*Demography India*
*Vol. 24, No. 2 (1995),* pp. 275-290

**T. Rajaretnam***

# Family Size **Desire,** Sex Preference, Socio-Economic Condition and Contraceptive Use in Rural Karnataka, India

## Introduction

INDIA is the first country in the world to initiate an officially sponsored family planning programme as early as in 1951. However, the implementation of the programme was very slow until the late 1960s. With the creation of a separate Department of family planning in the mid-1960s, greater emphasis was attached to this programme, and since then contraceptive use rates increased steadily. For example, at the end of the first 20 years of the programme (i.e., in 1971), the contraceptive prevalence rate (CPR) for all India was just 10 per cent but by the end of the next 20 years (i.e., in 1991), the CPR increased to 43 per cent. Among the major states of India, however, the CPR for 1991 varied between 73 per cent in Punjab and 25 per cent in Bihar. For Karnataka, it was 45 per cent; varying between a high of 57 per cent in Hassan district and a low of 30 per cent in Gulbarga district (Department of Family Welfare, Government of India 1991; 1992).

A number of social, economic, demographic and cultural factors, besides programme factors, contribute to the level of contraceptive use rates. By analysing district level data on the family planning acceptors in India, Jolly (1986) found that among different socio-economic variables, female literacy was shown to have had the largest impact on family planning acceptance. Similarly, based on multiple regression analysis of family planning statistics at state level, Shariff (1989) concluded that substantial improvements in education and decentralisation of the family planning strategy are a few interventions to increase contraceptive use rates. The education of woman is found to be one of the most important factors in many other countries as well. Ullah and Chakraborthy (1993) found in Bangladesh that women with secondary education are almost three times as likely to practice contraception as those who had no education. The World Fertility Survey which was conducted in a number of developing countries also found that education is closely associated with contraceptive use at national level (International Statistical Institute, Voorburg 1984).

*Population Research Centre, JSS Institute of Economic Research, Vidyagiri, Dharwad-580 004, India.

However, Visaria (1993) found in Gujarat that the relationship between education and contraceptive use is weak when controlled for the number of living children. Some studies have also arrived at the conclusion that in India caste is a proximate determinant of family planning practice especially in the rural areas (Reddy 1984; Badari 1993). But, a multivariate analysis of Maharashtra data obtained in 1980, revealed that number of living children and number of sons are much more closely associated with contraceptive use than education and caste (Srikantan *et al.* 1992). Raju *et al.* (1994) using data from Karnataka and Sinha and Kanitkar (1994) using data from Orissa, concluded that socio-economic development-related variables are not important in explaining the differences in family planning acceptance especially sterilization methods.

The relationship of family size desire and sex preference on contraceptive use has been highlighted by many studies conducted in different parts of India especially in the rural areas. Koenig and Foo (1992), based on a study in rural Uttar Pradesh, concluded that the patriarchal systems encouraged larger family sizes by providing special incentives among women for bearing a minimum number of sons. The consequence is the sufficiently high reproductive goals as to postpone or preclude the need for using contraception among couples. In Bihar and Rajasthan also, the impact of number of surviving sons on contraceptive use rates is found to be one of the highest (Kanitkar and Murthy 1983). In south India, studies have shown that couples prefer to have at least two sons and one daughter before initiating contraceptive use (Rajaretnam and Deshpande 1994b). However, in some parts of this region the parents are inclined to stop after a certain number of children even if all are females (Thiruvenkitasamy 1992). Jejeebhoy and Kulkarni (1989) also arrived at similar conclusions based on Maharashtra data. They argue that "recognition of child costs may be a necessary and sufficient condition for the adoption of contraception despite the fact that parents continued to value and rely on sons for their old age and other supports." But, often, such decisions are taken only after having had 4 or 5 children. Studies have also found that mothers who are assured of survival of their children have accepted family planning especially sterilisation more often than others (Prakasam *et al* \ 993; Lakshmamma and Reddy 1991; Sastry 1988).

Though many of these studies have highlighted the importance of family size desires, sex preference, child loss experience, and socio-economic condition, besides programme factors influencing contraceptive use, the conclusions of these studies are based mainly on bivariate analysis of the data, though a few studies have also attempted multiple regression analysis. Further, even the multiple regression technique has serious limitations for the analysis of determinants of contraceptive use due to a variety of reasons. Importantly, when the dependent variable is dichotomous (here 'use' or 'nonuse' of contraception), the predicted probabilities obtained from the multiple regression analysis need not lie between 0 and 1, and the assumptions necessary for hypothesis testing are violated (Retherford and Choe 1993). In this paper, an attempt has been made to investigate the importance of family size desires, sex preference, insurance for child loss and socio-economic factors on contraceptive use among couples by applying another multivariate technique called logistic regression (often called logit regression) which is considered to be more appropriate than the multiple regression technique for the analysis of determinants of contraceptive use.

**Data and Method**

This paper makes use of the data obtained in 3 cross-sectional sample surveys conducted during 1987-90 on currently married women (CMWs) of reproductive age (15-44) in the rural areas of 4* districts of Karnataka state. The districts covered (with the year of survey in parentheses) are: Bijapur (1987), Dharwad (1989), and Belgaum and Gulbarga (1990). The study designs differed somewhat by survey, but the samples largely represented the rural areas of these districts. In Dharwad district, the survey covered all the 35 villages of four mandal panchayats (local government bodies) in two taluks (subdistricts) located 150 kms apart; in the other districts, a number of primary health centres (PHCs) representing different strata or locations, and from them a number of subcentres (and all the villages covered by them) were selected. From each of these selected villages, a representative sample of households were selected, and all the CMWs in these households were interviewed depending on their availability. The numbers of CMWs included in this analysis are 779 for Bijapur, 1117 for Dharwad, 466 for Belgaum and 342 for Gulbarga district. It is to be noted that studies often consider only fecund, non-pregnant women for contraceptive analysis. In this study, however, we have considered all CMWs in the age group 15-44 as sterilization is the predominant method of contraception in the study areas and couples accept it for limiting family size rather than for spacing births.

