Chapter II

REVIEW OF LITERATURE

This chapter presents a detailed examination of various studies conducted to look into the question of sex preference and its effects on fertility behaviour. Since a sizeable amount of data relating to the subject has been amassed from studies in the developed countries, especially the United States, an analysis of these studies is undertaken first, followed by a look at the evidence from the developing countries including India. Finally, methodological issues that arise from these studies are highlighted— issues which could possibly explain the results obtained as well as point to some of the lacunae that exist in the examination of a such a sensitive subject.

2.1 THE UNITED STATES

In the United States, studies dating back more than thirty years include those reported by Clare and Kiser (1951), Dinitz et al. (1954), Flanagan (1942), McMahan (1951) and Winston (1933). Among the early studies the relevance of sex preference on the couple's decision to have another child is well illustrated by Winston (1933). The author hypothesized that upon having children of the desired sex, couples were less likely to have more children. To test this sex ratios for the last-born children and for all children ever born,

as recorded for 5,466 families in the Abridged Compendium of American Genealogy, were computed. He found that generally higher sex ratios (100 M/F) prevailed for the last-born children (117:100) than for all children ever born (106:100). He also found that more two-child families had two sons than two daughters and more families with two children of the opposite sex, had a son as a last child than a daughter. Harper's study (cited in Largey, 1972) also found a relatively higher sex ratio for the last-born children of 11,937 families. The author contended, however, that preference for children of both sexes was more prevalent than that towards a given sex.

In another study, Flanagan (1942) asked several hundred military officers and their wives to imagine how their families would have been altered in size, if predetermination of the sex of children were made possible by medical science, and if everything else remained constant. A majority of the respondents (89 percent of the officers and 82 percent of their wives) stated that such a condition would have made no difference in the size of their family or plans for additional children. Nevertheless, 11 percent of the men and 17 percent of the women thought control of sex of child would have led them to have larger families, while less than 1 percent of either husbands or wives thought it would have led to smaller families. Although

the study was post factum and the responses may have been biased rationalization, it suggested an important point, i.e., that preselection of sex may lead to large families, rather than serve to limit the size of families.

In another post factum study, Clare and Kiser (1951) examined the gender preference responses of husbands and wives in the 1941 Indianpolis study, the first large scale interview study of factors related to fertility in an American population that represented a significant segment of white adults. The responses of the couples about their preferences for children of each sex were cross-tabulated with the actual sex of their children. The authors concluded that most couples tended to be satisfied with the sex of the children they had and that sex preference was an important determinant of fertility among relatively few couples. These conclusions have drawn criticism from later investigators. For example, Pohlman (1967) has pointed out that ex post facto statements of sex preference by the parents are largely rationalizations, and thus it is not surprising that sex preference does not appear as a significant influence in fertility dynamics. Further, he noted that Clare and Kiser's data do not necessarily demonstrate a tendency for parents to be satisfied with the sex of the children that they have, but only to say that they are satisfied. In this context, "the study did not check on whether there was congruence between what parents said and

how they felt" (Pohlman, 1967, p. 275). Given the methodology and findings from the Indianapolis study, it is not surprising that researchers designing later American fertility studies, turned to more direct methods to estimate the impact of gender of children on fertility.

Freedman et al., (1960) reported an analysis of data taken from the 1955 Growth of American Families study (GAF) (Freedman et al., 1959). Within each current parity group women were classified into two categories, viz. those women who had children of the same sex and those who had children of different sexes. Among women with two children of the same sex, 63 percent of the respondents said they expected to have more children, while only 59 percent of women with a son and a daughter said they expected to have more children. This pattern was true at different parities indicating that parents whose children were of the same sex had a greater tendency to say they expected, and actually to have, at least one additional child than did parents whose families included one child of each sex. A number of other studies also bear on the sex of child composition of families. For example, using the 1954 edition of Who's Who in America as a source of data Fancher (1956, p. 322) concluded "parents with two children of the same sex are more likely to have a third child than are those with one of each sex". Similarly, Sears et al., (1957) reported that the sex of existing children affected

the attitude of mothers towards pregnancy :

> "There was a tendency for the mother to be happier about a new pregnancy if her existing children were girls only rather than boys only or both boys and girls. Indeed, she was very likely to be least enthusiastic if she already had children of both sexes" (p. 39).

