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Research Article

Measuring Son Preference Through Number of Children Born

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Abstract

The term 'son preference' refers to the attitude that sons are more important and valuable than daughters. The strong preference for sons is observed in India, particularly in northern parts of the country. The research also shows that the son preference has a sizable positive effect on fertility and contraceptive practice in Indian Context. In the present paper an attempt has been made to study the extent of son preference by analyzing the data on actual birth performance of females (couples). Authors have analysed the data of National Family Health Survey for different major states of India to study the spatial variation in son preference in the country as a whole as well as studying the pattern for different groups of the society classified according to education, type of residential area, caste and standard of living index.

Introduction

The term 'son preference' refers to the attitude that sons are more important and valuable than daughters. The existence of strong preference for sons in India, particularly in northern parts of the country, has now been thoroughly established through wide variety of data (Willamson, 1976; Miller, 1981; Arnold *et al*., 1998). There also exists considerable body of research that shows that, in the Indian context, son preference has a sizable positive effect on fertility and contraceptive practice (Das, 1987; Malhotra *et al*., 1995; Murthi*et al*., 1995; Mutharayappa*et al.*, 1997; Kulkarni, 1999). At the same time, there has been a growing international concern on the issue of 'missing' females and the increasing masculinity of India's population (Sen, 1989; Coale, 1991; Das Gupta and Bhat, 1997; Mayer, 1999; Griffiths *et al*, 2000; Sudha and Rajan, 1999; Agnihotri 2000). A noteworthy aspect of the century-long trend of rising masculinity of India's population is that since 1961 this rise has been mainly due to the deterioration of the sex ratio in juvenile ages (girls in the age group 0-6 years per 1000 boys). Quite significantly, as juvenile sex ratios were falling, the level of fertility too was declining as indicated by the downward trend in the proportion of population of age 0-6 years. By showing a further fall in the juvenile sex ratio the preliminary results of the latest Indian census (India, Registrar General, 2001) has fuelled the speculation that gender discrimination is intensifying in India.

Researchers have found that a number of cultural, social, and economic factors influence the relative benefits and costs of sons and daughters and ultimately parent's gender preferences (Arnold et al. 1975; Bulatao 1981; Espenshade 1977; Friedman et al., 1994;Vlasoff 1979;Vlasoff 1990). 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

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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 socio-cultural 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 (Caldwell et al., 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 marriage. 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 *(kanyadaan).* Some parents also cite the need to have a daughter to cry at the time of their death (Dharmalingam 1996).Sabharwal(2013) tested hypothesis that more educated men will be more likely to desire an equal number of sons and daughters compared to men with less education, who will desire more sons than daughters.

Recently Bhat and Zavier (2001, 2003) have studied the extent of son preference in India using NFHS data. The results are essentially based on the data related to 'Ideal Family Size' and 'Desire for at least one Son or at least one Daughter' collected in NFHS. Thus results are more based on the 'Desire' or 'Ideal size'. Such analyses are capable of essentially providing useful indicators for son preference but over all these are based on opinions or attitudes. What is happening in practice, is not provided by such data. On its face, sex of a child at any birth order is considered to be a random event. Further, for almost all cases there are two possibilities viz. either the child will be a male or a female. Let p denote the probability that the child will be male and q=(1-p) be the probability that the child will be female. It is normally hypothesized that p remains constant over different birth orders (in absence of pre-sex determination) and due to its random nature p may be assumed to be constant among females (couples). Further, sex of the child at a particular birth order is not going to affect the sex of the children at other birth orders. Thus one is tempted to assume that for fixed number of children (say n), the number of male children (X) follows a binomial distribution with parameters n and p. Gokhale and Kunte (1997), have assumed this to be true and fitted it to an observed set of data. However they could not found good fit to the data and consequently modified their model by assuming that p follows a beta distribution among couples. Even after this modification the chi square value was found to be highly significant and finely they have mentioned that this might be due a very large sample size in the present case. Large sample paradox is discussed in their paper (Kunte and Gore, 1992). Sharma and Vishwakarma (2004) have also assumed that for fixed n, the number of male children will follow a binomial distribution.

With present biological evidences available, it is reasonable to assume that for fixed number of children (n), the number of male children (X) should at least approximately, follow a binomial distribution as the n trials here should behave almost like Bernoulli trials. Now the question is: If for fixed n, the distribution of X does not follow binomial distribution, should it be inferred that the assumption of Bernoulli trials in this case is not true? Perhaps the answer is 'No'. Even if the assumptions of Bernoulli trials are true, the distribution of X may not be binomial (with parameters n and p) because of problem of stopping producing children after attainment of a desired sex distribution of produced children commonly called as stopping rule. It is true that with any stopping rule, the over all sex ratio at birth in the population is not affected (if p is constant among couples). However the sex ratio will be affected at different values of n. If there is more 'son' preference, the

probability ‘p’ should show a declining trend over n. However, if there is no ‘son’ preference (sex preference), the value should remain static over different values of n.

