Determinants of fertility in rural Karnataka

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The present analysis is based on the data collected in the baseline survey conducted in the rural areas of Karnataka state in South India in 1993. As many as 3987 currently married women in the age group of 15–44 were interviewed and information on their fertility and family size desires were collected. The study of determinants of fertility assumes great significance as rapid socioeconomic changes are taking place in the country. The determinants of fertility are, therefore, expected to reflect these ongoing changes in the demographic behaviour of the population. The analysis shows that female education has emerged as an important social variable that can bring desired changes in the levels of fertility. The analysis also reveals that there is an important section of women who do not desire additional children but were found to be pregnant at the time of survey; this reflects the inadequacy of family planning services. Age is the most important variable which continues to exert positive influence on the desired family size (DFS). This calls for a well-integrated reproductive health programme so as to motivate young mothers to practise family planning.

MANY attempts have been made to alter the course of fertility through family planning (FP) intervention, but still it has not made considerable impact in reducing fertility to the desirable level. The availability of FP services no doubt facilitates birth control for those who desire to use it. However, such exogenous interventions would provide limited impact on fertility unless indigenous culture and socioeconomic system reinforce small family goals through changes in the values and attitudes, institutional structure and sociocultural milieu of the population. In order to create an average social pattern of behaviour so as to achieve the desirable level of fertility, the fertility of Indian couples of different social and economic strata has been subjected to meticulous investigation. We have a plethora of studies of differential fertility by socioeconomic factors in recent times. These studies have succeeded in pointing out some of the socioeconomic determinants of fertility. Consequently, socioeconomic variables have been repeatedly used in the literature to estimate the desired family size[1-5].

The data utilized for this study were collected as part of the baseline Health and Family Welfare Survey[6] conducted by the JSS Institute of Economic Research in 1993 in rural areas of Belgaum district of Karnataka state. The survey was conducted in two Tahsils of Belgaum district. The sample of villages were selected using PPS (probability proportional to size) design employing the 1991 census list of villages as the sample frame. A total of 75 village communities were selected, and from each village 40 households were selected at random. The objective of the main survey was to provide baseline information on fertility and family planning aspects. The main objective of this paper is to investigate the socioeconomic determinants of fertility in rural Karnataka. The analysis is restricted to currently married women.

As a prelude to our efforts to understand the determinants of fertility, we have briefly discussed the fertility patterns and family size desires in the survey region. It is seen from Table 1 that the total fertility rate, the average number of children that would be born to a woman in the reproductive age of 15–44 was 3.19. Thus, under the present schedule of fertility and assuming that there is no mortality, a woman would have on an average one child more than required for replacement level. The age pattern of fertility shows a peak in the age group of 20–24 years. It is interesting to note that the contribution of older women of 30 and above years was just 17%.

The estimates of cohort fertility, the number of children born and living to women of different ages, show that the number of children born was 2.83 and those surviving was 2.45. The cohort data suggest that fertility at higher ages of 30 and over was quite high in the past. On an average, a woman had nearly 4 children by age 30, 4.57 by age 35 and 5.31 before completing the reproductive life.

Table 1. Age-specific fertility rate (ASFR) and cohort fertility estimates

Age	ASFR	Children ever born	Children living
15–19	0 141	0 70	0 60
20–24	0 237	2 10	1 88
25–29	0.154	3 28	2 93
30–34	0 057	3 98	3 45
35–39	0 041	4 57	3 88
40–44	0 007	5 31	4 41
15–44	3 19	2 83	2 45

Table 2. Percentage distribution of currently married women by desire for additional children and family size

Age	Mean number of living children	Additional children desired	Total children desired
15–19	0 60	2 21	2 81
20–24	1 88	1 18	3 06
25–29	2 93	0 60	3 53
30–34	3.45	0 30	3 75
35–39	3 88	0 26	4 14
40–44	4 41	0 01	4 42
15–44	2 45	0 99	3 44

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A comparison of current fertility with the completed family size shows that there has been substantial decline in the current level of fertility in the region compared to the fertility of older women.

In Table 2 we have analysed the future fertility desires by age and according to their mean number of living children, by additional children and total children desired. It is seen from the table that the total family size desired was 3.44. It is interesting to note that family size desired by older women of 35–39 and 40–44 ages was 4.10 and 4.33, respectively, and the corresponding figures for younger women of 20–24 and 25–29 was 3.0 and 3.5. The data thus suggest that the desired family size has been declining among the younger women compared to older ones.

The statistical model proposed in this article describes the desired complete family size (DFS) as a function of several socioeconomic and demographic variables. Except for two variables, age and religion, the model includes variables which determine the demand for children as suggested in microeconomic theories of fertility[3, 4].

The model can be described as follows:

$$D = a + B_i \times i + e_i$$

where D = desired complete family size, $I = 1–8$, $X1$ = wife's education, $X2$ = wife's occupation, $X3$ = husband's education, $X4$ = husband's occupation, $X5$ = wife's religion, $X6$ = household land ownership, $X7$ = consumer durables owned by the household, $X8$ = wife's age, B_i's are the regression coefficients and e_i's are the error terms.