Whelpton et al., (1966) arrived at a similar conclusion as that of Freedman et al., (1960), while Westoff et al., (1961, p. 295) reported :

> Sex of the first offspring affects at least the length of the subsequent birth interval.... Sex preference is an important motivating factor, to affect fertility patterns, including perhaps, family size .... Desired size of the family is not independent of a preference for a particular sex composition.

Similarly, Bumpass and Westoff (1970) examined the Princeton Fertility Study data to measure the sex of child effect on fertility. The study was a follow-up of mothers who had given birth to a second child in 1956, till 1967 by which time most mothers had completed their childbearing. After classifying second parity mothers by the sex of their first two children, subsequent births were used to calculate parity progression ratios. Among second parity mothers with a boy and a girl, 62 percent had a third birth, compared to 73 percent of mothers with two children of the same sex. The difference of 11 percent point was attributed to the effect of child gender preferences. The study further

reported that even at higher parities women had a tendency to have another child if they had children of the same sex rather than of different genders.

Another large scale survey which had reported about sex of child effects was the 1965 National Fertility Study (NFS). Among couples with two children, 70 percent of those with a boy and a girl wanted no more children while 64 per cent of those with two girls and 61 percent of those with two boys wanted no more children (Coombs, 1973). However, there was no such difference based on their existing sex composition in the percentage of couples saying they wanted no more children. This result contrasts sharply with that of the 1955 GAF and 1957 Princeton Study. Clare and Kiser's conclusion also seems to imply that sex preference is not an important enough motivating factor to affect the pattern of fertility for the majority of the couples. At this juncture it is difficult to assess which position was correct in American society although many studies including some large scale surveys referred earlier, support that sex preference is an important factor in fertility dynamics and many American parents prefer a balanced sex ratio in their families.

If we look into the more recent analysis of U.S. data, most of the studies reveal a small effect of the gender of child on actual or intended fertility, or show that such an effect, noticed in the middle and late 1950s, to have

disappeared completely. For example, Waller (1976), in his study examined the reproductive history of a sample of couples representing a general regional population for an influence of combination of sexes of the first two to four children upon completed family size. The result of his study found no such association which is in agreement with some other American studies (Ayala and Falk, 1971; Gray, 1972; Gray and Morrison, 1974; Loyd and Gray, 1969).

The study by Cutright et al., (1974) also suggested a diminishing effect of sex of previous children on fertility intention over time. They examined the probable impact of having children of the same sex or of different sex on the intended family size. The sample used in this study is however quite small. About 273 wives with just two children from a sample of 1123 white wives aged 18-44 living with their first husband in five North Central states, were drawn and analysed. Analysis of mean intended family size among wives, by their sex of previous children after controlling the characteristics of the sample that are known to be related to the dependent variable, did not reveal the expected effect of sex of children on mean intended family size among second parity wives. Analysis of third or higher parity wives in the 1971 sample yielded a similar finding. The authors finally concluded that sex predetermination, were it available, would probably have little impact on fertility. Similarly

Freedman and Coombs (1974), while reviewing the evidence of sex preference for a number of developed and developing countries, observed that there is no systematic indication of sex preference either in the attitudinal index, as measured by 'parents who want no more children' and 'number of additional children wanted', or in the behavioural index, as measured by 'practice of contraception' and 'parity progression ratio', in the United States. This is also consistent with the findings of some studies that family sex composition, in the aggregate, has little effect on parity progression ratios (Ben-Porath and Welch, 1976; McClelland and Hackenberg, 1978).

