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Son Preference and Its Effect on Fertility in India

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India's National Family Health Survey (NFHS) was conducted in 1992-93 under the auspices of the Ministry of Health and Family Welfare. The survey provides national and state-level estimates of fertility, infant and child mortality, family planning practice, maternal and child health care, and the utilization of services available to mothers and children. The International Institute for Population Sciences, Mumbai, coordinated the project in cooperation with 18 population research centres throughout India, the East-West Center Program on Population in Honolulu, Hawaii, and Macro International in Calverton, Maryland. The United States Agency for International Development provided funding for the project.

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Son Preference and Its Effect on Fertility in India

Abstract. Numerous studies have found that most Indian couples have a strong preference for sons over daughters. In an effort to have sons, many couples continue to have children after achieving their desired family size. This practice may have retarded India's fertility decline.

Using data from the 1992-93 National Family Health Survey, this report assesses the prevalence of son preference in India as a whole and in the 19 most populous states. The state-level analysis is important because fertility levels, social and economic conditions, and the strength of son preference vary widely from one part of the country to another.

The analysis compares the ideal number of sons and the ideal number of daughters mentioned by Indian women as well as contraceptive use by women with two sons and women with two daughters. It goes on to compare the situation for boys and girls in terms of immunization rates, period of breastfeeding, prevalence of three common childhood diseases and likelihood of treatment, prevalence of chronic undernutrition among children under age 4, and infant and child mortality rates. On nearly all these measures and in most states, male children have a decided advantage over female children. Son preference is particularly strong in northern and central India and somewhat weaker in the southern and western regions.

Next, the analysis uses life-table methods and hazard models to examine the effect of son preference on fertility. It also examines how the effect of son preference interacts with a woman's social and economic characteristics, in particular her rural or urban residence, literacy, and religion. The effect of son preference on fertility is found to vary substantially by region and state. In states where fertility is very high or very low, the effect is small, as expected, but in states with intermediate levels of fertility (between 2.0 and 3.0 children), it varies widely. It is highest in Himachal Pradesh, Punjab, Gujarat, and Maharashtra and lowest in West Bengal and most of the southern states. If gender preferences could be eliminated entirely, the fertility level in India would decline by about 8 percent. A decline of this magnitude would have a substantial impact on the population growth rate. Eliminating son preference would also have important social benefits.

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As in societies of East Asia, North Africa, the Middle East, and other parts of South Asia, in India couples have been observed to have a strong preference for sons over daughters (Arnold 1996, 1997; Cleland, Verrall, and Vaessen 1983; UN 1981, 1985; Williamson 1976) and to accord a low status to women (UN 1995). Parents' preferences for sons may have a significant impact on children's welfare and may affect demographic behavior as well. A large and populous country, India exhibits substantial variations in its geographic, economic, and cultural environment. Not surprisingly, large differentials in the degree of son preference and in demographic behavior have also been noted among India's regions (Arnold, Choe, and Roy 1996; IIPS 1995). This report examines the patterns of son preference and its effect on fertility in India overall and in 19 of its states.

Previous studies have found that a number of cultural, social, and economic factors influence the relative benefits and costs of sons and daughters and ultimately parents' gender preferences (Arnold et al. 1975; Bulatao 1981; Espenshade 1977; Friedman, Hechter, and Kanazawa 1994; C. Vlasoff 1990; M. Vlasoff 1979). Studies in India have identified three major factors that underlie son preference. One is the economic utility of sons. Sons are more likely than daughters to provide family labor on the farm or in a family business, earn wages, and support their parents during old age, although there is some recognition that sons are no longer a dependable source of old-age support (Bardhan 1988; Basu 1989; Dharmalingam 1996; Mamdani 1972; Miller 1981). Upon marriage, a son brings a daughter-in-law into his family, and she provides additional help around the house as well as an economic reward in the form of dowry payments. Another important advantage of having sons is their sociocultural utility. In the context of India's patrilineal and patriarchal family system, having one son is imperative for the continuation of the family line, and many sons provide additional status to the family (J. Caldwell, Reddy, and P. Caldwell 1989; Dyson and Moore 1983; Kapadia 1966; Karve 1965). Finally, the utility of having sons arises from the important religious functions that only sons can provide. According to Hindu tradition, sons are needed to kindle the funeral pyre of their deceased parents and to help in the salvation of their souls.

Although a daughter provides help in housework before marriage, she is considered to be an economic liability to her parents mainly because of the heavy dowry payment demanded by the groom's family (Kishor 1995), as well as the high cost of the wedding, which is generally the responsibility of the bride's family to bear. Socially, the utility of having daughters is small compared with their cost. Although daughters are often considered to provide more emotional satisfaction to parents than are sons (Dharmalingam 1996; PRC, Lucknow University, and IIPS 1994), they typically become a member of their husband's family after marriage and may have little continuing contact with their natal family. Parents also bear a large burden in arranging a suitable marriage for their daughters and protecting their chastity before mar-

riage. At the wedding ceremony, in many cases the father of the bride has to assume a humiliatingly low posture in the presence of the groom and his family. According to Hindu tradition, however, there is one important reason for having a daughter: her parents can earn religious merit by selflessly giving her away in marriage (*kanya daan*). Some parents also cite the need to have a daughter to cry at the time of their death (Dharmalingam 1996).

A strong preference for sons may be an obstacle to fertility decline if couples continue having children after reaching their overall family-size goal because they are not satisfied with the sex composition of their children. Existing studies, however, do not demonstrate a consistently strong effect of son preference on fertility (Arnold 1997, 1992; Bairagi and Langsten 1986; Das 1984, 1987, 1989; Haddad et al. 1996; Koenig and Foo 1992; Operations Research Group 1990; Parasuraman, Roy, and Surender 1994; Park 1986; Srinivas 1977). Moreover, fertility has declined dramatically in some countries where son preference is still widespread—for example, in South Korea and China. Research on the relationship between son preference and fertility is confounded by the observation that the link is weak in both high-fertility and low-fertility populations. In high-fertility societies, most couples continue to have children regardless of the number of sons and daughters they already have. In low-fertility societies, the influence of son preference is also weak because few couples want to have more than one or two children even if they do not achieve their ideal number of sons and daughters. The effect of son preference on fertility, therefore, is thought to be most pronounced in countries like India that are in the middle of the fertility transition.

In this report we examine how son preference influences parity progression in India as a whole and in individual states. We use a modified version of conventional parity progression, based on women with two or three surviving children, rather than on the number of children they have ever borne. We also examine how the effect of son preference interacts with a woman's socioeconomic characteristics, specifically urban/rural residence, literacy, and religion. The analysis estimates the effect of the sex composition of living children on the probability of a woman's having another child, controlling for the survival status of the last child and selected sociodemographic characteristics of the woman. We focus on the parity progression of women with two or three surviving children because most decisions about whether to stop childbearing seem to occur after a couple has had two or three children. For example, during the three years preceding India's 1992–93 National Family Health Survey (NFHS), 51 percent of births were of order 1–2, 29 percent were of order 3–4, and only 19 percent were of higher orders (IIPS 1995, table 5.11).

State-specific analyses are important in India, where decision making and program implementation are largely decentralized. The strength of son preference varies considerably from one part of the country to another, as do socioeconomic conditions

and levels of fertility and mortality. Of particular importance is the fact that son preference has been found to be consistently stronger in northern India than in the South (Basu 1992; Bhatia 1978; Kanitkar and Murthy 1983; Khan and Gupta 1987; Khan and Prasad 1983).

SOURCE OF DATA

We use data from the 1992–93 National Family Health Survey of India. The NFHS was a nationally representative sample survey of 89,777 ever-married women, ages 13–49, in 88,562 households. It was conducted in 25 states, which include more than 99 percent of India's population, and the households covered in the survey included more than 500,000 residents. The NFHS had a systematic, multistage, stratified sample design. In states where the urban population was not sufficiently large to provide a sample of at least 1,000 completed interviews with eligible women, urban areas were purposely oversampled (IIPS 1995). This report analyzes data from the 19 states having samples of more than 2,500 women. Estimates for the six small northeastern states (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura) are not shown separately in most tables, but those states are always included in the totals for India. We have used appropriate design weights in both our analyses for the states without self-weighting samples and our analyses for the national sample.

SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF STATES

Key socioeconomic and demographic characteristics show pronounced variations among India's states (Table 1). In all of the states except Delhi and Goa, the ever-married women interviewed in the survey come predominantly from rural areas, but the percentage of the population living in urban areas in those states varies from only 10 percent in Himachal Pradesh to 49 percent in Mizoram.

The literacy rate among women is quite low in India. A majority of women are illiterate in all states except Delhi, Himachal Pradesh, Goa, Kerala, and several of the small northeastern states. Female literacy is particularly low in Rajasthan, Madhya Pradesh, Uttar Pradesh, and Bihar, where more than 70 percent of women are illiterate.

