Son Preference, Family Composition and Women's Reproductive Choices in Madhya Pradesh, India

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The effect of son preference on demographic behavior is a long-standing topic of interest to demographers and social scientists. Research in this area has concentrated primarily on two main aspects of the potential social and demographic consequences of son preference. The first has mainly addressed distortions in sex ratios and indications of sex-selective abortion, excess female child mortality, and other forms of female disadvantage in child health and nutrition. [1] The second set of concerns center around the potential for son preference to contribute to a stall in fertility declines and decreases in contraceptive use. This literature has focused mainly on the ways in which gender preferences shape reproductive choices, particularly those related to delaying or preventing childbirth. In this paper, we focus on the latter of these two areas, exploring the role of sex preference in shaping women's fertility desires, use of both permanent and temporary contraception, and abortion behavior.

While there is a large literature on the effects of son preference on reproductive behavior, authors typically focus on individual aspects of this relationship (Bairagi 2001). However, women are likely to consider multiple decisions around reproductive and family formation choices at the same time, such that one decision is influenced by another. Also, it is increasingly becoming clear that women may have preferences not just for sons, but also for a balanced family composition and for an ideal total number of children. Thus, how a woman shapes her childbearing can depend not just on whether she wants sons, but also on how many children she already has, of what gender, and how many more she wants.

[1] As this paper focuses on reproductive choices, the rest of this section reviews literature related to those choices, and not gender discrimination in health or mortality among children.

Our paper addresses these issues by exploring the dynamics of son preference, family composition preferences, and several reproductive choices of married women in Madhya Pradesh, India. We take advantage of an unusually detailed dataset including information on each pregnancy women have experienced in their lifetimes to examine the effect of son preference and family composition preference on the likelihood of wanting a subsequent birth; using temporary methods of contraception; attempting an abortion; and opting for sterilization. Thus, in contrast to much of the prior research in this area, we examine a wide range of options women may exercise over their reproductive life to meet their preferences regarding the sex and numeric composition of their children.

LITERATURE REVIEW

A preference for sons has been documented in numerous countries throughout South and East Asia (Bairagi 2001; Banister 2003; Haughton and Haughton 1995; Hussain, Fikree and Berendes 2000; Leone, Matthews and Dalla Zuanna 2003; Pande and Astone 2007; Park and Cho 1995; Retherford and Roy 2003) as well as elsewhere in the world (e.g. in Egypt, see Yount, Langsten and Hill 2000). In an early global review of the topic, Williamson (1976) identified most countries in Asia as having strong to very strong son preference relative to other regions, a conclusion largely confirmed by more recent research (Arnold 1992).

Within South Asia, son preference is a long-standing feature of Indian society, with references to it in religious texts as far back as 800 B.C. (Atharva Veda, Book VII, verse 11, translation by Bloomfield 1897). Studies describe the persistence of son

preference to-date (Mishra, Roy and Retherford 2004), the determinants of son preference (Pande and Astone 2007), and fertility and mortality consequences of a persistent preference for sons (Clark 2000; Das Gupta 1987; Pande 2003). Son preference in India arises from the perceived economic, social, and religious utility of sons compared to daughters. Parents of girls are typically socially bound to find suitable husbands for their daughters at an early age, often pay all marriage costs, and provide a dowry; social norms dictate that parents cannot expect much emotional or economic support from married daughters. On the other hand, parents expect sons to provide financial and emotional care and regard them as a "social security" for old age; inheritance laws largely favor sons; and, sons perform important religious roles, ensure the continuation of the family lineage, and may be desired to increase a family's capacity to defend itself or to exercise power (Dyson and Moore 1983; Kishor 1995; Pande and Astone 2007).

At the same time, research shows that co-existing with son preference is a desire for a balanced sex composition, with parents often preferring a composition including one daughter along with at least one son (Pande 2003; Scrimshaw 1978). In much of India, the preferred family sex and size composition is often two sons and one daughter, where the daughter is seen to provide important religious, social or emotional value (Dharmalingam 1996; Dharmalingam and Morgan 1996; Mutharayappa et al. 1997; Williamson 1976). However, while families may want one daughter for a balanced family composition, very few want more than one daughter while most families definitely want at least one son (International Institute for Population Sciences (IIPS) and Macro 2000; Pande and Astone 2007). The persistence of son preference, its co-existence with

desires for a balanced family composition, and a growing small family norm mean that parents may be increasingly proactive in their reproductive behaviors to achieve their desired family size and sex composition. This clearly has implications for sex ratios, fertility and reproductive choices, as detailed below.

Sex ratios: Unusually skewed sex ratios have been documented in China, India, and elsewhere in Asia for several decades.[2] In India, over the hundred year period from 1901 to 2001 the census population sex ratios (expressed in India as the number of women per 1000 men) have shown more or less a continuous deterioration, from 972 females per 1000 males in 1901 to 933 females per 1000 males in 2001 (Banthia 2001:p3). This has been accompanied by increasingly skewed sex ratios at birth in many parts of the country. Chinese and Korean studies have also described an increasingly male sex ratio at birth, notably in the last two decades (Banister 2004; Park and Cho 1995). These highly skewed sex ratios at birth are nearly universally taken as a signal that son preference is modifying fertility behavior (Bairagi 2001; Jha et al. 2006; Leone et al. 2003; Park and Cho 1995; Unisa, Pujari and Usha 2005).

