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S. Rajaram*

Timing of Sterilization in Two Low Fertility States in India

Introduction

THE first two UN international conferences on population have focused mainly on the need for curtailing the rapid population growth by placing greater emphasis on family planning. However, the third and recent international conference has given high priority to programmes that focus on women's rights, gender equality, reproductive rights and reproductive health of the women. Following the recommendations of this conference, Government of India has removed all the targets for family planning from April 1996. It was reported that average Indian women becomes pregnant eight times and give births to 6-7 children, of which 4-6 live. More than a third of the 140 million who became pregnant in 1988 in the developing countries did not want another child (Coyaji, 1993). Regulation of fertility seems to be the major solution that can significantly improve women's reproductive health. The most effective and popular method used for the regulation of fertility by couples in the developing countries of the world is sterilization. The key advantage is that it offers permanent protection from becoming pregnant. Ross (1992) has indicated that majority of these users were concentrated in the two developing countries viz. China and India. The quality of sterilization is that it not only averts a large number of unwanted pregnancies but also benefits women's health by reducing the absolute number of pregnancies. A study of twelve developing countries including India has reported that the number of births averted by one sterilization was more than three times the number averted by the use of an intrauterine device (Ross *et al*, 1986).

The programme of action adopted at the end of International Conference on Population and Development advocates to reduce the unwanted births to improve the health of mothers (United Nations, 1996). However, the risk of unwanted birth is largely influenced by the unprotected years of exposure to pregnancy. So, if the couples accept a permanent method

* S. Rajaram, Ph.D. is a Research Officer in PRC, Dharwad. The views expressed in the article is not of the organization.

very early, it is possible not only to avoid a large numbe'r of unwanted births but also to reduce the fertility. For example, the proportion of sterilized couples by age 30 in one area is larger than another area indicates that the average years of unprotected period of exposure to pregnancy is smaller, thus the risk of unwanted fertility is low, in the first area. The impact of contraceptive use on fertility depends not only on the number (or percentage) of users but also largely on the timing of its use, so it is more appropriate to study the latter aspect which combines the first aspect as well. The fertility experience of couples largely depends upon the age of the women and unprotected years of exposure to pregnancy, so the significance of sterilization may influenced by the age of its acceptance. In India, there exists a wide regional variation in the timing of sterilization and unwanted fertility (UPS, 1995). Although the fertility in the states of Goa and Kerala has reached the below replacement level, these two states exhibits a very wide difference in the use of sterilization and unwanted fertility (for example see UPS, 1995). The age at sterilization in Goa is higher than that of Kerala. Also, the Goan women experience more unwanted births than their counterparts in Kerala. Hence, the study is focused on the differential experience of women in these two states in respect of the timing of sterilization. The timing of sterilization in this article is studied in terms of age at acceptance.

In the recent years, well-designed sample surveys were conducted in most of the developing countries (for example, Demographic Health Surveys) and provided the researchers to investigate various aspects of contraceptive use.

In this context, it is important to note that in India also a well-designed sample survey on the lines of DHS was carried out during 1992-93 and has favoured researchers to study the social and demographic correlates of contraceptive use (Ramesh *et al*, 1996). A separate body of literature has documented that the use of contraceptive methods largely depends upon the social, demographic and economic characteristics of the couple. In addition to these characteristics, the programme factors such as the extension work and incentives and disincentives also influences its use (Verma *et al.*, 1989). It has been suggested by Khan (1980) that efficient extension work supported by clinical facilities is essential for the acceptance of sterilization.The number of living children and the number of sons were the most crucial variables influencing the acceptance of sterilization (Khan, 1980). Similarly religious affiliation also influence the acceptance of sterilization due to behaviour related to childbearing. It has been found that higher educated women have a better knowledge to use non-terminal method more effectively (Bumpass 1987; Goldscheider and Mosher, 1988). Thus it can be expected that highly educated women are less likely to accept sterilization. The majority of the earlier studies were confined to the acceptance of sterilization or use of contraception and little has been done in studying the factors influencing its timing. Yet, the amount of knowledge gained from these studies is disappointing, especially in case of developing countries including India. Most of them suffer from weakness in study design, sample selection and methods of analysis (Ross *et al.*, 1985). A detailed review on this subject by Phillibe r (1985) has emphasized the need for research into the social science aspects of sterilization acceptance. Majority of the earlier research mainly focused on the use of various contraceptives. A few attempts have been made to examine the timing of sterilization (Rao and Zhao, 1994). Thus, in general, the independent variables used in the present analysis represent the concepts commonly used in the examination of differential

