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Anuja Jayaraman

Vinod Mishra

Fred Arnold

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The Effect of Family Size and Composition on Fertility Desires, Contraceptive Adoption, and Method Choice in South Asia

Anuja Jayaraman¹
Vinod Mishra¹
Fred Arnold¹

Macro International Inc.

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Corresponding author: Anuja Jayaraman, Macro International Inc., 11785 Beltsville Drive, Suite 300, Calverton, MD, USA 20705. E mail: Anuja.Jayaraman@macrointernational.com

¹ Macro International Inc.

ABSTRACT

We examine the influence of family size and composition on reproductive behavior in three South Asian countries—Nepal, India, and Bangladesh—that are known for strong son preference. Using data from recent Demographic and Health Surveys, we analyze whether the choice of contraceptive method adopted (modern versus traditional; temporary versus permanent) and desire for another child differ by parity and sex composition of surviving children. In addition, for India we pool data for four northern states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) and four southern states (Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu) in order to capture the north-south variation within the country. We also compare West Bengal and Bangladesh to understand how son preference in these culturally similar regions affects fertility desires and contraceptive adoption. The effects of parity and sex composition on fertility desire and contraceptive use are estimated using binary and multinomial logistic regression after controlling for key socioeconomic factors, including education, work status, media exposure, household wealth status, woman's participation in household decision-making, and urban/rural residence. We find that, independent of socioeconomic factors, women with more sons have a lower desire to have another child and are more likely to use contraception than those with more daughters. These effects are more prominent in Nepal and India than in Bangladesh. Within India, the effects are stronger in north India than in south India or West Bengal. However, considerable proportions of women also express a desire for at least one daughter, especially in Bangladesh after having a son. There is a clear shift towards permanent methods of contraception with an increase in the number of sons, but we find no systematic pattern in the use of traditional methods by parity or sex composition of children. We conclude that son preference remains widespread in all three countries, and it has a major influence on reproductive behavior. The preference for boys is embedded in the cultural and traditional beliefs of these countries. Reducing such preference would require a change in social norms and attitudes of the people and an improvement of the status of women within the household.

INTRODUCTION

Many countries in East and South Asia demonstrate a strong cultural preference for sons (Arnold et al., 1998; Clark, 2000). Numerous social and economic factors in these countries make sons more valuable than daughters. Sons are more prized than daughters for their financial and labor contributions to the family, for supporting their parents, and in perpetuation of the family name (Arnold, 2001). In some countries, especially in South Asia, sons also bring wealth into the family through dowry (Das Gupta et al., 2002) and are solely entitled to perform certain religious ceremonies. At the same time, some studies have shown that many parents in this region also want to have at least one daughter (Arnold, 2001).

Several studies from Bangladesh, India, Nepal, Pakistan, and Sri Lanka have confirmed widespread presence of son preference in South Asia and its impact on reproductive attitudes and discrimination against girls (Stash, 1996; Arnold, 2001). Son preference often translates into prejudice against the girl child in nutrition, schooling (Burgess and Zhuang, 2002; Kingdon, 2002), and health care (Pande, 2003; Timæus et al., 1998; Behrman, 1998), which can adversely affect their health and well-being and may even lead to higher female mortality (Das Gupta et al., 2002; Arnold et al., 1998; Pelletier, 1998; Choe et al., 1998; Kishor, 1995). However, Marcoux (2002) in a review of 306 child nutrition surveys failed to find any systematic antifemale bias in undernutrition. Sommerfelt and Arnold (1998) came to a similar conclusion with respect to stunting, underweight, and wasting in their study of 41 Demographic and Health Surveys. It is important to recognize, however, that there are considerable regional differences in the extent of son preference within South Asia. For example, son preference is much stronger in the northern and central uplands of India than in the south (Bhat and Zavier, 2003; Bose and Trent, 2006).

Desire for sons and a certain sex composition of children can also lead to selective stopping behavior, female feticide, and in extreme cases even female infanticide (Arnold et al., 2002; Sudha and Rajan, 1999). Any decline in fertility without changes in attitudes regarding son preference could be at the cost of increased use of sex-selective abortions or female infanticide (Yount et al., 2000; Arnold, 2001; Bairagi, 2001; Leone et al., 2003; Bhat and Zavier, 2003). Recent studies in India have linked son preference to high male/female sex ratios at birth, which indicate sex-selective abortion and may be responsible for rising population sex ratios (Arnold et al., 2002; Das Gupta and Bhat, 1997; Visaria and Visaria, 1995).

¹ Burgess and Zhuang (2002) tested for gender bias in intra-household allocation in the Sichuan (poor) and Jiangsu (rich) provinces of China. They found that poorer households have a stronger health expenditure bias against girls and a pro-boy bias in educational spending in both provinces.

Some studies have found that The effects of son preference on sex selective fertility behavior and sex ratios tend to intensify as fertility levels decline (Bhat and Zavier, 2003), and this has been observed in low fertility societies including China, Taiwan, and South Korea (Poston, 2002; Chowdhury and Bairagi, 1990). However, Larsen et al. (1998) find that son preference only decelerated fertility decline in Korea. They observe that modernization on the other hand tends to reduce fertility and individuals may be practicing sex-selective behavior, which could explain the low fertility levels despite the presence of son preference. At the same time, other modernizing factors including education, urbanization, and exposure to mass media also help in reducing preference for sons (Bhat and Zavier, 2003).