A large majority of Indians are Hindus (82 percent). Muslims constitute the second largest religion. Although nationwide only 11 percent of household heads are Muslim, in a few states the proportion of Muslims ranges between 16 and 26 percent. These include Jammu, Uttar Pradesh, Bihar, West Bengal, Assam, and Kerala. In Punjab more than half of the population is Sikh; and in Goa, Kerala, and four of the

Table 1 Selected background characteristics of ever-married women, ages 13-49, and household heads (percentages), by state: India, 1992-93

State	Urban residence	Illiterate	Religion of household head			Caste/tribe of household head		
			Hindu	Muslim	Other	Scheduled caste (SC)	Scheduled tribe (ST)	Non-SC/ST
INDIA	26	63.1	82.3	11.4	6.3	12.6	9.1	78.3
North								
Delhi	92	37.4	82.4	9.7	7.9	5.0	0.9	94.1
Haryana	26	63.8	88.4	4.3	7.3	28.3	*	71.6
Himachal Pradesh	10	49.7	96.8	1.3	1.9	23.4	5.7	70.8
Jammu Region of J & K	34	56.7	77.2	17.0	5.8	30.2	0.9	68.9
Punjab	28	52.6	39.7	1.2	59.1	28.0	*	72.0
Rajasthan	20	82.2	92.3	5.5	2.2	20.7	17.3	62.0
Central								
Madhya Pradesh	22	74.4	93.0	4.9	2.1	7.2	27.5	65.3
Uttar Pradesh	20	75.7	82.9	15.8	1.3	18.0	1.1	80.9
East								
Bihar	15	78.3	82.1	15.7	2.2	9.8	8.6	81.6
Orissa	15	67.4	96.7	1.5	1.8	9.5	23.6	66.6
West Bengal	27	50.6	77.2	20.7	2.1	8.7	4.8	86.5
Northeast								
Arunachal Pradesh	15	69.5	36.7	0.8	62.5	*	76.1	23.9
Assam	12	59.3	69.3	26.1	4.6	4.1	16.0	79.9
Manipur	32	47.6	60.2	5.4	34.4	*	28.7	71.3
Meghalaya	19	51.4	9.4	2.4	88.2	0.2	88.9	10.9
Mizoram	49	8.4	2.3	0.7	97.0	*	97.1	2.9
Nagaland	21	43.0	4.8	0.8	94.4	*	95.8	4.2
Tripura	20	41.3	86.4	8.4	5.2	0.6	16.5	82.9
West								
Goa	50	33.7	64.0	4.7	31.3	2.2	1.8	96.0
Gujarat	35	55.3	89.5	8.5	2.0	5.8	14.9	79.3
Maharashtra	41	50.2	77.3	11.1	11.6	6.6	10.0	83.4
South								
Andhra Pradesh	26	68.7	87.7	8.4	3.9	14.9	6.0	79.1
Karnataka	33	61.6	86.3	10.6	3.1	11.9	5.7	82.4
Kerala	28	16.0	58.3	19.1	22.6	3.6	3.6	92.8
Tamil Nadu	35	50.1	88.1	5.4	6.5	19.8	0.3	79.9

J & K—Jammu and Kashmir

* Less than 0.05 percent

northeastern states, Christians constitute sizable minorities. In Arunachal Pradesh 15 percent of household heads are Christian, and almost half report their religion as animism, Buddhism, or 'other'.

Scheduled castes constitute substantial proportions of the population (between 12 and 30 percent) in all of the northern states except Delhi, Uttar Pradesh, and the southern states other than Kerala. (Scheduled castes and tribes are groups that the Indian Government identifies as socially and economically backward and in need of special protection from social injustice and exploitation.) Rajasthan, Madhya Pradesh, Orissa, Gujarat, and all of the northeastern states have substantial proportions of scheduled tribes. In four northeastern states (Arunachal Pradesh, Meghalaya, Mizoram,

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Table 2 Selected demographic characteristics, by state: India, 1992-93

State	Total fertility rate	Mean ideal number of children	Singulate mean age at marriage	Contraceptive prevalence rate	Infant mortality rate	Mortality under age 5
INDIA	3.4	2.9	20.0	40.6	78.5	109.3
North						
Delhi	3.0	2.5	20.9	60.3	65.4	83.1
Haryana	4.0	2.6	18.4	49.7	73.3	98.7
Himachal Pradesh	3.0	2.4	20.4	58.4	55.8	69.1
Jammu Region of J & K	3.1	2.8	21.2	49.4	45.4	59.1
Punjab	2.9	2.6	21.1	58.7	53.7	68.0
Rajasthan	3.6	3.0	18.4	31.8	72.6	102.6
Central						
Madhya Pradesh	3.9	3.1	17.4	36.5	85.2	130.3
Uttar Pradesh	4.8	3.4	18.6	19.8	99.9	141.3
East						
Bihar	4.0	3.4	18.0	23.1	89.2	127.5
Orissa	2.9	3.0	20.7	36.3	112.1	131.0
West Bengal	2.9	2.6	19.2	57.4	75.3	99.3
Northeast						
Arunachal Pradesh	4.3	4.7	20.0	23.6	40.0	72.0
Assam	3.5	3.2	21.6	42.8	88.7	142.2
Manipur	2.8	3.7	25.0	34.9	42.4	61.7
Meghalaya	3.7	4.6	21.2	20.7	64.2	86.9
Mizoram	2.3	4.3	22.9	53.8	14.6	29.3
Nagaland	3.3	4.0	22.7	13.0	17.2	20.7
Tripura	2.7	2.6	21.2	56.1	75.8	104.6
West						
Goa	1.9	2.7	25.1	47.8	31.9	38.9
Gujarat	3.0	2.6	20.2	49.3	68.7	104.0
Maharashtra	2.9	2.5	19.3	53.7	50.5	70.3
South						
Andhra Pradesh	2.6	2.7	18.1	47.0	70.4	91.2
Karnataka	2.9	2.5	19.6	49.1	65.4	87.3
Kerala	2.0	2.6	22.1	63.3	23.8	32.0
Tamil Nadu	2.5	2.1	20.5	49.8	67.7	86.5

and Nagaland), scheduled tribes constitute large majorities of the population.

Table 2, showing selected demographic characteristics of the 19 states, indicates that in most states the total fertility rate ranges between 2 and 4 children per woman. The total fertility rate is below replacement level (2.1 children) in two states, Goa and Kerala. Fertility is particularly high in Haryana, Uttar Pradesh, Bihar, and Arunachal Pradesh. The mean ideal number of children reported by women in most states falls within a narrow range of 2.5 to 3.0. Only Himachal Pradesh and Tamil Nadu have a mean ideal number below 2.5.

The singulate mean age at marriage shows that Indian women marry at age 20, on average. In general, states with high levels of fertility have a young mean age at marriage and low contraceptive prevalence. Exceptions are found in West Bengal, Maharashtra, and Andhra Pradesh, where a combination of high contraceptive preva-

lence and young age at marriage has resulted in lower than average fertility. In Goa, an exceptionally high age at first marriage and a moderate level of contraceptive prevalence have been important factors in achieving below-replacement fertility. The low levels of contraceptive prevalence in Uttar Pradesh and Bihar are striking in a country where large-scale family planning efforts have been under way for more than four decades.

Infant and under-5 mortality rates are estimated from the birth histories of women, which include dates of birth for all children and the date of death for each deceased child. The infant mortality rate is several times as high in Uttar Pradesh and Orissa as in Goa, Kerala, and some of the small northeastern states. Under-5 mortality also varies substantially from one state to another. At the high end of the spectrum, more than 10 percent of children die before reaching their fifth birthday in Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Orissa, Assam, Tripura, and Gujarat. Once again, Goa and Kerala share the lowest mortality rates with Mizoram and Nagaland, but the rates in the latter two states seem to be unreliably low.

EVIDENCE OF SON PREFERENCE

We first examine the evidence of son preference from the NFHS data on the stated ideal number of sons and daughters, fertility and family planning behavior, and the treatment of sons and daughters. Table 3 shows selected indicators of son preference in every state except the small northeastern states, which have small sample sizes. The ideal number of sons exceeds the ideal number of daughters by 20 to 80 percent in all states. The preference for sons is particularly high in most of the northern states, as well as in Uttar Pradesh, Bihar, and Gujarat.

When asked about the sex composition of children in their ideal family, some women did not specify a preferred sex for some (or all) of their children. In those cases, the respondents said that the children's sex did not matter or that children of either sex would be fine. For India as a whole, responses related to 7 percent of children in ideal families were of this type (data not shown). The percentage varies among states, however, indicating variations in the strength of gender preference. In South and West India, the proportion of children in ideal families whose sex was not specified ranges from 12 to 26 percent. In the remaining states (except for Delhi, Haryana, and Himachal Pradesh), the proportion is 8 percent or less. In Kerala and Tamil Nadu, women do not care about the sex of about one-fourth of the children in their ideal families. In Rajasthan, on the other hand, women have a gender preference for nearly all children.

