
Son preference	16.814**	28.446*	4.036
	(0.045)	(0.093)	(0.434)
Adj. R^2	0.87	0.89	0.86
Obs.	150	72	78

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. All columns include state- and cohort-fixed effects; age at menarche; sex ratio at birth; two-stage marriage; wealth; female education; rural; female labor-force participation; female media exposure; female contraceptive knowledge; scheduled caste; scheduled tribe; Hindu; Muslim; Christian; and Sikh. Son preference is mean [ideal sons/ideal daughters]; child brides is percentage of ever-married females who began marital cohabitation before reaching puberty.

we use his education or membership in a scheduled caste. To measure his wife's child-bride status, we use an indicator variable that equals one if she began marital cohabitation with him before reaching puberty and zero if she did not.

Child brides are more likely than postpubescent brides to come from disadvantaged socioeconomic backgrounds, and marriages in India are endogamous—between brides and grooms from similar socioeconomic backgrounds.[21] To account

[21] Ninety-five percent of all marriages in India are intra-caste, and in the northern states from which most prepubescent brides hail, intra-caste marriage is nearly 100% (Goli et al., 2013).

Table 8
Child-Bride Status and Husband Quality.

Dependent variable:	Husband education	Husband scheduled caste
Child-bride status	−0.687***	0.038***
	(0.106)	(0.009)
Wealth	3.698***	−0.055***
	(0.107)	(0.008)
Rural	1.191***	−0.045***
	(0.229)	(0.010)
Scheduled caste	−1.006***	
	(0.129)	
Scheduled tribe	−1.278***	−0.141***
	(0.168)	(0.021)
Hindu	0.197*	0.002
	(0.105)	(0.024)
Muslim	−1.818***	−0.117***
	(0.382)	(0.023)
Christian	0.759**	0.041
	(0.367)	(0.057)
Sikh	−0.701**	−0.157**
	(0.281)	(0.058)
Adj. R^2	0.43	0.09
Obs.	76,716	77,078
State- and birth year-FEs?	X	X
State-wealth-quintile FEs?	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). Observations are husband-wife pairs. OLS with robust standard errors clustered by state in parentheses. Child-bride status is an indicator variable that equals one if a wife began marital cohabitation before reaching puberty and zero if she did not. Husband education is a husband's number of completed years of schooling. Husband scheduled caste is an indicator variable that equals one if a husband is a member of a scheduled caste and zero if he does not.

for this, the regressions in Table 8 control for state-wealth-quintile fixed effects (in addition to state- and birth year-fixed effects), which use variation between husband-wife pairs within the same endogamous group. The results are consistent with our theory: even after accounting for endogamy, the husbands of child brides are both less educated and more likely to be members of a scheduled caste than the husbands of postpubescent brides.

Finally, Table 9 considers the relationship between son preference and the ratio of traditional-marriage-aged males to females. To measure this ratio, we use data from the 1991 Census of India. For each state, our variable divides the number of males age 20–25 by the number of females age 15–20 (multiplied by 100), since these age groups reflect traditional marriage age for both sexes in India (in our data, more than 51% of males marry between the ages of 20 and 25, and more than 65% of females marry between the ages of 15 and 20).[22]

As in Tables 2–4, our son preference variable measures average son preference among ever-married females. Further, since our dependent variable here uses only one male and one female age group, it is not possible to use a state-cohort panel, precluding state- or cohort-fixed effects. Thus, even greater caution is warranted when drawing inferences from the regressions in Table 9.

Column 1 includes no controls. Column 2 controls for sex ratios at birth and birth year, the latter of which uses census data to measure the average year-of-birth of individuals in each state, included here since we cannot include cohort-fixed effects. Column 3 adds controls for wealth, female education, and percent rural. Column 4 adds controls for female labor-force participation, female media exposure, and female contraceptive knowledge. Column 5 adds controls for caste, tribe, and religious composition. And in column 6, we add region-fixed effects. Consistent with our theory, stronger son preference is associated with a higher ratio of traditional-marriage-aged males to females.

We take several steps to ensure the robustness of our primary results. First, we reexamine the relationship between son preference and child brides, investigated in Table 4, using two variables that account for sexual violence against females. One records the frequency with which ever-married females surveyed in the third wave of NFHS, NFHS-3 (2007), conducted in 2005–2006, report being forced to perform a sexual act.[23] NFHS-1 does not ask women about sexual violence.[24] However, NFHS-3 asks them: "At any time in your life, as a child or as an adult, has anyone ever forced you in any way to have sexual intercourse or perform any other sexual acts?" We use respondents' answers to this question to measure the percentage of females who report having been forced to perform a sexual act.[25]

Our other variable records the frequency of unmarried-female harassment. The India Human Development Survey (IHDS-1, 2007), conducted in 2005–2006, asks ever-married women: "How frequently are unmarried girls harassed in your

[22] The difference in these percentages reflects the fact that Indian males' ages at marriage are more dispersed than those of Indian females.
[23] These respondents are a subset of all ever-married women surveyed by NFHS-3, selected for that survey's domestic-violence module.
[24] Nor does NFHS-2, conducted in 1998–1999.
[25] Our forced sexual act variable excludes respondents who indicate having been forced to perform a sexual act by their former or current husbands; however, including them does not affect our results.

Table 9
Son Preference and Traditional-Marriage-Age Sex Ratios.

Dependent variable: Traditional-marriage-age sex ratio	(1)	(2)	(3)	(4)	(5)	(6)
Son preference	27.634***	21.411*	30.562***	29.417*	17.718*	22.847*
	(5.879)	(10.458)	(6.620)	(13.916)	(9.339)	(10.146)
Sex ratio at birth		0.965	0.182	−0.112	−0.315	0.072
		(0.908)	(0.452)	(0.380)	(0.285)	(0.329)
Birth year		0.257	0.100	0.379	0.121	0.105
		(0.299)	(0.168)	(0.313)	(0.359)	(0.138)
Wealth			7.139	2.572	4.660	5.723
			(5.297)	(5.762)	(9.913)	(13.428)
Female education			−3.386	−2.571	−3.137	−2.660
			(2.343)	(1.809)	(2.274)	(6.264)
Rural (%)			−0.455***	−0.611***	−0.625**	−0.563**
			(0.129)	(0.111)	(0.188)	(0.182)
Female labor-force participation (%)				−0.171	−0.291**	−0.255
				(0.148)	(0.111)	(0.159)
Female media exposure (%)				−0.037	−0.095	0.013
				(0.198)	(0.119)	(0.230)
Female contraceptive knowledge (%)				−0.237	−0.103	−0.124
				(0.246)	(0.119)	(0.114)
Scheduled caste (%)					−0.076	0.104
					(0.207)	(0.429)
Scheduled tribe (%)					0.005	0.105
					(0.131)	(0.079)
Hindu (%)					−0.454**	−0.384
					(0.158)	(0.217)
Muslim (%)					−0.308	−0.075
					(0.253)	(0.377)
Christian (%)					−0.501***	−0.470
					(0.119)	(0.287)
Sikh (%)					−0.377**	−0.352
					(0.150)	(0.272)
Adj. R^2	0.19	0.15	0.69	0.72	0.88	0.79
Obs.	24	24	24	24	24	24
Region-FEs?						X