In logistic regression, the parameters of the model are estimated using the maximum likelihood method and the significance test of the beta coefficients is often based on the Wald statistic which has chi-square distribution with degrees of freedom one or one less than the number of categories (Norusis 1990). The variables selection has been made through stepwise regression method using both forward selection and backward elimination procedures. The cutoff probability values used for entering *a* variable into the model (i.e. for forward selection) is 0.05 and for removing a variable from the model (i.e. for backward elimination) is 0.10. The odds-ratio is *e* raised to the power the coefficient, the factor by which the odds (here 'use' compared to 'nonuse' of contraception) change while the independent variable increases by one unit, when all other factors remaining constant. The odds-ratio can also be estimated, especially when interaction terms are present, as a ratio of the estimated odd of the particular category to that of the reference category.

**Variables**

It is assumed that in the rural areas of India, three components viz., cultural context, socio-economic condition and the programme efforts are the three major components determining contraceptive use among couples. However, under cultural context, our interest is not on the specific factors but on such cultural attributes as family size desire, sex preference and insurance for child loss, measured in terms of their number of child losses, respectively. In the study areas, as elsewhere in rural India, sterilization is the predominant method of contraception. As per our data, the contraceptive use in the study areas was 39 per cent for all methods and less than 3 per cent for all reversible methods. That means, couples

in the study areas accepted contraception for limiting their family size rather than for spacing the birth of their children. In fact demand for reversible methods (not necessarily desire for childspacing) is almost absent (Rajaretnam and Deshpande 1994a). It has been observed in a number of living children, contraceptive use increases as the number of male living chi Idren increases except when all are males (Rajaretnam and Deshpande 1994b; Srikantan *et al.* 1992; Das 1987). This shows that within the achieved family size, the sex distribution of the children is also important to the couples' decision to use contraception. Further, in a country like India where the infant and child mortality levels are still high, child loss experience influences contraceptive use at least in two ways. One, women who experience child loss are less likely to use contraception at least until the lost child is replaced. Two, mothers who experience child loss may tend to have a family size higher than their desired size so as to ensure the survival of a minimum number of their children to adulthood, and hence they may either avoid or delay use of contraception. That is, women who experience child loss may not only ensure replacement of the lost children but also tend to have a few more children before accepting a contraceptive method especially sterilization.

The relationship between family size and contraceptive use is not linear but rather curvilinear. So, the number of living children and its square term are included in the model to dissect the effect of number of living children on contraceptive use. It is to be noted that the square term will tend to capture most of the curvilinear pattern of the relationship (see Retherford and Choe 1993; Little 1980). Similarly, the number of child loss and its square term, and an interaction term, viz., number of child loss by number of living children, are included in the model to study the effect of child loss on contraceptive use. In order to study the effect of the sex composition of living children on contraceptive use, a number of combinations of male-female distribution of living children were considered. After a preliminary analysis of various combinations of male and female living children, the number of male living children, its square term, and whether the living children are all males (1 if yes and 0 otherwise) and this term by total number of living children are included. In order to see whether contraceptive use differs further if all the living children are females, two more variables, namely, whether the living children are all females (1 if yes and 0 otherwise) and this term by total number of living children, are also included in the model for further examination.

The socio-economic variables included, depending on data availability and their relevance are caste, type of family, type of house, source of light (electrification of house), size of landholding, household income, age at (effective) marriage of wife, and education and occupation of both husband and wife. A number of interaction terms are also included.

In addition to these variables, a few more variables are also included to control for the extraneous factors. The family planning programme in India has witnessed substantial improvements in the service facilities during the past two decades or so. As a result, couples are now better informed especially of female sterilization methods and more and more couples are coming forward to accept them. Further, women now tend to show a desire for lesser family size and a favourable attitude towards accepting family planning methods than before (Operations Research Group, Baroda 1990). With a view to capturing at least part of these cohort effects, current age of woman and an interaction term viz., current age by number

of living children have been included. Furthermore, as we utilize the data obtained from different studies conducted in different districts and at different time periods (but within a short span of three years), we have included the study district as a factor to control for the design and regional effects. However, due to paucity of data we could not consider more sensitive indicators of programme efforts in this analysis.

**Analysis**

The analysis has been done in two steps. In the first step, a logistic regression with contraceptive use as the response variable and all variables except the socio-economic variables as predictor variables is fitted to the data using both forward selection and backward elimination procedures. The logistic regression output show that study district, number of living children, the square term of number of living children, number of child loss, child loss by number of living children, current age of woman, and current age by number of living children are significantly (at least at 0.1 probability level) related to contraceptive use. With respect to sex composition of children, number of male living children and its square term, and the dummy for whether the living children are all males are found to be significantly related to contraceptive use. The output also show that, the observed contraceptive use status is correctly predicted (with at least 0.5 probability) in respect of 75 per cent of the cases. Further, the model chi-square and goodness-of-fit statistics show that the model is highly significant at 0.01 probability level in explaining contraceptive use among couples. However, the chi-square value for the -2 log likelihood show that the model is far from the 'perfect' model. That is, all the selected variables are significantly related to contraceptive use but they all together explained only a part of the total variation in the contraceptive use.

Secondly, the socio-economic variables are added to the list of significant variables *obtained from the above run and the model is fitted to the data using both forward selection* and backward elimination procedures. In both the procedures, in respect of a few variables, their interaction effects are significant but not their main effects. In order to facilitate the estimation of the effect of such variables on contraceptive use, new categorical variables are formed by combining the interacted variables; they are caste by landholding, caste by age at marriage, and husband's education by wife's education. This model when fitted to the data show that in addition to the significant variables of the initial run, caste by landholding, family type, husband-wife education level, and occupation of wife are significantly related to contraceptive use. On the other hand, age at marriage of woman, occupation of husband and electrification of house are not significantly related to contraceptive use. As in the above model, the model chi-square and the goodness-of-fit statistics are significant but the chi-square for the -2 log likelihood show that the combined model is also far from the 'perfect' model. The model could correctly predict the use status for only 76 per cent of the cases.