Family planning policies in most countries do not explicitly discourage son preference. Even successful programs such as those in Vietnam have not been able to reduce gender discrimination or weaken the patriarchal structure of the family (Belanger, 2002). The success and effectiveness of family planning and reproductive health programs may be limited if families continue to have additional children until they have their desired number of sons. Case and Deaton (2002) show that, on an average, household size of girls age 0-14 in India is larger than households with boys age 0-14, indicating that girls tend to live in larger households. They find that southern states (Tamil Nadu, Kerala, and Karnataka) have smaller differences in household size than other states (Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, and West Bengal). Generally, high infant and child mortality rates in South Asia coupled with strong preference for sons are believed to be responsible for the low use of contraception and high fertility rates (Stash, 2001; Clark, 2000). However, the evidence of son preference on contraceptive adoption and fertility is not conclusive. On the one hand, several studies have found that gender preference has significant implications for desired family size, fertility decisions, and contraceptive adoption (Bhat and Zavier, 2003; Khan and Khanum, 2000). Bhat and Zavier (2003) find a positive relation between ideal family size and sex preference. Khan and Khanum (2000) find that in Bangladesh the preference for a male child discourages women in lower parities from using contraception, which in turn acts as a barrier to reducing fertility. On the other hand, Bairagi (2001) in a study of data from the Matlab Demographic Surveillance System in Bangladesh did not find son preference to be a constraint on contraceptive use. Also, Leone et al. (2003) find that in Nepal son preference has only a moderate effect on contraceptive use and fertility. They estimated that there would be only an eight percent increase in contraceptive use and only a six percent fall in fertility in the absence of son preference. Haughton and Haughton (1995) also find evidence of son preference having a modest effect on contraceptive use with only a minor effect on fertility in Vietnam.

Given this perspective, we examine how family size and composition affect reproductive behavior in three South Asian countries—Nepal, India, and Bangladesh—that are known for strong son preference (Arnold, 2001). Couples can manipulate family size and sex composition of children using a range of contraceptive methods and possibly using sex-selective abortion. Use of these methods may reflect their preference for sons or daughters. Using data from recent Demographic and Health Surveys, we analyze whether the choice of contraceptive method adopted (modern versus traditional; temporary versus permanent) and the desire for another child differ by parity and sex composition of surviving children. In addition, for India we pool data for four northern states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) and four southern states (Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu) in order to capture the north-south variation within the country. We also compare West Bengal and Bangladesh to understand how son preference in these culturally similar regions affects fertility desires and contraceptive adoption.

DATA AND METHODS

The data are from the 2006 Nepal Demographic and Health Survey, the 2005-06 India National Family Health Survey, and the 2004 Bangladesh Demographic and Health Survey. These surveys collected data from nationally representative samples of households, covering 8,707, 109,041, and 10,500 households in Nepal, India, and Bangladesh, respectively. The analysis here is based on currently married, non-pregnant women age 15-49 interviewed in the sampled households in each country—6,950 in Nepal, 75,162 in India, and 9,847 in Bangladesh. Within India, the analysis includes 16,568 women from north India, 14,146 from south India, and 4,296 from West Bengal. Details on the survey procedures and sampling design are provided in individual survey reports (MOHP, New ERA, and Macro International Inc. 2007; IIPS and Macro International 2007; NIPORT, Mitra and Associates, and ORC Macro 2005).

We categorize women by their number and sex composition of living children at the time of the survey as follows: parity 1 (0 sons, 1 son), parity 2 (0 sons, 1 son, 2 sons), parity 3 (0 sons, 1 son, 2 sons, 3 sons), and parity 4+ (0 sons, 1 son, 2 sons, 3 or more sons). This is the primary predictor variable in our analysis. Women at parity 0 are excluded.

All three surveys asked currently married, non-pregnant women about their desire for a (another) child and current contraceptive usage. The surveys included information about the contraceptive method (or methods) women are currently using. This information allowed contraception to be combined into the following groups: modern methods (IUD, the pill, injectables, implants, Norplant, condom, female condom, male sterilization, female sterilization), traditional methods (periodic abstinence/rhythm/safe period, folk method, withdrawal)², temporary methods (IUD, the pill, injectables, implants, Norplant, condom, female condom, periodic abstinence/rhythm/safe period, folk method, withdrawal), and permanent methods (male sterilization, female sterilization). The analysis examines the extent to which parents who have not yet had the desired number of sons are less likely to use contraceptives. We use four outcome variables: 1. Desire for another child (0=do not desire; 1=desire); 2. Current contraceptive use (0=not using; 1=using); 3. Current use of a modern or traditional method (0=not using; 1=using a modern method; 2=using a traditional method); and 4. Current use of a temporary or permanent method (0=not using; 1=using a temporary method; 2=using a permanent method).