use of contraception by various investigators (Kanitkar and Murthy, 1983; Operation Research Group, 1990; Rajaretnam and Deshpande, 1994; Rajaretnam, 1995 etc.).

Data

The present study uses data from the large scale sample survey known as "National Family Health Survey (NFHS)" conducted in India. The data collection for the NFHS was undertaken by various Consulting Organizations (COs) in collaboration with the concerned Population Research Centre (PRCs) in each state. The data set for the states of Goa and Kerala were analyzed in the present study. The NFHS in Kerala was conducted during October 1992 and February 1993 and collected information from a representative sample of 4,332 ever married women aged 13-49 from 4,387 sampled households (PRC, Thiruvananthapuram and EPS, Mumbai, 1995). The survey work in the state of Goa was carried out between December 1992 and February 1993 and information were gathered from a representative sample of 3,141 ever married women aged 13-49 from 3,741 households (PRC, Dharwad and UPS, 1995). The sample design adopted for the state in the NFHS is a systematic, multi-stage stratified sample. The details of the sample design and implementation of the survey can be obtained from the detailed NFHS reports of the respective states. The analysis is confined to currently married women in the age group 15-49 with atleast one live birth.

Methodology

The differentials in the fertility experience of two groups of women namely sterilized and non-sterilized by background characteristics of the couples is examined using average children ever born. There is a notion that women choosing for sterilization may be self-selected for higher than average fecundity. To observe this idea, the fertility experience of the sterilized women during the five year period prior to sterilization (that is from the date of last birth) was compared with that of the non-sterilized women who have a marital duration of five years prior to the last birth. The above indicator can tell us whether the women or couple's sterilized have a higher fertility than the non-sterilized women during the previous five year period from the last birth.

The differentials in timing of sterilization by background characteristics of the women is studied in the next step using life table analysis. The fact that distinguishes life table analysis from other statistical analysis is the handling of censoring problem. The advantages of this methodology in analyzing event history data have been described elsewhere (Namboodiri and Suchindran, 1987). The conditional probability of being sterilized between time points t_i and t_{i+1}, (q_i), and the conditional probability of not being sterilized in the same interval (p_i) are given as :

$$q_i = (d_i/n_i) \qquad (1)$$

and $p_i = 1 - q_i$ with $n_i = n_i^* - (C_i/2)$

where n_i^* = the number of couples exposed at the beginning of interval (t_i, t_{i+1})

d_i = the numbers of couples sterilized in the same interval

c_i = the number of couples among those who had both terminated and reached the same interval without experiencing the event (that is non-sterilized couples). The proportion surviving (S_i) from experiencing the event (or non-sterilized) at the end of the interval (t_i , t_{i+1}) is given as :

$$S_i = (1 - \pi p_i) \quad (2)$$

In the above mentioned methodology all individuals are assumed to have the same risk at any given time. Multivariate life tables relax the above assumption: it assumes instead that the risk varies according to individual characteristics (Allison, 1984; Cox, 1972; Menken et al., 1981). The concomitant variables enter the regression analysis as independent variables, while the survival time is treated as the dependent variable. In addition they provide a way of assessing those changes with time that are not captured by changes hi the distribution according to any of the covariates explicitly included in the model (Menken, 1981). The model that was used in the analysis takes the from:

$$\lambda (t, x_k) = \lambda_0 (t) \exp (x_k, \beta_k) \quad (3)$$

where $\lambda (t, x_k)$ is the hazard rate at time 't' $\lambda_0(t)$ is the baseline hazard function, β_k is a vector of coefficients, and x_k is a vector of covariates. The baseline hazard is like the constant term in an ordinary least square equation. For a unit change in a given covariate, x_k, the relative change in the baseline hazard rate is given by exp (β_k). It refers to the instantaneous rate of experiencing an event of interest when all the covariates take the value zero.