Studies also find evidence that distorted sex ratios at birth now occur earlier in the family formation process than ever before, signaling a combination of persistent son preference with a newly emerging desire for a smaller overall family size. In Korea in 1984, the birth order specific sex ratio at birth did not increase sharply until between the third and fourth births (from 107.5 to 118.5). In 1992, the increase occurred at birth order two, with the sex ratio at birth climbing from 106.4 to 112.8 by birth order two (Park and

[2] While sex ratios in much of the world are described as male:female, in India they are described as female: male.

Cho 1995). In China Banister (2004) similarly found an increase in the sex ratio at birth at first births in more recent years, compared to second or third births two decades ago. The pattern observed in India and Nepal is somewhat different, reflecting slower fertility decline than in Korea or China, such that large distortions in sex ratios at birth do not occur until birth order three or four (Jha et al. 2006; Leone et al. 2003; Retherford and Roy 2003).

Research also shows that birth order specific sex ratios at birth differ by the sex composition of children already born. Sex ratios at birth within families in China and Korea rise with parity such that families with more children are disproportionately composed of largely female children, suggesting that parents continue to bear children till they reach their desired number of sons (Banister 2004; Park and Cho 1995). Using data from the NFHS-2, Retherford and Roy (2003) find a similar picture: Indian women who do not have a son have a higher sex ratio at birth (1.10 for second order births and 1.13 for third order births) than women with one living son at these birth orders.

Jha et al (2006) provide evidence that parents may want a daughter after they have sons but typically do not want more than one daughter, a preference which can differentially affect sex ratios at birth depending on the sex composition of surviving children. In their analysis, at birth order two the sex ratio at birth (female:male) for families with one son is 1,102 females per 1000 males, while families with one daughter have a much more skewed sex ratio of 759 females per 1,000 males. At birth order three, the difference is even starker, with a sex ratio of 1,176 females per 1,000 males among families with two sons and no daughters, versus 719 per 1,000 males for families with no sons and two daughters. These findings echo other research that suggests that parents

ideally want two or three children, of which one or two are sons and one is a daughter, and that the discriminatory choices they make aim for that sex and size composition (Das Gupta 1987; Pande 2003; Pande and Astone 2007).

Fertility: There is ample evidence that son preference can slow fertility decline, as couples bear children until they have sufficient boys (Clark 2000; Das Gupta and Bhat 1997; Leone et al. 2003). Studies in Bangladesh, Nepal and Vietnam attribute an increase of six to twelve percent in fertility to son preference (Bairagi 2001; Haughton and Haughton 1995; Leone et al. 2003).

As with sex ratios, the influence of son preference on fertility can be modified by the sex composition of surviving children such that women continue childbearing until at least one male child is born. Studies in India, China, Bangladesh and Nepal found that women who had only one or two daughters and no sons had notably higher fertility than women who had sons (Bairagi 2001; Jha et al. 2006; Leone et al. 2003; Poston 2002; Rahman and DaVanzo 1993). Studies in Korea and Nepal found a shorter waiting time to conception and higher parity progression ratios for women with no sons compared to those with no daughters (Larsen, Chung and Das Gupta 1998; Leone et al. 2003). Other studies find that while son preference may influence women's desire for additional children, it may not affect actual fertility behavior. Thus, in Pakistan, the sex of the previous child was a significant predictor of whether women wanted another child, but was not significantly associated with an actual subsequent birth (Hussain et al. 2000).

When son preference does influence fertility, there are several alternative ways in which women can act to achieve their wanted sex and size composition of children. They

can either delay or space births using temporary methods of contraception, they can resort to sex-selective or non-sex-selective abortion, or – once they have reached their desired family sex composition – they can stop childbearing by getting sterilized. The picture is further complicated by issues of access. Several studies contend that the presence of son preference by itself is not sufficient to induce modifications to reproductive behavior unless technologies, such as modern contraception, abortion services, and prenatal diagnostic techniques, are present to translate that preference into behavior (Banister 2004; Mari Bhat and Zavier 2005; Poston 2002; Retherford and Roy 2003).

Contraception: It is unclear whether son preference influences contraceptive use. Studies in Bangladesh and Egypt found that son preference exerted only a modest effect on overall contraceptive rates (Bairagi 2001; Yount et al. 2000). On the other hand, the effect of son preference appears to be much greater in Nepal: using data from the Nepal Demographic and Health Survey, Leone et al (2003) found that son preference was responsible for a 24% decrease in the contraceptive prevalence rate.