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$. Data for traditional-marriage-age sex ratio and birth year variables from Census of India (1991). Data for all remaining variables from NFHS-1 (1995). OLS with robust standard errors (clustered by region in column 6) in parentheses. States are divided into the following regions. North: Haryana; Himachal Pradesh; Madhya Pradesh; Delhi; Punjab; Rajasthan; and Uttar Pradesh. Northeast: Arunachal Pradesh; Assam; Manipur; Meghalaya; Mizoram; Nagaland; and Tripura. East: Bihar; Orissa; and West Bengal. West: Goa; Gujarat; and Maharashtra. South: Andhra Pradesh; Karnataka; Kerala; and Tamil Nadu. Jammu was not included in the 1991 Indian Census and is therefore not included in our regressions. Son preference is mean [ideal sons/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. Traditional-marriage-age sex ratio is 100*(males age 20–25/females age 15–20).

village/neighborhood?" where possible responses are "rarely," "sometimes," or "often." We use respondents' answers to this question to measure the percentage of females who report that unmarried girls are "sometimes" or "often" harassed in their communities.[26]

Sexual violence may be endogenous to child bride incidence. Moreover, sexual violence against females is notoriously underreported even in developed countries, and in a country such as India, underreporting is likely to be severe. Similar to above, special caution is therefore warranted when interpreting these results, which are reported in Table 10. Both sexual violence variables are negatively related to child bride incidence but are insignificant. Most important, controlling for sexual violence against females does not affect the relationship between son preference and child brides that we find in Table 4.

We also evaluate the robustness of each of our theory's primary predictions to three alternative ways of measuring son preference. The first measures the percentage of ever-married women whose ideal number of sons is greater than their ideal number of daughters. The second measures the percentage of such women whose ideal number of sons as a share of their total ideal number of children is greater than 50 percent. For the third, we construct a son preference index that assigns a zero to any ever-married woman whose ideal number of sons is less than her ideal number of daughters, assigns a one to any ever-married woman whose ideal number of sons equals her ideal number of daughters, and assigns a two to any ever-married woman whose ideal number of sons is greater than her ideal number of daughters. We then compute the average of this index, where a higher number means stronger son preference.

[26] The data for our sexual violence variables were collected several years after the data for our NFHS-1 variables, during which time a few Indian states were divided into new states. We assign the latter states to their 1992–1993 counterparts as follows: 1992–1993 Bihar is comprised of 2005–2006 Bihar and Jharkhand; 1992–1993 Madhya Pradesh is comprised of 2005–2006 Madhya Pradesh and Chhattisgarh; and 1992–1993 Uttar Pradesh is comprised of 2005–2006 Uttar Pradesh and Uttaranchal.

Table 10
Female Sexual Violence and Child Brides.

Dependent variable: Child brides (%)	(1)	(2)	(3)
Son preference	16.814**	17.439**	17.819**
	(7.960)	(8.009)	(8.570)
Forced sexual act (%)		−0.432	
		(0.272)	
Harassment (%)			−0.024
			(0.028)
Adj. R^2	0.87	0.87	0.87
Obs.	150	150	150

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data for forced sexual act variable from NFHS-3 (2007). Data for harassment variable from IHDS-1 (2007). Data for all remaining variables from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. All columns include state- and cohort-fixed effects; age at menarche; sex ratio at birth; two-stage marriage; wealth; female education; rural; female labor-force participation; female media exposure; female contraceptive knowledge; scheduled caste; scheduled tribe; Hindu; Muslim; Christian; and Sikh. Son preference is mean [ideal sons/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. Child brides is percentage of ever-married females who began marital cohabitation before reaching puberty. For forced sexual act and harassment variable definitions, see Appendix B.

Table 11
Alternative Measures of Son Preference.

	(1)	(2)	(3)
Panel A: Unwanted Daughters			
Ideal sons > Ideal daughters (%)	0.009*		
	(0.005)		
Ideal sons/Ideal children > 0.5 (%)		0.009*	
		(0.005)	
Son preference index			0.873**
			(0.352)
Adj. R^2	0.92	0.92	0.92
Obs.	150	150	150
Panel B: Postpubescent-Female Age at Marriage			
Ideal sons > Ideal daughters (%)	−0.029**		
	(0.014)		
Ideal sons/Ideal children > 0.5 (%)		−0.031**	
		(0.014)	
Son preference index			−2.470*
			(1.208)
Adj. R^2	0.95	0.95	0.95
Obs.	150	150	150
Panel C: Child Brides			
Ideal sons > Ideal daughters (%)	0.210*		
	(0.107)		
Ideal sons/Ideal children > 0.5 (%)		0.217*	
		(0.105)	
Son preference index			16.896**
			(7.897)
Adj. R^2	0.87	0.87	0.87
Obs.	150	150	150

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. All columns in all panels include state- and cohort-fixed effects; age at menarche; sex ratio at birth; two-stage marriage; wealth; female education; rural; female labor-force participation; female media exposure; female contraceptive knowledge; scheduled caste; scheduled tribe; Hindu; Muslim; Christian; Sikh. For variable definitions, see Appendix B.

We use the most complete specification from Tables 2–4, which includes two-way fixed effects and our full battery of controls. Additionally, for each alternative son preference variable, we consider a version that treats each child in a woman's ideal bundle toward whose sex she is indifferent as 0.5 ideal sons and 0.5 ideal daughters and a version that excludes children in women's ideal bundles toward whose sex they are indifferent. Our results are nearly the same using both versions; thus, in Table 11, we report estimates for the latter only. In every case, our results for son preference are consistent with those in Tables 2–4.

As two final robustness checks, we reexamine our child bride regressions from Table 4, first, excluding observations with zero prepubescent brides, and second, excluding ever-married women whose age at menarche is three standard deviations above or below the mean. Tables 12 and 13, respectively, present results. In both cases, they are similar to when we do not exclude these data.

Table 12
Positive Child Brides Only.