Very recently, Pebley and Westoff (1982) examined in detail the gender preference pattern during 1970-1975 and its potential effect through sex preselection technology in the United States. Data for the analysis were obtained from the 1970 and 1975 National Fertility Studies. The 1970 NFS were a survey of a national probability of 6,752 ever-married women under 45 years of age residing in the United States. In 1975, a subsample of 2,361 of these women was reinterviewed, and a new sample of 1,042 women married for less than five years at the time of the survey, was also interviewed. The study revealed that gender preferences had not changed, at least at the aggregate level, in the United States. The preference for a balanced sex composition and for a son as

the first child and then a daughter was obvious in both years. Further analysis of the same U.S. data suggested that family sex composition, in the aggregate, had little effect on parity progression ratios, with the exception at parity two, where women with two children of the same sex were a little more likely to have another child, and parity four and five where there was a somewhat greater chance of couples having another child if they had all or mostly boys. The second method that the authors used to examine the effect of gender preference on fertility, showed the proportion of women who had a child between 1970 and 1975 by the number and sex of children they already had in 1970 and their preference in that year for the sex of the next child. The results also support the idea that women aimed for a balanced sex composition after the first birth. If this is so, the authors suggested that subsequent fertility may be influenced by gender preferences, but in a low fertility population such as the United States, the effect is not large. Moreover, since the majority of U.S. women do not approve of using sex preselection techniques the development and use of such techniques would have little overall lasting impact on the sex ratio at birth or on the fertility in the United States.

The only study in the recent years which shows that the sex of children already born to couples has an effect on their subsequent fertility intentions is by Sloane and

Lee (1983). The authors argue that the results of a recent analysis which show a diminishing effect of sex of previous children on fertility intentions over time must remain tentative. In this context, they re-examined the data from national probability samples of women interviewed in the 1965 and 1970 National Fertility Studies (NFS) and compared them with that of the 1976 National Survey of Family Growth. The comparative analysis of 1965, 1970 and 1976 data revealed that among the women considered, an effect of the sex of their previous children on their intentions for additional births was observed at every parity, though it was different at each. The most significant finding, the authors noted is, "for women with two children, there has been no decline between 1965 and 1976 in the impact of having children of the same sex on intentions for further births. In every year, women with the same sex children were almost twice as likely as women with children of both sexes to intend another child rather than to intend to stop bearing children" (p. 366). The persistence of this effect among women with two children in particular, argues strongly for including sex of previous children as an independent variable in models of fertility intentions.

2.2 OTHER DEVELOPED COUNTRIES

The studies referred above mainly examined the importance of sex preference as a factor in the fertility dynamics

in American society. What about other developed societies ? Early evidence from these societies, though limited, suggested that such a preference was stronger and more definite than observed in the American society, and that this preference affected fertility behaviour. Among these early studies, those which supported the above position that sex preference was indeed a significant factor in fertility dynamics of societies were by Coombs et al., in Hungary (1975), Dalberg in Sweden, Gini and Giurovich in Italy (cited in Largey, 1972) and Thomas in England (1961). Of late, a number of studies have also examined the effects of sex preference on actual or intended fertility. However, these reports present conflicting results between and even within the same countries, in some cases. Among those studies within Europe represented by Sweden, Belgium, Great Britain and Hungary, there is no systematic evidence of sex preference on the couples' fertility behaviour (Coombs, 1973; Freedman and Coombs, 1974; Uddenberg et al., 1971).

2.3 DEVELOPING COUNTRIES

Within the less developed countries of the world, son preference dominates overwhelmingly. However, such a preference for sons is far from universal in developing countries and even where it exists, it is tempered by the desire for at least one daughter. Son preference is strong in Korea