Another indicator of son preference is the extent to which the desire to continue childbearing depends on the current sex composition of a couple's living children. A

Table 3 Selected indicators of son preference, by state: India, 1992–93

	Ratio ideal no. sons/ daughters	Proportion wanting no more children (2S/2D)	Proportion using contraception (2S/2D)	Proportion fully vaccinated (S/D)	Median duration breast- feeding (S/D)	Prevalence of three childhood diseases (S/D) ^a	Proportion taken to health facility (S/D) ^b	Proportion severely under- nourished (D/S) ^c	Excess female child mortality (%)
INDIA	1.5	1.9	1.7	1.08	1.07	0.91	1.11	1.04	43
North									
Delhi	1.3	2.0	1.2	1.30	1.09	0.90	1.02	0.98	56
Haryana	1.6	9.9	2.5	1.13	1.24	0.83	1.04	1.48	135
Himachal Pradesh	1.6	4.2	2.5	1.13	1.07	0.98	1.08	u	44
Jammu Region of J & K	1.6	5.3	1.8	1.05	1.07	0.86	0.99	0.98	69
Punjab	1.7	4.0	2.0	1.27	1.10	0.84	1.02	1.14	81
Rajasthan	1.7	8.6	5.9	1.27	1.21	0.95	1.24	1.07	59
Central									
Madhya Pradesh	1.5	3.1	3.2	1.28	1.19	0.82	1.19	u	22
Uttar Pradesh	1.7	3.3	2.8	1.32	1.07	0.91	1.07	0.97	70
East									
Bihar	1.7	2.9	2.3	1.42	1.14	0.87	1.16	1.01	55
Orissa	1.4	2.3	2.6	1.11	0.96	0.95	1.16	1.11	45
West Bengal	1.4	1.7	1.4	0.87	1.17	1.00	1.20	u	63
Northeast									
Assam	1.3	2.7	1.6	0.90	0.95	0.92	1.05	0.90	13
West									
Goa	1.3	1.6	1.2	0.99	0.80	0.87	0.97	0.81	11
Gujarat	1.8	2.8	2.7	1.06	1.03	0.86	1.12	0.97	42
Maharashtra	1.4	2.2	2.4	0.91	0.98	0.90	1.13	1.08	24
South									
Andhra Pradesh	1.4	1.2	1.2	1.07	1.01	0.97	1.11	u	28
Karnataka	1.3	1.9	1.9	0.94	1.09	0.90	1.01	1.24	30
Kerala	1.2	1.1	1.1	1.05	1.10	0.85	1.08	1.34	-6
Tamil Nadu	1.3	1.3	1.3	1.10	0.93	1.00	1.07	u	-20

S—sons; D—daughters

u—Estimates are unavailable because children's height was not measured.

a. Diarrhea, fever, or acute respiratory infection

b. Among children ill with diarrhea, fever, or acute respiratory infection. This ratio is based on only two of the three diseases in Jammu, Punjab, and West Bengal because of the small number of children who were ill with the third disease.

c. Severely under-nourished children are more than 3 standard deviations below the median height-for-age of an international reference population.

simplified measure is used in Table 3 to compare second-parity women with two sons to those with two daughters. Not surprisingly, women with two sons are less likely to want to have more children than are women with two daughters in every state. According to this measure, son preference is strong in the northern states and is especially strong in Haryana and Rajasthan. Except for Karnataka, states in the southern region exhibit a low level of son preference.

Son preference can also affect family planning behavior. In every state, women with two sons are more likely to use contraception than are women with two daughters. Rajasthan stands out as having very strong son preference according to this measure, whereas Goa, Andhra Pradesh, Kerala, and Tamil Nadu have weak son pref-

erence. On the basis of these three fertility-related measures, we infer that son preference is strong in the states in the northern and central regions (except Delhi) and weak in Goa and most of the southern states.

The strong tradition of son preference and the low status of women in India together produce an atmosphere in which female children may not be treated as well as male children in many cases, particularly where medical care and feeding practices are concerned (Basu 1989; Das Gupta 1987; Kishor 1995; Sen and Sengupta 1983). Table 3 shows several indicators of the relative treatment of daughters and sons. Each indicator is defined as a ratio that has a value exceeding 1.0 if boys receive more favorable treatment than girls and a value of less than 1.0 if girls receive more favorable treatment than boys. The first measure shows the extent of vaccination coverage of young children (ages 12–23 months). Children are defined as being fully vaccinated if they have received all of the recommended vaccinations against six childhood diseases (tuberculosis, diphtheria, whooping cough, tetanus, poliomyelitis, and measles). Male children are slightly more likely than female children to be fully vaccinated in India overall, and the male advantage is evident in all but five states. Girls face the most discrimination in a band of states from Punjab and Rajasthan in the West to Bihar and Orissa in the East.

Boys are breastfed for a slightly longer period of time than girls in India as a whole. Once again, the advantage for boys is observed in 14 of the 19 states. The duration of breastfeeding is much shorter for girls than for boys in Haryana, Rajasthan, and Madhya Pradesh. One reason for the shorter period of breastfeeding for girls is the parents' desire to have another child sooner after the birth of a girl than after the birth of a boy in the hope of having a boy for the next birth. Although the intent of the parents may not always be to provide less adequate nutrition to daughters by weaning them earlier, the effect is the same.

The NFHS estimated both the prevalence and treatment of three childhood diseases—diarrhea, fever, and acute respiratory infection—in the two weeks before the survey. Girls are consistently less likely than boys to be reported as ill with any of these conditions, possibly because their illnesses are given less serious attention by their parents; and when they become ill they are less likely to be taken to a health facility or health provider for treatment. Discrimination against girls in medical treatment is particularly pronounced in the contiguous states of Rajasthan, Madhya Pradesh, Bihar, Orissa, and West Bengal.

Poor feeding practices and frequent episodes of disease often result in the malnourishment of children. In fact, India has one of the most serious problems of malnourishment of any country in the world (Sommerfelt and Stewart 1994). Table 3 shows estimates of the ratio of female-to-male chronic undernutrition (stunting) among children under four years of age. Children who are severely undernourished, according to this measure, are more than 3 standard deviations below the median height-

for-age of an international reference population (Dibley, Goldsby, et al. 1987; Dibley, Staehling, et al. 1987). Girls are much more likely than boys to be severely stunted in Haryana, Karnataka, and Kerala. It should be pointed out, however, that Kerala has by far the lowest level of severe stunting of any state, and so the ratio for that state is based on small percentages. Moreover, in both Karnataka and Kerala, some of the measures of nutritional status show that girls are actually favored, making the results inconsistent for those states. Girls are also somewhat disadvantaged in Punjab, Rajasthan, and Maharashtra. Assam and Goa are the only states in which boys are considerably more likely to be severely stunted than girls.

The measures of medical care and nutritional status should be interpreted cautiously. Some of the worst cases of discrimination may have resulted in death during early childhood, thereby biasing the indicators that are based on surviving children.

In contrast to the usual pattern of higher male than female mortality at almost all ages, female mortality in South Asia is typically higher than male mortality throughout childhood and the early childbearing years (Ghosh 1987; Pebley and Amin 1991; Preston 1990; Tabutin and Willems 1995). In the NFHS data, age-specific mortality rates in 1991–92 were higher for females than for males in every five-year age group from 0–4 through 30–34 (IIPS 1995, table 8.3). During the first year of life, the mortality rate for India as a whole is slightly higher for males (89 per 1,000 births) than for females (84 per 1,000 births), but that result is entirely attributable to much higher neonatal mortality rates for males (see Figure 1). In the post-neonatal period, girls experience slightly higher mortality than boys. Female children are unusually disadvantaged in the next four years of life. Child mortality (ages 1–4) is 43 percent higher for females (42.0 per 1,000) than for males (29.4 per 1,000). This high level of excess female child mortality compares with an international average of only 2–3 percent, based on comparable information from nearly 50 Demographic and Health Surveys around the world (Bicego and Ahmad 1996; Sullivan, Rutstein, and Bicego 1994).

Figure 2 and the last column of Table 3 show the percentage by which female child mortality exceeds male child mortality in each state. Kerala and Tamil Nadu are the only two states in which child mortality is higher for males than for females. In every other state, female child mortality exceeds male child mortality by at least 11 percent; and in eight states the excess female child mortality is more than 50 percent. The disadvantage for girls is particularly notable in all the states in the northern and eastern regions. In Haryana, girls face a child mortality rate nearly 2.5 times as high as the rate for boys.

In summary, the indicators in Table 3 show that son preference is evident throughout India, although it is relatively weak in Goa and South India (except for Karnataka). Son preference is especially strong in Haryana, Rajasthan, and Madhya Pradesh; but it is at least moderately strong in all the states of northern, central, and eastern India.