Large numbers of studies have been done to examine the impact of different stopping rules on sex distribution of children and sex ratio at different birth orders (Goodman 1961, Keyfitz 1968, 1985, Yamaguchi 1989, Clark 2000, Barber 2004 and others). These papers examine these issues on the assumption that population is homogeneous or heterogeneous with respect to p (the probability of producing a male child at any birth order). In the present paper we attempt to study the extent of son preference by analyzing the data on actual birth performance of females (couples) utilizing the above idea. As discussed above, if there is no preference for the sex of any child then percentage of males (sons) should be same for each family size (number of children). However, if there is more son preference then the percentage of male children should show a declining trend as number of children increases. This may be more pronounced in case of females of completed fertility. Further, in the case of almost completed fertility the sex of the last child may also be an indicator of sex preference. For example if there is son preference, then it is more likely that the last child will be a son because in this situation the couple will be more satisfied to have a son as the last child and the couple may like to stop producing children after getting a son (as the last child). Keeping in view the above fact, we have analyzed the data of NFHS-2 for different major states of India to study the spatial variation in son preference in the country as a whole as well as studying the pattern for different groups of the society classified according to education, type of residential area, caste and standard of living index (SLI). The results and discussion are presented below in the form of various tables and conclusions from them.

Data

The NFHS has collected data on the complete birth history of females who are in the reproductive age group viz. (15-49) years at the time of survey. In this approach, the data have been collected on the ‘sex’ of each child produced by a female. From such raw data, sex of the child at any given parity and number of children produced by a female can be easily ascertained. This data set has been analysed here to study the proportion of male children for females giving specified number of children. To have females of almost completed fertility, we have considered only such females whose ages are more than 35 years on the survey date. As mentioned above the ‘sex’ of the last child can also be easily ascertained. This data set has also been analyzed to study the proportion of male children at the last birth of such females. These data sets constitute the study material for the present paper.

Results and Discussion

Table 1 presents the state wise proportion of male children among total births for females with different number of births (n) in their reproductive life. The values of n are 1, 2,3,4,5,6 and 7-8. The females with more than 8 births have not been considered here because of smaller number of observations. The figures in the brackets show the number of females. A critical review of the table shows that the value of proportion of male children among total births varies considerably according to the value of n. It also shows wide variation according to state even for fixed n. Punjab and Haryana are the two states, which show larger differences from other states.

The overall trend is that for $n \geq 2$, there is a declining trend in the proportion of male children as the value of n increases. The trend is more pronounced in case of Punjab and Haryana and less pronounced in the southern states like Kerala, Andhra Pradesh, Tamilnadu. West Bengal also shows similar trend. States like Gujarat, Maharashtra, Rajasthan, Uttar Pradesh, Bihar and Orissa occupy the in between position. On the basis of this trend we can say that Punjab and Haryana are the two most son preferring states where as states like Kerala, West Bengal, Andhra Pradesh, and Tamilnadu show less pronounced son preference. This is inferred from the following facts also: Proportion of male children for females having exactly two births (age of females being more than 35 years) is 0.68 and 0.72 for Punjab and Haryana whereas this proportion is only in the vicinity of 0.55 for the southern

states. Further there is a significant drop of 0.10 in this proportion (between the values for $n = 2$ and $n = 3$) for Punjab and Haryana whereas for southern states this proportion is almost static for $n = 2$ and $n = 3$.

Further, in most of the cases (i.e. states) the value of this proportion is less for $n = 1$ than for the case when $n = 2$ although the values are well above 0.52 which is the over all sex ratio in the population. This shows that couples normally do not stop after their first birth irrespective of the fact that whether the child is male or female: Only a small proportion of the couples might be stopping after getting their one desired son at the first birth it self. In fact, for the country as a whole the proportion of male children among those who have only one child in their reproductive life is 0.58 where as this proportion in the population is 0.52. This indicates that around 12% couples out of those producing only one child in their reproductive life, are those who stop producing additional children after getting their first son at the first birth which might be their ideal family size. The rest 88% are those who have either become incapable to produce additional children (secondarily sterile) or their ideal family size is just one child irrespective of the sex of the child.

Further, in case of Punjab this proportion is as high as 0.79 clearly indicating a definite inclination towards having only one child and that too a 'son' although this is based on only 47 observations but 47 is not such a small number for showing so much sampling variation. One other important disturbing but important result is that overall sex ratio at birth in the country is 0.52 where as it is 0.558 for Punjab and 0.543 for Haryana. This clearly indicates the phenomenon of 'missing girls' in the two states.

Till now we were discussing about the proportion of male children out of total births given by females for various values of n (given number of births). Now we discuss about the sex composition among specified number of total births. For $n = 1$, the sex composition is: either the birth will be male or female and this is already evident from table 1 for $n = 1$. However for $n = 2$, there will be four different sex composition viz. MM, MF, FM, FF where M stands for male and F stands for female. MM denotes that both children are male, MF denotes that first child is male and second child is female. Similarly FM and FF can be interpreted. In the absence of any sex preference, these proportions should be 0.25, 0.25, 0.25 and 0.25 if it is assumed that probability of producing a male child is $p = 0.5$ and population is homogeneous with respect to p and sex of children at different birth orders are independent. However, if $p \neq \frac{1}{2}$, then proportions will be p^2, pq, qp, q^2 where $q = 1 - p$.