² In Bangladesh, modern methods include IUD, the pill, Norplant, injectables, condom, male sterilization, and female sterilization, and traditional methods include periodic abstinence, withdrawal, and others. In India, modern methods include IUD, the pill, injectables, condom, female condom, male sterilization, and female sterilization, and traditional methods include rhythm/safe period, folk method, and withdrawal. In Nepal, modern methods include IUD, the pill, injectables, implants, condom, female sterilization, and male sterilization, and traditional methods include rhythm method, withdrawal, and folk method.

The study uses both descriptive and multivariate statistical methods. We first present levels of fertility desire, current contraceptive use, use of modern or traditional methods, and use of temporary or permanent methods by the number and sex composition of living children for each country and for regions within India. Using binary and multinomial logistic regression, we then estimate unadjusted and adjusted odds ratios for effects of number and sex composition of children on each of the four outcome variables by parity.

In the absence of sex-selective abortions, sex composition at any given parity is biologically determined. Therefore, the effect of sex composition should not be confounded with the effects of other factors such as education, wealth, and media exposure that are known to influence contraceptive adoption and method choice. However, given that sex selective abortion is prevalent in these countries and to the extent this practice is associated with socioeconomic factors, we need to control for these factors in the multivariate models (Mishra et al., 2004). Therefore, the adjusted models control for mother's educational level (no education, primary, secondary or more), current work status (working, not working), media exposure to family planning messages in the last few months (exposed³, not exposed), residence (urban, rural), household wealth status⁴, and participation in household decision-making⁵.

Logistic regression is estimated for the binary variables, one for each parity. Multinomial logit models are used to compare those using modern and traditional methods with those not using any method. Similarly, those using temporary and permanent methods are compared to those not using any modern contraceptive method. We estimate separate models for parity 1, parity 2, parity 3, and parity 4+ for each of the dependent variables. In addition for India, we pool four northern states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) and four southern states (Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu) and include a separate analysis for West Bengal. The analysis uses sampling weights and accounts for clustering in the survey design. We discuss only the adjusted effects of age and sex composition of children from the regression models. The effects of the control variables are not shown.

³ Media exposure includes hearing or seeing family planning messages on the radio, television, or newspapers.

⁴ Household wealth status is calculated by dividing the sample into quintiles based on household ownership of assets and use of selected services. For details on the calculation of the wealth index, refer to NIPORT, Mitra and Associates, and ORC Macro 2005.

⁵ Household decisions regarding respondents' own health care, large household purchases, and visits to family or relatives are included to create the household decision making variable. Women making any one of the decisions by themselves are considered to be participating in household decision-making.

RESULTS

Table 1 presents the sample distribution of currently married, non-pregnant women age 15-49 by parity and family composition of living children and by other variables used in the analysis for all countries and regions. At parity one for all countries, there are more women with a son than with a daughter except for north India where an equal number of women have a son and a daughter, but the differences are generally small. At parity two, we find more women with two sons than two daughters in all three countries. At parity three, there are more women with two sons and one daughter than those with two daughters and one son. This is not the case in south India and West Bengal where equal percentages of women have one son-two daughters and two sons-one daughter combinations. Only one percent of women at parity four or higher do not have any sons. These differences are generally more pronounced in north India. These descriptive statistics indicate that at parities two or higher, mothers with more sons are more likely to stop childbearing than those with more daughters, indicating differential contraceptive use and/or use of sex selective abortion to achieve their desired sex composition.

Close to two-thirds (65 percent) of women in Nepal and a little less than half (48 percent) of women in India are illiterate. Within India, north India is worse off with 65 percent of the women illiterate than south India (37 percent) and West Bengal (42 percent). In Bangladesh, the proportion illiterate is about the same as in West Bengal. Only 19 percent of women in Nepal and only 23 percent in north India have secondary or higher level of education.

In all three countries, a large majority of women live in rural areas. In Nepal, only 15 percent of the women live in urban areas. A much higher proportion of women report working in Nepal (75 percent) than in Bangladesh (21 percent) and India (38 percent). Within India, women in south India are more likely to work than those in north India or in West Bengal. Distribution of wealth quintiles is similar across these countries. Seventy-two percent of women in Nepal, 57 percent in India, and 42 percent in Bangladesh have seen or heard family planning messages on radio, television, or in the print media in the last few months. Women's participation in household decision making is low in all three countries. Only about one in every four women in Bangladesh and one in every three women in India and Nepal reported participating in one of the major household decisions. Women in West Bengal are more likely to participate in household decisions than those in north India or south India.

Table 1: Sample distribution of currently married, non-pregnant women age 15-49 years by parity and family composition of living children and by selected background characteristics in Nepal (2006), India (2005-06), and Bangladesh (2004)