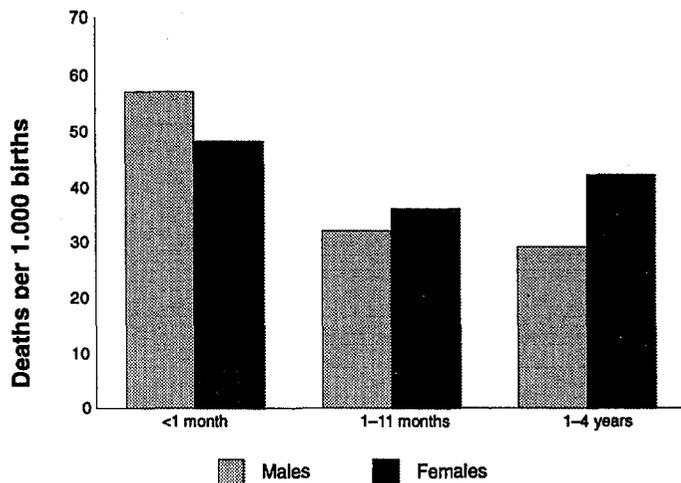


Figure 1 Infant and child mortality during the five-year period preceding the survey, by sex: India, 1992-93

Son preference is comparatively weak, but still substantial, in western and southern India, as well as in Assam. The degree of son preference in a state corresponds closely to the level of fertility there: those states with the strongest son preference tend to have high fertility, and those with the weakest, low fertility. The most prominent exceptions are Delhi, Bihar, and Assam, where fertility is high relative to the level of son preference, and Punjab, where fertility is low relative to the level of son preference. In the next section we examine how son preference is reflected in individuals' fertility behavior in each state, and how that relationship varies across socioeconomic and religious groups.

PARITY PROGRESSION

Using life-table methods and hazard models, we examine the effects of son preference on fertility by estimating how the sex composition of surviving children affects a woman's probability of having another child within five years. Our analysis is limited to parity progression during the period from 1980 until the time of the survey among women with two or three surviving children (referred to as parities 2 and 3 hereafter). Specifically, we estimate the extent to which the probability of having another child within five years depends upon the sex composition of older siblings, and we examine whether the relationship between family composition and parity progression depends upon the socioeconomic characteristics of a woman, namely her urban/rural residence, literacy, and religion. We compare the monthly probabilities of having an additional child for women whose living children have a given sex composition with the probabilities for a reference group. The monthly probabilities

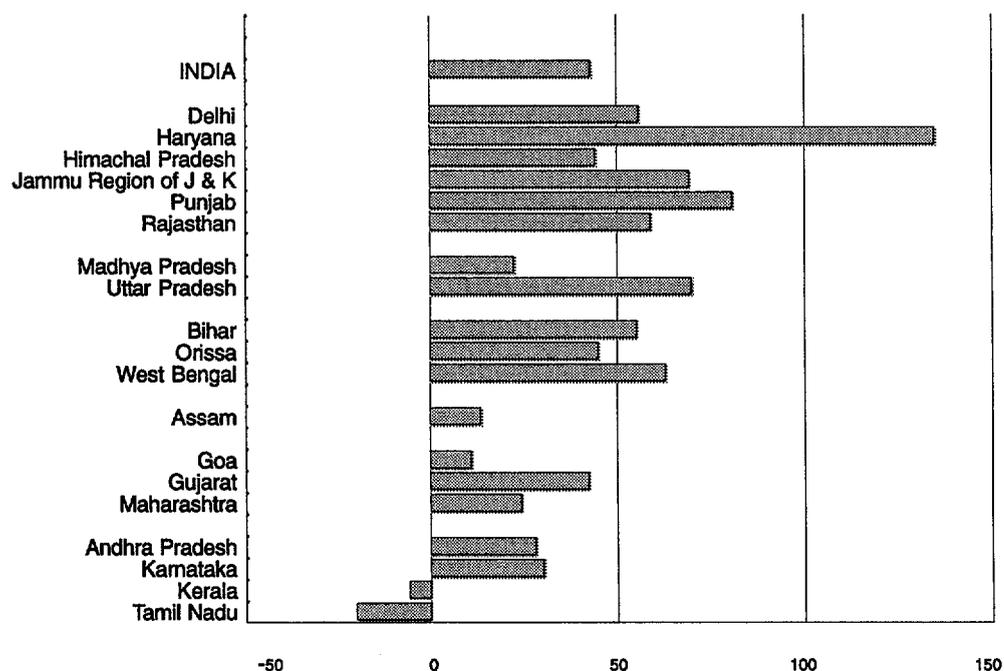


Figure 2 Percentage of excess female mortality at ages 1–4 during the five-year period preceding the survey: India, 1992–93

are summarized to estimate the probability of having an additional birth within five years. Among women with two or three surviving children, the reference groups are women with two sons, because those women have been observed to have the lowest probabilities of having additional children in India (Arnold, Choe, and Roy 1996).

The analysis model includes additional factors likely to have a strong effect on fertility. In the net-effects model, these factors are mother's place of residence, mother's literacy, religion of the household head, year of birth of the last child, mother's age at the birth of the last child, and the experience of child death. We also examine how the effects of son preference differ by these characteristics by including the interaction terms between sex composition of living children and socioeconomic factors.

For the reference group the probability of having another child within five years is estimated by a life-table method applied to women in that group. For other groups the relative risks estimated by the hazard models are applied to the probabilities of the reference group's estimated parity progression rates.

Parity progression by number of sons

The effects of the number of sons on parity progression are summarized in Tables 4 and 5. Table 4 shows the adjusted percentages of women who gave birth to the next

Table 4 Adjusted parity progression ratios for women with two surviving children, by number of sons and state: India, 1992-93

State	Percentage having next child within 5 years			Ratio (0S/2S)
	2 sons	1 son ^a	0 sons ^b	
INDIA	66.7	72.0*	80.7*	1.21
North				
Delhi	56.0	56.5	76.1*	1.36
Haryana	65.1	80.9*	89.2*	1.37
Himachal Pradesh	52.5	73.3*	85.5*	1.63
Jammu Region of J & K	68.1	77.4*	83.6*	1.23
Punjab	51.7	67.4*	80.9*	1.56
Rajasthan	74.5	81.2*	84.5*	1.13
Central				
Madhya Pradesh	76.4	82.4*	83.1*	1.09
Uttar Pradesh	78.9	81.5*	89.7*	1.14
East				
Bihar	75.2	81.6*	85.7*	1.14
Orissa	61.6	72.5*	80.9*	1.31
West Bengal	57.8	65.7*	74.3*	1.29
Northeast				
Assam	76.7	83.0*	89.2*	1.16
West				
Goa	48.2	50.0	67.2*	1.39
Gujarat	60.7	68.2*	83.6*	1.38
Maharashtra	63.3	72.2*	83.9*	1.33
South				
Andhra Pradesh	64.6	64.4	76.5*	1.18
Karnataka	67.0	67.8	82.5*	1.23
Kerala	47.0	35.5*	48.3	1.03
Tamil Nadu	54.7	54.4	71.1*	1.30

Note: Adjustments were made by using proportional hazard models controlling for the effects of child mortality, year of birth of the second child, maternal age, mother's literacy, mother's residence, and religion of head of household. S—son/s.

a. The asterisks (*) in this column indicate that the underlying hazard model coefficient associated with one son (compared with two sons) is statistically significant, with $p < 0.05$.

b. The asterisks (*) in this column indicate that the underlying hazard model coefficient associated with no sons (compared with two sons) is statistically significant, with $p < 0.05$.

child within five years, classified by the number of surviving sons and whether the differences between women with two sons and one son, and between women with two sons and no sons, are statistically significant at the 5 percent level. A similar pattern is observed in India as a whole and in most of the states. Women are least likely to have additional children if they have two sons and most likely to have additional children if they have no sons. With few exceptions, the differences in parity progression between women with two sons and other women are statistically significant. In five states (Delhi, Goa, Andhra Pradesh, Karnataka, and Tamil Nadu), the differences in parity progression between women with one son and women with two sons are not statistically significant. In those states, women seem to think that it is

Table 5. Adjusted parity progression ratios for women with three surviving children, by number of sons and state: India, 1992-93

State	Percentage having next child within 5 years				Ratio (0S/3S)	Ratio (1S/2S)
	3 sons ^a	2 sons	1 son ^b	0 sons ^c		
INDIA	55.5*	50.9	65.1*	78.0*	1.41	1.28
North						
Delhi	48.3	45.4	60.0*	74.0*	1.53	1.32
Haryana	40.8	38.5	73.2*	81.8*	2.00	1.90
Himachal Pradesh	39.8*	22.4	60.8*	85.7*	2.15	2.71
Jammu Region of J & K	54.8	52.1	69.1*	80.7*	1.47	1.33
Punjab	38.8*	28.2	59.6*	76.3*	1.97	2.11
Rajasthan	53.8	56.6	74.4*	83.1*	1.54	1.31
Central						
Madhya Pradesh	54.8	56.1	69.1*	85.8*	1.57	1.23
Uttar Pradesh	72.5	71.5	79.8*	83.7*	1.15	1.12
East						
Bihar	65.8	65.5	72.1*	83.1*	1.26	1.10
Orissa	47.8	48.0	63.4*	75.4*	1.58	1.32
West Bengal	51.9	47.5	63.9*	72.8*	1.40	1.35
Northeast						
Assam	78.2*	67.6	74.3*	88.4*	1.13	1.10
West						
Goa	36.5	31.7	48.0*	56.3*	1.54	1.51
Gujarat	51.3	40.3	64.9*	87.1*	1.70	1.61
Maharashtra	35.1	31.4	61.2*	76.4*	2.18	1.94
South						
Andhra Pradesh	47.1	38.9	50.2*	64.3*	1.37	1.29
Karnataka	51.8*	39.1	61.2*	84.7*	1.63	1.56
Kerala	28.9	26.0	31.4	48.1*	1.66	1.21
Tamil Nadu	50.2*	34.7	37.7*	56.2*	1.12	1.09

Note: Adjustments were made by using proportional hazard models controlling for the effects of child mortality, year of birth of the third child, maternal age, mother's literacy, mother's residence, and religion of head of household.