In this way, explanatory variables x_k have the effect of shifting a baseline hazard function, $\lambda_0(t)$, so that individuals with similar values of x_k have similar hazards but those with different values of x_k have hazard functions proportional to another. Cox's proportional hazard model is "semi-parametric" in that it does not require any assumption about the baseline hazard function. The proportionality assumption can be checked by plotting the logarithm of the negative log of survivor function against time for the different values of the covariates. If these curves are not parallel, the covariates must be modelled as time varying covariates or the sample must be blocked on the value of the non-proportional covariates (Allison, 1984; Namboodiri and Suchindran, 1987). The plotting as suggested above indicated that all the variables used in the present analysis satisfy the proportionality assumption. The variables entered in the multivariate analysis for the present study were sets of categorical (dummy) variables.

Results

A. Fertility

The fertility experience of the sterilized and non-sterilized couples is examined in the first part of the analysis. The average children ever born is used as the indicator of fertility experience and the results are provided hi Table 1. In both Kerala and Goa, the sterilized couples have a larger average parity than non-sterilized couples with the couples in Goa having the higher fertility. The sterilized women in Goa have almost one child more than their counterparts in Kerala. However, the differentials in fertility in these states among non-

TABLE I: MEAN CHILDREN EVER BORN TO CURRENTLY MARRIED WOMEN BY ACCEPTANCE OF STERILIZATION IN KERALA AND GOA

Variable	*Goa*			*Kerala*		
	S	*NS*	*Total*	*S*	*NS*	*Total*
Place of Residence						
Rural	4.15	2.57	3.16	3.14	2.43	2.80
Urban	3.88	2.46	2.90	3.09	2.15	2.66
Religion						
Hindus	4.05	2.48	3.13	2.93	1.86	2.52
Muslims	4.13	3.49	3.74	3.99	3.17	3.43
Others	3.84	2.43	2.63	3.09	1.95	2.58
Education of Women						
Illiterate	4.60	3.34	3.90	3.78	4.35	3.99
Literate/Primary	4.00	2.63	3.20	3.33	2.87	3.15
Middle School	3.22	2.21	2.48	2.68	1.78	2.22
High School & above	2.71	1.87	2.00	2.44	1.55	1.88
Work Status						
Working	4.00	2.46	2.98	3.14	2.37	2.75
Not working	4.08	2.64	3.14	3.07	2.27	2.81
Husband's education						
Illiterate	4.75	3.49	4.01	3.88	4.21	4.01
Literate/Primary	4.39	3.11	3.73	3.38	3.33	3.36
Middle and Matriculation	3.83	2.34	2.81	3.06	2.18	2.66
Above Matriculation	3.20	2.04	2.32	2.63	1.72	2.09
Husband's Occupation						
Professional/Clerk	3.28	2.02	2.38	2.60	1.88	2.19
Service/Sales	3.80	2.51	2.87	3.32	2.44	2.84
Farming, Hunting etc.	4.56	3.06	3.72	3.27	2.77	3.07
Production/Transport	4.05	2.52	3.07	3.03	2.19	2.67
Others	4.93	3.37	3.98	3.64	3.12	3.39
Age at First Birth						
<20	4.50	3.72	4.13	3.55	3.11	3.36
20-22	3.88	2.59	3.08	2.99	2.22	2.65
23-27	3.50	2.11	2.40	2.61	1.65	2.10
28+	2.85	1.70	1.86	2.31	1.48	1.78
Sex of the first Child						
Male	3.88	2.43	2.95	3.10	2.35	2.75
Female	4.22	2.61	3.13	3.14	2.36	2.77
Total	4.02	2.51	3.03	3.12	2.35	2.76
	887	1725	2612	1883	1649	3532

Note: S-Sterilized, MS-Non-sterilized.

sterilized women are marginal. It indicates that more couples in Goa accept sterilization at a higher parity than couples in Kerala. It is also well-expected that the couples accept the permanent method after completing their desired family size. Hence the desired family size in Goa may be higher than Kerala.