**Results**

Now we discuss the result of the outcome of the final model. Table 1 gives the output of the final model, which includes the variables and categories, and the beta coefficients and

their significant levels. Table 2 presents the unadjusted and adjusted CPRs and the odds-ratios. As per the survey, the contraceptive prevalence rate (CPR) for the 15-44 age group is 45 per cent in Belgaum district, 39 per cent in Bijapur district, 37 per cent in Dharwad district and only 33 per cent in Gulbarga district, After adjusted for all other factors in the model, the CPR increases by more than 5 per centage points (to 51 per cent) for Belgaum district, remains at the same level (37 per cent) for Dharwad district, but reduces by one per centage point (to 32 per cent) for Gulbarga district and by about 2.4 per centage points (to 36 percent) for Bijapur district. That is, after removing the effect of other factors in the model, the CPR difference between districts increases rather than decreasing. The odds-ratios show that the likelihood of the couples of Belgaum district using contraception is more than twice as high as the likelihood of the couples of Gulbarga district. For Bijapur and Dharwad districts, the likelihood is 20 to 27 percent as higher as the likelihood for Gulbarga district, although the CPR estimates refer to a later period for Gulbarga district.

TABLE 1: THE BETA COEFFICIENTS (BETA), THEIR STANDARD ERRORS (SE), WALD STATISTICS (WALD), DEGREES OF FREEDOM (DF) AND SIGNIFICANT LEVEL (SIG), OBTAINED FROM LOGIT REGRESSION ANALYSIS

| *Variable* | *Beta* | *SE* | *Wald* | *DF* | *Sig.* |
|---|---|---|---|---|---|
| District | | | 22.62 | 3 | 0.000 |
| Bijapur | 0.194 | 0.169 | 1.32 | 1 | 0.251 |
| Dhanvad | 0.242 | 0.162 | 2.24 | 1 | 0.135 |
| Belgaum | 0.788 | 0.186 | 17.99 | 1 | 0.000 |
| LC | 0.870 | 0.178 | 23.83 | 1 | 0.000 |
| LC Square | -0.098 | 0.016 | 38.81 | 1 | 0.000 |
| MLC | 1.199 | 0.139 | 74.08 | 1 | 0.000 |
| MLC Square | -0.141 | 0.025 | 31.05 | 1 | 0.000 |
| All LC Male | -0.385 | 0.170 | 5.11 | 1 | 0.024 |
| Child Loss | 0.201 | 0.120 | 2.79 | 1 | 0.095 |
| *LC x Child Loss* | *-0.101* | 0.028 | *12.97* | 1 | 0.000 |
| Current Age | | | 29.12 | 5 | 0.000 |
| 15-19 | -4.504 | 1.209 | 13.89 | 1 | 0.000 |
| 20-24 | -1.184 | 0.548 | 4.67 | 1 | 0.031 |
| 25-29 | 0.040 | 0.488 | 0.01 | 1 | 0.934 |
| 30-34 | 0.295 | 0.488 | 0.36 | 1 | 0.546 |
| 35-39 | 0.440 | 0.491 | 0.80 | 1 | 0.371 |
| LC x Current Age | | | 13.63 | 5 | 0.018 |
| LC x 15-19 | 1.733 | 0.551 | 9.88 | 1 | 0.002 |
| LC x 20-24 | 0.232 | 0.153 | 2.31 | 1 | 0.129 |
| LC x 25-29 | -0.035 | 0.114 | 0.10 | 1 | 0.756 |
| LC x 30-34 | 0.000 | 0.102 | 0.00 | 1 | 0.998 |
| LC x 35-39 | -0.017 | 0.095 | 0.03 | 1 | 0.855 |
| Caste & Landholding | | | 25.71 | 8 | 0.001 |
| *Caste-Hindus with:* | | | | | |
| Up to 10 acres | -0.076 | 0.151 | 0.26 | 1 | 0.614 |
| Above 10 acres | -0.098 | 0.188 | 0.27 | 1 | 0.604 |

| | | | | | |
|---|---|---|---|---|---|
| *SC/ST with:* | | | | | |
| No land | -0.319 | 0.179 | 3.18 | 1 | 0.074 |
| Up to 10 acres | -0.803 | 0.202 | 15.82 | 1 | 0.000 |
| Above 10 acres | -1.088 | 0.412 | 6.97 | 1 | 0.008 |
| *Non-Hindus with:* | | | | | |
| No land | 0.051 | 0.295 | 0.03 | 1 | 0.863 |
| Up to 10 acres | -0.087 | 0.322 | 0.07 | 1 | 0.787 |
| Above 10 acres | 0.068 | 0.503 | 0.02 | 1 | 0.893 |
| Education of Wife and Husband | | | 31.23 | 7 | 0.000 |
| *wife illiterate & husband:* | | | | | |
| l-4std | 0.089 | 0.145 | 0.38 | 1 | 0.540 |
| 5-7 std | 0.426 | 0.170 | 6.29 | 1 | 0.012 |
| 8+ std | 0.308 | 0.217 | 2.01 | 1 | 0.156 |
| *Wife literate and husband:* | | | | | |
| Illiterate | 0.144 | 0.291 | 0.25 | 1 | 0.621 |
| 1-4 std | 0.214 | 0.316 | 0.46 | 1 | 0.499 |
| 5-7 std | 0.559 | 0.253 | 4.91 | 1 | 0.027 |
| 8+std | 1.066 | 0.207 | 26.46 | 1 | 0.000 |
| Occupation of Wife | | | 9.95 | 3 | 0.019 |
| Housewife | 0.157 | 0.186 | 0.71 | 1 | 0.399 |
| Cultivator | 0.017 | 0.194 | 0.01 | 1 | 0.929 |
| Labourer | 0.408 | 0.174 | 5.53 | 1 | 0.019 |
| Type of Family | | | 6.13 | 3 | 0.106 |
| Extended nuclear | -0.294 | 0.133 | 4.88 | 1 | 0.027 |
| Two couples | -0.185 | 0.145 | 1.64 | 1 | 0.201 |
| Three + couples | -0.272 | 0.173 | 2.47 | 1 | 0.116 |
| Constant | -3.370 | 0.555 | 36.84 | 1 | 0.000 |