Characteristics	India (2005-06)					Bangladesh (2004)
	Nepal (2006)	All India	North India ^a	South India ^b	West Bengal	
Parity and family composition						
<i>Parity 1</i>						
No Son	8	8	7	8	11	10
1 Son	9	9	7	10	14	11
<i>Parity 2</i>						
No Son	4	5	3	8	6	5
1 Son	13	17	11	24	18	14
2 Sons	10	10	7	12	10	8
<i>Parity 3</i>						
No Son	2	2	1	3	2	2
1 Son	9	8	7	9	8	8
2 Sons	10	11	12	9	8	9
3 Sons	3	3	3	3	3	2
<i>Parity 4+</i>						
No Son	1	1	1	1	1	1
1 Son	8	6	7	3	5	6
2 Sons	11	10	15	5	7	10
3 or more sons	12	11	20	4	8	14
<i>Education</i>						
Illiterate	65	48	65	37	42	43
Primary	16	15	12	18	22	30
Secondary+	19	36	23	45	36	27
<i>Residence</i>						
Urban	15	31	23	38	29	22
Rural	85	69	77	62	71	78
<i>Work status</i>						
Not working	25	62	65	55	71	79
Working	75	38	35	45	29	21
<i>Wealth quintile</i>						
Lowest	18	18	26	8	24	20
Second	20	19	24	16	25	20
Middle	21	20	19	26	20	20
Fourth	20	21	17	27	17	21
Highest	21	22	15	23	14	20
<i>Media exposure</i>						
No	28	43	49	35	43	58
Yes	72	57	51	65	57	42
Participation in household decisions						
No	69	66	70	67	58	75
Yes	31	34	30	33	42	25
<i>N</i>	6950	75162	16568	14146	4296	8864

a: Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh.

b: Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

Fertility Desires

Overall, 18 percent of currently married, non-pregnant women age 15-49 years in Nepal and India and 37 percent in Bangladesh want to have another child (Table 2). The proportion desiring another child is higher in north India (21 percent) than in south India (15 percent) or West Bengal (17 percent), consistent with higher fertility levels in north India. In general, the proportion desiring another child declines with increasing parity. At any given parity, the proportion desiring another child declines with an increasing number of sons. For example, at parity two in Nepal, 51 percent of women with two daughters want to have another child, compared with only 6 percent of women two sons. It is noteworthy that at parity two in Bangladesh women with two sons are more likely to want another child than those with one son and one daughter, indicating a desire to have at least one daughter. At parity three in India (north India and south India) and Bangladesh, the desire for another child is greater among women with three sons than among women with two sons and one daughter. In Bangladesh at parity 3, four percent of women want another child when they have two sons and one daughter versus 15 percent who want another child if they have all sons.

Table 2: Percent of currently married, non-pregnant women age 15-49 years desiring another child by parity and family composition in Nepal (2006), India (2005-06), and Bangladesh (2004)						
Parity and family composition	Nepal (2006)	India (2005-06)			West Bengal	Bangladesh (2004)
		All India	North India	South India		
Parity 1						
No Son	77	73	89	60	57	89
1 Son	64	61	76	58	43	85
Parity 2						
No Son	51	36	67	13	25	50
1 Son	11	10	21	5	6	23
2 Sons	6	9	17	5	6	32
Parity 3						
No Son	45	32	66	10	17	39
1 Son	6	8	17	2	5	11
2 Sons	1	2	4	1	2	4
3 Sons	1	4	8	3	1	15
Parity 4+						
No Son	35	33	56	3	18	28
1 Son	3	6	10	2	2	5
2 Sons	1	1	2	1	1	2
3 or more sons	1	2	2	2	2	2
Total	18	18	21	15	17	37

Contraceptive use

Table 3 presents current contraceptive use rates by parity and sex composition of living children. Overall, the contraceptive use rate is lowest in Nepal (55 percent) and highest in India (66 percent). Within India, West Bengal has the highest rate (79 percent) followed by South India (75 percent), but it is much lower in north India (53 percent). In general, women with no sons are less likely use a family planning method than those who have a son, suggesting that most women want at least one son. At each parity, the contraceptive use rate increases as the number of living sons increases to two. The increase is steeper in the case of Nepal and India, particularly north India, than in south India, West Bengal, or Bangladesh. Interestingly, at each parity a considerable proportion of women report using contraception even when they have no sons, particularly in Bangladesh and West Bengal where more than one half of women with no sons report using contraception at each parity. At parity 4+, women with two sons are more likely to use contraception than women with more than two sons, again indicating some desire for at least one daughter.

Parity and family composition	India (2005-06)					Bangladesh (2004)
	Nepal (2006)	All India	North India	South India	West Bengal	
Parity 1						
No Son	32	35	22	33	71	57
1 Son	35	42	29	32	71	62
Parity 2						
No Son	40	57	28	77	78	60
1 Son	55	73	53	85	84	71
2 Sons	69	79	65	86	87	68
Parity 3						
No Son	39	55	25	78	78	61
1 Son	62	73	53	88	85	73
2 Sons	75	82	72	91	87	74
3 Sons	75	79	65	89	88	73
Parity 4+						
No Son	37	46	18	81	82	52
1 Son	55	65	51	85	81	67
2 Sons	63	72	65	81	76	68
3 or more sons	53	60	54	75	70	60
Total	55	66	53	75	79	65