The results also reveal that the sterilized couples have higher average parity than non-sterilized women irrespective of background characteristics. The fertility is high in rural area and among categories of Muslims, illiterate women, illiterate husbands. The women who had their first birth below age 20 have the highest fertility irrespective of states. No consistent relationship was found between various categories of women's work and husband's occupation in these states. It was also observed that in Goa, sex of the first child has a great influence on the fertility of sterilized as well as non-sterilized couples.

Since the above observation is made without any control of marriage duration, one may argue that the non-sterilized couples have shorter duration than the sterilized couples. This control has been introduced in the next step of the analysis. Generally women (or couples) choosing for sterilization may be self-selected for higher than average fecundity and many of the women who are not sterilized know that they are infecund, hence do not practice contraception (Stupp and Samara, 1994). This reasoning was validated in the next step of the analysis. This was captured by computing the average parity of the couple during the five year period prior to last birth. The couples who were continuously married during the period of observation only were taken into consideration for this analysis. Thus we have not only a control for duration but also a control for the biological capacity of the couples. The results of this analysis are provided in Table 2. From this table also it is observed that the sterilized couples have higher fertility than non-sterlized couples even after controlling for duration. Thus it is certain that the pace of progression to higher parity is very quick among sterilized couples than non-sterilized couples. In other words sterilized couples may have higher fecundity than the non-sterilized couples and therefore, accepting sterilization. In both the states the fertility of sterilized couples is higher than the non-sterilized couples irrespective of the background characteristics. It is evident from the results that Goan women have experienced a higher fertility during the five year period prior to last birth also. However, the differentials in the fertility between the two states have narrowed.

B. Age at Sterilization

It has been suggested that future sterilization patterns will be parallel to those prevailing now (Ross and Frankenberg, 1993). Because of the carryover effect of current users and to the established role of the method, the states with high sterilization prevalence will continue to have high prevalence. The extent to which a family planning programme promoted younger and lower parity women to accept a method generally suggests the success of the programme in reducing the fertility. The differentials in the acceptance of sterilization by age 30 and 40 in the two States is computed and presented in Table 3.

From the table it can be seen that in Goa, only 23 per cent couples adopting sterilization by age 30 and in Kerala this is about 48 per cent. By age 40 the acceptance is about 44 and 70 per cent in Goa and Kerala respectively. In Goa, the quantum of acceptance is higher in

TABLE 2: MEAN CHILDREN EVER BORN TO CURRENTLY MARRIED WOMEN DURING THE FIVE YEAR PERIOD PRIOR TO THE LAST BIRTH BY ACCEPTANCE OF STERILIZATION IN (CERALA AND GOA