Dependent variable: Child brides (%)	(1)	(2)	(3)	(4)	(5)	(6)
Son preference	14.675***	21.997**	21.075*	21.473*	20.261*	20.609**
	(1.770)	(9.885)	(11.100)	(11.318)	(10.946)	(9.204)
Age at menarche		5.196	4.747	5.192	4.931	5.206
		(3.545)	(3.589)	(3.585)	(3.518)	(3.568)
Sex ratio at birth		0.046	0. 046	0.058	0.065	0.061
		(0.056)	(0.056)	(0.0.56)	(0.0.66)	(0.0.58)
Two-stage marriage (%)		−0.011	−0.035	−0.056	−0.050	−0.041
		(0.081)	(0.130)	(0.128)	(0.131)	(0.084)
Wealth			−5.913	−5.533	−6.062	
			(8.947)	(8.457)	(9.302)	
Female education			0.224	0.175	0.047	
			(1.279)	(1.178)	(1.278)	
Rural (%)			−0.169	−0.153	−0.172	−0.083
			(0.166)	(0.146)	(0.161)	(0.116)
Female labor-force participation (%)				−0.049	−0.054	−0.067
				(0.081)	(0.104)	(0.133)
Female media exposure (%)				−0.005	0.001	−0.004
				(0.076)	(0.079)	(0.084)
Female contraceptive knowledge (%)				0.183	0.213	0.210*
				(0.110)	(0.128)	(0.122)
Scheduled caste (%)					−0.008	0.030
					(0.218)	(0.200)
Scheduled tribe (%)					0.059	0.106
					(0.181)	(0.178)
Hindu (%)					0.217	0.312
					(0.356)	(0.403)
Muslim (%)					0.071	0.188
					(0.414)	(0.396)
Christian (%)					−0.039	0.029
					(0.502)	(0.461)
Sikh (%)					0.457	0.491
					(0.473)	(0.519)
Adj. R^2	0.23	0.87	0.86	0.86	0.86	0.86
Obs.	130	130	130	130	130	130
State- and cohort-FEs?		X	X	X	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS with robust standard errors clustered by state in parentheses. Son preference is mean [ideal sons/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. Child brides is percentage of ever-married females who began marital cohabitation before reaching puberty.

Table 13
Dropping Age-at-Menarche Outliers.

Dependent variable: Child brides (%)	(1)	(2)	(3)	(4)	(5)	(6)
Son preference	14.155***	17.756*	16.414*	16.320*	15.988*	16.027**
	(1.694)	(8.922)	(8.710)	(8.340)	(7.772)	(7.308)
Age at menarche		4.350	4.449	4.977	5.034	5.030
		(3.235)	(3.258)	(3.176)	(3.145)	(3.201)
Sex ratio at birth		0.037	0.037	0.048	0.048	0.049
		(0.047)	(0.050)	(0.052)	(0.056)	(0.050)
Two-stage marriage (%)		0.055	0.047	−0.010	−0.005	−0.005
		(0.065)	(0.106)	(0.115)	(0.122)	(0.081)
Wealth			−0.478	−1.983	−1.608	
			(6.542)	(6.464)	(7.083)	
Female education			0.112	0.078	0.014	
			(1.039)	(0.976)	(1.026)	
Rural (%)			−0.103	−0.121	−0.120	−0.101
			(0.137)	(0.129)	(0.137)	(0.099)
Female labor-force participation (%)				−0.044	−0.068	−0.071
				(0.059)	(0.090)	(0.119)
Female media exposure (%)				−0.002	0.005	0.002
				(0.057)	(0.060)	(0.064)
Female contraceptive knowledge (%)				0.173**	0.159*	0.158*
				(0.076)	(0.085)	(0.085)
Scheduled caste (%)					0.005	0.018
					(0.218)	(0.199)
Scheduled tribe (%)					0.068	0.083
					(0.151)	(0.158)
Hindu (%)					0.264	0.274
					(0.238)	(0.311)
Muslim (%)					0.172	0.192
					(0.252)	(0.282)

Table 13 (*Continued*)

Dependent variable: Child brides (%)	(1)	(2)	(3)	(4)	(5)	(6)
Christian (%)					0.207	0.214
					(0.266)	(0.295)
Sikh (%)					0.199	0.202
					(0.368)	(0.404)
Adj. R^2	0.23	0.87	0.86	0.87	0.86	0.87
Obs.	150	150	150	150	150	150
State- and cohort-FEs?		X	X	X	X	X

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data from NFHS-1 (1995). OLS regression with robust standard errors clustered by state in parentheses. Son preference is [ideal sons/ideal daughters], where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. Child brides is percentage of ever-married females who began marital cohabitation before reaching puberty, excluding those whose reported age at menarche is three standard deviations above or below the mean.

6. Conclusion

This paper develops an economic theory to account for the puzzling presence of millions of prepubescent brides in the developing world. According to that theory, in the absence of access to sex-selective abortion, strong son preference creates a supply of, and demand for, prepubescent brides, as some son-seeking couples who produce unwanted daughters aim to dispose of their prepubescent girls by transferring them to parties who will take them and some wife-seeking men who cannot find traditional-marriage-aged brides are willing to take prepubescent girls as wives.

Analyses of data from India, one of the most son-preferring and child-bride populous countries in the world, furnish evidence for this theory. We find that stronger son preference is associated with the birth of more unwanted daughters, younger postpubescent-female age at marriage, and a higher incidence of prepubescent brides. Additionally, we find that son preference has a stronger positive association with prepubescent brides where poverty is more extreme, that prepubescent brides have lower quality husbands than postpubescent brides, and that stronger son preference is associated with a higher ratio of traditional-marriage-aged males to females.

Appendix A.

See Table A1.

Table A1
Distribution of Ages at Menarche and First Marriage.