Table 4 categorizes contraceptive use by modern and traditional methods. Modern methods are more common than traditional methods in each country. The proportion of women relying on traditional methods is much higher in Bangladesh and West Bengal than in other regions. In West Bengal, a little more than one in five women rely on traditional methods, and this proportion declines with increasing parity through parity 3. In other regions or countries, we do not find any systematic pattern in the use of traditional methods by parity or sex composition of children. Modern method use by parity and sex composition of children is similar to the pattern for overall method use in Table 3. At each parity, the modern method use rate increases with the number of living sons, plateaus among women with two sons, and then declines somewhat among women with three or more sons. The only exception is Bangladesh. For all India and Nepal, the proportion using modern methods increases with the number of sons at parity 1 and 2. In Nepal, at parity 1, 28 percent of women use a modern method when they have a daughter versus 31 percent when they have a son. At parity 2, modern method use increases from 35 to 48 to 64 percent as the number of sons increases from zero to one to two. Similarly in India, at parity 1, modern method use increases from 23 percent among women who have a daughter to 29 percent among those who have a son; and at parity 2, modern method use is highest when families have two sons. In Bangladesh, the patterns are not as obvious. For example at parity 2, the modern contraceptive use rate is slightly lower among women with two sons (58 percent) than among women with one son and one daughter (62 percent). At parities 3 and higher, the modern contraceptive use rate increases with an increasing number of sons, peaks among women with 2 sons, and then plateaus or declines slightly among women with 3 or more sons. Regions within India follow patterns similar to all India, with South India and West Bengal having higher usage of modern methods than North India.

Table 4: Percent using modern and traditional contraceptive methods by parity and family composition in Nepal (2006), India (2005-06), and Bangladesh (2004)

Parity and family composition	India (2005-06)											
	Nepal (2006)		All India		North India		South India		West Bengal		Bangladesh (2004)	
	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional
Parity 1												
No Son	28	4	23	13	13	9	26	7	33	38	47	10
1 Son	31	3	29	13	19	10	27	5	36	36	54	8
Parity 2												
No Son	35	5	47	10	19	9	72	4	48	29	51	9
1 Son	48	7	65	9	43	10	82	2	62	22	62	9
2 Sons	64	6	72	7	57	8	84	2	70	16	58	10
Parity 3												
No Son	35	4	47	8	15	10	76	2	56	22	48	13
1 Son	57	4	66	7	43	10	88	0	73	12	60	13
2 Sons	72	3	76	5	64	8	90	1	74	12	62	12
3 Sons	73	3	74	6	57	8	89	1	78	10	62	11
Parity 4+												
No Son	35	2	37	9	7	11	80	1	57	25	33	19
1 Son	51	4	56	9	40	11	84	1	62	19	54	12
2 Sons	60	3	63	8	54	11	81	0	62	14	50	18
3 or more sons	49	4	50	10	42	11	74	1	55	16	45	15
Total	51	4	57	8	43	10	72	2	57	22	53	12

Table 5 looks at these differentials by family size and composition separately for temporary and permanent contraceptive methods. Permanent methods (female and male sterilization) are much more popular in India and Nepal than in Bangladesh. In India and Nepal there is a clear shift towards permanent methods with an increase in the number of sons. That is, with an increase in parity and the number of sons, more couples adopt permanent methods. For example, in Nepal at parity 3 only 4 percent of women use a permanent method when they have no sons, compared with 31 percent when they have one son, 56 percent when they have two sons, and 59 percent when they have three sons. As expected, at each parity, the ratio of permanent to temporary methods increases with an increasing number of sons. In Bangladesh, temporary methods are much more prevalent than permanent methods across all parities. Since temporary methods enable couples to preserve their ability to have another son, we find that those who have fewer sons or no sons are more likely to use temporary methods.

We also find that there are major differentials in contraceptive use rates by urban/rural residence, education, household wealth status, media exposure, and other factors (data not shown). The differentials by parity and sex composition tend to be narrower in urban, more educated, and wealthier women.

Table 5: Percent using temporary (temp.) and permanent (perm.) contraceptive methods by parity and family composition in Nepal (2006), India (2005-06), and Bangladesh (2004)

Parity and family composition	India (2005-06)											
	Nepal (2006)		All India		North India		South India		West Bengal		Bangladesh (2004)	
	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.
Parity 1												
No Son	30	2	30	5	20	2	19	13	67	4	55	2
1 Son	32	2	33	8	23	6	17	14	66	5	59	3
Parity 2												
No Son	36	4	24	34	23	5	10	67	52	26	57	3
1 Son	33	21	24	49	30	23	6	79	37	47	65	6
2 Sons	28	41	19	60	23	41	5	81	37	50	62	6
Parity 3												
No Son	35	4	18	37	20	5	3	75	41	37	58	3
1 Son	30	31	17	55	22	31	2	86	25	60	64	9
2 Sons	19	56	12	70	15	57	2	89	23	63	59	15
3 Sons	16	59	11	68	13	52	2	87	23	65	65	8
Parity 4+												
No Son	29	8	17	30	12	5	3	78	56	26	50	3
1 Son	27	29	18	47	20	31	3	82	35	46	59	7
2 Sons	17	46	14	57	18	47	1	80	23	53	59	9
3 or more sons	24	29	17	43	19	35	2	73	27	43	51	9
Total	27	29	20	45	20	33	7	68	41	38	59	6

Multivariate Analysis

Fertility Desires

Table 6 presents the unadjusted and adjusted odds ratio estimates of the effects of parity and sex composition of children on the desire to have another child. The unadjusted and adjusted effects are similar at each parity in all three countries, indicating that the effects of parity and sex composition are largely independent of socioeconomic factors. Across all parities, the desire to have an additional child goes down with an increase in number of sons. At parity 1, compared to women with a daughter, women with a son are less likely to want another child. The odds ratios are well below 1 and are statistically significant for all countries and regions, except for south India.