Variable	*Goa*			*Kerala*		
	S	*NS*	*Total*	*S*	*NS*	*Total*
Place of Residence						
Rural	2.64	2.13	2.37	2.37	2.00	2.23
Urban	2.64	2.08	2.31	2.51	1.90	229
Religion						
Hindus	2.66	2.10	2.41	2.37	1.81	2.23
Muslims	2.72	2.32	2.50	2.52	2.12	2.27
Others	2.41	2.07	2.13	2.42	1.87	2.23
Education of women						
Illiterate	2.69	2.20	2.45	2.43	2.12	2.32
Literate/Primary	2.71	2.21	2.47	2.50	2.05	2.34
Middle School	2.63	1.96	2.19	2.40	1.91	2.20
High School and above	2.20	1.93	1.99	2.11	1.75	1.94
Work Static						
Working	2.66	2.09	2.35	2.41	1.99	2.23
Not working	2.60	2.13	2.33	2.42	1.92	2.29
Husband's Education						
Illiterate	2.64	2.27	2.45	2.44	2.10	2.30
Literate/Primary	2.80	2.17	2.52	2.48	2.15	2.36
Middle and Matriculation	2.71	2.13	2.38	2.44	1.95	2.26
Above Matriculation	2.36	1.96	2.09	2.21	1.79	2.02
Husband's Occupation						
Professional/Clerk	2.50	1.92	2.15	2.24	1.76	2.01
Service/Sales	2.60	2.15	2.32	2.49	2.00	2.27
Farming, Hunting etc.	2.68	2.30	2.51	2.36	2.06	2.25
Production/Transport	2.67	2.11	2.37	2.45	2.00	2.30
Others	2.79	2.06	2.38	2.41	2.00	2.23
Age at First Birth						
<20	2.68	2.27	2.50	2.46	2.06	2.30
20-22	2.67	2.13	2.39	2.40	2.11	2.30
23-27	2.57	2.05	2.21	2.34	1.74	2.11
28+	2.33	1.80	1.91	2.11	1.54	1.79
Sex of the First Child						
Male	2.65	2.17	2.32	2.40	1.93	2.22
Female	2.63	2.04	2.37	2.43	2.02	2.27
Total	2.64	2.10	2.34	2.41	1.98	2.24
	756	949	1705	1277	797	2074

Note: S-Sterilized, AW-Non-sterilized

rural area. In respect of religious affiliation, it is important to notice that the acceptance among Muslim couples is almost same in both the states. Among various religious groups in Goa, the acceptance by age 30 is highest for Muslim couples. In Goa, a small proportion of the couples from the other religious group (most of them are Roman Catholic) accepts the sterilization by age 30 and 40. More non-working women in Goa accepts the terminal method, whereas in Kerala reverse is true. A fluctuating scenario in the acceptance of sterilization by husband's education and occupation is observed in these states. However, a consistent pattern in the acceptance of sterilization by age at first birth is observed. In Kerala, the acceptance is highest among the couples who have two surviving sons, whereas in Goa it is highest among the couples who have three surviving sons. There may be a higher son preference in Goa than in Kerala. Similarly the acceptance is highest in Kerala, if the children ever born to the couples are three. But in Goa it is highest among the couples who have four and above children. It is also important to note that the state level differentials in the acceptance is negligible for the couples who have four and above children. However, a large state level differentials exist in the acceptance of sterilization among the women who have two and three children. From the programme point of view, the results clearly indicate that in Kerala it was able to promote a large number of younger and lower parity women to adopt sterilization than in Goa. A marginal differential in acceptance of sterilization by the sex of the first child is observed in Goa.

The foregoing results do not have any social, economic or demographic controls. Thus in the next step of analysis, social, economic and demographic controls were introduced. These controls are brought by applying the Cox proportional hazard model. As mentioned in the methodology section, the results are generally discussed in reference to the omitted category. The results from the analysis are provided in Table 4 and the list of omitted category is given in the end of the Table. It may be further noted that the relative risk of being sterilized at all durations is not the estimated parameter (coefficient) itself but the exponent of it. The results indicate that religion, age at first birth, number of sons surviving, and children ever born are the significant factors that determines the timing of sterilization in Goa. In case of Kerala, in addition to these factors work status, literacy level of both husband and wife are also significant factors in explaining the timing of sterilization. The effect of various categories of the variables on the timing of sterilization is discussed in detail.