Table 2 represents these proportions (along with numbers) for the case $n = 2$, for different states. Here too, similar results are seen as obtained earlier. First, the four proportions do not indicate similar values for different states. Further, the proportions for MM, MF, FM and FF are not even approximately equal, especially the proportion for FF is much below the other proportions for all the states and gap for FF is not uniform across the states. If we find number of FF cases per hundred MM cases then the following values are obtained for different states:

Table A: Number of FF cases per hundred MM cases

State	**Punjab**	**Haryana**	**Gujarat**	**Maharashtra**	**Madhya Pradesh**	**Rajasthan**	**Uttar Pradesh**	**Bihar**	**Orissa**	**Karnataka**	**Tamil Nadu**	**Andhra Pradesh**	**West Bengal**	**Kerala**	**India**
No. of FF cases per 100 MM cases	16	8	24	52	28	28	32	42	45	57	63	58	61	76	42

The values for Punjab and Haryana are as small as 16 and 8 where as the values for southern states are 76, 63, 58 and 57 for Kerala, Tamil Nadu, Andhra Pradesh and Karnataka respectively. This shows the gap of stopping behavior of couples who stop at two children across the states. The other important observed feature of the observed frequencies is that the frequencies observed for MM are much larger than the frequencies for MF and FM for states of Haryana and Punjab, whereas the cases for MM, MF and FM are almost equal for states like Kerala, West Bengal, Andhra Pradesh and Tamil Nadu. This again shows that couples in Punjab and Hariyana stopping at two children are more satisfied when both the children are sons rather than one is son and the other is daughter.

We can also calculate the value of χ^2 for different states to show the variation in stopping behavior of couples across the states. As usual the χ^2 can be calculated as:

$$\chi^2 = \sum_{i=1}^{4}\left[\frac{(O_i - e_i)^2}{e_i}\right]$$

where e_i's are the expected frequencies for four combination MM, MF, FM and FF computed on the basis of their expected proportion as p^2, pq, qp and q^2. O_i's are the observed frequencies (the value of p has been taken as 0.52 for all states).

The calculated values of χ^2 are given at the bottom of the table (just above the last row). All χ^2 values are significant at 5% level of significance showing a departure from expected pattern indicating presence of son preference. It is to be mentioned that the value of χ^2 can be considered to be an indicator of departure from expectation (expectation on the assumption of no son preference). However, the value of χ^2 can be affected by the size of the sample (N) also. To over come this difficulty we can calculate the coefficient of contingency (as suggested by Karl Pearson):

$$C = \sqrt{\frac{\chi^2}{\chi^2 + N}}$$

Obviously larger the value of C, larger is departure from expectation. The values of C are also given at the bottom of this table.

We can also develop another measure to indicate the level of departure from expectation for comparison across states. This can be

$$K = \sum_{i=1}^{4}\left|p_{i(o)} - p_{i(e)}\right|$$

where $p_{i(o)}$, $i = 1,2,3,4$ are observed proportions for MM, MF, FM and FF respectively. $p_{i(e)}$, $i = 1,2,3,4$ are expected proportions for MM, MF, FM and FF respectively. To have larger numbers for comparison, we may consider the measure as 100 K rather K. The values of this measure are also given in the same table.

Now we discuss about the sex combination when $n = 3$. Obviously there will be 8 combinations as MMM, MMF, MFM, MFF, FMM, FMF, FFM, FFF. Table 3 presents the observed frequencies as well as proportions for different states. In case of no sex preference for children and homogeneous population with respect to p, the expected proportions will be p^3, p^2q, p^2q, pq^2, qp^2, q^2p, q^2p and q^3. The values χ^2, C and 100 K are also given in the same table at the bottom rows.

A critical review of this table shows almost similar results as seen for $n = 2$. To examine the differential behaviour of sex preference among different states (for $n = 3$) we calculate the values of χ^2 as computed for $n = 2$. Here too, we find that Hariyana and Punjab show definitely different behaviour in comparison to southern states. The gap between proportions for MMM and FFF are large for Punjab and Hariyanawhere as this is quite small for southern states. Of course, other states occupy the middle positions in between the two extremes.

A few additional points need special mention: By and large at the country as a whole the proportion for MMM, MFM, MMF, FMM are approximately equal and well above the expected proportion on the basis of no son preference. This shows that couples stopping at three children are more satisfied when they get at least two sons out of three children. On the other hand proportions for FFM, FMF, MFF are relatively low from the above proportions showing lesser satisfaction with one son out of three children. Further, proportion for FFM is larger than proportions for FMF and MFF showing more satisfaction with son as the last child out of three births in comparison to having a son before the last birth. Of course FFF is the least preferred combination for stopping after third birth. It is further to be pointed out that the states like Rajsthan, Madhya Pradesh, Uttar Pradesh, Bihar and Orissa also show reasonably high values for C as well as 100K for $n = 3$, showing a higher preference for two sons out of 3 total births

It is important to mention here that similar calculations can be done for n ≥ 4 also but due to larger number of combinations and smaller number of observations we have not attempted this type of analysis for n ≥ 4. We have mentioned earlier that sex of the last child can also be an indicator of the sex preference in any society. Consequently we have also analyzed the data relating to sex of the last child for females of different states (age of female more than 35 years). Table 4 presents the proportions of male births at last births for different values of n (n=1, 2, 3, 4, 5, 6, 7-8).