At parity 2 in Bangladesh, south India, and West Bengal, the desire to have another child is much higher among women who have no daughters than women who have one son and one daughter. Similarly at parity 3, the desire to have another child is much higher among women with all three sons than among those with two sons and one daughter. This implies that in Bangladesh, West Bengal, and south India women are not satisfied with just having sons. On the other hand in Nepal and north India, women's desire to have another child generally goes down progressively as the number of sons increases.

Table 6: Effects (unadjusted and adjusted odds ratios) of family composition on the desire to have another child in Nepal (2006), India (2005-06), and Bangladesh (2004)

Parity and family composition	India (2005-06)											
	Nepal (2006)		All India		North India		South India		West Bengal		Bangladesh (2004)	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Parity 1												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	0.50**	0.51**	0.58**	0.58**	0.40**	0.38**	0.91	0.92	0.67**	0.58**	0.68**	0.65**
N	1222		13564		2364		2628		1185		1883	
Parity 2												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	0.09**	0.07**	0.21**	0.19**	0.12**	0.09**	0.36**	0.35**	0.21**	0.20**	0.27**	0.27**
2 Sons	0.05**	0.03**	0.18**	0.17**	0.10**	0.07**	0.39**	0.38**	0.24**	0.22**	0.45**	0.44**
N	1796		24222		3889		6158		1469		2393	
Parity 3												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	0.08**	0.06**	0.19**	0.19**	0.11**	0.08**	0.28**	0.27**	0.23**	0.22**	0.24**	0.21**
2 Sons	0.01**	0.01**	0.07**	0.06**	0.02**	0.01**	0.13**	0.13**	0.08**	0.07**	0.08**	0.07**
3 Sons	0.02**	0.01**	0.12**	0.11**	0.05**	0.03**	0.39**	0.37**	0.19*	0.18*	0.32**	0.27**
N	1638		17932		3907		3333		843		1864	
Parity 4+												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	0.06**	0.06**	0.16**	0.15**	0.09**	0.08**	0.58	0.50	0.12*	0.10*	0.17**	0.15**
2 Sons	0.01**	0.01**	0.05**	0.04**	0.02**	0.01**	0.20*	0.17*	0.04**	0.03**	0.09**	0.08**
3 or more sons	0.01**	0.01**	0.07**	0.06**	0.02**	0.01**	0.74	0.64	0.09**	0.06**	0.07**	0.06**
N	2292		19208		6383		1976		677		2722	

Note: The adjusted model controls for mothers' education, current work status, media exposure to family planning messages, residence, wealth quintiles, and participation in household decisionmaking. The reference category for parity in each model is having no sons.

** Significant at 1 percent, *Significant at 5 percent. The number of cases in the unadjusted and adjusted models are close.

Contraceptive use

The unadjusted and adjusted effects of family size and sex composition on contraceptive use are presented in Table 7. Again, the results from the unadjusted and adjusted models are similar in all cases. With a few exceptions, the adjusted odds of contraceptive use tend to increase with an increase in the number of sons, peak among women with two sons, and then decline somewhat among women with three or more sons. An exception is Nepal where at parity 3 the adjusted odds are highest among women with all three sons. Another exception is Bangladesh where at parity 2 the adjusted odds are higher among women with one son and one daughter than among women with both sons. The effects are strongest in Nepal, followed by India, and are weakest in Bangladesh. Within India, the adjusted effects of parity and sex composition on contraceptive use are much stronger in north India than in south India or West Bengal. At parities 1 and 4+ in south India and at parities 1, 3, and 4+ in West Bengal, the effects are not statistically significant.

Table 7: Effects (unadjusted and adjusted odds ratios) of family composition on contraceptive use in Nepal (2006), India (2005-06), and Bangladesh (2004)

Parity and family composition	India (2005-06)											
	Nepal (2006)		All India		North India		South India		West Bengal		Bangladesh (2004)	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Parity 1												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.19	1.19	1.26**	1.26**	1.37**	1.47**	0.96	0.98	1.09	1.15	1.20	1.25*
N	1222		13588		2364		2640		1185		1884	
Parity 2												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.87**	1.97**	1.97**	1.97**	2.90**	2.96**	1.55**	1.59**	1.34	1.29	1.57**	1.54**
2 Sons	3.29**	3.54**	2.55**	2.70**	4.23**	4.96**	1.70**	1.76**	1.77**	1.75**	1.42**	1.41**
N	1797		24250		3892		6167		1469		2393	
Parity 3												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	2.33**	2.34**	2.06**	2.04**	3.51**	3.52**	1.90**	1.95**	1.51	1.56	1.81**	1.91**
2 Sons	4.71**	4.81**	3.29**	3.50**	6.73**	7.92**	2.90**	2.96**	1.53	1.53	1.87**	1.99**
3 Sons	4.93**	5.49**	2.98**	3.18**	5.27**	5.93**	2.23**	2.36**	1.82	1.94	1.80**	1.83**
N	1638		17949		3909		3335		843		1864	
Parity 4+												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	2.13**	2.27**	1.88**	1.87**	4.00**	4.03**	1.30	1.40	1.02	1.03	1.64*	1.67*
2 Sons	3.25**	3.61**	2.46**	2.63**	6.54**	7.52**	1.10	1.23	0.86	0.84	1.64*	1.75**
3 or more sons	2.34**	2.74**	1.51**	1.69**	4.22**	5.27**	0.77	0.85	0.62	0.66	1.17	1.26
N	2293		19232		6385		1980		799		2723	