The results clearly indicate that the effect of various factors on the timing of sterilization is not uniform in these states. For example though the religious affiliation is important in explaining the acceptance as well as the timing'of sterilization, the direction is not uniform in these states. In both the states, more Hindu couples accepts the sterilization at an earlier age than Muslim couples. The acceptance of couples from other religious group is lower in Goa, whereas in Kerala reverse is true. The results also suggest that the acceptance among women who had studied below high school level is earlier than those who studied high school and above. These women may have other characteristics like low age at marriage and high fertility, that might have forced them to adopt sterilization at an earlier age than more educated women. It is also possible that more educated women may use reversible method more efficiently than less educated women. The effect of the husband's characteristics on the adoption of sterilization is not uniform in these states. In Kerala, the couple accepts

TABLE 3: PROPORTION OF COUPLES STERILIZING BY AGE 30 AND 40 IN KERALA AND GOA

Variable	*Goa*		*Kerala*	
	30	*40*	*30*	*40*
Place of Residence				
Rural	0.2556	0.4949	0.4687	0.7080
Urban	0.2141	0.3885	0.4934	0.6897
Religion				
Hindus	0.2944	0.5424	0.5503	0.7721
Muslims	0.3250	0.5002	0.3260	0.4895
Others	0.0753	0.1856	0.4228	0.7139
Education of women				
Illiterate	0.2944	0.5389	0.4537	0.7075
Literate/Primary	0.2990	0.5200	0.5392	0.7586
Middle School	0.2230	0.3818	0.5461	0.7100
High School and above	0.0989	0.2330	0.3055	0.5637
Work Status				
Working	0.2051	0.4129	0.5205	0.7721
Not working	0.2473	0.4539	0.4597	0.6742
Husband's Education				
Illiterate	0.2778	0.5048	0.4206	0.5680
Literate/Primary	0.3206	0.5686	0.5120	0.7513
Middle and Matriculation	0.2650	0.4368	0.5404	0.7576
Above Matriculation	0.1486	0.3245	0.3380	0.5645
Husband's Occupation				
Professional/Clerk	0.1742	0.3546	0.3456	0.5524
Service/Sales	0.1869	0.3647	0.4307	0.6501
Fanning, Hunting etc.	0.2925	0.5525	0.5000	0.7491
Production/Transport	0.2756	0.4924	0.5418	0.7712
Others	0.2217	0.4189	0.3870	0.6064
Age at First Birth				
<20	0.4593	0.6250	0.5736	0.7296
20-22	0.2961	0.5178	0.5437	0.7675
23-27	0.0793	0.3491	0.3485	0.6369
28+	0.0070	0.1691	0.0233	0.4634
Sons Surviving				
0	0.0376	0.1525	0.3778	0.5691
1	0.1708	0.3306	0.5036	0.6890
2	0.3563	0.5778	0.5435	0.7809
3	0.3726	0.6398	0.4870	0.7748
4+	0.2673	0.5767	0.1910	0.5450
Total Children Ever Born				
1	0.0200	0.0492	0.0354	0.0727
2	0.1212	0.2292	0.5550	0.7147
3	0.3143	0.4697	0.6363	0.8248
4+	0.3498	0.6382	0.3650	0.6856
Sex of the First Child				
Male	0.2561	0.4600	0.4773	0.7046
Female	0.2100	0.4201	0.4742	0.7002
Total	0.2348	0.4416	0.4758	0.7024