State	Cohort													
	23–26		27–30		31–34		35–39		40–44		45–49		All	
	CB	AB	CB	AB	CB	AB	CB	AB	CB	AB	CB	AB	CB	AB
All India	14.39	13.66	14.36	13.68	14.20	13.70	14.38	13.73	14.50	13.71	14.36	13.74	14.34	13.66
	12.41	16.96	12.50	17.19	12.36	17.24	12.36	17.10	12.31	16.85	12.20	16.76	12.37	16.84
	4.87		5.98		6.15		7.68		8.53		9.62		6.49	
Andhra Pradesh	18.09	13.18	15.00	13.11	13.20	13.15	15.93	13.19	14.71	13.19	14.67	13.27	15.12	13.14
	13.00	15.52	13.00	15.44	11.87	15.58	12.40	15.34	11.57	15.09	11.78	14.94	12.30	15.30
	1.77		1.34		3.69		2.85		2.02		3.09		2.08	
Arunachal Pradesh	15.00	12.90	14.00	12.90	14.00	12.99		13.01		13.08		13.34	14.33	12.96
	12.00	17.40	11.00	17.72	13.00	18.13		18.25		18.77		19.63	12.00	17.76
	0.80		0.65		1.20		0.00		0.00		0.00		0.42	
Assam	12.96	12.75	12.79	12.83	14.00	12.70	12.71	12.82	14.15	12.80	12.89	12.79	13.52	12.75
	11.92	16.62	11.40	17.37	12.35	17.16	11.57	17.27	12.19	16.76	11.44	16.77	12.14	16.71
	1.90		0.83		2.97		1.25		3.04		2.66		1.90	
Bihar	13.54	13.27	13.65	13.25	13.79	13.27	14.07	13.22	13.60	13.23	13.66	13.23	13.69	13.24
	11.42	16.59	11.83	16.67	11.82	16.55	11.93	16.65	11.67	16.21	11.63	15.98	11.69	16.36
	5.95		8.51		8.35		8.53		9.85		14.23		7.95	
Goa	14.00	13.64	13.50	13.81	13.00	13.70	17.50	13.74	15.23	13.65	15.20	13.66	15.22	13.69
	12.00	20.18	12.00	21.56	11.25	21.71	13.83	21.19	13.46	20.22	13.50	20.52	13.24	20.78
	0.32		0.45		1.01		1.08		2.74		4.61		1.68	
Gujarat	16.79	14.30	15.27	14.35	15.50	14.41	15.30	14.41	16.13	14.36	15.40	14.40	15.55	14.35
	14.43	18.10	13.93	18.18	14.00	18.47	13.30	17.95	14.13	18.04	13.73	17.68	13.84	17.97
	2.64		3.13		3.29		2.02		5.48		4.52		3.29	
Haryana	15.43	14.25	15.04	14.21	15.30	14.13	15.51	14.24	15.11	14.29	15.50	14.29	15.27	14.19
	13.93	17.31	14.04	17.30	14.10	17.15	14.26	17.21	13.75	17.31	14.50	17.43	14.01	17.12
	2.73		2.57		3.08		3.70		7.12		2.96		3.34	

Table A1 (*Continued*)

State	Cohort													
	23–26		27–30		31–34		35–39		40–44		45–49		All	
	CB	AB	CB	AB	CB	AB	CB	AB	CB	AB	CB	AB	CB	AB
Himachal Pradesh	16.32	14.90	14.92	15.00	15.73	14.81	16.21	14.83	15.16	14.92	15.75	14.80	15.60	14.89
	14.92	18.48	13.24	18.29	14.13	17.92	13.91	17.56	13.15	17.38	12.89	17.09	13.63	17.88
	4.25		7.50		11.01		11.54		15.21		12.74		8.97	
Jammu	14.75	14.37	15.14	14.30	14.17	14.19	14.55	14.07	14.59	14.06	15.88	14.06	14.81	14.19
	13.25	18.87	14.14	18.64	13.17	18.22	13.40	17.22	13.41	16.88	14.76	17.13	13.67	17.86
	1.34		1.98		2.14		4.60		5.31		4.71		2.75	
Karnataka	13.50	13.54	13.60	13.54	12.00	13.54	13.67	13.69	13.00	13.59	14.00	13.77	13.73	13.53
	11.75	16.56	12.40	16.96	11.00	17.12	12.33	16.91	11.50	16.69	13.00	16.80	12.36	16.59
	0.67		0.76		0.21		0.58		0.51		0.63		0.59	
Kerala	14.30	14.25	14.95	14.26	16.67	14.38	15.62	14.30	16.34	14.51	15.79	14.47	15.73	14.31
	12.90	19.12	13.26	19.73	15.07	20.30	13.90	19.92	14.34	19.62	14.13	19.46	14.03	19.48
	1.82		2.97		2.81		4.34		5.56		5.99		3.70	
Madhya Pradesh	13.97	13.62	14.10	13.69	13.91	13.69	14.41	13.71	14.51	13.55	14.15	13.75	14.19	13.63
	12.12	16.22	12.15	16.29	12.09	16.15	12.43	16.25	12.31	15.89	12.04	16.38	12.22	16.09
	10.13		10.08		11.97		13.59		13.13		13.00		11.58	
Maharashtra	14.46	13.52	14.09	13.52	13.25	13.47	13.71	13.51	13.89	13.49	13.81	13.39	13.79	13.48
	12.79	16.56	12.52	16.94	11.71	16.87	11.98	16.74	12.11	16.48	12.12	15.95	12.17	16.44
	4.11		6.41		5.25		7.41		7.20		8.67		5.83	
Manipur	15.00	13.44		13.55			17.00	13.48		13.46		13.41	16.00	13.48
	14.00	18.78		19.30		20.71	16.00	20.20		19.82		19.38	15.00	19.50
	0.79		0.00		0.00		0.77		0.00		0.00		0.25	
Meghalaya	16.00	13.88		13.78		13.72	15.00	13.98	14.00	13.78	13.00	14.31	14.57	13.88
	15.00	18.35		18.88		18.02	12.50	19.18	12.50	18.91	12.00	20.23	12.86	18.61
	0.64		0.00		0.00		1.83		2.00		0.96		0.84	
Mizoram		14.69		14.79	16.00	14.91		14.91		14.89		14.96	16.00	14.82
		19.67		20.41	15.00	20.48		20.94		20.96		21.36	15.00	20.44
	0.00		0.00		1.16		0.00		0.00		0.00		0.12	
Nagaland	14.50	13.61		13.80	14.00	13.90	24.00	14.05		13.75		13.92	18.50	13.82
	13.50	19.08		19.07	12.00	18.98	21.00	19.95		19.53		20.27	15.00	19.33
	1.21		0.00		1.96		0.66		0.00		0.00		0.65	
New Delhi	14.73	14.04	15.33	14.08	15.27	14.02	15.22	14.05	15.67	14.07	15.18	13.93	15.20	14.04
	13.13	18.39	13.33	18.90	13.67	18.96	13.22	19.10	13.83	18.74	13.55	18.19	13.43	18.59
	2.79		3.15		3.47		3.93		5.52		6.88		3.94	
Orissa	14.00	13.28	12.00	13.33	14.29	13.33	14.85	13.23	14.75	13.18	13.98	13.26	14.83	13.26
	13.00	17.18	11.00	16.98	12.72	16.85	12.54	16.18	11.75	15.93	12.98	15.92	12.78	16.54
	0.20		0.27		0.74		1.54		1.11		0.68		0.64	
Punjab		14.24	13.67	14.33	14.50	14.17	14.56	14.15	19.57	14.21		14.27	15.96	14.22
		18.98	12.67	19.19	12.00	19.01	12.56	18.91	14.86	18.76		18.64	13.30	18.84
	0.00		0.68		0.49		1.80		2.05		0.00		0.87	
Rajasthan	14.82	14.28	14.92	14.14	14.83	14.17	14.78	14.19	14.93	14.05	15.33	14.26	14.88	14.16
	12.75	16.95	12.82	16.66	12.78	16.87	12.71	16.78	12.81	17.13	12.91	17.05	12.83	16.70
	19.22		16.52		20.37		18.00		15.88		17.89		17.40	
Tamil Nadu		14.06	16.00	14.09	15.00	14.23	13.50	14.11	17.25	14.14	15.20	14.17	15.69	14.10
		18.02	13.75	18.16	9.00	18.46	12.50	18.28	15.00	17.44	14.00	16.92	13.69	17.77
	0.00		0.75		0.22		0.38		0.86		1.51		0.47	
Tripura	13.17	13.53	13.33	13.53	13.67	13.74	14.23	13.97	14.21	13.66	14.45	14.33	14.09	13.67
	11.83	17.00	12.33	17.45	11.67	19.15	12.46	17.95	12.57	16.40	12.91	17.42	12.55	17.28
	4.48		3.75		2.78		8.55		13.59		13.10		6.19	
Uttar Pradesh	14.51	13.81	14.78	13.77	14.65	13.79	14.75	13.82	14.62	13.80	14.69	13.72	14.65	13.78
	12.84	17.03	12.78	17.10	12.98	16.88	12.99	16.83	12.74	16.69	12.66	16.70	12.81	16.79
	5.39		9.64		8.31		10.56		10.37		12.24		8.49	
West Bengal	13.45	13.32	13.51	13.36	13.56	13.52	13.58	13.59	14.00	13.37	13.84	13.46	13.69	13.39
	11.47	16.55	11.82	17.23	11.24	17.09	11.31	16.95	11.26	16.56	11.11	17.01	11.37	16.60
	7.36		7.60		11.32		18.67		26.19		26.25		12.82	