LC-Number of living children, MLC-number of male living children
*Note:* The reference categories are as indicated in Table 2.
A 'Sig' value of 0.01 or less means that the corresponding 'Beta' coefficient is highly significant, while a value greater than 0.05 means that the coefficient is not statistically significant.

The age pattern of contraceptive use shows that the unadjusted CPR progressively increases from a low of 3 percent for women of 15-19 age group to 58 percent for women of 30-34 age group, remains at this level for women of 35-39 age group, and decreases to 48 percent for women of 40-44 age group. After adjusted for all other factors in the model, except for the 15-19 age group, the CPR difference between age groups substantially reduces but the pattern of relationship remains the same. The adjusted CPR is 26 percent for the women of 20-24 age group, 46 percent for the women of 35-39 age group and only 37 percent for the women of 40-44 age group. However, the adjusted CPR for the women of 15-19 age group is as high as 52 per cent. The lower CPR for women of 40-44 age group is not unexpected because many women in this age group believe that they are no longer at the risk of becoming pregnant and hence not using contraception. For example, in Bijapur district, over three-fourths of the non-acceptors in this age group reported that they have attained sterility/menopause and hence they did not see any need of using contraception (Rajaretnam and Patil 1990). Also, when these women were young, the family planning programme was

TABLE 2: UNADJUSTED AND ADJUSTED CONTRACEPTIVE PREVALENCE RATES, AND ODDS-RATIOS

| *Variable/ Category* | *No. of women* | *Unadj. CPR* | *Adj. CPR* | *Odds-ratio* |
|---|---|---|---|---|
| All women | 2717 | 38.6 | 38.6 | NA |
| District | | | | |
| Bijapur | 782 | 38.7 | 36.3 | 1.21 |
| Dharwad | 1120 | 37.3 | 37.4 | 1.27 |
| Belgaum | 471 | 45.2 | 50.8 | 2.20 |
| Gulbarga* | 344 | 33.4 | 32.0 | 1.00 |
| Current Age | | | | |
| 15-19 | 377 | 3.2 | 51.8 | 1.82 |
| 20-24 | 588 | 22.1 | 26.3 | 0.61 |
| 25-29 | 629 | 44.8 | 35.6 | 0.94 |
| 30-34 | 462 | 58.0 | 44.2 | 1.34 |
| 35-39 | 374 | 58.8 | 46.5 | 1.48 |
| 40-44* | 287 | 47.7 | 37.1 | 1.00 |
| Living Children | | | | |
| 0 | 331 | 0.9 | 8.1 | 0.17 |
| 1 | 396 | 6.3 | 19.3 | 0.45 |
| 2@ | 461 | 30.4 | 34.7 | 1.00 |
| 3 | 545 | 56.5 | 49.3 | 1.83 |
| 4 | 428 | 63.3 | 59.4 | 2.75 |
| 5 | 261 | 60.2 | 64.4 | 3.40 |
| 6 | 144 | 55.6 | 64.8 | 3.46 |
| 7 | 80 | 52.5 | 60.6 | 2.89 |
| 8 | 71 | 32.4 | 51.4 | 1.99 |
| Religion/Caste | | | | |
| Caste-Hindus@ | 1883 | 40.8 | 41.6 | 1.00 |
| SC/ST | 648 | 31.5 | 27.2 | 0.52 |
| Non-Hindus | 186 | 40.9 | 42.9 | 1.05 |
| Landholding (in acres) | | | | |
| No land@ | 947 | 40.8 | 41.2 | 1.00 |
| Up to 10 acres | 1143 | 38.1 | 37.0 | 0.84 |
| Above 10 acres | 627 | 36.2 | 35.3 | 0.78 |
| Caste and Landholding | | | | |
| *Caste-Hindus with:* | | | | |
| No land* | 539 | 43.0 | 43.0 | 1.00 |
| Up to 10 acres | 806 | 40.9 | 41.1 | 0.93 |
| Above 10 acres | 538 | 38.5 | 40.6 | 0.91 |
| *SC/ST with:* | | | | |
| No land | 331 | 36.3 | 35.4 | 0.73 |
| Up to 10 acres | 260 | 28.1 | 25.2 | 0.45 |
| above 10 acres | 57 | 19.3 | 20.2 | 0.34 |

