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Effectiveness of Female Sterilization in Greater Bombay : Some Vital Issues for Reconsideration for the National Programme

Introduction

STERILISATION programme has been given major emphasis as an effective and safe method of ending reproduction in the Indian family planning programme. However, many studies have shown that the demographic impact of sterilization is low even though there has been a significant increase in the acceptance rate of male and female sterilization since 1964. In a recently held seminar[5] it was pointed out that the family planning programme in India did not give the desired impact as the timing of sterilization in relation to age and parity was late.

Against this background, the progress of the female sterilization programme in three Municipal Maternity Hospitals located in different regions of Greater Bombay, namely, Cadel Road Hospital, Rajawadi Hospital and Victoria Maternity Home, has been discussed for the period 1970-73 and compared with the performance of Greater Bombay as a whole. More than 90 per cent of the total female sterilizations have been post-partum and carried out in various maternity hospitals in Greater Bombay. The timing of sterilization in relation to age, parity and number of living children has been studied and

the programme effectiveness has been evaluated by working out the number of births averted.

Acceptors by Age

The acceptance rate of the female sterilization has been showing an increasing trend after 1967 in Greater Bombay. During the ten year period 1957-67, about 3500 tubectomies per year were performed in Greater Bombay. But the period 1967-73, the seven year period has recorded 95,318 tubectomies, a three fold increase[6]. The year 1973 for which the latest data are available, the largest number of tubectomies (22,127) have been performed in Greater Bombay. Table 1 gives the distribution of the tubectomised women by age for the three hospitals and for Greater Bombay. The relationship between age at sterilization and acceptance is curvilinear. The acceptance rate rises with age until the highest rate attained in 30-34 and then falls. This relationship has been observed for all the three hospitals and for Greater Bombay (Table 1). The lowest acceptance rate relates to ages below 20 and above 40. A perusal of the acceptors' age distribution reveals that the Victoria Maternity Home has attracted relatively younger women as compared with the other two hospitals of Greater Bombay. Both the mean age and the median age at sterilisation have not changed materially during the period 1970-73. But there is a slight decrease in the mean and median values for the Victoria Maternity Home.

Parity when Sterilised

Parity is an important variable determining the effectiveness of the sterilization programme. The programme should be aimed at attracting lower parity women so as to achieve maximum benefit in preventing the number of births. Table 2 gives the distribution of sterilized females by parity for the three hospitals and Greater Bombay for the period 1970-73. The acceptance rate increases with parity and attains the modal value at parity 4 and then dips gradually for all the years except in the case of the Cadel Road Hospital for the year 1971, where the model parity is 5. This reflects the fact that the motivation on the part of the couples increases with parity. An interesting feature observed here is that both mean and median parity show a steady decline during the period 1970-73 (Table 2). The mean parity has gone down from 5.04 in 1971 to 4.24 in 1973 and the median parity has recorded a decline from 4.83 in 1971 to 4.12 in 1973 for Greater Bombay. The accep-

TABLE 1 -DISTRIBUTION OF STERILISED FEMALES ACCORDING TO AGE DURING 1970-1973

*Greater Bombay**			*Cadel Road Hospital*				*Rajawadi Hospital***			*Victoria Maternity Home*			
Age Group	*1972*	*1973*	*1970*	*1971*	*1972*	*7973*	*1971*	*7972*	*1973*	*7970*	*1971*	*1972*	*1973*
15-19	—	0.01											
20-24	3.89[1]	4.01	1.14	0.78	0.99	2.56	5.84	2.33	2.63	1.46	1.93	4.20	5.06
25-29	30.78	32.39	21.44	22.01	22.85	30.35	35.06	15.19	16.17	33.33	31.13	29.38	41.07
30-34	47.45	45,36	61.70	56.44	57.29	53.04	44.94	60.78	60.15	49.71	52.34	50.62	43.45
35-39	16.26	16.25	15.22	19.65	18.22	13.10	14.16[s]	21. 70[3]	21.05[s]	15.50[3]	14.60[3]	15.80[3]	10.42[3]
40-44	1.60	1.85	0.49[2]	1.12[2]	0.65[2]	0.96[2]	—	—	—	—	—	—	—.
45+	0.02	0.13	—	—	—	—	—	—	—	—	—	—	—.
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Tubecto-mies	21242	22127	611	636	604	626	445	645	532	342	363	405	336
Mean Age	31.5	31.5	32.4	32.1	32.3	33.0	31.2	33.1	33.0	31.8	31.8	31.8	30.7
Median Age	31.3	31.2	32.1	32.4	32.2	31.4	30.5	32.1	32.1	30.7	31.0	31.1	30.0