Notes: Data from NFHS-1 (1995). For each state, the first row contains average age at menarche, the second contains average age at first marriage, and the third contains the percentage of child brides (ever-married females who began cohabitation before reaching puberty). Columns "CB" present data for child brides; columns ("AB") present data for postpubescent brides; column "All" presents data for all ever-married females (ages 13–49).

Appendix B.

See Table B1.

Table B1
Variable Descriptions.

Variable	Description
Age:	
Cohort	Age group of which an individual used in our data is a member, scaled from 1 to 6 where: 1 = 23–26 years; 2 = 27–30 years; 3 = 31–34 years; 4 = 35–39 years; 5 = 40–44 years; 6 = 45–49 years. Data source: NFHS-1 (1995).
Birth year	Table 6: Bride's year-of-birth. Data source: REDS (1999). Table 8: Wife's year-of-birth. Data source: NFHS-1 (1995). Table 9: Average year-of-birth for individuals in a state. Data source: Census of India (1991).
Caste and Tribe:	
Other backward caste	Indicator variable that equals one if a bride's father belongs to other backward caste and zero if he does not. Data source: REDS (1999).
Scheduled caste	Table 6: Indicator variable that equals one if a bride's father belongs to a scheduled caste and zero if he does not. Data source: REDS (1999). Table 8: Indicator variable that equals one if an ever-married female belongs to a scheduled caste and zero if she does not. (NFHS-1 reports scheduled-caste status for household heads only. In constructing our data, we assign that status to every member of a household). Data source: NFHS-1 (1995).
Scheduled caste (%)	Percentage of individuals in a state-cohort who belong to a scheduled caste. Data source: NFHS-1 (1995).
Scheduled tribe	Table 6: Indicator variable that equals one if a bride's father belongs to a scheduled tribe and zero if he does not. Data source: REDS (1999). Table 8: Indicator variable that equals one if an ever-married female belongs to a scheduled tribe and zero if she does not. (NFHS-1 reports scheduled-tribe status for household heads only. In constructing our data, we assign that status to every member of a household). Data source: NFHS-1 (1995).
Scheduled tribe (%)	Percentage of individuals in a state-cohort who belong to a scheduled tribe. Data source: NFHS-1 (1995).
Upper caste	Indicator variable that equals one if a bride's father belongs to an upper caste and zero if he does not. Data source: REDS (1999).
Demographic Characteristics:	
Female education	Average years of schooling for ever-married women in a state-cohort. Data source: NFHS-1 (1995).
Daughter's education	Bride's number of years of schooling (including college). Data source: REDS (1999).
Husband alive	Indicator variable that equals one if bride's father is still alive at the time of the interview and zero if he is not. Data source: REDS (1999).
Husband's education	Number of years of schooling (including college) of a bride's father. Data source: REDS (1999).
Ln household income	Natural logarithm of a brides' parents' household income plus one (to ensure the variable is defined for all non-missing observations). Data source: REDS (1999).
Rural	Indicator variable that equals one if husband and wife live in a rural area and zero if they do not. Data source: NFHS-1 (1995).
Rural (%)	Percentage of individuals in a state-cohort who live in a rural area. Data source: NFHS-1 (1995).
Wealth	Average wealth of individuals in a state-cohort measured using the DHS-constructed "wealth index." This index is a composite measure of a household's cumulative living standard, calculated using data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities. For details on this index's construction, see: http://www.dhsprogram.com/topics/wealth-index/Index.cfm. (NFHS-1 reports a wealth-index value for households only. In constructing our data, we assign that value to every member of a household). Data source: NFHS-1 (1995). Table 8: Husband-wife household wealth, measured using DHS-constructed wealth index, as described above. Data source: NFHS-1 (1995).
Wife's education	Number of years of schooling (including college) of a bride's mother. Data source: REDS (1999).
Fertility:	
Dead daughters	Number of dead female children in a bride's parents' fertility history, as reported by her mother. Data source: REDS (1999).
Daughter's birth order	Bride's order of birth, as reported by her mother. Data source: REDS (1999).
Dead sons	Number of dead male children in a bride's parents' fertility history, as reported by her mother. Data source: REDS (1999).
Ideal fertility	Average ideal number of children for ever-married women in a state-cohort. Data source: NFHS-1 (1995).
Live children	Number of live children in a bride parents' fertility history at the time of interview, as reported by her mother. Data source: REDS (1999).
Unwanted daughters	Average of actual number of daughters minus ideal number of daughters divided by ideal number of daughters ([actual daughters − ideal daughters]/ideal daughters) for ever-married women with completed families in a state-cohort, where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. A family is completed if its wife wishes to have no more children or if its wife or husband is sterilized. Data source: NFHS-1 (1995).