(Park, 1978), Malaysia (Coombs and Fernandez, 1978), Taiwan (Chang et al., 1981, Freedman and Takeshita, 1969), Bangladesh (Ahmed, 1981) as well as in various Muslim nations (Khan and Sirageldin, 1977), while there is little or no preference for sons in Thailand (Kamnuasilpa et al., 1982; Peerasit et al., 1982a; 1982b) and in Indonesia (Gille and Pardoko, 1966). More importantly, appreciable effects of family composition on fertility behaviour have been discerned in only a few countries. For example, while analysing the data from a number of developing countries in this context, Freedman and Coombs (1974) observed that in Korea and Taiwan, and to a slightly lesser extent in India, there was a reasonably clear preference for sons. Similarly, there appeared to be some preference for sons on certain measures of fertility behaviour such as parity progression ratios and percentage of couples currently practicing contraception, in Mexico city and Ankara. Such a preference for sons is however not to the exclusion of daughters. On the other hand, in west Malaysia, the Philippines and Thailand there was no clear, systematic indication of preference for sons. The actual effect of son preference on fertility in Korea and Taiwan appears to have been documented in many other studies. The Korean studies seem to indicate that the attitude of son preference strongly affects fertility. Depending on the number of sons and sex sequence of existing children, significant differences were observed in the tendency of continuing family growth (Kim and Choi, 1981; Lee and Choe, 1982; Park, 1978;

Park, 1983). A higher rate of contraceptive use was seen among women who had sons rather than among those women with daughters (Arnold, 1985; Hahm and Koh, 1981). If strong son preference continue among Korean women, a decrease in Korean fertility cannot be expected in the immediate future (Choi and Park, 1980). However, a recent study based on a new measure of the effect of sex preference on fertility that avoids many of the problems inherent in other methods, reveals that if there was no sex preference in Korea, the rate of contraceptive use among currently married, fecund, non-pregnant women would rise by nine percentage points, indicating that son preference will have a dampening effect on the fertility decline in Korea, but it will not be a major obstacle to the achievement of Korea's fertility goals (Arnold, 1985). The Taiwan study, utilizing an island-wide sample of 5588 wives under 40 years of age, showed that underlying preferences for number and for sex of children, as measured by newly developed scales, were more predictive of fertility, fertility intentions and use of contraception. Underlying preferences indicated a persistent potential for large families and a clear preference for sons in the majority of the populations studied (Coombs and Sun, 1978; Coombs, 1979). Similar results have been reported recently by Chang et al., (1981) and Sun (1983) for Taiwan.

The Philippine study which made use of a nationwide survey and covered a sample of 6,243 currently married women in the age group 20-39, presented an analysis of family sex composition preferences as well as the relationship between actual family sex composition and desire for no additional children among Filipino women (Stinner and Mader, 1975). What emerged from the study was contrary to the findings by Freedman and Coombs (1974) from the same country's data. Stinner and Mader's (1975) study revealed that in the rural sectors of the population (Mindanao and Sulu) son preference was relatively strong. The Metropolis of Manila and some other sectors of rural population exhibited a balance or son - daughter equivalence. This has been mainly attributed to the difference in culture. The concentration of Muslims in Mindanao and Sulu is relatively very high. Further, this was attributed to its pioneer environment and the presumed utility of sons in such a milieu.

In Thailand the model family size is now two children with three children being the most commonly preferred number. Very few Thai women indicate a desired family size of fewer than two children or more than four. However, the desire for children of both sexes predisposes women (who would otherwise be content with two children), to continue childbearing if the first two children are of the same sex (Knodel and Prachuabmoh, 1976; Peerasit et al., 1982a; 1982b). Thai men also

expressed the desire for at least one child of each sex, although son preference among them was stronger than that among the women (Knodel and Prachuabmoh, 1976).

In Singapore, a society which aims to achieve zero population growth by 2030, and with an official motto of 'Girl or Boy, Two is Enough', there is a preference for having children of both sexes. Among families with the same number of children, those with children of only one sex are less likely to decide not to have more children. There is also a clear preference for sons, and among those with more than one child, the proportion deciding not to have another child is higher among those who have at least one son than among those who, though with more than one child, have daughters only (Goh, 1981). Similarly, in Hong Kong also son preference was seen to affect fertility behaviour namely child spacing and use of terminal method (Lowe, 1980). However, there is hardly any evidence of son preference among Japanese couples (Nohara and Ohtani, 1983).