Studies are more consistent in reporting differences in contraceptive use by parity and sex composition. Research suggests that couples do not use contraception and continue childbearing until a son, or a threshold number of daughters, is born. Studies in Bangladesh found that the percent of women using contraception increased with parity and, within parities, with the number of sons (Bairagi 2001). Women with sons at parities one through three were significantly more likely to use contraception than those with girls only, and contraceptive use was highest (67.6%) among couples with two sons and one daughter (Khan and Khanum 2000). In Pakistan, where the average first use

occurs only at the third parity in any case, contraceptive use was highest when there was a combination of at least one boy and no more than two girls (Hussain et al. 2000). Analysis of contraceptive use by sex composition in Nepal showed the greatest differences by sex composition at the third parity: 44-49% of women with two-three sons used contraception as compared to only 3% of women with three girls and no sons (Leone et al. 2003). Similarly, Yount et al (2000) found in Egypt that families with no sons had lower odds of using contraception than families with sons.

Sterilization: The above studies do not differentiate between the use of temporary methods of contraception and sterilization. A study in Nepal, where sterilization is a predominant form of contraception, found that the proportion that had stopped childbearing was much higher among women whose last child was a boy (64%) than among women whose last child was a girl (37%). These proportions were even starker at 17% for women with three sons as compared to 3% who had three daughters (Leone et al. 2003). Another study in Malaysia concluded that having one or more sons "induces parents to adopt more effective or permanent methods of birth control" (Pong 1994). On the other hand, parity-wise analysis in Pakistan found that it is a combination of consideration of sex and number of children that matters: women stopped childbearing when they had at least one son or had three daughters, whether or not a son was born (Hussain et al. 2000).

Abortion: Studies in China and Korea have found evidence of sex-selective abortion. Banister (2004) examines sex ratios at birth and age-specific sex ratios at death to

conclude that sex-selective abortion is a primary cause for China's shortage of girls. Additionally, changes in sex ratio at birth increasingly occurs at early birth orders, suggesting that sex-selective abortion is being used not just to get sons but to do so while maintaining a smaller family size. Park and Cho (1995) find in Korea that sex-selective abortion is a likely cause of increased sex ratios at birth in small families and among first born children.

Evidence from India suggests that high son preference may not translate into sex-selective abortion where such technology is not easily available, such as in the poorer states of northern India or for poorer households. The propensity to use sex-selective abortion was found to increase with socioeconomic status, such that it was strongest among urban women, women with middle school or higher education, and women living in households with a high standard of living (Retherford and Roy 2003). Others also have concluded that while the use of sex-selection techniques was contingent on having had a previous birth but no sons (termed a "male-selection scenario"), their actual use was largely a function of greater access among higher educated and wealthier women (Mari Bhat and Zavier 2005).

Abortion may be used more generally to manipulate reproduction to achieve desired sex and family size composition, for instance when contraception is either not accessible or acceptable. In Bangladesh, an analysis by parity and sex composition demonstrated that abortion overall was higher among families with two sons than those of equal size who had no sons(Bairagi 2001). The author suggests that there are few indications of the practice of sex-selective abortion specifically; rather, fertility was

continued until a desired sex composition was achieved, and abortion was used to limit family size at that point.

These studies provide clear evidence for the effect of son preference on reproductive choices in a variety of social and cultural settings. However, the choices women make also factor in their preferences for total family size and a desire for some balance in the sex composition such that there is one daughter, but usually no more than one girl. What is less clear is the preferred reproductive action that women choose from among a possible array of choices. Are women more likely to abort, sterilize or use temporary contraception to achieve their desired family size and sex composition? What choices do they make at less-than-ideal sex and size composition of families? How does each sex-and-size composition affect 'wantedness' itself in terms of a woman's desire to have an additional child? This paper addresses these questions by simultaneously examining the effect of son preference and family composition on multiple reproductive choices among a single sample of women through their reproductive life.

SETTING

The setting for this study is Madhya Pradesh, one of India's poorest states. With a population of 60 million people, about three-quarters of which reside in rural areas, Madhya Pradesh is characterized by high fertility rates, limited infrastructure, and a history of underdevelopment (International Institute for Population Sciences (IIPS) and Macro 2001; Office of the Registrar General 2001). The overwhelming majority of the population relies on agriculture for their livelihood, with industrial production being

largely confined to urban areas and their surroundings. Agricultural production is based primarily on traditional techniques, resulting in relatively low productivity. As a result, almost half of the population lived below the government poverty line in 1993-1994 (Central Statistical Organization 1999).

Madhya Pradesh also lags behind the majority of other Indian states in terms of demographic behavior. Survey data in 1998-1999 found that the total fertility rate for the state was 3.3, considerably above the national level of 2.9 (International Institute for Population Sciences (IIPS) and Macro 2001). As is the case for rural India as a whole, the predominant method for fertility control is female sterilization, with 44 percent of women aged 15-49 reporting being sterilized, while only 7.3 percent reported using a modern spacing method (International Institute for Population Sciences (IIPS) 2007). Madhya Pradesh also has a long history of son preference that has become more prominent in recent decades. The 2001 census found that the population sex ratio (the ratio of females to males) was 919 (Registrar General & Census Commissioner 2007), falling from 931 in 1991 and 941 in 1981 (International Institute for Population Sciences (IIPS) and Macro 2001). Women were much more likely to report wanting more children when they only had female children, with survey data from 1998-1999 finding that approximately 80 percent of those with two daughters and no sons reporting wanting to continue with their fertility, compared with 22 percent of those with two sons and no daughters (International Institute for Population Sciences (IIPS) and Macro 2001).