| | | | | |
|---|---|---|---|---|
| *Non-Hindus with:* | | | | |
| No land | 77 | 44.2 | 44.2 | 1.05 |
| Up to 10 acres | 77 | 42.9 | 40.9 | 0.92 |
| Above 10 acres | 32 | 28.1 | 44.6 | 1.07 |
| Type of Family | | | | |
| Strictly nuclear* | 1201 | 50.2 | 41.9 | 1.00 |
| Extended nuclear | 519 | 35.3 | 35.0 | 0.75 |
| Two couples | 545 | 28.4 | 37.5 | 0.83 |
| Three+ couples | 452 | 23.9 | 35.5 | 0.76 |
| Education of Wife | | | | |
| Illiterate | 2193 | 37.7 | 36.7 | 1.00 |
| Literate | 524 | 42.4 | 42.2 | 1.26 |
| Education of Husband | | | | |
| Illiterate® | 1458 | 34.7 | 34.6 | 1.00 |
| l-4std | 467 | 39.8 | 36.5 | 1.09 |
| 5-7 std | 397 | 47.1 | 44.7 | 1.53 |
| 8+ std | 395 | 43.0 | 44.7 | 1.53 |
| Education of Wife and Husband | | | | |
| *wife illiterate and husband* | | | | |
| Illiterate* | 1366 | 35.0 | 33.9 | .00. |
| 1-4 std | 395 | 39.2 | 36.0 | .09 |
| 5-7 std | 272 | 48.9 | 44.0 | .53 |
| 8+std | 160 | 38.1 | 41.1 | .36 |
| *wife literate and husband* | | | | |
| Illiterate | 92 | 30.4 | 37.2 | .15 |
| 1-4 std | 72 | 43.1 | 38.9 | .24 |
| 5-7 std | 125 | 43.2 | 47.3 | .75 |
| 8+std | 235 | 46.4 | 59.9 | 2.90 |
| Occupation of Wife | | | | |
| Housewife | 714 | 39.9 | 37.9 | 1.17 |
| Cultivator | 781 | 36.0 | 34.7 | 1.02 |
| Labourer | 941 | 39.9 | 43.9 | 1.50 |
| Other* | 281 | 38.4 | 34.3 | 1.00 |

* Reference category in the model.
@ Treated as reference category for tabulation purposes.
*Note:* The unadjusted CPRs obtained from bivariate logistic regression and that obtained from the survey estimate are almost the same especially for the categorical variables and hence the unadjusted CPR obtained from the survey estimate are presented in the table.

not so intensive as it is today. At the same time, the very high adjusted CPR for the 15-19 age group is rather surprising. For this age group, the rate is very high mainly due to its interaction with number of living children. The beta coefficient is 1.7 for this age group as against 0.2 or lower for all other age groups (see Table 1). That is why adjusted CPR for the 15-19 age group is 52 per cent as against the unadjusted CPR of 3 per cent. An investigation

of the pattern of CPR by living children of these women show that very few women of this age group had two or more living children with at least two male living children (11 out of 377 women), and among them, 45 per cent are using contraception as compared with just 2 per cent among their counterparts. But in the other age groups, the proportion of women having two or more living children with at least two male living children is very high (52 per cent) and among them 62 per cent are using contraception as against 24 per cent among their counterparts (figures not shown). This indicates that even young women will tend to use contraception if they have achieved their desired family size and sex distribution of children. It is to be noted that as already mentioned age at marriage of the woman is not significantly related to contraceptive use. All these indicate that in the study population age and age at marriage are not very important for the women to use contraception.

The number of living children the couples had is strongly and positively related to CPR level. However, the relationship is curvilinear as is evident from the negative and significant beta coefficient.for its square term. The unadjusted CPR is just 1 per cent for women with no living children, and even for women with one living child, it is only 6 per cent. The CPR increases to 30 percent, 57 per cent and 63 per cent as the number of living children increases to 2,3 and 4, respectively. The CPR level decreases as the number of living children to the women further increases. The adjusted CPR also reveals a similar pattern, with the CPR level stabilizing at around 60 to 65 per cent for women with 4 to 7 living children. The adjusted CPR tends to decline for women with 8 or more living children for which the explanation is the same as that discussed earlier in respect of older women. The analysis indicates that many women in the study areas desire at least 4 living children before accepting family planning. It is to be noted that the mean living children of the acceptors work out to 3.9 and the proportion of acceptors having 4 or more living children is 55 per cent.

There are clear evidences to show that the sex composition of living children is an important factor motivating couples to use contraception. From Table 1 it is seen that the number of male living children, its square term, and the term "whether the living children are all males" are significantly related to contraceptive use. Again, the highly significant and positive beta coefficient for the number of male living children, and the significant and negative beta coefficient for its square term show that the CPR increases with the number of male living children. However, the rate of increase in the CPR decreases as the number of male living children increases. Further, the insignificant interaction between number of male living children and number of living children indicates that irrespective of number of living children, women want to have a certain number of male living children before accepting contraception. Furthermore, the significant and negative beta coefficient for "whether the living children are all males" means that the CPR is low when the living children are all males, which indicates that women not only desire a certain number of male living children but also a female child before initiating contraception. The adjusted CPR by number of living children, controlling for the number of male living children (Fig. 1) indicates that couples with no male living children have rarely responded to contraception at least until they had many living children. Further, irrespective of the number of living children, contraceptive use increases as the number of male living children increases up to three, but further increase in the number of male living children has not increased the CPR level further. The analysis

indicates that in the study areas contraceptive use reaches a maximum for women with 4 living children comprising 3 males and one female. At this stage, the proportion using contraception increases to as high as 80 per cent. It appears that the strong son preference might be one of the reasons for many women to have many living children before accepting family planning, particularly sterilisation.