S—son/s

a. The asterisks (*) in this column indicate that the underlying hazard model coefficient associated with three sons (compared to two sons) is statistically significant, with $p < 0.05$.

b. The asterisks (*) in this column indicate that the underlying hazard model coefficient associated with one son (compared to two sons) is statistically significant, with $p < 0.05$.

c. The asterisks (*) in this column indicate that the underlying hazard model coefficient associated with no sons (compared to two sons) is statistically significant, with $p < 0.05$.

important to have at least one son; but once they have had one son, the sex of the other child does not affect future childbearing decisions. In Kerala, parity progression is lowest among women with one child of each sex; women with no sons and women with no daughters have higher parity progression, at similar levels. Thus, women in Kerala exhibit no preference for sons or daughters and prefer to have one child of each sex.

The last column of Table 4 shows an index of son preference that is the ratio of the parity progression ratios of women with two daughters and women with two

sons. According to this index, Himachal Pradesh and Punjab stand out as having the highest effect of son preference on fertility behavior. Strong son preference is also noted in most of the states of the northern region, Orissa and West Bengal in the East, and the states of the western region. Rajasthan and Uttar Pradesh, which show high levels of son preference as measured by fertility preferences and child mortality, exhibit relatively weak son preference in fertility decisions. Both those states have high fertility levels, and most women with two children go on to have more children regardless of the sex composition of their living children.

Table 5 shows the adjusted percentages of women with three surviving children who gave birth to the next child within five years, classified by the number of surviving sons. In India as a whole and in almost every state, women with two sons and one daughter are least likely to have a fourth child. The difference in parity progression among women with two sons and three sons is not, however, statistically significant in most states. The parity progression rate is significantly higher among women with three sons and no daughters than among women with two sons and one daughter in only five states—Himachal Pradesh, Punjab, Assam, Karnataka, and Tamil Nadu. In those states, women show a preference for having at least one daughter after having two or more sons. Women with no sons have very high parity progression ratios in all states, ranging from about 50 percent in Goa, Kerala, and Tamil Nadu to more than 80 percent in Haryana, Himachal Pradesh, Jammu, Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Assam, Gujarat, and Karnataka. Furthermore, having one surviving son does not seem to satisfy most Indian women. In all states except Kerala, women with one surviving son are much more likely to have additional children than are women with two sons.

Table 5 also shows two measures of parity progression ratios. The first compares women with three daughters to women with three sons, and the second compares women with one son and two daughters to women with two sons and one daughter. The first ratio may not be an ideal measure of son preference, for two reasons. First, among women with three children, the proportion with children all of the same sex is quite small, and the estimated parity progression ratios may be unstable. Second, parity progression among women whose children are all of the same sex is affected by the effort to have children of both sexes as well as by son preference. The second ratio does not have these problems but is problematic because both groups of women have sons. Table 5 shows, however, that although the first measure is almost always higher than the second, the two ratios give substantially the same results. Haryana, Himachal Pradesh, Punjab, and Maharashtra stand out as having very strong son preference among third-parity women. States with high levels of fertility show low to moderate degrees of son preference. The effect of son preference is weakest in states with widely differing overall levels of fertility, namely Uttar Pradesh, Assam, and Tamil Nadu.

Table 6. Excess percentages of births of order 3, order 4, and all births due to parents' gender preferences for children, estimated from adjusted parity progression ratios, by state: India, 1992-93

State	Excess percentages of births		
	Third child	Fourth child	All children
INDIA	8.9	17.3	8.4
North			
Delhi	8.3	16.2	8.1
Haryana	21.1	45.7	14.9
Himachal Pradesh	34.3	112.4	24.6
Jammu Region of J & K	12.0	16.3	8.8
Punjab	28.2	60.9	16.7
Rajasthan	7.4	19.8	9.1
Central			
Madhya Pradesh	5.9	15.1	7.0
Uttar Pradesh	4.7	4.4	4.5
East			
Bihar	7.5	7.7	7.1
Orissa	16.4	20.1	10.0
West Bengal	14.1	20.4	8.6
Northeast			
Assam	8.0	8.2	4.7
West			
Goa	11.9	26.7	10.0
Gujarat	15.0	38.9	12.3
Maharashtra	14.8	58.2	14.6
South			
Andhra Pradesh	4.6	18.7	6.0
Karnataka	6.3	34.6	8.3
Kerala	16.9	10.4	7.9
Tamil Nadu	8.1	12.3	6.7

Table 6 shows another set of indicators of gender preference for children: the excess percentage of births attributable to gender preference. Arnold (1985) has developed a measure to quantify the effect of gender preference on fertility and family planning. This measure is designed particularly for use in populations in which gender preferences are fairly homogeneous. The measure assumes that in the absence of gender preference, all groups of women at a given parity would proceed to have an additional child at the same rate as women at that same parity with the most desirable sex composition of children (i.e., those with the lowest parity progression ratio). Estimated excess percentages of births due to gender preference computed in this way are shown in Table 6.

Overall, the parity progression ratio of women in India is 8.9 percent higher at parity 2 and 17.3 percent higher at parity 3 than it would be if there were no gender preference and women's parity progression ratios did not depend upon the number of surviving sons. For all parities combined, the excess percentage of births due to gender preference is estimated to be 8.4 percent. The decrease in parity progression if

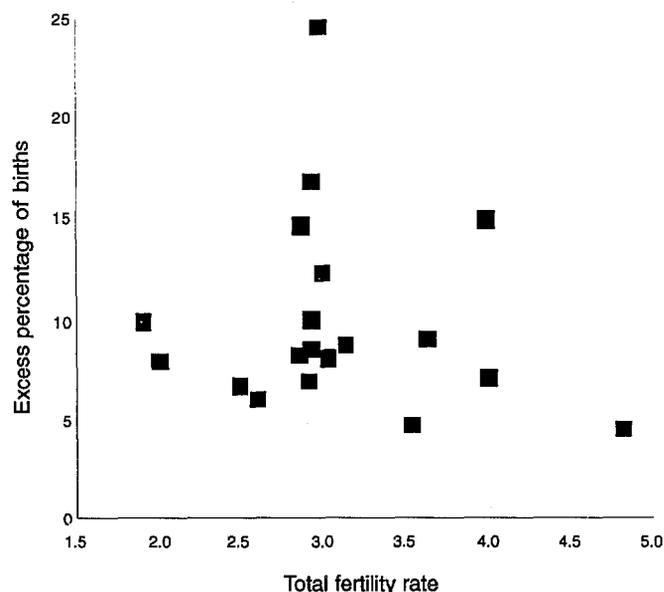


Figure 3 Relationship between total fertility and excess births due to gender preferences for children: 19 Indian states, 1992-93

gender preference were absent is estimated to be approximately equivalent to reducing the total fertility rate from 3.39 to 3.13 children per woman. Although moderate, even a decrease of this magnitude would have a noticeable impact on India's rate of population growth. A particularly high level of gender preference is observed in Haryana, Himachal Pradesh, and Punjab according to this measure. The effect of gender preference on fertility is moderately high in states in the western region. It is relatively low in states in the southern region, where fertility is low, and in states where fertility levels are high.

Figure 3, a scatter plot of the relationship between total fertility rates and the excess percentage of births due to gender preference, indicates that in states with very high and very low levels of fertility, the effect of gender preference on fertility is low or moderate. A large effect of gender preference on fertility is observed in some, but not all, states with an intermediate level of fertility. The pattern suggests that, within India, the effect of gender preference depends upon some characteristics of the states other than the level of fertility alone. In the following sections we examine in more detail the role of urban versus rural residence, women's literacy, and religion in determining the effect of gender preference on fertility.