DATA AND ANALYTICAL APPROACH

The data used for this study come from a survey conducted in 2002 of 2,444 married women between the ages of 15 and 39 with at least one child in both rural and urban areas of Madhya Pradesh[3]. Data was collected using a mixed-methods approach, with an innovative "narrative" life story technique, more commonly used in qualitative approaches, was used to elicit details on sensitive topics, including contraceptive use and experience with abortion (for more detail, see Malhotra et al. 2002) Information collected at the time of the survey included basic demographic characteristics, educational and occupational experience, a range of variables designed to measure female autonomy, household characteristics, knowledge on the legal status of abortion, knowledge and attitudes about contraception, and physical access to abortion services.

In addition to cross-sectional information on women's characteristics at the time of the survey, detailed retrospective information was collected on each of the pregnancies women had experienced in their lifetime using a pregnancy calendar. Women were asked a series of questions for each pregnancy they had experienced since marriage, including pregnancy-specific information on fertility preferences, contraceptive use, work experience, living arrangements, whether any attempts were made to terminate the pregnancy, experience with domestic violence, women's autonomy and a range of household level variables. This resulted in a dataset including information on 9,127 individual pregnancy intervals with a known outcome.

[3] Respondents were selected through stratified cluster sampling, with one district randomly selected from six geographic regions. Ten primary sampling units (PSU) were selected in each district through probability proportional to size sampling, with purposeful oversampling of urban areas to ensure sufficient cases for the analysis of rural-urban differences. The sample was restricted to one eligible woman per household, with a random selection of the eligible woman from households with more than one eligible woman.

These data are particularly well suited to an analysis of the importance of sex preference for reproductive behavior. The availability of pregnancy-specific data allows for the construction of more complex measures of the social and demographic environment within which reproductive decision-making takes place. In addition, much more information is available on pregnancies that did not end in a live birth, such as those where an abortion was performed, than is typically the case in most of the datasets used to explore this issue. As a result, we are able to explore in greater detail a wider range of reproductive outcomes, including abortion.

We use this information to model a range of reproductive choices that women made in each pregnancy interval, focusing specifically on the role of the sex composition of surviving children in shaping the decisions women reach. We begin by estimating the likelihood of a woman reporting that she wanted a given pregnancy at the beginning of the pregnancy interval (i.e. either immediately following marriage or the resolution of the prior interval). We then estimate separate models for each of the key reproductive choices women make in a given pregnancy interval: whether to use temporary contraceptive methods, whether to use a permanent method, and whether to have an abortion once conception has occurred[4]. Together, these analyses provide a much more comprehensive picture of reproductive behavior than is typical in the literature in this area.

The dependent variable in each of the four models is a dichotomous variable indicating whether a woman either reported wanting another pregnancy at the onset of the

[4] The decision to use temporary and permanent methods cannot be modeled together, for a variety of reasons. In addition to the substantial differences between these two options in terms of the decision-making process (sterilization represents a clear intention to permanently limit fertility, while use of temporary methods does not), the two decisions are endogenous (see Rindfuss etal, 1996).

pregnancy interval; whether she used temporary contraceptive methods in the interval, either traditional or modern; whether she was sterilized in the interval; and whether she attempted an abortion the interval[5]. An overwhelming majority of women reported wanting to have a birth in intervals in which they had no surviving children. As a result, we restrict the analysis of 'wantedness' to those women with at least one child. Because use of contraception and abortion was extremely rare in intervals where women had no children, we restrict the analyses of these to only those intervals in which the women had at least one surviving child at the beginning of the interval and was not sterilized during the interval[6]. The analysis of sterilization decisions is restricted to those intervals in which the women had at least two surviving children at the start of the interval, as virtually no women were sterilized prior to reaching this parity. Following the exclusion of intervals with missing values on any of the variables used in the analyses, 8,476 pregnancy intervals were used for the analysis of the 'wantedness' of the pregnancy, 7,589 for the analysis of temporary method use, 7,610 for the analysis of abortion attempts, and 5,378 for the analysis of permanent method use. The statistical model used is a logistic regression of the form:

$$\Pr(y_i = 1|x_i) = \frac{\exp(x_i\beta)}{1+\exp(x_i\beta)}$$

[5] Our definition of abortion attempt is broader than in most other research in this area, including as abortion attempts methods as varied as carrying particularly heavy loads, eating particularly spicy food, and taking birth control pills. This reflects our focus on the intent of the woman, rather than the effectiveness of her method choice.