The variable D is constructed by adding the total number of surviving children to the number of additional children desired at the time of baseline survey. As regards acceptors of sterilization, their present surviving children were taken as their desired family size. All the respondents have provided numeric answers.

As the data on education do not make a continuous variable with completed years of schooling, the variable $X1$ has been treated as a two-category variable: unity if the wife had attended school, and zero otherwise. Prima facie the data had indicated that a large majority of the wives were illiterate. $X3$ was treated analogous to wife's education.

$X2$ and $X4$ were also treated as two-category variables coded as unity if the wife/husband had engaged in paid employment, and zero otherwise.

$X5$ is a two-category variable coded as unity if a woman is Muslim, and zero otherwise.

$X6$ was considered as a continuous variable measuring the amount of agricultural land owned by the household, while $X7$ as a two-category variable coded as unity if the household is electrified, owns a bicycle, a radio and a wrist watch, and zero otherwise.

The mean values, standard deviations and hypothesized direction of relationship are presented in Table 3. In general, it is expected that the DFS will be lower among women who have better socioeconomic status as measured by education, occupation, ownership of agricultural land and household durables. The results show that only 28% of wives were literate as against 57% of husbands. The mean age of the respondents was 27 years and 7.6% of them were Muslims. Only 47% of wives in contrast to 97% of husbands were gainfully employed. The households owned on an average 7 acres of land. Out of 4 consumer durables chosen as indicators of economic status of the household, the mean number of durables owned was found to be 2.4.

Table 4 presents the zero-order correlation coefficients between dependent and each of the independent variables. The correlation coefficients between dependent and each of the independent variables suggest that at bivariate level except for the age of wife, wife's education and wife's occupation the other predictors are not related to DFS. Among the independent variables correlations are generally low. Husband's education is highly correlated with wife's education. It is seen that out of 28 correlation coefficients of independent variables 16 have values less than or equal to 0.10, which suggests a low degree of multicollinearity.

The results of multiple regression analysis presented in Table 5 include standardized regression coefficients along with their rank order and the adjusted R^2 multiple regression coefficient. The results show that age has the largest standardized regression coefficient and hence the highest relative importance in predicting DFS. Wife's education has the second highest value followed by husband's and wife's occupation and wife's religion.

Findings suggest that in the full sample approximately 40% of the variation is jointly explained by the predictors in the proposed statistical model. The hypothesized relationship between DFS and each of the predictors shows that it does not hold good with regard to wife's occupation, husband's occupation and ownership of land by the household. Contrary to our expectation, the occupation of both husband and wife and ownership of land has positive effect on DFS. Although the household durables have the hypothesized sign, the relationship is not statistically significant.

Several empirical studies have shown that higher education tends to lower fertility[7, 8]. Therefore, it is reasonable to expect that female education would have negative effect on fertility. In our sample wife's education has significant negative relationship with DFS while the relationship of education of husband is in the expected direction but not statistically significant. It is further seen that wife and husband's employment has fertility-increasing effects. In rural areas the wife would be working in the agricultural sector and in most cases the nature of her employment does not compete with child bearing. The results also suggest that the DFS is

very marginally higher among Muslim women than among their Hindu counterparts. It is observed that when the effects of other predictors are taken into consideration, DFS of Muslim women was found to be slightly higher by 0.03 children than Hindu women. This finding is in conformity with other empirical studies, especially in the Indian context which have shown that Muslim fertility has all along been higher than in other religious denominations.

Contrary to our expectation, the direction of relationship between ownership of agricultural cultivable land has a negative relationship although the relationship is not statistically significant. This marks an important departure from the findings of other studies[10], which showed that the relationship was positive. The ownership of household durables like wrist watch, bicycle, radio and electrification of the house has as expected negative relationship on DFS although the relationship is not statistically significant.

Table 5 also presents the results for two age cohorts separately. It is seen that the prediction power of the fitted equation has declined considerably, specially for older-age cohorts. The equation explains nearly 30% variation in the younger age cohorts while it was as low as 5% in respect of older age cohorts. In the younger age cohorts wife's and husband's education has very significant negative relationship, but virtually no such effect was found in the older-age cohorts.

It is interesting to note that wife's education and ownership of cultivable land continue to have negative relationship even in the older-age cohorts. However, wife's age continues to show consistently significant positive relationship in both the age cohorts.

In this section the consistency between the DFS expressed at the time of baseline survey and the actual fertility behaviour of the respondents is analysed on the basis of the incidence of current pregnancy. If the woman has surviving children more or equal to DFS, and if she was pregnant at the time of survey then it is considered as a pregnancy not desired. Utilizing the information at the time of baseline survey, the respondents are classified into two groups:

1. DFS > number of living children (LC).
2. DFS = LC.

As DFS is constructed by adding the number of additional children desired at the time of baseline survey to the number of living children, it cannot be smaller than LC. Therefore, the respondents are classified into two groups only, viz. DFS > LC and DFS = LC. In addition, the respondents are also grouped according to age cohorts. The younger-age cohorts include women under age 30 and the older age cohorts include women 30 years and above. Table 6 presents the distribution of respondent according to DFS classification, age cohort, and information on the current pregnancy status at the time of survey.