*The acceptors' age distribution is on the basis of sample data. Data are not available by age for 1970-71.
**Data are not available for the year 1970.
1. Refer to the age group below 25.
2. Refer to the age 40 and above.
3. Refer ta the age 35 and above.

TABLE 2—DISTRIBUTION OF STERILISED FEMALES ACCORDING TO PARITY DURING 1970-73

Parity	*Greater Bombay**			*Cadel Road Hospital*				*Rajawadi Hospital***			*Victoria Maternity Home*			
	1971	*1972*	*1973*	*1970*	*1971*	*1972*	*1973*	*1971*	*1972*	*1973*	*1970*	*1971*	*1972*	*1973*
1	0.07	0.11	0.23	—	—	–	–	–	–	—	—	—	—	–
2	1.35	2.79	4.43	0.49	0.94	1.99	1.76	1.12	0.62	1.88	0.88	0.83	1.48	0.60
3	12.30	17.38	23.57	10.31	17.77	13.91	19.97	14.83	15.66	18.23	8.19	10.74	9.38	11.90
4	27.66	32-94	35.37	33.72	30.03	33.28	38.82	29.66	36.43	34.02	28.06	28.92	32.10	30.60
5	26.38	24.16	21.36	26.19	30.19	25.82	25.40	26.75	27.91	26.69	25.15	26.17	20.25	28.27
6	15.89	12.93	9.50	14.08	11.01	13.41	8.31	13.48	9.92	13.91	19.30	15.70	17.53	15.18
7+	16.35	9.62	5.54	15.21	10.06	11.59	5.74	14.16	9.46	5.27	18.42	17.64	19.26	1339
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Tubec-tomies	19405	21242	22127	611	636	604	626	445	645	532	342	363	405	336
Mean	5.04	4.71	4.24	5.01	4.72	4.79	4.40	4.91	4.63	4.51	5.23	5.11	5.12	4.93
Median	4.83	4.40	4.12	4.71	4.54	4.53	4.23	4.66	4.43	4.38	5.01	4.86	4.85	4.74

*Data are not available for the year 1970. The distribution by parity is on sample basis.

**Data are not available for the year 1970.

Median are calculated on the assumption that the parity is a continuous variable, 1st parity varies from 0.5 to 1.5, 2nd parity varies from 1.5 to 2.5 etc.

tance rate at any point of time depends, not only on the acceptors of that year, but also on the performance of the previous year. To make the rate really comparable, acceptance rate should be related to really eligible couples omitting those already sterilised. Though it looks simple, the problem is a complicated one if one tries to solve it. Among the three hospitals, Cadel Road Hospital has shown maximum annual percentage declines in the mean and median parity during the period 1970-73 (Table 3). However, these values are

TABLE 3—ANNUAL PERCENT DECLINE IN THE MEAN AND MEDIAN PARITY

	Annual Percentage Decline	
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	Mean Parity	*Median Parity*
Greater Bombay	5.3	4.9
Cadel Road Hospital	3.0	2.5
Rajawadi Hospital	2.7	2.0
Victoria Maternity Home	1.4	1.3

lower as compared with the decline taken in Greater Bombay. The decreasing trend of both mean and median parity during the period 1970-73 reveals the fact that the timing of sterilization in relation to parity is gradually receding to lower levels which is a healthy sign for the programme.