The fact that sex preference for children varies both between and within cultures and this preference does affect fertility behaviour, is very much apparent from a recent comparative study of sex preference in 28 countries carried out under the auspices of WFS comparative studies (Cleland et al., 1983; United Nations, 1987). The approach was

essentially descriptive, the main aim being to identify the nature of preference and to examine the effects of family composition on reproductive attitude and behaviour. The general conclusions are consistent with the findings of previous studies. The analysis of WFS data revealed that there was little or no preference for sons in the sub-saharan, African and Latin American countries and in fact, a possibility of a preference for daughters among Caribbean women, while there was evidence of a very strong preference for sons in the Arab region. In Asia, the attitudinal data portrayed a strong preference for sons in Korea, Pakistan, Bangladesh and Nepal. Despite this, data from only a few countries suggested the effect of parental sex preferences on reproductive behaviour. Little or no effect of family composition on contraception or on fertility was observed for Jordan, Syria, Pakistan, Bangladesh and Nepal. Only in Korea, and to a lesser extent in Malaysia, was there a clear evidence that "a desire for sons sustains an appreciably higher level of fertility than would otherwise be the case", (Cleland, 1983). The two most populous countries of the world, China and India, were not represented in this study. The study, however, noted that the son preference inferred for Malaysia could be almost entirely attributed to the population of Chinese descent. In their study on sex preference, fertility and family planning in China, Arnold and Zhaoxing (1986), too concluded that Chinese couples exhibited a strong preference for at least one son, as measured by the

use of contraception, rate of abortion and acceptance and renouncement of one child certificate by couples who have no sons. However, despite this preference, its overall effect on fertility appears to be small.

In most countries, there is thus a tendency for son preference i.e. a woman is more likely to want another child if she has all daughters than if she has all sons. However, this pattern is not universal. There is a general tendency for a balance sex composition, or for a sex composition that approximates this balance, in certain countries.

2.4 INDIAN STUDIES

There are very few empirical works on the subject in India. The first serious effort in this direction was made by Robert Repetto (1972). After examining the data from North India he concluded that, among the general population, son preference and number of living sons were not factors that influenced actual fertility levels. The decisions on family size were more likely to be derived from economic considerations. The analysis was, however, based on the data from three separate small sample surveys conducted in the rural and urban areas of Uttar Pradesh and Delhi. Sarma and Jain (1974), after analysing the 1970 All India Survey data collected by Operations Research Group, Baroda reported that the number of living sons had very little impact on the

couples' fertility behaviour (parity progression ratio, use of contraception) in India. Making use of the same ORG data and other Indian survey data, Freedman and Coombs (1974) also reported that the evidence was not very strong with respect to the influence of number of living sons on fertility. However, the relationship of the present number of sons to subsequent fertility was marked, to some extent, among older women in India, after the third parity. Mukerji (1977) also found no meaningful relationship between sex composition of children after a certain parity and the proportion going for the next birth, in his examination of two sets of survey data, the first from the same All India Survey conducted by ORG, Baroda, in 1970 and the second collected by the National Sample Survey (NSS, India) in 1961. On the other hand, Lahiri (1975) noted from the NSS data that in urban India the desire for an additional child fell quite rapidly as the number of sons increased. The desire for an additional child was twice or even more among persons with three or more daughters than among those with the same number of sons. The increase in willingness to use contraceptive devices with the number of living sons, as noted by Morrison (1957), further supports the foregoing position. Likewise, Pohlman (1967, p. 274), reported "among Indian males having vasectomies, the proportion with less than two daughters is significantly larger than the proportion with less than two sons". Further, many published

and unpublished Indian data show that acceptance of certain forms of contraception, especially those like vasectomy or tubectomy, which are intended to terminate fertility, are much more popular among couples whose living children included a disproportionate number of sons (Gopalakrishna, 1981; Poffenberger, 1967; Vig, 1981). Thus the studies on the effect of sex preference on fertility in India do not seem to show any consistent results and have been rather inconclusive.