Residence and son preference

Does the effect of son preference on fertility depend upon whether women live in urban or rural areas? Tables 7 through 9 show parity progression ratios and

Table 7 Adjusted parity progression ratios for women with two surviving children, by residence and whether they have two or no surviving sons, and by state: India, 1992-93

State	Urban residence			Rural residence			Interaction term significant?
	2 sons	0 sons	Ratio (0S/2S)	2 sons	0 sons	Ratio (0S/2S)	
INDIA	62.4	80.0	1.28*	68.2	81.0	1.19*	Yes
North							
Delhi	55.4	75.8	1.37*	63.7	79.4	1.25	No
Haryana	61.1	87.3	1.43*	67.4	90.3	1.34*	No
Himachal Pradesh	41.7	74.4	1.78*	58.1	90.0	1.55*	No
Jammu Region of J & K	58.6	75.7	1.29	72.7	87.0	1.20	No
Punjab	44.2	76.4	1.73*	54.9	82.2	1.50*	No
Rajasthan	68.3	80.7	1.18*	75.9	85.3	1.12*	No
Central							
Madhya Pradesh	78.1	82.1	1.05	75.9	83.7	1.10	No
Uttar Pradesh	72.2	86.3	1.19*	80.6	87.9	1.09*	No
East							
Bihar	75.8	88.5	1.17*	75.0	84.8	1.13*	No
Orissa	56.6	75.2	1.33*	62.1	81.9	1.32*	No
West Bengal	51.9	70.7	1.36*	59.1	75.0	1.27*	No
Northeast							
Assam	66.9	83.3	1.24*	81.6	91.5	1.12*	No
West							
Goa	43.6	65.2	1.49*	53.0	67.1	1.27*	No
Gujarat	57.4	86.8	1.51*	62.4	80.8	1.30*	Yes
Maharashtra	56.1	82.9	1.48*	68.1	86.9	1.28*	No
South							
Andhra Pradesh	65.3	81.6	1.25*	64.4	73.9	1.15	No
Karnataka	64.1	79.6	1.24*	68.4	83.8	1.23*	No
Kerala	43.7	50.4	1.15	48.3	46.7	0.97	No
Tamil Nadu	51.3	65.0	1.27*	56.5	75.0	1.33*	No

S—son/s

* $p < 0.05$

related statistics for women classified by urban/rural residence and the number of surviving sons.

Table 7 shows that the fertility effect of son preference is slightly higher in urban areas than in rural areas at parity 2. Parity progression ratios for women with no surviving sons are similar in urban and rural areas. Among women with two surviving sons, however, parity progression ratios are somewhat lower in urban areas than in rural areas. The last column of Table 7 indicates whether the coefficient associated with the interaction term between the number of sons (two versus none) and urban/rural residence is statistically significant or not. If it is statistically significant, the urban/rural difference in son preference, in terms of the ratio of parity progression between women with two sons and no sons, is statistically significant. Although a statistically significant urban/rural difference is observed for India as a whole, at the state level only Gujarat shows a statistically significant difference in son preference.

Table 8 Adjusted parity progression ratios for women with three surviving children, by residence and whether they have three or no surviving sons, and by state: India, 1992-93

State	Urban residence			Rural residence			Interaction term significant?
	Three sons	No sons	Ratio (0S/3S)	Three sons	No sons	Ratio (0S/3S)	
INDIA	52.9	75.4	1.42*	56.5	79.0	1.40*	No
North							
Delhi	47.9	75.5	1.57*	u	u	u	u
Haryana	39.7	75.3	1.90*	41.5	85.0	2.05*	No
Himachal Pradesh	28.7	78.8	2.75*	44.7	87.9	1.97*	No
Jammu Region of J & K	45.3	80.1	1.77*	58.4	81.0	1.39*	No
Punjab	34.7	72.5	2.09*	40.5	77.8	1.92	No
Rajasthan	48.3	85.4	1.77*	55.0	82.6	1.50*	No
Central							
Madhya Pradesh	60.6	86.1	1.42*	53.1	85.7	1.61*	No
Uttar Pradesh	65.9	87.5	1.33*	74.2	82.6	1.11*	Yes
East							
Bihar	70.4	79.4	1.13*	64.7	84.0	1.30*	No
Orissa	40.2	76.5	1.90*	51.1	75.0	1.47*	No
West Bengal	56.7	51.2	0.90	51.1	76.5	1.50*	Yes
Northeast							
Assam	62.9	70.6	1.12	84.1	93.6	1.11	No
West							
Goa	33.4	53.5	1.60*	39.4	58.8	1.49	No
Gujarat	50.9	86.5	1.70*	51.5	87.4	1.70*	No
Maharashtra	37.9	76.7	2.02*	33.6	80.3	2.39*	No
South							
Andhra Pradesh	51.2	56.9	1.11	45.8	66.8	1.46*	No
Karnataka	46.6	78.5	1.68*	53.9	87.0	1.61*	No
Kerala	27.1	43.5	1.61	29.6	49.8	1.68	No
Tamil Nadu	49.0	57.0	1.16	50.7	55.9	1.10	No

S—son/s

u—Estimates are unavailable because of small samples.

* $p < 0.05$

At parity 3 the place of residence does not matter at all at the national level (Tables 8 and 9). At the state level the effects of son preference on parity progression are virtually the same among urban and rural women, with few exceptions. Haryana shows a pattern different from all other states in the comparison of women with two sons and those with one son (Table 9). Among women with three children in Haryana, the son-preference index measured by the ratio of parity progression ratios for women with one son and those with two sons is significantly higher among rural women than urban women. In the comparison of women with three sons and those with no sons (Table 8), son preference is more important among rural women in West Bengal and less important among rural women in Uttar Pradesh.

In every state except Kerala, a large majority of rural women with three daughters continue childbearing within five years. The same is true for urban women in most states, but only about half of urban women with three daughters continue

Table 9 Adjusted parity progression ratios for women with three surviving children, by residence and whether they have one or two surviving sons, and by state: India, 1992-93

State	Urban residence			Rural residence			Interaction term significant?
	2 sons	1 son	Ratio (1S/2S)	2 sons	1 son	Ratio (1S/2S)	
INDIA	48.6	62.5	1.29*	51.7	66.8	1.29*	No
North							
Delhi	45.1	59.5	1.32	48.7	61.2	1.26	No
Haryana	43.7	60.1	1.37*	35.8	76.1	2.12*	Yes
Himachal Pradesh	18.6	38.1	2.05	23.9	62.7	2.62*	No
Jammu Region of J & K	47.5	54.3	1.14	53.8	74.2	1.38*	No
Punjab	25.1	51.6	2.05*	29.5	60.1	2.04*	No
Rajasthan	52.2	70.7	1.35*	57.6	75.6	1.31*	No
Central							
Madhya Pradesh	61.0	72.2	1.18*	54.6	68.7	1.26*	No
Uttar Pradesh	66.5	75.7	1.14*	72.7	81.2	1.12*	No
East							
Bihar	68.8	79.5	1.16*	64.7	72.5	1.12*	No
Orissa	44.7	51.4	1.15*	49.4	67.8	1.37*	No
West Bengal	45.9	70.6	1.54*	47.8	63.5	1.33*	No
Northeast							
Assam	52.5	58.1	1.11*	74.1	80.9	1.09*	No
West							
Goa	29.8	45.8	1.54*	33.3	52.7	1.58*	No
Gujarat	41.9	60.7	1.45*	39.6	66.6	1.68*	No
Maharashtra	32.7	63.8	1.95*	30.8	61.5	2.00*	No
South							
Andhra Pradesh	43.1	46.9	1.09	37.6	50.4	1.34*	No
Karnataka	33.8	56.5	1.67*	41.5	62.7	1.51*	No
Kerala	28.0	21.8	0.78	25.3	29.3	1.16	No
Tamil Nadu	34.0	35.7	1.05	35.0	37.8	1.08*	No

S—son/s

* $p < 0.05$

childbearing in West Bengal, Goa, Andhra Pradesh, Kerala, and Tamil Nadu. A majority of urban women in most states curtail their childbearing after they have had three sons. Notable exceptions are Madhya Pradesh, Uttar Pradesh, Bihar, and Assam, where 60 to 70 percent of these women have another child within five years.

Education and son preference

Tables 10 through 12 show how the effect of son preference on fertility differs by women's literacy. Among women with two surviving children, parity progression is lower among literate women than among illiterate women. But the difference is much larger if women have two surviving sons, which means that the effect of son preference on fertility is greater among literate than among illiterate women. The difference in the index of son preference between literate and illiterate women is statisti-

Table 10 Adjusted parity progression ratios for women with two surviving children, by women's literacy and whether they have two or no surviving sons, and by state: India, 1992-93

State	Literate			Illiterate			Interaction term significant?
	2 sons	0 sons	Ratio (0S/2S)	2 sons	0 sons	Ratio (0S/2S)	
INDIA	57.2	76.3	1.33*	72.4	83.2	1.15*	Yes
North							
Delhi	48.9	72.2	1.48*	69.2	82.5	1.19	No
Haryana	57.2	86.5	1.51*	70.4	90.9	1.29*	No
Himachal Pradesh	46.9	86.0	1.83*	62.5	85.0	1.36*	Yes
Jammu Region of J & K	62.2	87.2	1.40*	74.9	78.6	1.05	Yes
Punjab	43.6	74.4	1.71*	60.9	86.3	1.42*	No
Rajasthan	66.4	81.5	1.23*	76.1	85.0	1.12*	No
Central							
Madhya Pradesh	65.4	84.0	1.28*	79.9	83.1	1.04	Yes
Uttar Pradesh	72.7	83.9	1.15*	80.9	88.7	1.10*	No
East							
Bihar	66.8	82.7	1.24*	77.7	86.5	1.11*	No
Orissa	62.7	87.6	1.40*	61.5	80.6	1.31*	No
West Bengal	48.9	71.6	1.46*	65.4	76.4	1.17*	Yes
Northeast							
Assam	69.6	87.5	1.26*	83.0	90.3	1.09	No
West							
Goa	45.1	61.1	1.36*	56.4	78.2	1.39*	No
Gujarat	48.7	82.6	1.69*	70.3	83.2	1.18*	Yes
Maharashtra	60.1	82.7	1.38*	66.6	87.9	1.32*	No
South							
Andhra Pradesh	52.1	72.7	1.39*	70.3	77.5	1.10	No
Karnataka	57.0	81.1	1.42*	73.3	83.3	1.14*	Yes
Kerala	44.6	45.5	1.02	67.8	66.8	0.99	No
Tamil Nadu	53.1	65.7	1.24*	56.4	77.6	1.38*	No

S—son/s

* $p < 0.05$

cally significant for India at large and for six of the 19 states (Table 10). In all of those cases, son preference has a greater effect among literate women.