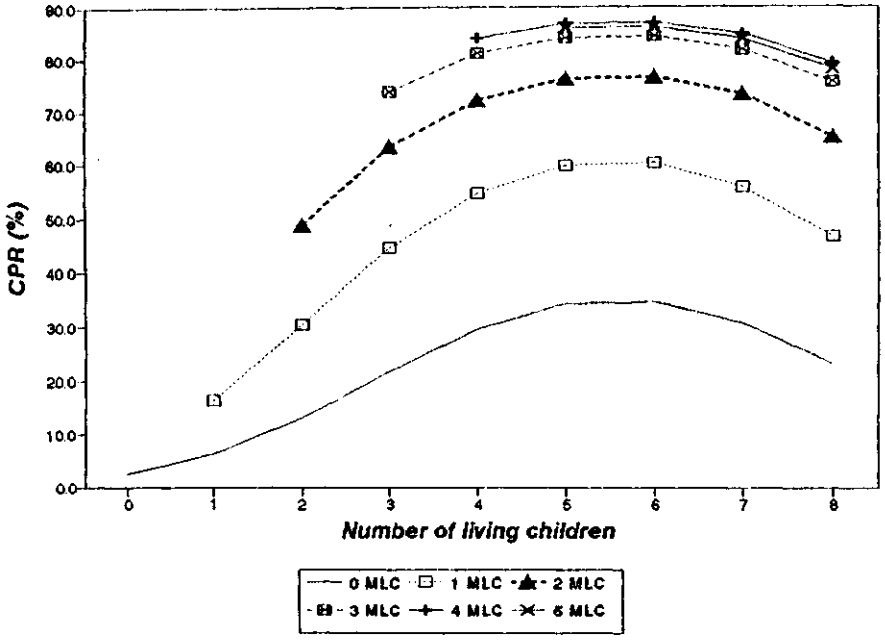


Fig. 1. Adjusted CPR by Living Children, According to Male Living Children

*Note:*

1. The proportion of women whose living children are all males is fixed at the overall mean throughout.
2. Though number of living children and number of male living children are treated as two independent variables in the model, the portion of the graph with the number of living children less than the number of male living children is not shown as it makes no sense.

With respect to child loss, as already mentioned, the number of child loss is significantly related to contraceptive use only at 0.08 probability level, while its interaction with number of living children is negative and highly significant. That means, child loss experience of women tends to reduce contraceptive use rates differently at different levels of number of living children. It is to be noted that the sex of the lost child is also an important factor influencing contraceptive use, which is not studied here. The adjusted CPR by number of child loss, according to number of living children (see Fig. 2) indicates that for women with 3 or more living children, contraceptive use decreases as the number of child loss increases. The figure also shows that a particular level of CPR is reached only at a higher number of living children if the women had experienced a child loss than if they had not. The analysis

indicates that couples who experience child loss tend to delay or avoided using contraception even after replacing the children they had lost, either because they wanted to have a few more children as insurance for possible further child loss or they wanted to replace with children of the same sex.

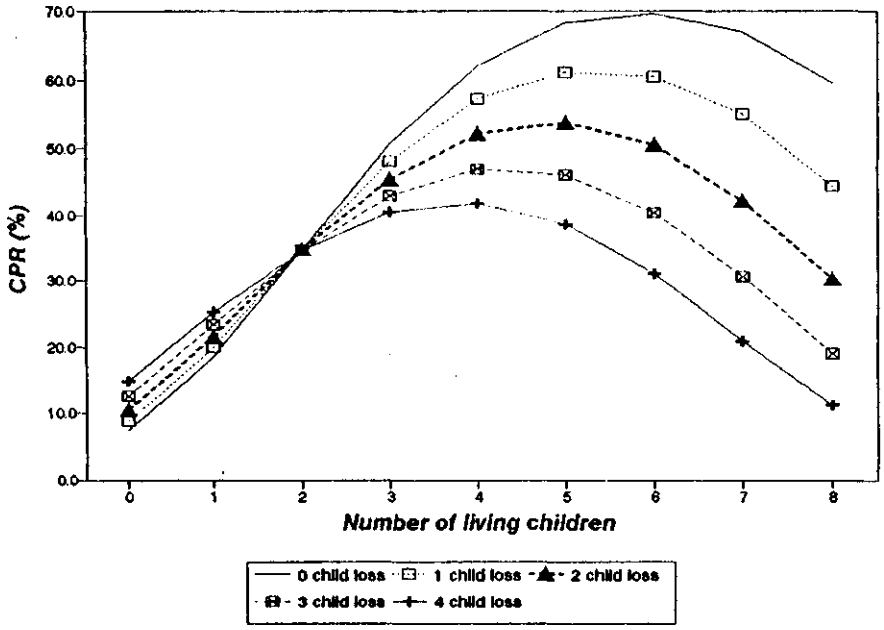


Fig. 2. Adjusted CPR by Living Children, According to Number of Child Loss

As far as the effect of socio-economic factors on contraceptive use is concerned, in the study areas, age at effective marriage of wife, occupation of husband, type of house, and electrification of house are observed to be not significantly related (even at 0.1 probability level) to contraceptive use among couples. On the other hand, type of family, caste and landholding of the household, education of both husband and wife, and occupation of wife turn out to be significant factors.

With respect to type of family, it is to be first noted that strictly nuclear family refers to those households with the index couple and their own unmarried children only, extended nuclear family is an extension of the strictly nuclear family with at least one more member but not couples, and joint family refers to those households with two or more couples of any age. The joint family is further divided into two groups: those with two couples and those with three or more couples. According to this classification, the unadjusted CPR is as high as 50 per cent for women of strictly nuclear family, 35 per cent for women of extended nuclear family, 28 per cent for women of two-couple family and just 24 per cent for women of three-or-more-couple family. However, after adjustment for all other factors in the model, the differences narrowed to a great extent; the CPR for women of strictly nuclear family is 42

per cent and that for women of all other groups is between 35 to 38 per cent. In terms of odds-ratio, the likelihood of women of strictly nuclear family using contraception is about one-third as high as the likelihood of women of extended nuclear or joint family. The analysis indicates that in the study areas nuclear family set-up encourages family planning acceptance more favourably than joint family set-up.

With respect to religion and caste, the observed CPRs are 41 per cent for both caste Hindus (forward and backward classes among Hindus) and non-Hindus and 32 per cent (or about one-third lower) for scheduled castes and scheduled tribes (SC/STs) combined. After adjusted for the other factors, the CPR increases for caste-Hindus and non-Hindus by one to two per centage points, but the rate decreases by more than 4 per centage points for SC/STs. The odds-ratios show that both caste-Hindus and non-Hindus are twice as likely to use contraception as scheduled castes and scheduled tribes. Further, it is important to note that non-Hindus, mostly Muslims, do not differ much from caste-Hindus in their efforts to use contraception.