From table 4, it is observed that for most of the states, the proportion of male births at last birth is well above 0.52, which is the over all proportion of male births in the population. As seen earlier, here also Punjab and Hariyana show the maximum proportions (0.661 and 0.657) where as Kerala shows the value as 0.511. Other results are similar to those observed earlier and we do not discuss them in detail. Till now we were discussing about the variation in son preference behavior across the states. Now we try to present similar findings for different groups of the Indian society classified according to caste, religion, education of female, place of residence (rural/urban) and SLI (standard of living index). Similar tables, analogous to tables 1 to 4, are prepared for this situation also and the results are presented in tables 5 to 8.

A close look at table 5 reveals that although there is declining trend in p as n increases but here the trend is not that much prominent as observed in the case of states perhaps showing more variation in son preference behavior across different states in comparison to variation in different groups of the Indian society. It is perhaps because of the fact that here the groups have been formed combining the data for all the states and consequently effects of states are confounded here. It would have been better if similar tables (for different groups of the society) would have been prepared for each state but because of problem of smaller number of observation under such tabulation plan, we have not prepared such tables. A close look at tables 6 to 8 reveals similar results with problem of confounding of state effects with group effects (groups formed on the basis of caste, religion, type of residential area, education of female and standard of living index). However, as mentioned earlier, we have not done such detailed tabulation due to smaller number of observations and the results should be seen under this perspective.

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Table 1: Proportion of male children (p) among given number of children born (n) for different states

No. of Children Born	Punjab	Haryana	Gujarat	Maharashtra	Madhya Pradesh	Rajasthan	Uttar Pradesh	Bihar	Orissa	Karnataka	Tamil Nadu	Andhra Pradesh	West Bengal	Kerala	India
1	0.79 (47)	0.52 (23)	0.55 (56)	0.57 (124)	0.49 (69)	0.64 (50)	0.62 (73)	0.62 (64)	0.61 (70)	0.58 (95)	0.54 (164)	0.50 (70)	0.51 (193)	0.45 (114)	0.58 (1634)
2	0.68 (254)	0.72 (157)	0.63 (274)	0.61 (385)	0.63 (156)	0.66 (155)	0.64 (204)	0.60 (169)	0.57 (238)	0.56 (296)	0.55 (438)	0.56 (242)	0.55 (358)	0.53 (455)	0.59 (5073)
3	0.58 (310)	0.62 (257)	0.61 (385)	0.58 (522)	0.61 (352)	0.65 (321)	0.60 (392)	0.61 (291)	0.59 (326)	0.58 (372)	0.52 (469)	0.57 (328)	0.52 (325)	0.51 (395)	0.57 (6791)
4	0.55 (264)	0.55 (212)	0.54 (310)	0.51 (408)	0.57 (394)	0.55 (435)	0.56 (482)	0.54 (426)	0.52 (322)	0.50 (267)	0.52 (328)	0.54 (271)	0.53 (265)	0.52 (164)	0.54 (6163)
5	0.50 (128)	0.53 (148)	0.47 (200)	0.51 (225)	0.50 (358)	0.52 (393)	0.54 (471)	0.53 (404)	0.51 (243)	0.51 (192)	0.50 (189)	0.50 (201)	0.48 (180)	0.48 (78)	0.50 (4558)
6	0.47 (85)	0.49 (111)	0.46 (136)	0.42 (134)	0.52 (286)	0.50 (361)	0.51 (449)	0.49 (323)	0.51 (157)	0.48 (119)	0.49 (109)	0.50 (120)	0.49 (124)	0.53 (44)	0.49 (3327)
7-8	0.45 (39)	0.46 (99)	0.43 (98)	0.43 (77)	0.49 (363)	0.49 (398)	0.52 (659)	0.52 (375)	0.47 (120)	0.47 (130)	0.49 (71)	0.48 (104)	0.49 (107)	0.51 (32)	0.49 (3381)
Total	**0.558 (1127)**	**0.543 (1007)**	**0.521 (1459)**	**0.519 (1875)**	**0.529 (1978)**	**0.520 (2113)**	**0.530 (2730)**	**0.525 (2052)**	**0.525 (1476)**	**0.514 (1471)**	**0.518 (1768)**	**0.523 (1336)**	**0.514 (1552)**	**0.507 (1282)**	**0.522 (30927)**

Table 2: Proportion (frequencies) for MM, MF, FM and FF combinations in different states (Children born =2)