Among women with three surviving children, the ratios of parity progression among women with three sons and those with no sons show large differences by women's literacy. The difference is statistically significant for seven of the 19 states as well as for India as a whole (Table 11). Once again, in every case the effect is greater for literate than for illiterate women. In fact, in seven states—Haryana, Himachal Pradesh, Punjab, Rajasthan, Madhya Pradesh, Gujarat, and Maharashtra—literate women with no sons are more than twice as likely to continue childbearing as literate women with three sons, but there are no states where the differential is that large for illiterate women. When we examine the ratios of parity progression among women with one son and two sons (Table 12), we find the interaction with literacy is significant only in Punjab, where the effect of son preference is stronger for illiterate women.

Table 11 Adjusted parity progression ratios for women with three surviving children, by women's literacy and whether they have three or no surviving sons, and by state: India, 1992-93

State	Literate			Illiterate			Interaction term significant?
	3 sons	0 sons	Ratio (0S/3S)	3 sons	0 sons	Ratio (0S/3S)	
INDIA	43.7	75.1	1.72*	62.3	79.5	1.28*	Yes
North							
Delhi	35.0	60.5	1.73*	63.6	85.8	1.35	No
Haryana	27.2	83.8	3.08*	49.2	80.7	1.64*	Yes
Himachal Pradesh	30.9	87.9	2.85*	51.7	82.9	1.61*	Yes
Jammu Region of J & K	42.4	61.6	1.45*	65.0	91.7	1.41*	No
Punjab	27.2	76.9	2.83*	48.5	75.9	1.57	Yes
Rajasthan	40.5	84.7	2.09*	56.0	82.8	1.48*	No
Central							
Madhya Pradesh	44.7	92.0	2.06*	58.0	83.6	1.44*	Yes
Uttar Pradesh	59.6	78.8	1.32*	75.9	84.9	1.12*	No
East							
Bihar	49.1	83.5	1.70*	70.0	83.0	1.19*	Yes
Orissa	46.9	83.6	1.78*	48.4	69.8	1.44*	No
West Bengal	42.0	73.0	1.74*	58.0	72.7	1.25*	No
Northeast							
Assam	70.8	88.1	1.24*	83.2	88.5	1.06	No
West							
Goa	31.6	47.3	1.50	45.0	70.6	1.57	No
Gujarat	36.8	83.7	2.28*	60.5	88.9	1.47*	Yes
Maharashtra	29.0	82.6	2.85*	40.8	75.8	1.86*	Yes
South							
Andhra Pradesh	29.1	54.7	1.88*	53.9	67.3	1.25*	No
Karnataka	46.7	78.4	1.68*	54.1	87.2	1.61*	No
Kerala	26.9	48.1	1.78*	38.2	48.4	1.27	No
Tamil Nadu	43.9	46.2	1.05	55.7	64.9	1.17	No

S—son/s

* $p < 0.05$

Religion and son preference

Tables 13 through 15 summarize the relationship between the effect of son preference on parity progression and women's religion. In general, the effect of son preference is weaker among Muslims than among Hindus when we consider the parity progression of women with two surviving children (Table 13). In fact, for Muslims the ratio of parity progression among women with two sons to women with no sons is not statistically significant in most states. Only in Jammu and Rajasthan do Muslims exhibit a significant son preference. In every state except Kerala, son preference has some effect on fertility for Hindus, and the effect is statistically significant in 14 states. Women who are not Hindus or Muslims often exhibit strong son preference in parity progression in states with sufficiently large samples of these women. Most notable is the case of Punjab, where women from other religions (mainly Sikhs) have

Table 12 Adjusted parity progression ratios of women with three surviving children, by women's literacy and whether they have one or two surviving sons, and by state: India, 1992-93

State	Literate			Illiterate			Interaction term significant?
	2 sons	1 son	Ratio (1S/2S)	2 sons	1 son	Ratio (1S/2S)	
INDIA	40.7	54.8	1.35*	56.8	71.4	1.26*	No
North							
Delhi	32.6	45.4	1.39	60.4	74.4	1.23	No
Haryana	26.8	55.2	2.06*	45.5	77.9	1.71*	No
Himachal Pradesh	18.7	47.7	2.56*	27.2	64.6	2.37*	No
Jammu Region of J & K	38.3	56.6	1.48*	63.8	78.2	1.23*	No
Punjab	23.3	40.6	1.74*	32.0	70.2	2.19*	Yes
Rajasthan	43.9	64.6	1.47*	58.7	76.2	1.30*	No
Central							
Madhya Pradesh	49.2	63.9	1.30*	58.2	71.2	1.22*	No
Uttar Pradesh	58.6	71.0	1.21*	74.9	82.3	1.10*	No
East							
Bihar	48.3	61.2	1.27*	69.8	76.9	1.10*	No
Orissa	48.8	62.7	1.29*	47.6	63.2	1.33*	No
West Bengal	38.2	58.2	1.52*	53.2	68.2	1.28*	No
Northeast							
Assam	62.4	63.7	1.02	71.4	81.5	1.14*	No
West							
Goa	26.4	43.6	1.65*	41.1	58.9	1.43*	No
Gujarat	29.9	50.3	1.68*	47.1	72.8	1.55*	No
Maharashtra	28.9	55.4	1.92*	33.7	68.1	2.02*	No
South							
Andhra Pradesh	23.4	37.3	1.59*	45.1	53.7	1.19*	No
Karnataka	35.2	53.5	1.52*	41.0	64.2	1.57*	No
Kerala	23.8	26.0	1.09	36.8	32.3	0.88	No
Tamil Nadu	31.1	27.5	0.88	38.0	46.9	1.24*	No

S—son/s

* $p < 0.05$

a very strong preference for sons. Another interesting result is the difference in parity progression ratios for women with three children in Kerala (Table 14). Although Kerala does not show much son preference overall, Hindu women without any sons have a much higher propensity to continue childbearing than those with one or more sons. In Bihar and Karnataka, Hindu women with only one son and two daughters are much more likely to have another child than are women with two sons and one daughter (Table 15).

In summary, the effect of son preference on fertility is generally strongest for groups of women who have a moderate level of fertility. These findings suggest that it will be difficult to eliminate entirely the effect of son preference on fertility in India in the near future as fertility falls to moderate levels in the populous northern Indian states.

Table 13 Adjusted parity progression ratios for women with two surviving children, by religion of the head of household and whether the women have two or no surviving sons, and by state: India, 1992-93

State	Hindu			Muslim			Other			Interaction term significant?	
	2 sons	0 sons	Ratio (0S/2S)	2 sons	0 sons	Ratio (0S/2S)	2 sons	0 sons	Ratio (0S/2S)	Muslim	Other
INDIA	65.2	80.4	1.23*	78.0	82.3	1.05	63.9	81.7	1.28*	Yes	No
North											
Delhi	55.5	75.3	1.36	66.0	85.9	1.30	u	u	u	No	u
Haryana	64.5	88.6	1.37*	u	u	u	70.6	92.8	1.31*	u	No
Himachal Pradesh	51.9	85.9	1.65*	u	u	u	u	u	u	u	u
Jammu Region of J & K	68.1	83.7	1.23	64.8	83.6	1.29*	75.3	81.0	1.08	No	No
Punjab	57.7	78.7	1.36*	u	u	u	47.6	81.8	1.72*	u	Yes
Rajasthan	74.9	84.4	1.13*	74.6	88.6	1.19*	u	u	u	No	u
Central											
Madhya Pradesh	75.8	83.3	1.10	u	u	u	u	u	u	u	u
Uttar Pradesh	76.9	87.3	1.14*	88.9	89.5	1.01	u	u	u	Yes	u
East											
Bihar	74.9	85.6	1.14*	79.1	82.3	1.04	u	u	u	No	u
Orissa	58.5	77.3	1.32*	u	u	u	u	u	u	u	u
West Bengal	52.6	73.6	1.40*	71.7	76.5	1.07	u	u	u	Yes	u
Northeast											
Assam	72.6	89.5	1.23*	84.8	85.2	1.00	u	u	u	No	u
West											
Goa	51.1	67.2	1.32*	u	u	u	38.5	55.8	1.45*	u	No
Gujarat	60.2	84.1	1.40*	68.0	69.6	1.02	u	u	u	Yes	u
Maharashtra	60.3	85.0	1.41*	84.1	90.4	1.08	56.3	80.9	1.44*	No	No
South											
Andhra Pradesh	62.9	75.0	1.19	76.8	86.0	1.12	u	u	u	No	u
Karnataka	64.9	81.9	1.26*	82.4	84.2	1.02	u	u	u	No	u
Kerala	40.8	40.1	0.98	63.3	56.0	0.89	46.0	59.8	1.30	No	No
Tamil Nadu	52.9	70.9	1.34*	75.7	81.5	1.08	58.1	69.2	1.19	No	No

S—son/s

u—Estimates are unavailable because of small samples.