[6] The sterilization decision appears to be very different from either the decision to use contraception or attempt abortion, with very few women attempted abortion or used temporary contraception in the intervals where they were sterilized.

where $\Pr(y_i=1|x_i)$ is the probability of observing outcome 1, given the vector x_i of interval-specific individual, household, and community level variables. Parameter estimates are obtained with maximum likelihood procedures, using the Huber/White/Sandwich robust estimate of variance technique available in Stata to correct for the effect of the sample design and the potential contribution of multiple pregnancy intervals to the dataset by individual women.

The selection of the independent variables included in these analyses is guided by a number of substantive and methodological considerations. The key independent variable in our analyses measures the sex composition of a woman's surviving children at the beginning of the interval. To capture the complexity of the effect this has on reproductive outcomes, we created an eight category sex composition variable, including the following combinations: one girl child only, one boy child only, two daughters only, two sons only, one girl and one boy, one girl and two boys, two girls and one boy, and an 'other' category including the remaining possible combinations of boys and girls[7]. Based on existing research in India suggesting that parents prefer a mixed sex composition with at least one boy, we expect women to be more likely to wish to continue their fertility if they have either 'one girl only' or 'two girls only'.

We also control for a number of the characteristics of the woman and her household. The woman's characteristics we include are: her age at the beginning of the interval (measured in years), her education level, four measures of relative empowerment within her marital relationship and household (the consummate age at marriage, whether she had experienced domestic violence in prior intervals, whether she had worked for pay

[7] Because the sterilization analyses includes only those women with two surviving children at the start of the interval, this analysis does not include the 'one girl only' and 'one boy only' categories.

outside the household in prior intervals, and whether she faced any restrictions on her mobility), and the total number of surviving children she had at the beginning of the interval. While we expect that older, more educated, and empowered women will be more likely to be able to act on their reproductive preferences, the implications of these for reproductive behavior are unclear, as these women may or may not be more likely to have a strong preference for sons. Additional control variables included in the models that are specific to the woman include her religion, caste, and whether she resided in a rural or urban area, all of which were measured at the time of survey.

We also control for a number of additional variables related to the social and economic context within which women make their reproductive decisions. At the household level, we include whether the household had problems meeting expenses in the interval, and whether the household included more than one generation of adults (typically her in-laws). We expect that women from poorer households will be more likely to want additional births, partly because these women are more likely to be members of agricultural communities, and are therefore less likely to take measures to avoid births. The presence of older adults in the household is also expected to increase the pressure for women to continue childbearing, particularly in cases where women do not yet have male children. To capture this more directly, we also control for whether the woman reported feeling pressure from her in-laws to have an additional child. Finally, we control for the husband's education level and whether the woman reported that he wanted an additional birth or not. With the exception of the husband's desire for additional children, these variables are included in each of the models[8].

[8] The model examining whether women wanted an additional birth excludes husband's desires due to the high correlation (0.73) between the reported desires of women and their husbands.

The descriptive statistics for the variables used in these analyses are shown in Table 1. Because the characteristics of the 'wantedness', use of temporary contraception, and abortion samples are very similar, we present these together as a group containing all intervals with 'one or more children'. The descriptive statistics for the sample used for the analyses of sterilization are presented under the heading 'two or more children'. These statistics reinforce the poor situation of women in this region. In most of the intervals in the data, women had no education, a minority had ever worked outside the home, and many faced significant restrictions on their mobility. Women also reported having ever experienced domestic violence in roughly half of all intervals in the dataset. Women in intervals where they had two or more children were somewhat less likely to report severe restrictions on their mobility and more likely to report working outside the home, probably because the women in these intervals were on average somewhat older and had more surviving children.

The relationship between the composition of children and the subsequent desire for children empirically due to the endogenous relationship that may exist between these processes. Individuals may have higher numbers of children because they have an underlying preference for greater numbers of children. Research in this area has tried to deal with this through the use of statistical techniques based on the use of a variety of instruments as identifying variables, with varying degrees of success. In this case, finding effective instruments is extremely difficult, as these processes are determined by the same set of underlying social, economic, and demographic variables. As a result, we do not attempt to correct statistically for this, but rather take it into account when discussing the relationships between desires and the current sex composition of children.

RESULTS

Table 2 presents results from the final multivariate logit models for the four outcome variables of interest. The unit of analysis, as mentioned earlier, is birth interval. Model 1 presents the independent effect of each explanatory variable on the probability of a child being wanted in a particular birth interval. Model 2 presents the effects for the probability that any temporary contraceptive method was used in an interval; in Model 3 we examine the relationship of our explanatory variables to the likelihood of an abortion attempt in an interval; and, finally, in Model 4 we show the effects for the probability that the woman or her partner were sterilized in a particular interval.

Effect of son and family composition preference on reproductive choices

The coefficients on the variables for combinations of surviving daughters and sons at the start of each interval show the effect of each family composition category on the odds of the various reproductive choices that women make in that interval. The results are strongest – in terms of statistical significance and coefficient size – for wantedness (Model 1) and sterilization (Model 4).