State	**Punjab**	**Haryana**	**Gujarat**	**Maharashtra**	**Madhya Pradesh**	**Rajasthan**	**Uttar Pradesh**	**Bihar**	**Orissa**	**Karnataka**	**Tamil Nadu**	**Andhra Pradesh**	**West Bengal**	**Kerala**	**India**
MM	43.3 (110)	47.8 (75)	35.0 (96)	29.9 (115)	37.2 (58)	43.9 (68)	41.7 (85)	33.7 (57)	32.1 (77)	25.7 (76)	27.4 (120)	27.7 (67)	27.7 (99)	24.8 (113)	32.6 (1654)
MF	22.4 (57)	22.3 (35)	30.7 (84)	23.4 (90)	26.9 (42)	22.6 (35)	22.1 (45)	32.0 (54)	32.5 (78)	31.1 (92)	22.6 (99)	31.4 (76)	26.5 (95)	28.1 (128)	26.5 (1343)
FM	27.2 (69)	26.1 (41)	25.9 (71)	31.2 (120)	25.6 (40)	21.3 (33)	23.0 (47)	20.1 (34)	20.8 (50)	28.7 (85)	32.9 (144)	24.8 (60)	29.1 (104)	28.1 (128)	27.1 (1375)
FF	7.1 (18)	3.8 (6)	8.4 (23)	15.6 (60)	10.3 (16)	12.3 (19)	13.2 (27)	14.1 (24)	14.6 (35)	14.5 (43)	17.1 (75)	16.1 (39)	16.8 (60)	18.9 (86)	13.8 (701)
Total	100.0 (254)	100.0 (157)	100.0 (274)	100.0 (385)	100.0 (156)	100.0 (155)	100.0 (204)	100.0 (169)	100.0 (240)	100.0 (296)	100.0 (438)	100.0 (242)	100.0 (358)	100.0 (455)	100.0 (5073)
χ^2	**54.1**	**50.7**	**35.7**	**16.8**	**17.3**	**25.2**	**25.6**	**13.5**	**16.8**	**15.6**	**18.6**	**9.1**	**8.9**	**7.9**	**259.3**
C	**0.42**	**0.49**	**0.34**	**0.20**	**0.32**	**0.37**	**0.33**	**0.27**	**0.26**	**0.22**	**0.20**	**0.19**	**0.16**	**0.13**	**0.22**
100K	**36.9**	**43.8**	**29.3**	**18.1**	**25.6**	**33.7**	**29.3**	**27.4**	**25.2**	**19.8**	**16.5**	**14.2**	**12.6**	**12.7**	**18.4**

Table 3: Proportion (frequencies) for MMM, MMF, MFM, MFF, FMM, FMF, FFM and FFF combinations in different states (Children born =3)

State	Punjab	Haryana	Gujarat	Maharashtra	Madhya Pradesh	Rajasthan	Uttar Pradesh	Bihar	Orissa	Karnataka	Tamil Nadu	Andhra Pradesh	West Bengal	Kerala	India
MMM	12.6 (39)	18.3 (47)	18.7 (72)	16.5 (86)	14.5 (58)	20.9 (67)	15.8 (62)	19.2 (56)	16.3 (53)	15.1 (56)	11.5 (54)	15.2 (50)	11.4 (37)	10.1 (40)	14.8 (1004)
MMF	16.5 (51)	15.6 (40)	13.0 (50)	14.6 (76)	16.8 (59)	17.8 (57)	17.3 (68)	15.5 (45)	16.0 (52)	20.4 (76)	16.8 (79)	15.2 (50)	14.2 (46)	14.2 (56)	15.7 (1068)
MFM	17.4 (54)	16.0 (41)	16.9 (65)	14.9 (78)	21.3 (75)	17.1 (55)	18.4 (72)	15.5 (45)	15.0 (49)	13.7 (51)	12.4 (58)	14.3 (47)	16.0 (52)	12.7 (50)	15.7 (1067)
MFF	8.4 (26)	8.6 (22)	9.1 (35)	9.1 (55)	7.1 (25)	7.2 (23)	9.7 (38)	9.6 (28)	8.3 (27)	8.6 (32)	11.1 (52)	9.5 (31)	8.6 (28)	11.9 (47)	9.7 (662)
FMM	17.1 (53)	149.5 (50)	18.4 (71)	18.4 (88)	16.2 (57)	20.6 (66)	16.8 (66)	17.5 (51)	17.8 (58)	15.1 (56)	13.2 (62)	18.6 (61)	15.7 (51)	13.9 (55)	16.2 (1103)
FMF	10.0 (31)	8.2 (21)	6.8 (26)	6.8 (47)	8.8 (31)	6.5 (21)	7.7 (30)	8.9 (26)	7.7 (25)	10.2 (38)	11.1 (52)	9.1 (30)	11.4 (37)	10.6 (42)	9.2 (624)
FFM	15.5 (48)	12.8 (33)	13.8 (53)	13.8 (67)	9.1 (32)	7.5 (24)	11.2 (44)	10.0 (29)	14.1 (46)	11.0 (41)	14.9 (70)	9.8 (32)	12.3 (40)	15.2 (60)	12.9 (878)
FFF	2.6 (8)	1.2 (3)	3.4 (13)	3.4 (25)	4.3 (15)	2.5 (8)	3.1 (12)	3.8 (11)	4.9 (16)	5.9 (22)	9.0 (42)	8.2 (27)	10.5 (34)	11.4 (45)	5.7 (385)
Total	100.0 (310)	100.0 (257)	100.0 (385)	100.0 (522)	100.0 (352)	100.0 (321)	100.0 (392)	100.0 (291)	100.0 (326)	100.0 (372)	100.0 (469)	100.0 (328)	100.0 (325)	100.0 (395)	100.0 (6791)
χ^2	**39.8**	**43.2**	**52.3**	**34.4**	**54.1**	**75.6**	**50.6**	**31.5**	**31.4**	**31.3**	**13.6**	**17.7**	**9.4**	**9.1**	**392.7**
C	**0.34**	**0.38**	**0.35**	**0.25**	**0.36**	**0.44**	**0.32**	**0.31**	**0.30**	**0.28**	**0.17**	**0.23**	**0.17**	**0.15**	**0.23**
100K	**31.1**	**34.2**	**31.6**	**21.4**	**35.4**	**46.6**	**30.7**	**29.4**	**28.3**	**22.5**	**14.1**	**20.8**	**14.5**	**11.4**	**20.8**