* $p < 0.05$

Table 14 Adjusted parity progression ratios for women with three surviving children, by religion of the head of household and whether the women have three or no surviving sons, and by state: India, 1992-93

State	Hindu			Muslim			Other			Interaction term significant?	
	3 sons	0 sons	Ratio (0S/3S)	3 sons	0 sons	Ratio (0S/3S)	3 sons	0 sons	Ratio (0S/3S)	Muslim	Other
INDIA	53.3	77.1	1.45*	72.2	85.2	1.18*	53.1	75.4	1.42*	Yes	No
North											
Delhi	47.0	74.1	1.58*	61.8	74.6	1.21	u	u	u	No	u
Haryana	39.2	80.7	2.06*	u	u	u	42.1	81.4	1.93*	u	No
Himachal Pradesh	38.6	85.5	2.21*	u	u	u	u	u	u	u	u
Jammu Region of J & K	52.9	83.6	1.58*	62.9	75.0	1.19*	55.0	56.7	1.03	No	No
Punjab	40.4	71.2	1.76	u	u	u	37.4	79.0	2.11*	u	No
Rajasthan	53.1	81.5	1.53*	65.3	89.7	1.37*	u	u	u	No	u
Central											
Madhya Pradesh	54.5	84.2	1.55*	u	u	u	u	u	u	u	u
Uttar Pradesh	71.3	83.6	1.17*	79.9	84.8	1.06	u	u	u	No	u
East											
Bihar	63.1	82.3	1.30*	80.2	87.2	1.09	u	u	u	No	u
Orissa	47.1	75.1	1.59*	u	u	u	u	u	u	u	u
West Bengal	44.4	70.8	1.60*	68.8	76.7	1.11	u	u	u	No	u
Northeast											
Assam	74.9	87.5	1.17	84.8	88.8	1.05	u	u	u	No	u
West											
Goa	41.3	61.2	1.48	u	u	u	23.0	39.5	1.71*	u	No
Gujarat	50.2	86.2	1.72*	59.9	95.3	1.59*	u	u	u	No	u
Maharashtra	31.2	77.6	2.49*	61.4	87.4	1.42	30.9	74.8	2.42*	No	No
South											
Andhra Pradesh	44.3	60.9	1.37*	74.8	90.6	1.21*	u	u	u	No	u
Karnataka	48.1	82.0	1.71*	72.0	96.4	1.34*	u	u	u	No	u
Kerala	17.5	46.3	2.64*	58.8	52.9	0.90	22.0	44.2	2.01	Yes	No
Tamil Nadu	49.4	54.6	1.11	u	u	u	u	u	u	u	u

S—son/s

u—Estimates are unavailable because of small samples.

* $p < 0.05$

Table 15 Adjusted parity progression ratios for women with three surviving children, by religion of the head of household and whether the women have one or two surviving sons, and by state: India, 1992-93

State	Hindu			Muslim			Other			Interaction term significant?	
	2 sons	1 son	Ratio (1S/2S)	2 sons	1 son	Ratio (1S/2S)	2 sons	1 son	Ratio (1S/2S)	Muslim	Other
INDIA	48.4	64.0	1.32*	69.0	76.6	1.11	48.9	64.5	1.32*	Yes	No
North											
Delhi	44.4	58.6	1.32	54.1	73.0	1.35	u	u	u	No	u
Haryana	37.1	69.1	1.86*	u	u	u	33.3	77.5	2.33*	u	No
Himachal Pradesh	21.8	55.8	2.56*	u	u	u	u	u	u	u	u
Jammu Region of J & K	50.3	68.3	1.36*	62.6	68.7	1.10	44.5	80.5	1.81*	No	No
Punjab	26.0	63.8	2.45*	u	u	u	29.2	54.2	1.86*	u	No
Rajasthan	55.3	75.0	1.36*	75.6	77.1	1.02	u	u	u	No	u
Central											
Madhya Pradesh	55.5	68.4	1.23*	u	u	u	u	u	u	u	u
Uttar Pradesh	70.2	79.3	1.13*	78.4	84.8	1.08	u	u	u	No	u
East											
Bihar	61.4	73.1	1.19*	85.6	77.2	0.90	u	u	u	Yes	u
Orissa	46.9	61.8	1.32*	75.0	83.8	1.12	u	u	u	No	u
West Bengal	40.6	56.4	1.39*	61.8	79.5	1.29*	u	u	u	No	u
Northeast											
Assam	63.2	72.7	1.15*	76.2	76.4	1.00	u	u	u	No	u
West											
Goa	36.4	52.8	1.45*	u	u	u	22.0	33.8	1.54*	u	No
Gujarat	38.7	64.1	1.65*	56.6	67.9	1.20	u	u	u	No	u
Maharashtra	27.4	58.8	2.14*	58.8	79.7	1.36*	29.0	61.2	2.11*	No	No
South											
Andhra Pradesh	37.0	47.8	1.29*	68.0	74.4	1.09	u	u	u	No	u
Karnataka	36.1	57.5	1.59*	58.8	79.5	1.35*	u	u	u	Yes	u
Kerala	18.5	18.4	0.99	51.0	56.9	1.12	14.7	14.6	0.99	No	No
Tamil Nadu	33.2	38.0	1.15*	u	u	u	u	u	u	u	u

S—son/s

u—Estimates are unavailable because of small samples.

* $p < 0.05$

CONCLUSION

Our study confirms that a preference for sons is widespread in India and that son preference affects fertility behavior in every part of the country. In India as a whole, both attitudes and behavior are vitally influenced by a long-standing preference for sons that is deeply rooted in the cultural traditions of the society. Women express a strong preference for having at least one son, and often at least two sons, among their children. There is some evidence, as well, of a desire to have one daughter, but having more than one daughter is generally not considered desirable. Daughters face discrimination in the medical treatment of illnesses and in the administration of vaccinations against serious childhood diseases. The survey finds less evidence of systematic discrimination against young girls with respect to feeding practices or nutritional status. The most troubling problem evident in the NFHS data is the unusually high excess mortality for girls who are 1–4 years old. In that age group, female mortality exceeds male mortality by more than 40 percent.

Our study has focused on the impact of son preference on reproductive behavior, which we have found to vary substantially across India's states. Several states in northern India (particularly Himachal Pradesh and Punjab) exhibit especially strong effects. Son preference has a significant, but much weaker, effect on fertility in such diverse states as Uttar Pradesh, Bihar, Assam, Kerala, and Tamil Nadu. If the states are arrayed according to their overall level of fertility, an interesting pattern emerges. In states where fertility is very high or very low, the effect of son preference on fertility is small, as expected. In states with intermediate levels of fertility, however, the effect of son preference on fertility varies widely. Among the states with total fertility rates between 2.0 and 3.0 children, some (notably Himachal Pradesh, Punjab, Gujarat, and Maharashtra) exhibit very large effects of son preference on fertility, whereas the effect is much smaller in others (notably West Bengal and most of the states in the southern region).

If gender preferences for children could be entirely eliminated, we estimate that the level of fertility in India would fall by about 8 percent. This rather modest effect, in the face of a strongly articulated preference for sons, is due both to a rather weak effect of son preference on fertility in some of the most populous states and to the fact that by sheer biological chance most couples are able to have their minimum desired number of sons without exceeding their overall family-size goals.

Studies in countries with persistent high levels of son preference and very low levels of fertility document that such a combination can result in a skewed sex ratio at birth if women have access to methods of identifying the sex of fetuses and to induced abortions (Park and Cho 1995). A skewed sex ratio, in turn, has worrisome implications for future population structure, the marriage and labor market, and personality development. In this regard, population policy needs to pay special attention to the possible consequences of high son preference that go beyond the retardation of fertility decline.

Although son preference in India will be difficult to change dramatically in the short run, Arnold, Choe, and Roy (1996) have recommended a number of programs that could expedite the transition toward more gender-neutral attitudes and behavior. These include expanded efforts to encourage equal education for daughters and sons (such as educational savings accounts for girls and the provision of free midday meals at schools) and education and motivational programs to encourage equal treatment of daughters and sons, particularly with respect to medical care. Without a basic change in the dowry system and the other traditions that engender a preference for sons, however, it is unlikely that son preference will decline sufficiently to transform fertility behavior in the near future.

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