The results suggest that in the DFS > LC category approximately 11% of the respondents were pregnant at the time of survey. As expected, the respondents in the younger-age cohort have higher pregnancy rate (15%) compared to older-age cohort (2.5%). The data suggest that the chances of pregnancy among the younger-age cohort are much higher than among the older-age cohort. However, it may be noted that even among the younger-age cohort the 15% incidence of pregnancy is not too high. In the second group, where DFS = LC, over 20% of the respondents were pregnant at the time of survey. By and large the data suggest that a very small section of the eligible women are likely to experience undesired pregnancy presumably because of inadequacy of family planning service.

Our findings suggest that wife's education has a negative effect on the desired family size, i.e. educated women desire smaller family sizes. Female employment

Table 3. Mean and standard deviation of the variables employed in multiple regression analysis

Variable	Hypothesized sign	Mean	Standard deviation
Wife's education (X1)	(−)	0.2841	0 4511
Wife's occupation (X2)	(−)	0.476	0 4995
Husband' education (X3)	(−)	0.5692	0 4953
Husband' occupation (X4)	(−)	0 9737	0 161
Religion (X5)	(+)	0 0763	0 2655
Land ownership (X6)	(+)	7 142	13 486
Household durables (X7)	(−)	2 4487	1 3635
Respondent's age (X8)	(+)	27 846	7.7409

Number of case 3987.

Table 4. Correlation matrix of dependent and independent variables

Variable	X1	X2	X5	X3	X4	X6	X7	X8	DFS
X1	1 000								
X2	−0 227**	1 000							
X5	0 142	−0 0437*	1 000						
X3	0 366**	−0.225**	0 018	1 000					
X4	−0 004	0 006	0.001	−0 016	1 000				
X6	0 19**	−0 158**	−0 090**	0 144**	0 020	1 000			
X7	0 302**	0 174**	0 026	0 330**	−0 004	0 214**	1 000		
X8	−0 0204	0 078**	0 0152	0 032	−0 073**	−0 005	0 023	1 000	
DFS	−0 069**	0 0933**	0 037	−0 029	−0 015	−0 031	−0 019	0 605**	1 000

*Significant at −0 01, **significant at −0 001.

Table 5. Results of multiple regression analysis of the desired family size

	Standardized regression coefficients		
Variable	Full sample	Below 30 years	Over 30 years
Constant term	−1 469	−2 241	−0 178
X1	−0 3281** (2)	−0 0760*** (2)	−0 004
X2	0 0302** (5)	0 005	0 059
X3	−0 0245	−0 0760*** (3)	0 020
X4	0 0294** (3)	0 006	0 043
X5	0.0289** (4)	0.006	0 042
X6	−0 008	−0 012	−0 019
X7	−0 006	−0 006	0 007
X8	0 604*** (1)	0 5394*** (1)	0 2316***
R^2 (adjusted)	0 371	0 296	0 051
Number of cases	3987	2708	1279

***Significant at 1% level.
**Significant at 5% level.
Rank order of standardized coefficients in brackets

Table 6. Percentage distribution of the women according to desired family size, pregnancy status and age cohort

Category	Pregnancy status	Younger-age cohort	Older-age cohort	Total
DFS > LC	Yes	286 (15 0)	23 (2 5)	309 (10 9)
	No	1626 (85 0)	892 (97 5)	2518 (89 1)
Subtotal		1912 (100 0)	915 (100 0)	2827 (100 0)
DFS = LC	Yes	13 (33 3)	–	13 (20 3)
	No	26 (66 7)	25 (100 0)	51 (79 7)
Subtotal		39 (100 0)	25 (100.0)	64 (100 0)

outside home has little impact on the desired family size. This is not unexpected as female employment in the rural areas is largely in the agricultural sector and the nature of work does not conflict with rearing of children. It is interesting to note that the wealth variables measured in terms of ownership of cultivable land and household items have the hypothesized negative direction although the level of relationship with DFS was not significant. This implies that with rising income the desired DFS may also fall. This marks an important departure from the microeconomic theories of fertility, which suggest positive relationship. The demographic variable age has strong positive influence on DFS, followed by religion.

The incidence of pregnancy among the respondents who desired no additional children at the time of baseline survey was sizeable. This implies that the family planning services need to be further strengthened in rural areas.

Programmes for female education in the rural areas should receive top priority. The positive influence of age of DFS implies that younger mothers should be netted to bring about desired changes in fertility levels; this calls for an integrated reproductive health care and family planning programme. Although small, there is a sizeable section of mothers who do not desire additional children but were pregnant at the time of baseline survey, which shows that family planning services still need to be strengthened.

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