Note: The adjusted model controls for mothers' education, current work status, media exposure to family planning messages, residence, wealth quintiles, and participation in household decisionmaking. The reference category for parity in each model is having no sons.

** Significant at 1 percent, *Significant at 5 percent. The number of cases in the unadjusted and adjusted models are close.

Modern and traditional methods

Multinomial logit models were estimated to compare the adjusted effects of parity and sex composition on the likelihood of using a modern or a traditional contraceptive method (Table 8). At most parities in all three countries, the adjusted relative risk ratio for using a modern contraceptive method increases with an increasing number of sons. The relative risk ratio for using a traditional method also tends to increase with an increasing number of sons in Nepal and India, but not in Bangladesh. The effects of parity and sex composition on the likelihood of using a modern method are similar to those discussed above (in Table 7) for all methods. Again, within India, the effects on modern method use are much stronger in north India than in south India or West Bengal. However, for traditional methods, the effects are positive and significant only in north India. As in the case of Bangladesh, there is no clear relationship between parity and sex composition and traditional method use in West Bengal, despite a relatively high use of traditional methods.

Table 8: Effects (adjusted relative risk ratio from multinomial logit models) of family composition on modern and traditional contraceptive use in Nepal (2006), India (2005-06), and Bangladesh (2004)

Parity and family composition	India (2005-06)											
	Nepal (2006)		All India		North India		South India		West Bengal		Bangladesh (2004)	
	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional
Parity 1												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.24	0.85	1.33**	1.15**	1.52**	1.37*	1.05	0.76	1.26	1.05	1.31**	0.97
N	1222		13588		2364		2640		1185		1884	
Parity 2												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	2.02**	1.33	2.09**	1.42**	3.35**	1.88**	1.63**	0.91	1.60**	0.83	1.59**	1.26
2 Sons	3.73**	2.33**	2.94**	1.62**	6.02**	2.16**	1.82**	0.91	2.26**	0.99	1.40*	1.46
N	1797		24250		3892		6167		1469		2393	
Parity 3												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	2.42**	2.27	2.15**	1.49**	4.33**	1.68*	1.99**	0.52	1.73	1.01	2.00**	1.56
2 Sons	5.21**	2.74	3.83**	1.73**	10.52**	2.27**	3.02**	1.05	1.69	1.02	2.09**	1.62
3 Sons	5.65**	3.35	3.49**	1.53*	7.76**	1.91*	2.41**	0.73	2.26**	0.98	2.05**	1.04
N	1638		17949		3909		3335		843		1863	
Parity 4+												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	2.13**	6.91	2.04**	1.24	5.89**	1.74	1.37	1.95	1.07	0.94	2.04**	0.98
2 Sons	3.53**	6.39	2.98**	1.35*	11.86**	2.35**	1.20	0.51	0.92	0.65	1.93**	1.42
3 or more sons	2.60**	5.90	1.84**	1.14	7.89**	2.09*	0.82	1.26	0.70	0.55	1.43	0.94
N	2293		19232		6385		1980		799		2723	

Note: The adjusted model controls for mothers' education, current work status, media exposure to family planning messages, residence, wealth quintiles, and participation in household decisionmaking. Not using any contraception is the base category. The reference category for parity in each model is having no sons. Wealth Index categories 1 and 2 are combined for Nepal and South India due to inadequate number of observations.

** Significant at 1 percent, *Significant at 5 percent.

Permanent and temporary methods

The adjusted effects of parity and sex composition on the likelihood of using a temporary or a permanent contraceptive method (relative to no use) are presented in Table 9. At each parity in all three countries, the likelihood of using a permanent method is strongly positively associated with an increasing number of sons. In most cases, the adjusted relative risk ratio for using a permanent method peaks among women with two sons and then declines somewhat among women with three or more sons. The adjusted effects of parity and sex composition on the likelihood of using a temporary method are much weaker than the effects for using a permanent method. In most cases, having at least one son increases the likelihood of using a temporary method, but there is no clear relationship with increasing number of sons.

Across regions within India, the adjusted effects of parity and sex composition are stronger in north India than in south India or West Bengal. For permanent method use, the effects are positive and significant in both north and south India as well as in West Bengal, but for temporary methods the effects are significant only in north India. In north India, the number of sons is positively and significantly associated with the likelihood of using a temporary or a permanent method at each parity, but in south India and West Bengal this association is observed only for permanent method use at parities 2 and 3.