Acceptors by Number of Living Children

Table 4 gives the distribution of sterilized females according to the number of living children in Greater Bombay for three years 1971, 1972 and 1973. The mean number of living children from 4.61 in 1971 has gone down to 4.16 in 1973 for Greater Bombay. The median value also has shown a downward trend. More than 60 per cent of the acceptors are having 4 and more living children. Many studies have shown that there is a strong preference for male children among the Indian couples [7, 8]. According to the available data for Greater Bombay for the year 1972 the average number of male living children is 2.42 for tubectomised persons as against 1.86 for the vasectomised persons (Table 4). We may note that both mean and median numbers of living children are higher for sterilised females than sterilised males, the reason being that tubectomy cases are more selective to high fertility couples, and also most

of the females wait to be sterilised during next post-partum period as interval tubectomy is still not popular.

TABLE 4—DISTRIBUTION OF STERILISED PERSONS ACCORDING TO THE NUMBER OF LIVING CHILDREN IN GREATER BOMBAY

No. of Living children	*Percentage of*				
	Sterilised Females			*Sterilised Males*	
	1971	1972	*1973*	*1971*	*1972*
1	0.14	0.18	0.37	0.29	0.11
2	2.53	3.52	5.16	24.34	30.99
3	17.02	20.52	25.15	31.49	31.72
4	30.63	34.55	33.99	22.59	19.57
5	28.10	24.10	22.41	12.02	9.80
6	13.03	11.68	8.71	5.95	4.73
7+	8.55	5.38	4.21	3.32	3.08
Total	100.00	100.CO	100.00	100.00	100.00
Mean	4.61	4.42	4.16	3.54	3.34
Median	4.10	3.93	3.79	2.95	2.80
Average male living children	_	2.42	—	—	1.S6

SOURCE : D. N. Pai, "Religion as a Variable in Sterilisation", *In-Depth Course in Family Planning for Medical Doctors,* Bombay 19-23, August 1974, p. 34.

More than 90 per cent of the female sterilisations are the post-partum and are carried out in the maternity hospitals in Greater Bombay. Table 5 gives the number of deliveries and tubectomies performed in 1971, 1972 and 1973 for the three hospitals as well as for Greater Bombay. Out of those who have come for deliveries about 12.0 per cent have accepted sterilisation in Greater Bombay on an average during 1971-73. The corresponding ratios are 14.1 per cent in the Cadel Road Hospital, 13.6 per cent in the Victoria Maternity Home and 10.1 per cent in the Rajawadi Hospital. Roughly about 10 per cent of mothers of parity 3 have been taken out of reproduction annually in Greater Bombay and only 7 to 8 per cent of women are taken out of reproduction in the three hospitals considered here. The performance is no way an encouraging one especially when we view the fact that the objective of the Indian family planning programme is to reduce the proportion of women moving to parity 4 and above annually.

In this context the importance of spacing of births among women of earlier parities must be emphasised in the family planning programme. Under the present Indian conditions with low literacy levels, it i s rather difficult to create sufficient motivation among the couples of lower parity to accept the permanent methods of family planning. Several KAP studies were conducted in this regard, but the most recent one is by Operations Research Group conducted

TABLE 5—NUMBER OF DELIVERIES AND TUBECTOMIES BY PARITY
1971-73

			(A)	GREATER BOMBAY					
Parity	*No. of deliveries*			*No, of tubectomies*			*Percent tubectomies to deliveries*		
	1971	7972	*1973*	*1971*	*1972*	*,'973*	*1971*	*1972*	*1973*
1	49699	50513	54270	14	27	50	0.03	0.05	0.09
2	42484	42422	45987	262	595	980	0.6	1.4	2.1
3	32530	31006	34341	2386	3696	5216	7.3	11.9	15.2
4	19789	20915	22144	5367	6998	7827	27.1	33.5	35.4
5 and above	19161	21845	22215	11,376	9926	8054	59.4	45.4	36.3
Total	163663	166701	178957	19,405	21242	22127	11.8	12.7	12.4
				(B) CADEL ROAD HOSPITAL					
1	863	982	1107	Nil	Nil	Nil	0.0	0.0	0.0
2	1112	1256	1385	6	12	11	0.5	1.0	0.8
3	1036	1141	1082	113	84	125	10.9	7.4	11.6
4	702	600	547	191	201	243	27.2	33.5	44.4
5 and above	591	402	459	326	307	247	55.2	76.4	53.8
Total	4304	4381	4580	636	604	626	14.8	13.8	13.7
			(C)	RAJAWADI HOSPITAL					
1	792	1151	1072	Nil	Nil	Nil	0.0	0.0	0.0
2	907	1258	1304	5	4	10	0.5	0.3	0.7
3	855	1282	1198	66	101	97	7.7	7.9	8.1
4	724	960	992	132	235	181	18.2	24.5	18.3
5 and above	948	1753	2048	242	305	244	25.5	17.4	11.9
Total	4226	6404	6614	445	645	532	10.5	10.1	9.8