Table 4: Proportion of male children (p) at last birth for given number of children born (n) in different states

No. of Children Born	Punjab	Haryana	Gujarat	Maharashtra	Madhya Pradesh	Rajasthan	Uttar Pradesh	Bihar	Orissa	Karnataka	Tamil Nadu	Andhra Pradesh	West Bengal	Kerala	India
1	0.79 (47)	0.52 (23)	0.55 (56)	0.57 (124)	0.49 (69)	0.64 (50)	0.62 (73)	0.62 (64)	0.61 (70)	0.58 (95)	0.54 (164)	0.50 (70)	0.51 (193)	0.45 (114)	0.58 (1634)
2	0.71 (254)	0.74 (157)	0.61 (274)	0.61 (385)	0.63 (156)	0.65 (155)	0.65 (204)	0.54 (169)	0.53 (238)	0.54 (296)	0.60 (438)	0.53 (242)	0.57 (358)	0.53 (455)	0.60 (5073)
3	0.63 (310)	0.67 (257)	0.68 (385)	0.61 (522)	0.63 (352)	0.66 (321)	0.62 (392)	0.62 (291)	0.63 (326)	0.55 (372)	0.52 (469)	0.58 (328)	0.55 (325)	0.52 (395)	0.60 (6791)
4	0.65 (264)	0.60 (212)	0.67 (310)	0.64 (408)	0.59 (394)	0.56 (435)	0.60 (482)	0.55 (426)	0.56 (322)	0.54 (267)	0.59 (328)	0.58 (271)	0.54 (265)	0.53 (164)	0.58 (6163)
5	0.68 (128)	0.61 (148)	0.57 (200)	0.60 (225)	0.59 (358)	0.59 (393)	0.60 (471)	0.54 (404)	0.54 (243)	0.61 (192)	0.48 (189)	0.54 (201)	0.51 (180)	0.44 (78)	0.56 (4558)
6	0.65 (85)	0.53 (111)	0.52 (136)	0.56 (134)	0.56 (286)	0.54 (361)	0.55 (449)	0.46 (323)	0.59 (157)	0.55 (119)	0.54 (109)	0.51 (120)	0.51 (124)	0.59 (44)	0.54 (3327)
7-8	0.51 (39)	0.60 (99)	0.51 (98)	0.54 (77)	0.56 (363)	0.54 (398)	0.53 (659)	0.35 (375)	0.48 (120)	0.50 (130)	0.45 (71)	0.51 (104)	0.50 (107)	0.13 (32)	0.53 (3381)
Total	**0.661 (1127)**	**0.657 (1007)**	**0.615 (1459)**	**0.604 (1875)**	**0.584 (1978)**	**0.577 (2113)**	**0.570 (2730)**	**0.542 (2052)**	**0.565 (1476)**	**0.552 (1471)**	**0.551 (1768)**	**0.548 (1336)**	**0.539 (1552)**	**0.511 (1282)**	**0.571 (30927)**

Table 5: Proportion of male children (p) among given number of children born (n) according to different characteristics (India)

No. of Children Born	Caste			SLI			Education				Place of residence		Religion		Total
	SC/ST	OBC	Others	Low	Medium	High	Illiterate	Primary	Second.	Higher	Urban	Rural	Hindu	Muslim	
1	0.54 (359)	0.57 (400)	0.60 (872)	0.53 (368)	0.60 (612)	0.58 (630)	0.57 (576)	0.59 (241)	0.56 (403)	0.60 (411)	0.58 (831)	0.58 (803)	0.57 (1291)	0.64 (111)	0.58 (1634)
2	0.59 (856)	0.58 (1298)	0.60 (2908)	0.56 (784)	0.60 (1821)	0.60 (2399)	0.61 (1444)	0.61 (755)	0.59 (1579)	0.57 (1295)	0.58 (2678)	0.61 (2395)	0.59 (4037)	0.58 (287)	0.59 (5073)
3	0.58 (1541)	0.58 (1902)	0.57 (3329)	0.56 (1271)	0.58 (3028)	0.57 (2397)	0.60 (2845)	0.58 (1354)	0.55 (1895)	0.51 (695)	0.56 (2757)	0.58 (4034)	0.58 (5476)	0.56 (480)	0.57 (6791)
4	0.55 (1632)	0.53 (1826)	0.57 (2681)	0.54 (1340)	0.54 (3105)	0.52 (1635)	0.55 (3376)	0.53 (1268)	0.52 (1294)	0.45 (224)	0.53 (2070)	0.54 (4093)	0.54 (4919)	0.55 (571)	0.54 (6163)
5	0.52 (1409)	0.51 (1340)	0.49 (1777)	0.52 (1252)	0.51 (2353)	0.47 (902)	0.52 (2977)	0.50 (870)	0.45 (618)	0.39 (92)	0.49 (1260)	0.51 (3298)	0.50 (3576)	0.53 (549)	0.50 (4558)
6	0.51 (1128)	0.50 (1004)	0.47 (1168)	0.51 (1028)	0.49 (1744)	0.47 (517)	0.50 (2416)	0.47 (577)	0.46 (302)	0.41 (31)	0.49 (810)	0.50 (2517)	0.49 (2508)	0.51 (497)	0.49 (3327)
7-8	0.49 (1207)	0.50 (953)	0.49 (1176)	0.50 (1157)	0.49 (1804)	0.48 (381)	0.50 (2690)	0.48 (484)	0.46 (192)	0.49 (13)	0.49 (661)	0.50 (2720)	0.49 (2405)	0.50 (646)	0.49 (3381)
Total	**0.523 (8132)**	**0.522 (8723)**	**0.522 (13911)**	**0.519 (13239)**	**0.522 (14467)**	**0.527 (18861)**	**0.524 (16324)**	**0.520 (5549)**	**0.518 (6283)**	**0.516 (2761)**	**0.521 (11067)**	**0.519 (19860)**	**0.522 (24212)**	**0.524 (3141)**	**0.522 (30927)**