Table B1 (*Continued*)

Variable	Description
Marriage:	
Child brides (%)	Percentage of ever-married women in a state-cohort whose age at menarche was strictly greater than their age at cohabitation with their first husband. Data source: NFHS-1 (1995).
Child-bride status	Indicator variable that equals one if a wife's age at first marital cohabitation with her husband was strictly greater than her age at menarche and zero it was not. Data source: NFHS-1 (1995).
Married daughter wed by age 13	Indicator variable that equals one if a couple's married daughter began marital cohabitation by age 13 and zero if she did not.
Post-pubescent female age at first marriage	Average age at first marital cohabitation for ever-married women whose age at menarche was less than or equal to their age at cohabitation with their first husband in a state-cohort. Data source: NFHS-1 (1995).
Two-stage marriage (%)	Percentage of ever-married women in a state-cohort whose marriage followed a two-stage process separating ritual and actual marriage (the latter marked by marital cohabitation). Data source: NFHS-1 (1995).
Religion:	
Buddhist	Indicator variable that equals one if a bride's father is Buddhist and zero if he is not. Data source: REDS (1999).
Christian	Table 6: Indicator variable that equals one if a bride's father is Christian and zero if he is not. Data source: REDS (1999). Table 8: Indicator variable that equals one if husband and wife are Christian and zero if they are not. (NFHS-1 reports religious affiliation for household heads only. In constructing our data, we assign that affiliation to every member of a household). Data source: NFHS-1 (1995).
Christian (%)	Percentage of individuals in a state-cohort who are Christian. Data source: NFHS-1 (1995).
Hindu	Table 6: Indicator variable that equals one if a bride's father is Hindu and zero if he is not. Data source: REDS (1999). Table 8: Indicator variable that equals one if husband and wife are Hindu and zero if they are not. (NFHS-1 reports religious affiliation for household heads only. In constructing our data, we assign that affiliation to every member of a household). Data source: NFHS-1 (1995).
Hindu (%)	Percentage of individuals in a state-cohort who are Hindu. Data source: NFHS-1 (1995).
Jain	Indicator variable that equals one if a bride's father is Jain and zero if he is not. Data source: REDS (1999).
Muslim	Table 6: Indicator variable that equals one if a bride's father is Muslim and zero if he is not. Data source: REDS (1999). Table 8: Indicator variable that equals one if husband and wife are Muslim and zero if they are not. (NFHS-1 reports religious affiliation for household heads only. In constructing our data, we assign that affiliation to every member of a household). Data source: NFHS-1 (1995).
Muslim (%)	Percentage of individuals in a state-cohort who are Muslim. Data source: NFHS-1 (1995).
Sikh	Table 6: Indicator variable that equals one if a bride's father is Sikh and zero if he is not. Data source: REDS (1999). Table 8: Indicator variable that equals one if husband and wife are Sikh and zero if they are not. (NFHS-1 reports religious affiliation for household heads only. In constructing our data, we assign that affiliation to every member of a household). Data source: NFHS-1 (1995).
Sikh (%)	Percentage of individuals in a state-cohort who are Sikh. (NFHS-1 reports religious affiliation for household heads only. In constructing our data, we assign that affiliation to every member of a household). Data source: NFHS-1 (1995).
Sex Ratios:	
Sex ratio at birth	Number of males born to ever-married women divided by number of females born to ever-married women, multiplied by 100, in a state-cohort. Data source: NFHS-1 (1995).
Traditional-marriage-age sex ratio	Number of males age 20–25 divided by number of females age 15–20, multiplied by 100, in a state. Data source: Census of India (1991).
Sexual Violence:	
Forced sexual act (%)	Percentage of ever-married women in a state-cohort who report having been forced to perform a sexual act by someone other than their former or current husband. Data source: NFHS-3 (2007).
Harassment (%)	Percentage of ever-married women in a state-cohort who report that unmarried girls are "sometimes" or "often" harassed in their communities. Data source: IHDS-1 (2007).
Son Preference:	
Ideal sons > Ideal daughters (%)	Percentage of ever-married women in a state-cohort whose ideal number of sons strictly exceeds their ideal number of daughters, where each child in a woman's ideal bundle toward whose sex she is indifferent is excluded. Data source: NFHS-1 (1995).
Ideal sons/Ideal children > 0.5 (%)	Percentage of ever-married women in a state-cohort whose ideal number of sons, excluding children in their ideal bundles toward whose sex they are indifferent, divided by their ideal number of children strictly exceeds one-half. Data source: NFHS-1 (1995).
Son preference	Average of ideal number of sons divided by ideal number of daughters for ever-married women in a state-cohort, where each child in a woman's ideal bundle toward whose sex she is indifferent is treated as 0.5 ideal sons and 0.5 ideal daughters. Data source: NFHS-1 (1995).
Son preference index	Average of a son-preference index in each state-cohort constructed by the authors, which assigns a value of 0 to ever-married women whose ideal number of sons is strictly less than their ideal number of daughters; a value of 1 to ever-married women whose ideal number of sons is equal to their ideal number of daughters; and a value of 2 to ever-married women whose ideal number of sons is strictly greater than their ideal number of daughters, in each case excluding children in women's ideal bundles toward whose sex they are indifferent. Data source: NFHS-1 (1995).

Table B1 (*Continued*)

Variable	Description
Women's Characteristics:	
Age at menarche	Average age at menarche for ever-married women in a state-cohort. Data source: NFHS-1 (1995).
Female contraceptive knowledge (%)	Percentage of ever-married women in a state-cohort who know of at least one modern or traditional contraceptive method. Data source: NFHS-1 (1995).
Female labor-force participation (%)	Percentage of ever-married women in a state-cohort who earn money from employment. Data source: NFHS-1 (1995).
Female media exposure (%)	Percentage of ever-married women in a state-cohort who are regularly exposed to mass media. A woman is considered regularly exposed to mass media if she watches television at least once per week, listens to radio at least once per week, or goes to the movie theatre at least once per month. Data source: NFHS-1 (1995).