The coefficients in Model 1 suggest that two girls and no boys (the reference category) is the least preferred combination of children. At every other combination of children at the start of an interval, women are less likely to want another child in that birth interval than is the case for two daughters. However, that women may want at least one daughter is evident in that the most preferred combination seems to be one girl and

two boys. Women who have one daughter and two sons at the start of an interval are least likely to say they want another child in that interval (OR=0.160).

The large positive odds in Model 4 for every category of sex-and-size composition relative to two girls only are consistent with the pattern in Model 1. Women with one girl and two boys at the start of an interval are 14 times more likely to be sterilized in that interval than women with two girls only. The coefficient for this category is also statistically significantly different from the coefficients for the other categories of family composition, suggesting that the sex-and-size composition of one girl and two boys is the most preferred. However, even women with only boys and no girls are over seven times more likely to get sterilized in a particular interval, while women with two girls and one boy are about four times more likely to do so. In other words, consistent with the results for wantedness, women in this population seem to want two or three children, of which one has to be a boy. Once they reach any combination that allows for this sex-and-size composition, they are likely to stop bearing any more children.

That women in this context use stopping rather than spacing behavior to achieve their desired sex-and-size composition of children is corroborated by the results in Models 2 and 3. The coefficients for family composition categories in Model 2 (use of temporary contraceptive methods) are negative, indicating that two girls is the least preferred category. However, none of the coefficients is statistically significant, suggesting that family composition at the start of an interval is not a significant factor in women's decision to use temporary methods in that interval. In the case of attempted abortion, only the coefficient for the most preferred category is strongly significant, while

the coefficients for 2+ boys only and two children of mixed sex composition are marginally signficant. Women who have one daughter and two sons at the start of an interval are almost twice as likely to attempt an abortion in that interval as women who have two daughters only (OR=1.94).

Effects of other socio-economic characteristics

Education – the woman's and her husband's -- has a large impact on all her reproductive choices in ways that suggest a strong "modernizing" influence of education on reproductive decision-making, consistent with the large literature on this subject. In any one interval women with any level of education are less likely to want another child, more likely to use temporary contraception, more likely to attempt abortion, or more likely to get sterilized, than women with no schooling. For the first three outcomes, the level of education matters such that higher levels of education show stronger effects than lower levels of education. For instance, women with primary education are 50% as likely as illiterate women to want another child, while those with over 10 years schooling by the start of an interval are only one-third as likely. Similarly, women with primary schooling are 60% more likely to use temporary contraception as are illiterate women, while those with over 10 years of schooling are more than three times more likely.

Husband's education has similar effects. Women whose husbands have six or more years of education are less likely to want another child at the start of an interval, and much more likely to use temporary methods of contraception in that interval, than women with husbands who had no schooling. The results for high levels of husband's education are particularly striking for temporary contraception, given the low levels of

spacing in this population. Women whose husbands have 10 or more years of schooling are twice as likely to use spacing methods as are those with illiterate husbands.

The effect of women's mobility is statistically significant, though smaller than that of education. Women with many restrictions on mobility at the start of an interval are less likely to want another child in that interval, possibly reflecting their dissatisfaction with their household environment. This is supported by the negative, though statistically insignificant, effect of experience with domestic violence on the desire to have another child. At the same time, they are much less likely to act on this preference. Women with mobility restrictions are only half as likely to use temporary contraception and twice as likely to attempt abortion are women with no such restrictions. The lack of contraceptive use and resorting to abortion may reflect that women with mobility restrictions cannot access health centers or other places that keep contraception, and thus have to resort to non-medical attempts to abort in an interval when they have an unwanted pregnancy.

Women's family situation and the attitudes of significant decision-makers in her marital home play an important role, consistent with the large literature from South Asia establishing that women often do not have the power to make reproductive choices in isolation of what their in-laws or husbands desire (Mathur et al. 2005). Women who live in extended, non-nuclear families, or whose in-laws pressure them to have another child at the start of an interval, are much more likely than other women to say they want another child in that interval. Such women – as well as those whose husbands want to have another child at the start of an interval – are also significantly less likely to exercise any reproductive choice to stop childbearing in that interval. A striking result is the one

for exposure to violence: women who face violence do not want more children and exercise whatever choices they can to that end. Thus, our results show that women who were beaten by their husbands in the previous interval are 26% more likely to use temporary contraception or to attempt abortion in the current interval than women who reported no violence in a prior interval. As noted above, they are also less likely to want another child in that interval, though the coefficient is not significant, suggesting that women are less likely to want to bring a child into a home environment that is abusive or highly restrictive.

DISCUSSION

These results provide further evidence for the need to frame research on the role of son preference in reproductive decisions within the broader context of family composition preferences. In particular, it is clear that in this context a strong preference exists for a mixed sex composition of children, albeit one that is heavily skewed in favor of sons, and that this has a strong influence on both childbearing desires and reproductive behavior. As the results of these analyses demonstrate clearly, the least preferred outcome in terms of sex composition is having only daughters, while the most preferred is having one girl and two boys.