Table 6: Proportion (frequencies) for MM, MF, FM and FF combinations according to different characteristics in India (Children born =2)

Characteristics	Caste			SLI			Education				Place of residence		Religion		Total
	SC/ST	OBC	Others	Low	Medium	High	Illiterate	Primary	Second.	Higher	Urban	Rural	Hindu	Muslim	
MM	32.1 (275)	32.0 (416)	33.0 (959)	28.7 (225)	33.7 (613)	33.1 (795)	36.2 (523)	34.2 (260)	30.8 (487)	29.7 (384)	30.6 (819)	34.9 (835)	32.5 (1312)	32.4 (93)	32.6 (1654)
MF	27.7 (237)	25.9 (336)	26.4 (767)	26.8 (210)	27.3 (497)	25.8 (618)	27.1 (392)	27.0 (204)	27.0 (426)	24.8 (321)	26.0 (695)	27.1 (648)	26.3 (1060)	26.5 (76)	26.5 (1343)
FM	25.8 (221)	26.7 (347)	27.7 (805)	27.7 (217)	25.3 (459)	28.1 (675)	22.9 (331)	25.4 (192)	29.4 (464)	30.0 (388)	28.7 (769)	25.3 (606)	27.0 (1092)	24.0 (69)	27.1 (1375)
FF	14.4 (123)	15.3 (199)	13.0 (377)	16.8 (132)	13.8 (252)	13.0 (311)	13.7 (198)	13.1 (99)	12.8 (202)	15.6 (202)	14.7 (395)	12.8 (306)	14.2 (573)	17.1 (49)	13.8 (701)
Total	100.0 (856)	100.0 (1298)	100.0 (2908)	100.0 (784)	100.0 (1821)	100.0 (2399)	100.0 (1444)	100.0 (755)	100.0 (1579)	100.0 (1295)	100.0 (2678)	100.0 (2395)	100.0 (4037)	100.0 (287)	100.0 (5073)
χ^2	**38.9**	**47.6**	**177.0**	**17.2**	**100.5**	**149.0**	**104.7**	**48.9**	**95.4**	**47.4**	**108.5**	**168.1**	**191.4**	**7.9**	**259.3**
C	**0.21**	**0.19**	**0.24**	**0.15**	**0.23**	**0.24**	**0.26**	**0.25**	**0.24**	**0.19**	**0.20**	**0.26**	**0.21**	**0.16**	**0.22**
100K	**17.3**	**15.4**	**20.2**	**12.4**	**18.4**	**20.2**	**22.7**	**19.9**	**20.5**	**15.2**	**16.6**	**20.5**	**17.7**	**13.7**	**18.4**

Table 7: Proportion (frequencies) for MMM, MMF, MFM, MFF, FMM, FMF, FFM and FFF combinations according to different characteristics in India (Children born =3)