2.5 METHODOLOGICAL ISSUES

As noted from the earlier discussion, a number of studies have been undertaken to study the relationship between sex preference and fertility in the United States and many other countries of the world. There are two distinct lines of work that bear on the likely effects of sex preference or sex predetermination on fertility. One research style asks people about their preference for children of each sex. Depending on the responses, the likely impact of sex preference on fertility is assessed. The second approach classifies couples according to their parity at the time of interview and the sex of children already born. When the dependent variable is Parity Progression Ratio (PPR), the difference in PPRs between couples with children of the same and those with different sex is assumed to measure the effect of sex of child on actual fertility. A large number of studies compute intended family

size as an alternative dependent variable and compare the mean number of children intended, or the percentage of couples who say they intend to have more children, across the sex of child classification. The differences reveal the likely effect of the gender of child on intended fertility. These measures of sex preferences are indirect and based on statistical aggregations of single behaviours or attitudes of many couples. Their accuracy depends on the validity of the assumption that sex preference within the population that is being studied is relatively homogeneous and the existence of sex preference acts only to increase the desire to have more children, not to decrease it (McClelland, 1979). The observed aggregate association between family composition and subsequent fertility behaviour may not capture the full extent of individual family effects if individual preferences vary and their effects are mutually cancelling at the aggregate level. Further, it is not true for every population that families with an undesired composition will necessarily be more likely to continue childbearing than those who have achieved a more desired composition. Fear of obtaining an even less desirable balance of boys and girls with the birth of the next child or as well as overall size considerations may inhibit the former group from continuing child bearing. Thus an aggregate analysis may underestimate the effects of sex preference and cannot be used to make inferences about the effects of sex preference on individual fertility decisions.

As an alternative to the aggregate behaviour measures, Coombs et al. (1975) have suggested individual measures of size and sex preference, based on developments in psychological measurement in unfolding theory and additive conjoint measurement. This model (Coombs' Scales) distangles size and sex bias, giving independent measures of each. The technique was tested for theoretical relevance and field feasibility in several cultures. Taiwan was the first developing culture in which theoretical testing was carried out and also the first in which the new method was used in a large-scale cross-sectional survey (Coombs and Sun, 1978). These measures are designed to describe only the qualitative nature of the individual's sex preference, but they cannot be used to show that such preferences necessarily have any impact on fertility decisions. Later, McClelland (1979) suggested a new measure based on both psychological and behavioural measures of sex preference, to yield quantative estimates of the impact of sex preference on fertility. The psychological measure is a rank ordering of family composition preferences (Coombs et al., 1975) and the behavioural measure is the respondent's intended fertility stopping rule (the set of family composition at which no additional children would be desired). The technique was later demonstrated amongst 172 US college students to test for theoretical relevance and field feasibility (Widmer et al., 1981). Although the measure suggested by McClelland (1979) overcomes the basic

logical problems stemming from the heterogenity of sex preference and the riskiness of fertility decisions which parity progression ratio analyses and other behavioural measures of sex preference ignore, the practicability of the new measure is still to be seen in a large scale survey and in developing countries. Further, the method is divorced from reality because it measures attitudes towards hypothetical family compositions rather than actual family situations. Moreover, McClelland's model estimates the impact of sex preference on intended fertility. Such a measure cannot determine if sex preference influences actual fertility.

McClelland (1983) also presented a decision-making model for considering the effects of sex preference on fertility and evaluates currently available methods for measuring sex preferences. This model of fertility decision making suggested three criteria for evaluating measures of sex preferences : (a) sensitivity to the multiple determinants of fertility decisions; (b) sensitivity to individual differences in values, beliefs and preferences and (c) ability to discriminate between decisions that are influenced by sex preferences and those that are not. These can be behavioural, attitudinal or behavioural intention measures. Behavioural measures have the advantage of being based on real behaviour and can often be calculated from aggregate data sets compiled for other purposes. However, they misrepresent the true effects of sex preferences on fertility

whenever either size or sex preferences are heterogeneous in a population or misbeliefs about the probabilities of the sex of the next birth are common. Attitudinal measures can determine whether sex preference exists and can identify the pattern of these preferences. However, they cannot indicate if sex preferences affect fertility. Behavioural intention measures assess both the existence and pattern of sex preferences and although they cannot determine if sex preferences influence fertility, they can indicate whether preferences affect fertility intentions. An unresolved problem concerns the inability of all the three measures to provide a quantitative estimate of the effect of sex selection on birth order ratios, fertility rates, or the sex ratio.