Landholding of households does not seem to promote use of contraception in the study areas, but rather it tends to inhibit the use. The observed CPR is 41 per cent for women of landless households, while it is 38 per cent for women of households with small (up to 10 acres of) landholding and 36 per cent for women of households with higher landholding. After adjusted for the effect of other factors, the differences rather widened, though only marginally. It appears that women of landless households are 30 per cent more as likely to use contraception as the women of landholding households.

An analysis of the combined effect of caste and landholding on contraceptive use shows that among the women of caste-Hindus, landholding has no or negligible impact on their likelihood of using contraception. So also among the women of non-Hindus. But among the women of scheduled castes and scheduled tribes, women of landless households are twice as likely as the women of landholding households to use contraception. It is to be noted that SC/ST women in the sample accounted for as many as 24 per cent, and among them, 50 percent are from landholding households, but only 8 percent are from households with more than 10 acres of landholding.

Coming to the effect of education of husband and of wife on contraceptive use, it is observed that the CPR level increases as the educational level of both husband and wife increases. The unadjusted CPR is 35 per cent for husbands who are illiterate, 40 per cent for husbands with less than primary education and 43-47 per cent for those who completed primary education. Similarly, the CPR is 38 per cent for wives who are illiterate and 42 per cent for those who are literate. The differences persisted even after the effect of other factors are controlled. It appears that literate women are 26 per cent more as likely to use contraception as illiterate women, and husbands with education above primary level are about 53 per cent more as likely to use contraception as those who are just literate or illiterate. When the educational level of both husband and wife are considered jointly, the analysis shows that the educational level of either or both spouses have contributed to increase use of contraception. It appears that even where the wives are illiterate, husbands who had completed primary education are at least one-third more as likely to use contraception as illiterate husbands. This likelihood increases to 2 to 3 times if both are literate and husband

had completed primary education. However, as per the sample data, the proportion of couples wherein the wife is a literate and the husband has completed primary education is just 13 per cent. This indicates that substantial increase in contraceptive use through effecting improvements in the educational level of the couples is less likely to be achieved in the near future.

The effect of occupation of wife on contraceptive use shows that there is no substantial differences in contraceptive use by occupation of wife with the exception of labours for whom the likelihood is about 50 per cent as high as that of most others. In general, the pattern of CPR by both occupation and by landholding indicates that women of poor families have responded to contraception more favourably than most others.

## Summary and Conclusions

In this paper, an attempt has been made to investigate family size desire, sex preference and various cultural and socio-economic factors for their contribution to contraceptive use among women, by applying logistic regression technique. The data used are obtained from 3 cross-sectional sample surveys conducted during 1987-90 on currently married women (CMWs) of reproductive age in the rural areas of 4 districts of Karnataka state.

The logistic regression results show that within Karnataka, there are significant differences in the use of contraception between districts. Among the study districts, couples of Belgaum district are more than twice as likely and couples of Bijapur and Dharwad district are about one-fourth as likely to use contraception as the couples of Gulbarga district. With respect to family size desire and sex preferences, even after controlling for other factors, contraceptive use increases steadily as the number of living children increases up to 4 and the number of male living children increases up to 3. Further, couples with all their living children male are less likely to use contraception than couples with a combination of both males and females. It appears that in the study areas, other things being equal, contraceptive use rates would go up to 80 per cent if all couples had 4 living children with a sex composition of 3 males and one female. On the other hand, contraceptive use decreases as the number of childless increases, implying that couples who experience child loss tend to delay or avoided contraception. The age pattern of contraceptive use indicates that even young women tend to use contraception if they have achieved their desired family size and sex composition of children.

Among the socio-economic factors, age at effective marriage of wife, occupation of husband, type of house and electrification of house are observed to be not significantly related (even at 0.1 probability level) to contraceptive use among couples. On the other hand, type of family, caste, landholding, education of husband and wife, and occupation of wife turn out to be significant factors. Specifically, nuclear family set-up encourages family planning acceptance more favourably than joint family set-up. Caste-Hindus and non-Hindus are twice as likely to use contraception as scheduled castes and scheduled tribes. Further, non-Hindus, mostly Muslims, do not differ from caste-Hindus in their efforts to use contraception. Landholding of household tends to inhibit use of contraception among couples. With respect to education, literate women are 25 per cent more as likely to use contraception as those of

illiterate women, and husbands with education above primary level are about 50 per cent more as likely to use contraception as those who are just literate or illiterate. This likelihood increases to 2 to 3 times if both are literate and husband had completed primary education. There is no substantial difference in contraceptive use by occupation of wife with the exception of labours for whom the likelihood is about 50 per cent higher as that of most others. It appears that women of poor families have responded to contraception more favourably than most others.

Though a few social factors like education are significantly related to contraceptive use, their influence is not as great as that of number of living children or number of living sons. It is likely that these factors influence contraceptive use through such factors as family size desire and sex preferences, and it is beyond the scope of the present analysis. However, available evidences suggest that such a relationship is not strong. For example, an analysis of the same data for the socio-economic differentials in sex preference and its impact on contraceptive use showed that women of different socio-economic groups exhibited more or less the same sex preference and also the consequent effect on contraceptive use (Rajaretnam, forthcoming). Further, an analysis of data on sterilization acceptors who had accepted the method during the 1980s in the rural areas of five districts of the same state (including two of the study districts) showed that the socio-economic differences in the family size of the acceptors is marginal or negligible (overall mean 3.8) (Rajaretnam 1995).

In conclusion, in the study areas, family size desire and sex preference are the two predominant determinants of contraceptive use, mainly through sterilisation acceptance. Many couples seem to desire at least four children comprising of a minimum of 2-3 males and one female, and, upon achieving this, most couples (up to 80 per cent) tend to use contraception. It appears that couples who continue to add more children and delay or avoid using contraception are those who could not achieve their desired sex composition of children within their first few children. Insurance for child loss is also a significant factor influencing contraceptive use among couples. On the other hand, socio-economic factors are weakly or only moderately related to contraceptive use, but among them, social factors are more favourable than economic factors to the couples' decision to use contraception.