References

Abramitzky, R., Delavande, A., Vasconcelos, L., 2011. Marrying up: the role of sex ratio in assortative matching. Am. Econ. J.: Appl. Econ. 3, 124–157.
Akbulut-Yuksel, M., Rosenblum, D., 2012. The Indian Ultrasound Paradox. IZA Discussion Paper No. 6273.
Allen, D.W., Lu, S.E., 2017. Matching, marriage, and children: differences across sexual orientations. Rev. Econ. Household 15, 527–547.
Allen, D.W., 1990. An inquiry into the state's role in marriage. J. Econ. Behav. Organ. 13, 171–191.
Anukriti, S., 2013. Sex Ratios, Schooling, and the Marriage Market in India, Unpublished Manuscript. Boston College.
Arnold, F., Parasuraman, S., 2009. The effect of ultrasound testing during pregnancy on pregnancy termination and the sex ratio at birth in India. In: Paper Presented at the XXVI International Population Conference, International Union for the Scientific Study of Population, Marrakech, Morocco.
Arnold, F., Choe, M.K., Roy, T.K., 1998. Son preference, the family-building process and child mortality in India. Popul. Stud. 52, 301–315.
Arnold, F., Kishor, S., Roy, T.K., 2002. Sex-selective abortions in India. Popul. Dev. Rev. 28, 759–785.
Arnold, F., 1997. Gender Preferences for Children. Demographic and Health Surveys, Comparative Studies No. 23.
Barcellos, S.H., Carvalho, L., Lleras-Muney, A., 2012. Child Gender and Parental Investments in India: Are Boys and Girls Treated Differently? NBER Working Paper No. 17781.
Becker, G.S., Murphy, K.M., 1988. The family and the state. J. Law Econ. 31, 1–18.
Becker, G.S., 1973. A theory of marriage: part I. J. Political Econ. 81, 813–846.
Becker, G.S., 1974. A theory of marriage: part II. J. Political Econ. 82, S11–S26.
Becker, G.S., 1991. A Treatise on the Family. Harvard University Press, Cambridge.
Bergstrom, T.C., Bagnoli, M., 1993. Courtship as a waiting game. J. Political Econ. 101, 85–202.
Bergstrom, T.C., Schoeni, R., 1996. Income prospects and age at marriage. J. Popul. Econ. 9, 115–130.
Bhakat, P., 2013. An analysis of abortion laws and sex selective abortion in India: a case study of Rajasthan. World Academy of Science. Eng. Technol. 7, 1827–1833.
Bhakhri, B.K., Prasad, M.S., Choudhary, I.P., Biswas, K., 2010. Delayed puberty: experience of a tertiary care centre in India. Ann. Trop. Paediatr. 30, 205–212.
Bhalotra, S., Cochrane, T., 2010. Where Have All the Young Girls Gone? Identification of Sex Selection in India IZA. Discussion Paper No. 5381.
Bhanji, S.M., Punjani, N.S., 2014. Determinants of child (early) marriages among young girls: a public health issue. J. Women's Health Care 3, 3.
Brainerd, E., 2007. Uncounted Costs of World War II: the Effect of Changing Sex Ratios on Marriage and Fertility of Russian Women. Unpublished Manuscript. Williams College.
Brinig, M.F., 1990. Rings and promises. J. Law Econ. Organ. 6, 203–215.
Brinig, M.F., 2007. Economics of Family Law, vol. 2. Edward Elgar, Cheltenham, UK.
Cave Browne, J., 1857. Indian Infanticide, Its Origin, Progress and Suppression. W. H. Allen & Co., London.
Census of India, 1991. General Population Tables (A-Series) and Social and Cultural Tables (C-Series). Office of the Registrar General and Census Commissioner, India, New Delhi.
Census of India, 2001. Data Highlights: Migration Tables (D-Series). Office of the Registrar General and Census Commissioner, India, New Delhi.
Chakraborty, T., Kim, S., 2010. Kinship institutions and sex ratios in India. Demography 47, 989–1012.
Clark, S., 2000. Son preference and sex composition of children: evidence from India. Demography 37, 95–108.
Cleland, J., Verrall, J., Vaessen, M., 1983. Preferences for the Sex of Children and Their Influence on Reproductive Behavior. World Fertility Survey, Comparative Studies No. 27.
Cohen, L., 1987. Marriage, divorce, and quasi rents; or: 'I gave him the best years of my life.'. J. Legal Stud. 16, 267–303.
Coles, M.G., Francesconi, M., 2011. On the emergence of toyboys: the timing of marriage with aging and uncertain careers. Int. Econ. Rev. 52, 825–853.
Díaz-Giménez, J., Giolito, E., 2013. Accounting for the timing of first marriage. Int. Econ. Rev. 54, 135–158.
DHS, 1990–1999. Demographic and Health Surveys (various) [Datasets]. Calverton, MD: ICF International [Distributor].
DHS-Bangladesh, 1994. Bangladesh Demographic and Health Survey, 1993–1994 [Dataset]. Calverton, MD: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International Inc. [Producers]. ICF International [Distributor].
Dalmia, S., Lawrence, P.G., 2005. The institution of dowry in India: why it continues to prevail. J. Dev. Areas 38, 71–93.
Das Gupta, M., Bhat, P.N.M., 1997. Fertility decline and increased manifestation of sex bias in India. Popul. Stud. 51, 307–315.
Das Gupta, M., Zhenghua, J., Bohua, L., Zhenming, X., Chung, W., Hwa-Ok, B., 2003. Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea. J. Dev. Stud. 40, 153–187.
Das Gupta, M., 1987. Selective discrimination against female children in Punjab, India. Popul. Dev. Rev. 13, 77–100.
Goli, S., Singh, D., Sekher, T.V., 2013. Exploring the myth of mixed marriages in India: evidence from a nation-wide survey. J. Comp. Family Stud. 44, 193–206.
Grossbard, S., 2015. Sex ratios, polygyny, and the value of women in marriage—a Beckerian approach. J. Demogr. Econ. 81, 13–25.
Grossbard, S.A., 2016. The Economics of Marriage. Edward Elgar, Cheltenham, UK.
Gupta, B., 2014. Where have all the brides gone? Son preference and marriage in India over the twentieth century. Econ. Hist. Rev. 67, 1–24.
Hamilton, G., Siow, A., 2007. Class, gender, and marriage. Rev. Econ. Dyn. 10, 549–575.
Howard, S., 2012. India : the Orphanage Giving Girls a Future. Telegraph, June 11.
Hui, L., Blanchard, B., 2014. China's Unwanted Babies Once Mostly Girls, Now Mostly Sick, Disabled. Reuters, February 3.
IHDS-1, 2007. India Human Development Survey [Computer file]. ICPSR22626-v1. University of Maryland and National Council of Applied Economic Research, New Delhi [producers]. Ann Arbor : Inter-University Consortium for Political and Social Research [distributor].
Islam, M.N., Ahmed, A.U., 1998. Age at first marriage and its determinants in Bangladesh. Asian-Pac. Popul. J. 13, 73–92.
Jayachandran, S., Kuziemko, I., 2011. Why do mothers breastfeed girls less than boys? Evidence and implications for child health in India. Q. J. Econ. 26, 1485–1538.
Johnson, K., 1993. Chinese orphanages: saving China's abandoned girls. Aust. J. Chin. Affairs 30, 61–87.