Characteristics	Caste			SLI			Education				Place of residence		Religion		Total
	SC/ST	OBC	Others	Low	Medium	High	Illiterate	Primary	Second.	Higher	Urban	Rural	Hindu	Muslim	
MMM	14.9 (229)	15.6 (297)	14.3 (477)	15.3 (195)	15.4 (466)	13.9 (332)	17.0 (483)	14.3 (194)	13.1 (248)	11.4 (79)	14.5 (400)	15.0 (604)	15.0 (822)	16.0 (77)	14.8 (1004)
MMF	17.3 (267)	16.8 (319)	14.4 (478)	14.9 (190)	16.5 (499)	15.2 (364)	17.4 (495)	16.4 (222)	14.2 (269)	11.7 (81)	14.9 (410)	16.3 (658)	16.2 (885)	16.3 (78)	15.7 (1068)
MFM	14.9 (230)	15.3 (291)	16.3 (541)	13.2 (168)	16.7 (505)	15.9 (380)	16.9 (481)	15.3 (207)	15.3 (290)	12.8 (89)	14.6 (403)	16.5 (664)	15.8 (866)	12.5 (60)	15.7 (1067)
MFF	10.3 (158)	9.3 (177)	9.8 (326)	9.1 (116)	10.0 (302)	9.8 (234)	8.1 (230)	11.3 (153)	10.9 (207)	10.2 (71)	10.3 (285)	9.3 (377)	9.3 (508)	11.9 (57)	9.7 (662)
FMM	17.3 (266)	15.7 (299)	16.1 (535)	17.3 (220)	15.7 (474)	16.3 (391)	17.2 (490)	17.4 (236)	15.1 (287)	12.9 (90)	15.0 (414)	17.1 (689)	16.7 (916)	15.4 (74)	16.2 (1103)
FMF	9.0 (138)	9.5 (180)	9.1 (304)	10.3 (131)	9.3 (281)	8.5 (204)	8.7 (248)	8.9 (120)	10.4 (197)	8.5 (59)	9.1 (251)	9.2 (373)	8.9 (489)	10.4 (50)	9.2 (624)
FFM	11.0 (170)	11.7 (223)	14.5 (483)	13.1 (166)	11.2 (338)	15.0 (359)	9.5 (269)	11.6 (157)	15.0 (285)	24.0 (167)	15.0 (413)	11.5 (465)	12.8 (702)	10.8 (52)	12.9 (878)
FFF	5.4 (83)	6.1 (116)	5.6 (185)	6.7 (85)	5.4 (163)	5.5 (133)	5.2 (149)	4.8 (65)	5.9 (112)	8.5 (59)	6.6 (181)	5.1 (204)	5.3 (288)	6.7 (32)	5.7 (385)
Total	100.0 (1541)	100.0 (1902)	100.0 (3329)	100.0 (1271)	100.0 (3028)	100.0 (2397)	100.0 (2845)	100.0 (1354)	100.0 (1895)	100.0 (695)	100.0 (2757)	100.0 (4034)	100.0 (5476)	100.0(480)	100.0 (6791)
χ^2	**111.0**	**107.1**	**201.8**	**58.5**	**199.5**	**162.6**	**297.0**	**98.1**	**84.1**	**101.8**	**118.8**	**307.5**	**385.2**	**17.2**	**392.7**
C	**0.26**	**0.23**	**0.24**	**0.21**	**0.25**	**0.25**	**0.31**	**0.26**	**0.21**	**0.36**	**0.20**	**0.27**	**0.26**	**0.19**	**0.23**
100K	**22.8**	**20.8**	**21.1**	**17.8**	**22.4**	**16.8**	**31.0**	**20.9**	**17.5**	**24.1**	**18.0**	**23.7**	**23.1**	**15.4**	**20.8**

Table 8: Proportion of male children (p) at last birth for given number of children born (n) according to different characteristics (India)

No. of Children Born	Caste			SLI			Education				Place of residence		Religion		Total
	SC/ST	OBC	Others	Low	Medium	High	Illiterate	Primary	Second.	Higher	Urban	Rural	Hindu	Muslim	
1	0.54 (359)	0.57 (400)	0.60 (872)	0.53 (368)	0.60 (612)	0.58 (630)	0.57 (576)	0.59 (241)	0.56 (403)	0.60 (411)	0.58 (831)	0.58 (803)	0.57 (1291)	0.64 (111)	0.58 (1634)
2	0.58 (856)	0.59 (1298)	0.61 (2908)	0.56 (784)	0.59 (1821)	0.61 (2399)	0.59 (1444)	0.60 (755)	0.60 (1579)	0.60 (1295)	0.59 (2678)	0.60 (2395)	0.60 (4037)	0.56 (287)	0.60 (5073)
3	0.58 (1541)	0.58 (1902)	0.62 (3329)	0.59 (1271)	0.59 (3028)	0.61 (2397)	0.61 (2845)	0.59 (1354)	0.59 (1895)	0.61 (695)	0.59 (2757)	0.60 (4034)	0.60 (5476)	0.55 (480)	0.60 (6791)
4	0.57 (1632)	0.57 (1826)	0.59 (2681)	0.58 (1340)	0.57 (3105)	0.59 (1635)	0.57 (3376)	0.57 (1268)	0.60 (1294)	0.61 (224)	0.59 (2070)	0.58 (4093)	0.58 (4919)	0.56 (571)	0.58 (6163)
5	0.57 (1409)	0.56 (1340)	0.56 (1777)	0.56 (1252)	0.56 (2353)	0.57 (902)	0.56 (2977)	0.58 (870)	0.53 (618)	0.61 (92)	0.57 (1260)	0.56 (3298)	0.57 (3576)	0.54 (549)	0.56 (4558)
6	0.54 (1128)	0.52 (1004)	0.55 (1168)	0.53 (1028)	0.54 (1744)	0.56 (517)	0.53 (2416)	0.60 (577)	0.53 (302)	0.61 (31)	0.54 (810)	0.54 (2517)	0.54 (2508)	0.51 (497)	0.54 (3327)
7-8	0.52 (1207)	0.53 (953)	0.52 (1176)	0.52 (1157)	0.53 (1804)	0.54 (381)	0.53 (2690)	0.53 (484)	0.53 (192)	0.84 (13)	0.51 (661)	0.53 (2720)	0.54 (2405)	0.50 (646)	0.53 (3381)
Total	**0.558 (8132)**	**0.565 (8723)**	**0.583 (13911)**	**0.555 (13239)**	**0.563 (14467)**	**0.597 (18861)**	**0.560 (16324)**	**0.578 (5549)**	**0.580 (6283)**	**0.603 (2761)**	**0.568 (11067)**	**0.577 (19860)**	**0.576 (24212)**	**0.531 (3141)**	**0.571 (30927)**