The effect of these preferences on desires and behavior are significant, both in substantive and statistical terms. Women were much more likely to report wanting an additional child when they only had daughters, and as a result were far less likely to be sterilized or seek an abortion than women with other gender combinations. In contrast,

women who had achieved a 'balanced' composition (i.e. one girl and two sons) were much more likely to take steps to end further childbearing through sterilization or to attempt an abortion if a pregnancy did take place. The magnitude of the effect of sex composition on the decision to pursue sterilization is particularly interesting in this context. While some of this effect reflects the lack of contraceptive alternatives in this context, the sterilization decision is particularly revealing because of its permanence, implying that women and/or their partners are fully committed to the existing sex composition of their children.

These results also illustrate the significant disconnect between women's fertility desires and their ability to act on these, particularly with regard to the use of temporary contraception. While we do find a strong positive effect of education on contraceptive use, it is clear that the social environment that frames women's contraceptive decisions plays a major role in limiting women's use of contraception. In particular, these results provide clear evidence for the fact that many of these decisions are largely made by others in their household, particularly their husbands and in-laws. The negative effect of experiencing higher restrictions on mobility provides further evidence of this, as do the effects of the desires of women's husbands and in-laws, both of which have a strong effect on contraceptive use. Furthermore, it is clear that even when all parties are in agreement regarding the need to restrict further childbearing, women overwhelmingly ended up being sterilized, reflecting the both poor access to contraceptive services in the area and the prevalence of pro-natal social norms that discourage contraceptive use. However, even this decision appears to be strongly influenced by other household

members, as implied by the large and significant effects of the childbearing desires of women's husbands and in-laws.

CONCLUSIONS

This study contributes to the analyses of the influence of sex preferences on reproductive desires and behavior in two main ways. First, this research extends previous work done in this area by examining the effect of the sex composition of current children on both desires and subsequent reproductive behavior. Second, we focus on a range of reproductive behaviors representing virtually the full set of options for women in contexts such as Madhya Pradesh. This allows for a more nuanced and contextualized examination of the relationships between these than is typically the case.

The analyses conducted in this paper illustrate well the complexity of the relationship between sex preference and reproductive behavior, and suggest that the more comprehensive approach taken in this paper is a promising direction for further research. The results show that while both childbearing desires and reproductive behavior are influenced by broadly the same factors, there are important differences between the types of reproductive responses. Our findings also reinforce the importance of the broader social environment, and particularly those related to women's relative decision-making power and overall empowerment, to all of these outcomes.

These results suggest a number of directions for future research on the role of sex preferences in shaping reproductive behavior. Recent research has found that sex-selective abortion may be highest among women with higher education, but it remains

unclear what the relationships are between education and sex preference, and how these may influence individual reproductive behaviors differently. Our results are consistent with a general desire to control fertility among more educated women, but it is ambiguous how this may interact with preferences to influence behavior. This paper also highlights the need for additional research exploring the ways in which women's sex preferences are shaped by those of other household members, and how these interact to shape behavior.

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Table 1: Means and percentages for dependent and independent variables included in analyses.

Variable	Number of Children		Variable	Number of Children	
	1 or more	2 or more		1 or more	2 or more
Dependent Variables					
Wanted pregnancy	67.7	---	Used any temporary method	12.5	---
Attempted abortion	7.6	---	Was sterilized	---	15.2
Independent Variables					
Woman's characteristics in interval					
Age at start of the interval*	23.0	24.7	Total number of surviving children at start of interval*	2.3	3.1
			Woman has experienced domestic violence	47.9	54.1
Education			*Mobility*		
No schooling	63.2	65.6	No restrictions	29.5	33.6
1-5 years of schooling	14.9	15.2	Few restrictions	40.2	40.9
6-10 yrs of schooling	16.0	14.5	Several or many restrictions	30.3	25.5
10+ yrs schooling	6.0	4.7			
Ever worked outside of home?	37.9	41.3			
Consummate age at marriage			*Husband's Characteristics in Interval*		
Less than 15	23.1	24.0	*Education*		
Between 15 and 17	52.8	54.3	No schooling	30.0	30.7
18 and above	24.1	21.8	1-5 years of schooling	16.9	17.2
Sex Composition of Children			6-10 yrs of schooling	30.8	30.4
1 girl only	17.3	---	10+ yrs schooling	22.3	21.8
1 boy only	17.9	---	Husband wanted to have another child	73.5	63.9
2 girls only	6.8	10.5	*Household and community characteristics*		
2+ boys only	10.1	15.6	HH had some or lots of problems meeting expenses	53.5	56.8
1 girl 1 boy	13.8	21.3	Non-nuclear household	59.3	52.6
1 girl 2 boys	7.0	10.7	Pressure from in-laws for next child	21.4	18.5
Two girls one boy	7.0	10.7	Resides in rural area	79.8	80.8
Other sex comp	20.2	31.1	Respondent was Hindu	93.9	93.9
			Woman is general caste	25.9	25.6

Table 2: Determinants of reproductive desires and behavior among married women in Madhya Pradesh, India: Odd Ratios from logistic regressions.