(D) VICTORIA MATERNITY HOSPITAL									
1	585	644	602	Nil	Nil	Nil	0.0	0.0	0.0
2	719	647	710	3	6	2	0.4	0.9	0.3
3	628	605	652	39	38	40	6.2	6.3	6.1
4	369	395	359	105	130	103	28.5	32.9	28.7
5 and above	430	412	376	216	231	191	50.2	56.1	50.8
Total	2731	2703	2699	363	405	336	13.3	15.0	12.5

on an all India level in 1970 [9]. Table 6 brings out clearly the differences in the demographic characteristics of users of various methods. It is very perti-

TABLE 6—DIFFERENCES IN THE DEMOGRAPHIC CHARACTERISTICS OF USERS OF VARIOUS METHODS

Method	*Average age of wife*	*Average No. of living children*	*Average No. of living sons*
Terminal methods	33.7	4.3	2.5
Diaphragm/jelly/foam tablet	34.7	3.8	^{2}-l
IUCD	31.4	3.8	2.1
Traditional methods	31.8	3.4	1.8
Condom	28.4	3.4	1.6
Oral contraceptive	27.4	2.3	1.1

SOURCE : Operations Research Group, Baroda : *Family Planning Practices in India. The First All India Survey Report* 1973, p. 48.

nent to evaluate critically the strategy of the Indian family planning programme giving heavy importance on sterilisations from the demographic point of view. The average age of wife is 33.7 years and the couple has 4.3 living children (children born alive will be more) in the case of sterilisations. With lowering of these figures the impact on fertility will be much greater. On an average, an Indian woman is only 26 years of age by the time she has 3 children [10]. The couples view that this age is too early for the acceptance of permanent contraception.

The same survey showed that couples do have a favourable liking for spacing between births of two children. Two or three years of spacing between births is favoured by slightly over 50 per cent of the couples [11]. It is suggested that the methods of spacing have to be given due importance as instruments of family planning, and the experience of other countries shows that the adoption of spacing automatically brings about the needed motivational force for resorting to the limitations of births earlier among the couples [12]. Since 90 per cent of total deliveries are taking place in maternity hospitals in Greater Bombay, with the active participation and involvement of medical personnel it is not a difficult task to inject sufficient motivation to the mothers who come for deliveries to accept temporary methods for spacing and eventually to go in for methods of limitation of births.

Effectiveness of the Programme

One of the ways of measuring the impact of the sterilisation programme is to work out the number of births that would have occurred in the population in the absence of the programme. This is tantamount to saying the number of births averted due to the acceptors of sterilisation. Two assumptions were made for the calculation of the number of births saved : (1) the acceptors will experience the same age specific marital fertility rates as that of the general population of Greater Bombay during the entire reproductive period and (2) the mortality level of the sterilised women and that of the general population is assumed to be the same. Joint survivorship ratios of husbands and wives have been worked out by assuming expectation of life at birth of 56.68 years for males and 57.37 for females in 1970* and further it has been assumed that the expectation of life at birth would increase by half year per year after 1970.