Kamal, S.M.M., Hassan, C.H., 2015. Child marriage and its association with adverse reproductive outcomes for women in Bangladesh. Asia Pac. J. Public Health 27, NP1492–NP1506.
Kamal, S.M.M., Hassan, C.H., Alam, G.M., Ying, Y., 2015. Child marriage in Bangladesh: trends and determinants. J. Biosoc. Sci. 47, 120–139.
Kamal, S.M.M., 2011. Socio-economic determinants of age at first marriage of the ethnic tribal women in Bangladesh. Asian Popul. Stud. 7, 69–84.
Khanna, S.K., 1997. Traditions and reproductive technology in an urbanizing north Indian village. Soc. Sci. Med. 44, 171–180.
Klaus, D., Tipandjan, A., 2015. Son preference in India: shedding light on the North-South gradient. Comp. Pop. Stud. 40, 77–102.
Kulin, H.E., Bwibo, N., Mutie, D., Santner, S.J., 1982. The effect of chronic childhood malnutrition on pubertal growth and development. Am. J. Clin. Nutr. 36, 527–536.
Leeson, P.T., Pierson, J., 2016. Prenups. J. Legal Stud. 45, 367–400.
Miller, B.D., 1987. Female infanticide and child neglect in rural North India. In: Scheper-Hughes, N. (Ed.), Child Survival: Anthropological Perspectives on the Treatment and Maltreatment of Children. D. Reidel Publishing, Boston, pp. 95–112.
Mitra, A., 2014. Son preference in India: implications for gender development. J. Econ. Issues 48, 1021–1037.
Mutharayappa, R., Choe, M.K., Arnold, F., Roy, T.K., 1997. Son Preference and Its Effect on Fertility in India. National Family Health Survey, Subject Reports No. 3.
NFHS-1, 1995. National Family Health Survey (MCH and Family Planning), India 1992-93 [Dataset]. Bombay: International Institute for Population Sciences [Producers]. ICF International [Distributor].
NFHS-3, 2007. National Family Health Survey (NFHS-3), 2005–06: India: Volumes I and II [Dataset]. Mumbai: International Institute for Population Sciences and Macro International [Producers]. ICF International [Distributor].
Nour, N.M., 2006. Health consequences of child marriage in Africa. Emerg. Infect. Dis. 12, 1644–1649.
Nour, N.M., 2009. Child marriage: a silent health and human rights issue. Rev. Obstet. Gynecol. 2, 51–56.
Oster, E., 2009. Proximate causes of population gender imbalance in India. Demography 46, 325–339.
Palmert, M.R., Boepple, P.A., 2001. Variation in the timing of puberty: clinical spectrum and genetic investigation. J. Clin. Endocrinol. Metab. 86, 2364–2368.
Pande, R.P., Astone, N.M., 2007. Explaining son preference in rural India: the independent role of structural versus individual factors. Popul. Res. Policy Rev. 26, 1–29.
Pande, R., Malhotra, A., 2006. Son Preference and Daughter Neglect in India: What Happens to Living Girls? ICRW, Washington, DC.
Posner, R.A., 1980. A theory of primitive society, with special reference to law. J. Law Econ. 23, 1–53.
REDS, 1999. Rural Economic and Demographic Survey, 1999 [Dataset]. New Delhi : National Council of Applied Economic Research [Producers].
Retherford, R.D., Roy, T.K., 2003. Factors Affecting Sex-selective Abortion in India and 17 Major States. National Family Health Survey, Subject Reports No. 21.
Rose, E., 1999. Consumption smoothing and excess female mortality in India. Rev. Econ. Stat. 81, 41–49.
Rosenzweig, M., Schultz, P., 1982. Market opportunities, genetic endowments, and intrafamily resource distribution: child survival in rural India. Am. Econ. Rev. 72, 803–815.
Roy, T.K., 2008. Determinants of early marriage in Rajshahi, Bangladesh. Pak. J. Soc. Sci. 5, 606–611.
Russell, B., 2007. The Mystery of China's Orphans. New York Times, February 1.
Saravanan, S., 2002. Female infanticide in India: a review of the literature. Soc. Change 32, 58–66.
Sarkar, A., 2013. Age of marriage of women in society: cultures, religions, and law. In: Paper Presented at the LV Annual Conference of the Indian Political Science Association, Hyderabad, India.
Savitridina, R., 1997. Determinants and consequences of early marriage in Java, Indonesia. Asia-Pac. Popu. J. 12, 25–48.
Sekher, T.V., Hatti, N., 2005. Discrimination of female children in modern India: from conception through childhood. In: Paper Presented at the XXV International Population Conference, International Union for the Scientific Study of Population, Tours, France.
Siow, A., 1998. Differential fecundity, markets, and gender roles. J. Political Econ. 106, 334–354.
Soliman, A., De Sanctis, V., Elalaily, R., 2014. Nutrition and pubertal development. Indian J. Endocrinol. Metab. 18, S39–S47.
South, S.J., Trent, K., 1988. Sex ratios and women's roles: a cross-national analysis. Am. J. Sociol. 93, 1096–1115.
Sudah, S., Rajan, S.I., 1999. Female demographic disadvantage in India 1981–1991: sex-selective abortions and female infanticide. Dev. Change 30, 585–618.
Tarozzi, A., Mahajan, A., 2007. Child nutrition in India in the nineties. Econ. Dev. Cult. Change 55, 441–486.
Thurston, A., 1996. In a Chinese Orphanage. Atlantic Monthly, April.
Vanneman, R., Desai, S.B., Vikram, K., 2012. Son preference in India. In: Paper Presented at the Annual Meeting of the Population Association of America, San Francisco, CA.
Williamson, N.E., 1976. Sons or Daughters: A Cross-Cultural Survey of Parental Preferences. Sage Publications, Beverly Hills.
Wilson, J., 1855. History of the Suppression of Infanticide in Western India. Smith, Taylor, and Co., Bombay.
World Bank, 2014a. Gender Statistics Online Database, Available at: http://data.worldbank.org/data-catalog/gender-statistics.
World Bank, 2014b. World Development Indicators Online Database, Available at: http://data.worldbank.org/data-catalog/world-development-indicators.