Table 9: Effects (adjusted relative risk ratio from multinomial logit models) of family composition on temporary (temp.) and permanent (perm.) contraceptive use in Nepal (2006), India (2005-06), and Bangladesh (2004)

Parity and family composition	India (2005-06)											
	Nepal (2006)		All India		North India		South India		West Bengal		Bangladesh (2004)	
	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.
Parity 1												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.18	1.23	1.19**	1.73**	1.31*	2.90**	0.90	1.13	1.13	1.40	1.23*	2.02*
N	1222		13588		2364		2640		1185		1884	
Parity 2												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.29	7.96**	1.63**	2.26**	2.08**	5.63**	0.98	1.69**	0.89	2.17**	1.46**	3.42**
2 Sons	1.75**	18.85**	1.72**	2.46**	2.46**	12.00**	0.95	1.90**	1.18	2.98**	1.34*	3.12**
N	1797		24250		3892		6167		1469		2393	
Parity 3												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.36	8.80**	1.57**	2.33**	1.98**	6.94**	1.26	1.99**	0.95	2.20*	1.77**	3.86**
2 Sons	1.60*	25.89**	1.67**	4.58**	2.39**	20.00**	1.15	3.08**	0.84	2.26*	1.72**	5.92**
3 Sons	1.45	31.92**	1.47**	4.19**	1.51	15.57**	1.23	2.44**	0.99	2.95*	1.70*	3.67**
N	1638		17979		3909		3335		843		1863	
Parity 4+												
No Son	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 Son	1.53	5.00**	1.41**	2.16**	2.77**	5.63**	1.31	1.38	0.74	1.53	1.57*	3.33*
2 Sons	1.39	12.06**	1.51**	3.33**	3.64**	12.42**	0.67	1.22	0.44	1.51	1.62*	3.94*
3 or more sons	1.58	7.04**	1.29*	1.95**	3.26**	7.82**	0.95	0.82	0.44	1.01	1.13	3.35*
N	2293		19232		6385		1980		799		2723	

Note: The adjusted model controls for mothers' education, current work status, media exposure to family planning messages, residence, wealth quintiles, and participation in household decisionmaking. Not using any contraception is the base category. The reference category for parity in each model is having no sons. Wealth Index categories 1 and 2 are combined for South India due to an inadequate number of observations.

** Significant at 1 percent, *Significant at 5 percent.

CONCLUSION

This study explores the effect of son preference on fertility desires and contraceptive method choice and examines whether women adopt different family planning methods to manipulate family size and composition. The analysis uses the latest Demographic and Health Survey data available for Nepal, India, and Bangladesh. We find that even after controlling for key socioeconomic factors, a strong preference for sons exists in all three countries. However, there are regional differences within India. Our analysis shows that parity and sex composition of previous children affect fertility desires and contraceptive behavior. Women with more sons are more likely to use contraception and have a lower desire to have another child than those with more daughters. An important finding is that the effects of parity and sex composition on contraceptive use and fertility desires continue to be strong and significant even after controlling for education, work status, wealth status, media exposure, women's participation in household decision-making, and urban/rural residence. As in Mishra et al. (2004), we argue that since sex ratio at birth is biologically determined, these factors may partly control for sex-selective abortion behavior.

The study reveals that son preference is more prominent in Nepal and India than in Bangladesh. Within India, the effects of parity and family composition on fertility desires and contraceptive use are stronger in north India than in south India or West Bengal. Across all parities in all three countries, women with fewer sons are more likely to desire another child and less likely to use contraception. There is also evidence that many women want to have a daughter, especially in Bangladesh, after having one son. An earlier study suggested that there is a desire for at least one daughter in Bangladesh but not before having two sons (Chowdhury and Bairagi, 1990).

Between modern and traditional methods, we observe a clearer association of parity and sex composition with modern method use only. In general, there is a greater reliance on permanent methods as families get closer to their desired family size and their desired number of sons. This pattern is stronger in Nepal and India than in Bangladesh. In Nepal and India, the emphasis of the family planning programs for many years has been on the permanent methods, especially female sterilization. We find a weaker relationship between contraceptive method use and preference for a male child in West Bengal and south India than in north India.

The current study has several limitations. First, the study is based on cross-sectional data at a single point in time in each country, which only allows an examination of the associations between family composition and fertility desires and contraceptive use. Second, the surveys did

not collect information on sex-selective abortions or feticide. However, we include several controls for socioeconomic factors, which tend to be correlated with sex selective abortion behavior. Finally, it is important to note that our data on desired fertility are self-reported data, which could be biased due to rationalization and may not necessarily correlate with fertility behavior.

The programs need to target women of a certain parity and sex composition and counter the practice of sex selective abortions to maximize family planning acceptance and reduce fertility. More importantly, there is need to reduce son preference. The desire for sons is embedded within the cultural fabric of the South Asian society, and tackling this would require alteration of social norms and attitudes of people and improving women's status, with particular emphasis on higher education (Pande and Astone, 2007). Policies and programs should include mechanisms to make daughters valuable and remove gender differences within households through family planning, education, and various social upliftment programs. Such programs need to first recognize variations in women's status and son preference by socio-cultural groups and regions within South Asia and then be tailored accordingly.

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