Recently, Arnold (1985) proposed a new measure of sex preference which answers the question "what would happen to fertility if all sex preferences were to disappear suddenly?" The measure assumes that all couples at each parity will act in the same way as those at the same parity who are currently most satisfied with the sex composition of their children. This measure has the advantage of being superior to the previous measures because : (1) it is flexible and can handle any type of sex preference; (2) it does not assume a linear relationship between sex preference and fertility; (3) it can be used with a variety of behavioural and attitudinal measures related to fertility and family planning; (4) the data necessary for

calculation are readily available for a wide range of countries; (5) it can quantify the overall effect of sex preference on fertility. The measure, however, has some limitations. Some grouping of the data may be necessary, especially at higher parities. This may overstate the effect of sex preference. The measure might also overstate the effect of sex preference if a certain composition of children is so desirable that couples would stop at that point even if they had not reached their total desired family size. There are thus still measurement problems and there is no unambiguous method for assessing the impact of sex preference on fertility.

Heer and Smith (1968) have used computer simulation to demonstrate that son preference as reflected in son survivorship motivation, may keep family size high in areas where mortality is high. Later, May and Heer (1968) adopted the original Heer and Smith's simulation model and inputs for India to see whether son survivorship motivation required large family sizes in India. They observed that son survivorship is a commonly expressed motive for having a large family. Couples have many children in order to be sure that they will have at least one son who will survive them in their old age. Consequently, the desire for sons may at times be as significant as the ignorance of family planning methods in the fertility dynamics of Indian families.

Applied probability theory has also been used to study

the problem. Sheps (1963) has shown that if the probability of having a boy is the same for all individuals, sex preference will not affect the sex ratio in the population, but if the sex bias is stable and the couple is fertile the expected family size will increase with increasing preference for the sex over the other. Sheps used the well-known results of the coin-tossing experiment to show the effect of sex preference on the completed size by taking the reproductive life of a woman as infinite. Extending the work of Sheps, Mitra (1970) has derived expressions where the strategy is to have a minimum of b boys and g girls in no more than k trials. Sheps used the strategy of at least b boys and g girls subject to the condition that $b+g \leqslant k$ and further the couples will, in any case, have exactly k children regardless of their distribution by sex. In these works, mortality among children born was not considered. Krishnamoorthy (1974) derived probability expression by introducing mortality in it. This, therefore, measures the combined effect of sex preference and child mortality on family size.

Sheps (1963) and Mitra (1970) assumed in their models that the reproductive life of a woman as infinite. However, Pathak (1973) observed that it is not always possible for a couple to achieve the desired family size because (i) the duration of a woman's fertile period is limited, (ii) the conceptions are, to some extent, random events, (iii) a part of the effective marital duration of a woman is wasted owing

to gestation and amenorrhea periods following every conception and (iv) a couple may stop voluntarily - this may be because of the number and sex composition of the born children and a feeling of the impossibility of achieving the desired composition. Within this consideration he proposed a model to study the variation in the family size attained in a given time under different parental preferences regarding the sex of children. Later, following a similar approach, Pathak and Saxena (1979) formulated a model to study the variation in the time required for attaining such desired size and sex composition of the family (by taking marital duration of the couple as finite). Making use of Pathak's result (1973), Waheed (1973) derived expected family size for a couple under varying sex preference rules with the help of some patterns of parity distribution obtained either through the application of a discrete model or through empirical studies. He observed that the difference in the average family size under different sex preference rules were quite small for all patterns of parity distribution. Keyfitz (1977) provides quantitative estimates of the possible effect of sex predetermination in lowering fertility. A number of other studies (Goodman, 1961; Hatzold, 1974; McDonald, 1973) also analysed the magnitude of this effect. When parents wish to have at least one boy, or at least one boy and one girl etc., and keep having children until they attain their wish, the family size is shown to be higher than it would be if they stop at one or two

children irrespective of sex. These studies have generally assumed that a couple has a preference for a fixed minimum number of boys and a fixed minimum number of girls to calculate the expected family size. The fixed minimum model also implies that sex preference can only increase, not decrease fertility (McClelland, 1983). The accuracy of the results depends on the validity of the assumptions in a population under study, although these studies are useful for estimating the maximum possible impact of sex preference on family size.