**Acknowledgement**

The author gratefully acknowledges the comments and suggestions of Dr. P. N. Mari Bhat, Director of the Population Research Centre, on the earlier versions of this paper.

**References**

Badari, V. S., 1993, Social and Cultural Determinants of Contraception in Karnataka, India. Paper presented to the International Population Conference of the IUSSP at Montreal. Das, Narayan, 1987, Sex preference and fertility behaviour: A study of recent Indian data. *Demography*, 24 (4):

-517-530. Department of Family Welfare, Government of India, 1991, *Analytical Review of Couple Protection Rates 1990.*

, Ministry of Health and Family Welfare, New Delhi.

Department of Family Welfare, Government of India, *1992, Family Welfare Programme in India: Year Book 1990-91*. Ministry of Health and Family Welfare, New Delhi.

International Statistical Institute, Netherlands, 1984, *World Fertility Survey: Major Findings and Implications*. International Statistical Institute, Voorburg, the Netherlands. Jejeebhoy, Shireen J. and Kulkarni, Sumati, 1989, Demand for Children and Reproductive Motivation: Empirical Observations from Rural Maharashtra. *In:* S. N. Singh, M. K. Premi, P. S. Bhatia and Ashish Bose (eds.), *Population Transition in India*, Vol. II, pp. 107-121. B. R. Publishing Corporation, Delhi. Jolly, K. G., 1986, *Family Planning in India, 1969-1984: A District Level Study*. Hindustan Publishing Corporation, New Delhi. Kanitkar, Tara and Murthy, B. N., 1983, Factors Associated with Contraception in Bihar and Rajasthan: Findings from Recent Sample Surveys. *In:* K. Srinivasan and S. Mukherji (eds.), *Dynamics of Population and Family Welfare 1983*, pp. 165-198. Himalaya Publishing House, Bombay. Koenig, Michael A. and Foo, Gillian, H. C., 1992, Patriarchy, women's status, and reproductive behaviour in rural North India. *Demography India*, 21 (2): 145-166. Lakshmamma, T. and Prabhakara Reddy, B., 1991, Child survival and family planning acceptance. *Demography India*, 20 (2): 187-198. Little, Roderick J. A., 1980, Linear Models for WFS Data. *Technical Bulletin*, 19: *World Fertility Survey*, International Statistical Institute, Voorburg, the Netherlands. Norusis, Marija J., 1990, *SPSS/PC*$^{+}$ *Advances Statistics 4.0*. SPSS Inc., Chicago. Operations Research Group, Baroda, 1990, *Family Planning Practices in India: Third All India Survey*. Operations Research Group, Baroda. Prakasam, C. P., Sinha, U. P., Khan, A. G. and Reddy, Hanimi, 1993, Influence of loss of child on Mother's Reproduction. *UPS Research Report* Series, No. 4 of 1993-94. Rajaretnam, T., 1995, Socio-economic Differentials in Fertility and Family Size of Sterilization Acceptors in Rural Karnataka, India. PRC Working Paper Series, Population Research Centre, Dharwad (forthcoming). Rajaretnam, T., forthcoming, Socio-economic Factors, Sex Preference and Contraceptive Use in Rural South India. Rajaretnam, T. andPatil, R. L., 1990, Evaluation of family welfare and maternal and child health programme in Bijapur district, Karnataka state: A Summary Report. *Journal of Institute of Economic Research*, 25 <1&2):9-18. Raajaretnam, T. and Deshpande, R. V., 1994a, Factors inhibiting use of reversible contraceptive methods in rural South India. *Studies in Family Planning*, 25 (2): 111-121 Rajaretnam, T. and Deshpande, R. V., 1994b, The effect of sex preference on contraceptive use and fertil ity in rural South India. *International Family Planning Perspectives*, 20 (3): 88-95. Raju, K. N. M., Bhat, T. N., Umamani, K. S. and Lingaraju, M., 1994, Differential acceptance of family planning methods in a high performance district in Karnataka. *The Journal of Family Welfare*, 40 (2): 31 -39. Reddy, V. Meera, 1984, The influence of demographic variables on the adoption of sterilisation. *The Journal of Family Welfare*, 30 (3): 46-56. Retherford, Robert D. and Choe, Minja Him, 1993, *Statistical Models for Casual Analysis*. John Wiley and Sons, Inc., New York. Sastry, K. Ramachandra, Sethurathnam, R. and Rajamonickam, S., 1988, A Study of Determinants of Survival Status of Children. *In: Research Compendium: Findings and Implications of Population and Health Studies, 1964-87*. The Gandhigram Institute of Rural Health and Family Welfare Trust, Gandhigram, Tamil Nadu. Shariff, Abusaleh, 1989, Societal determinants of the regional differentials in India's family planning programme performance. *Demography India*, 18 (1 & 2): 1-20. Sinha, R. K. and Kanitkar, Tara, 1994, Acceptance of family planning and linkages with development variables: Evidence from a study of 80 villages in Orissa. *The Journal of Family Welfare*, 40 (2): 18-25. Srikantan, K. Sivaswamy, Mullay, Sanjeevanee and Radkar, Anjali, 1992, Correlates of family planning acceptance: A multivariate analysis. *Artha Vijnana*, 34 (2): 163-181.
Thiruvenkitasamy, S., 1992, Economic motivation and fertility behaviour: A comparison of rural and urban areas in Tamil Nadu. *The Journal of Family Welfare*, 38 (1): 68-79.
Ullah, Md. Shahid and Chakraborty, Nitai, 1993, Factors affecting use of contraception in Bangladesh: A multi variate analysis. *Asia-Pacific Population Journal*, 8 (3): 19-30.
Visaria, Leela, 1993, Regional Variations in Female Autonomy and Fertility and Contraception in India. Working Paper No. 50, Gujarat Institute of Development Research, Ahmedabad.