	Model 1		Model 2		Model 3		Model 4	
	Desire for another child		Use of any temporary contraception		Attempted abortion		Used sterilization	
	Odds	SE	Odds	SE	Odds	SE	Odds	SE
Woman's characteristics in interval								
Age at start of the interval	0.950*	(0.019)	0.945**	(0.014)	0.926**	(0.025)	0.990	(0.022)
Education								
Respondent has no schooling (reference)								
Respondent has less than primary schooling	0.562***	(0.054)	1.636**	(0.257)	1.558**	(0.229)	1.173***	(0.037)
Respondent has 6-10 yrs of schooling	0.409***	(0.039)	1.817**	(0.279)	1.522**	(0.239)	1.206	(0.180)
Respondent has over 10 yrs schooling	0.321***	(0.049)	3.244***	(0.734)	2.034**	(0.506)	0.878	(0.209)
Has woman ever worked outside of home?	0.933	(0.051)	0.875	(0.091)	1.139	(0.084)	1.134	(0.108)
Consummate age at marriage								
Woman’s consummate age is less than 15 (reference)								
Woman's consummate age is between 15 and 17	0.971	(0.111)	1.431	(0.363)	0.957	(0.106)	1.012	(0.156)
Woman's consummate age is 18 and above	0.816	(0.141)	2.742***	(0.400)	1.224	(0.163)	1.106	(0.234)
Sex Composition of Children								
2 girls only (reference)								
1 girl only	0.825	(0.174)	0.733	(0.118)	1.078	(0.247)	--	--
1 boy only	0.657*	(0.134)	0.752	(0.153)	1.294	(0.269)	--	--
2+ boys only	0.305***	(0.042)	0.823	(0.170)	1.247*	(0.132)	7.351**	(3.878)
1 girl 1 boy	0.372***	(0.070)	1.001	(0.155)	1.301*	(0.170)	2.998	(1.748)
1 girl 2 boys	0.160***	(0.020)	0.866	(0.207)	1.936***	(0.272)	14.004***	(6.915)
Two girls one boy	0.402***	(0.047)	0.961	(0.130)	1.094	(0.144)	3.937*	(2.121)
Other sex comp	0.496**	(0.087)	0.819	(0.219)	0.992	(0.181)	10.930***	(5.350)
Total number of surviving children at start of interval	0.568***	(0.020)	1.026	(0.111)	1.431***	(0.061)	0.940	(0.054)
Woman has experienced domestic violence	0.846	(0.094)	1.263**	(0.108)	1.261*	(0.128)	0.988	(0.109)
Mobility								
Woman reported no restrictions on mobility (reference)								
Few restrictions on mobility	0.981	(0.117)	0.803	(0.097)	1.382**	(0.152)	0.801	(0.114)
Had several or many restrictions on mobility	0.774**	(0.064)	0.516**	(0.095)	1.999***	(0.241)	0.769	(0.119)

Table 2: Determinants of reproductive desires and behavior among married women in Madhya Pradesh, India: Odd Ratios from logistic regressions (continued).

	Model 1		Model 2		Model 3		Model 4	
	Desire for another child		Use of any temporary contraception		Attempted abortion		Used sterilization	
	Odds	SE	Odds	SE	Odds	SE	Odds	SE
Husband's Characteristics in Interval								
Education								
Husband has no schooling (reference)								
Husband has less than primary schooling	0.743	(0.113)	1.290	(0.241)	1.296	(0.333)	1.100	(0.207)
husband has 6-10 yrs of schooling	0.771**	(0.057)	1.566**	(0.198)	1.468	(0.445)	1.035	(0.091)
Husband has over 10 yrs schooling	0.727**	(0.069)	2.217***	(0.171)	1.696	(0.645)	0.705	(0.164)
Husband wanted to have another child	--	--	0.352***	(0.049)	0.186***	(0.022)	0.020***	(0.004)
Household and community characteristics								
HH had some or lots of problems meeting expenses	1.202**	(0.072)	0.973	(0.139)	0.798*	(0.079)	0.970	(0.065)
Woman lived in non-nuclear household	1.176*	(0.078)	0.727**	(0.060)	0.817	(0.086)	1.005	(0.120)
Pressure from in-laws for next child	1.336**	(0.147)	0.690*	(0.125)	0.874	(0.163)	0.279**	(0.110)
Resides in rural area	1.489**	(0.214)	0.599*	(0.130)	0.809	(0.096)	1.048	(0.316)
Respondent was Hindu	1.161	(0.126)	0.688	(0.194)	0.647*	(0.127)	2.105*	(0.713)
Woman is general caste	0.904	(0.099)	1.440	(0.362)	0.836	(0.138)	1.114	(0.208)
Observations	8476		7589		7610		5378	

Notes: SE = Robust standard errors
* = $p<0.10$; * = $p<0.05$; * = $p<0.001$