The likely impact of sex preference on the birth rate and other current fertility indices, through probability mechanism or simulation models, however, is not known and has not been assessed by any of the previous studies, except for the model developed by Talwar (1975). This model is not flexible enough to study the effects of sex preference on some refined current fertility indices. Nevertheless, Talwar's study attempted to assess, by assuming the sex of a live birth to be a binomial event, the contribution of desires for specific sex compositions on the level of birth rate in a population. Data from India were utilized in order to quantify the contribution to the birth rate of various desired compositions in a family, and the level of birth rate if specific reproductive patterns were adopted.

The study noted that the birth rate would fall from 40 to 22 births per 1000 population if couples stop reproduction

after having three children. Even if couples who did not get their desired sex composition, continued to reproduce beyond three children, the birth rate would go to a maximum of 26 births per 1000 population (under a pattern where family planning is adopted by those who have at least one male and one female child surviving upto five years of age). It was therefore concluded by the author that the birth rate in India could be greatly reduced by an effective campaign of limiting family size to three, even if such a compaign were accepted by only those couples who had achieved their desired family composition.

2.6 OVERVIEW

The review has highlighted certain salient points related to sex preference and its effects on fertility behaviour, based on studies from developed as well as from the third world countries. A major part of the evidence from the developed countries does not indicate preference of one sex over the other, in fact, it has revealed a preference for a balanced sex composition. The likely dominance of family size over family composition has tended to reduce the impact of sex preference on fertility behaviour in these low fertility countries. On the other hand, data from the majority of the developing countries show a clear son preference, although there are countries which indicate a balanced sex preference.

Further, it is interesting to note that even in countries where son preference exists, such a preference is not to the exclusion of daughters. In some countries, couples exhibit little or no son preference, and there are even a few instances in which a preference for daughters has been documented. Despite the high levels of son preference in many of the developing countries, particularly in the region of Asia, appreciable effects of family composition on fertility behaviour have been noticed in only a few countries.

In case of India also, which is known as a son bias society, research has failed to show conclusive evidence regarding the impact of such a preference on fertility. The sparse research evidence indicating this was essentially gathered during the sixties and early seventies, when no clear evidence of rationalisation, particularly in terms of contraceptive use, was noticed among Indian couples. The use of contraception was low even among couples who had achieved their desired sex composition. Moreover, prevalence of large families increased the probability of satisfying the sex preference. This might have weakened the effects of sex preference on fertility behaviour. With reproduction increasingly under voluntary control, attitudes and preferences may play an important role in determing actual fertility.

The review has also highlighted the inadequacy of techniques for measuring the impact of sex preference on fertility. The accuracy of the traditional measures depended on the validity of the assumptions that sex preferences within a population being studied were relatively homogenous and the existence of sex preference acts only to increase fertility not to decrease it. Subsequently, more detailed and greatly improved measures of size and gender preferences were developed by various researchers. There are still measurement problems and there is no unambiguous method for assessing the impact of sex preference on fertility.

Finally, research evidence on the implications of allowing couples to attain their desired sex composition on their completed family size has been examined. In this regard, various models based on probability theory have been analysed. It was generally shown that if the sex bias is stable and the couple is fertile, the expected family size would increase with increasing preference for one sex over the other. Although these models are useful to estimate the maximum possible impact of sex preference on family size, they are not particularly useful to study the effect of such a preference on the national birth rate and other current fertility indices. It is needless to emphasize the importance of developing such models in framing national population policies. The present research is an attempt in this direction.