TABLE 4. PROPORTIONAL HAZARD MODEL FOR TIMING OF STERILIZATION IN KERALA AND GOA

Variable	*Goa*		*Kerala*	
	β	*Hazard ratio*	β	*Hazard ratio*
Place of Residence*				
Urban	-0.1286	0.8794	0.0916	1.0959
Religion'	0.3420*	1.4078	0.8272	2.2869
Hindus				
Others	-0.8432*	0.4303	0.6781*	1.9701
Education of women'				
Illiterate	0.0887	1.0927	0.1716	1.1873
Literate/Primary	0.3082*	1.3610	0.3200*	1.3772
Middle School	0.2665	1.3054	0.2875*	1.3330
Work Status"				
Working	0.0167	1.0168	0.1538*	1.1663
Husband's Education*				
Illiterate	-0.2193	0.8031	0.3085*	1.3614
Literate/Primary	-0.1158	0.8907	0.4747*	1.6092
Middle and Matriculation	-0.0012	0.9989	0.4383*	1.5500
Husband's Occupation'	-0.2854*	0.7517	0.0517	1.0530
Service/Sales				
Farming, Hunting etc.	-0.0959	0.9086	0.1344	1.1439
Production/Transport	-0.0081	0.9919	0.2738*	1.3149
Others	-0.2248	0.7987	-0.0112	0.9889
Age at First Birth'	0.9640*	2.6221	1.4025*	4.0654
<20				
20-22	0.6620*	1.9386	0.9933*	2.7001
23-27	0.2176	1.2431	0.5117*	1.6682
Sons Surviving[1,]	0.5826*	1.7907	0.2602*	1.2972
1				
2	0.9391*	2.5578	0.2817*	1.3253
3	0.7720*	2.1640	0.3348*	1.3977
4+	0.4660*	1.5935	-0.2224	0.8006
Total Children Ever Born[1]				
2	1.8203*	6.1737	2.3415*	10.3968
3	2.5366*	12.6366	2.2464*	9.4536
4	2.6044*	13.5231	1.6566*	5.2415
Sex of the First Child'				
Male	0.0847	1.0884	-0.0124	0.9877
- Log L	6190		13641	
- Number of cases	2612		3532	
Censored cases	887		1649	

Reference categories : (a) rural; (b) Muslim; (c) High school and above; (d) Not working; (e) above matriculation; (f) Professional/Clerk; (g) 28 and above; (h) zero; (i) one; (j) Female.

* Significant at below 5% level.

the terminal method at an earlier age, if the husband has studied below matriculation. However, the occupation of husband is not a strong factor in explaining the timing of sterilization acceptance. The other factor which significantly influence the age at sterilization is the age at first birth. The women who had their first birth at an earlier age accepts the sterilization early. Women who deliver their first birth earlier may experience higher fertility and accept the terminal method earlier. The number of sons surviving has a strong influence on the acceptance and timing of sterilization in both the states. The results also suggest that male preference is higher in Goa than in Kerala. Similarly, the total children ever born is a more important factor in explaining the acceptance of sterilization in both the states. The results clearly indicate that in Kerala more lower parity women adopt sterilization at an earlier age. However in Goa, the acceptance is more among the couples who had experienced higher fertility.

In Goa, the fertility experience of the couples has a strong influence on the acceptance of sterilization. However, in Kerala the fertility experience along with some individual characteristic has a strong influence on the timing of sterilization acceptance. In Goa, male preference has a more inhibiting effect on the acceptance of sterilization. Hence in Goa, cultural factors along with programme factors might have played a major role in the acceptance of sterilization.

Conclusions

It has been observed from the analysis that in general the fertility of sterilized couples is higher than the non-sterilized couples irrespective of background characteristics. It has also been seen from the results that the sterilized couples have experienced a higher fertility during the five year period prior to the last birth. The couples might have been sterilized because of their experience of higher fertility and desire not to have an additional child. The results clearly indicate that the couples who have more than one child accept the sterilization quickly than couples who have only one child. The couples who have only one child may be relatively less fecund than other group of women, thus not accepting sterilization early. In Kerala, once the couples have achieved two or three children, the acceptance of sterilization is very quick, while in Goa it is faster, if the couples have three or more children. So it is evident that Goanese women accept the sterilization when they experience higher fertility than Kerala women.

Similarly in Goa, the preference for male children seems to be high and thus the acceptance of sterilization is strongly influenced by the surviving sons. Individual characteristics, except religious affiliation, are not strong enough to explain the timing of sterilization. It suggests that in Goa, cultural factors have a major role in the acceptance of sterilization. Since in both the states, the effect of the fertility experience on the timing of sterilization is higher than that of social and economic variables, it can be concluded that the timing of sterilization is largely dependent on the fertility experience of the couples. From the programme point of view, the significance of sterilization is higher in Kerala than in Goa, as in Kerala more younger and lower parity women accept sterilization. A high preference for sons in the state of Goa, might have lowered the acceptance of sterilization at

an earlier age and low parity.

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