In the case of sterilisation a couple drops out of observation on wife's attainment of age 49 or earlier on death of spouse. Starting with the given cohort of married sterilised women by 5 year age groups, survivors within ages 15-49 at 5 yearly intervals are obtained by applying the joint survivorship ratios as obtained earlier. The number of children born to them in the follow-

*The expectation of life at birth of 52.18 for males and 52.87 for females have been taken from the paper : Sunendranath Singh, "Construction of Life Table for Greater Bombay" *Seminar paper presented at the International Institute for Population Studies,* Bombay, 1973-74.

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ing year is obtained by multiplying by relevant age specific marital fertility rates.* Thus the number of births are estimated to the initial acceptors of a particular year in the 1st, 6th, l1th, 16th, 21st and 26th year as it moves along in time. At the end of 30th year all the survivors will be aged 49 or over and hence none of the cohort will be under observation. Table 7 gives the total number of births that will be saved in the next 30 years due to the acceptors of tubectomies in a particular year for the three hospitals as well as for Greater Bombay.

TABLE 7—NUMBER OF BIRTHS AVERTED BY THE TUBECTOMY PROGRAMME

Hospital	*Year*	*No. of tubectomies*	*No. of births saved*	*Births saved per tubectomy*
Cadel Road Hospital	1970	611	749.2	1.22
	1971	636	774.3	1.21
	1972	604	732.2	1.21
	1973	626	869.2	1.38
Rajawadi Hospital	1971	445	710.5	1.59
	1972	645	759.8	1.17
	1973	532	637.9	1.19
Victoria Maternity	1970	342	475.0	1.38
Home	1971	363	501.5	1.38
	1972	405	630.5	1.55
	1973	336	531.5	1.58
Greater Bombay	1971	19405	27555	1.42
	1972	21242	29695	1.40
	1973	22127	32812	1.48

The estimates of the number of births averted given here cannot be considered exact as the calculations involve the assumption that the acceptors will experience the same age specific marital fertility rates as the general population throughout the reproductive span. If the acceptors fertility are higher than the non-acceptors then these are under estimates to some extent. Since

*The age specific marital fertility rates (233.06, 257.65, 261.56, 166.00, 82.89 and 25.50 for the respective age groups 15-19, 20-24, 25-29, 30-34, 35-39 and 40-44) have been taken from : J. R. Rele and Tara Kanitkar, "Fertility and Family Planning in Greater Bombay", unpublished survey report, IIPS, 1970 (typed).

the objective here is to compare the effectiveness of the programme, it does not matter very much whether these are over or under estimates.

Some interesting findings emerge on a closer perusal of Table 7. For example, in the Cadel Road Hospital the number of births averted in 1973 (869) is considerably higher as compared to 1971 (774) despite the fact that the number of tubectomies in 1973 (626) is lower than 1971 (636). The reason for this is seen in the comparison of age distributions of the acceptors for 1973 and 1971. The acceptors in 1973 are relatively younger as compared with 1971. Whereas in 1973 about 33 per cent of the acceptors were below age 30, the corresponding percentage in 1971 is only 22.8. The same explanation may be cited for the years 1971 and 1973 in the case of Rajawadi Hospital. Age distribution is the critical variable for the impact of the sterilisation programme. If the actual distribution turns out to be younger, more births will be averted and the birth rate will be still lower than the estimate, but if it is older, less number of births will be saved and the birth rate will be higher than the estimate.

Among the three hospitals considered here, Cadel Road Hospital has performed well in terms of the number of births likely to be saved in the next 30 years. But if we consider the number of births saved per female sterilization to an average cohort of acceptors in 1971, 1972 and 1973, it comes out to be 1.26 for the Cadel Road, 1.31 for the Rajawadi Hospital, 1.50 for the Victoria Maternity Home and 1.43 for the Greater Bombay as a whole. The effectiveness of the programme is not found to be appreciable because on an average only 1.43 births are likely to be saved per female sterilization performed. If this is the level of performance in Greater Bombay which is 100 per cent urban, the level of performance on an all India basis must be still worse. There is a wide difference in the practice of family planning between urban and rural areas of India. According to the recent all India Survey [13] 35.6 per cent urban couples are currently using or had used some method in the past as against only 14.3 per cent of rural couples. And more than 70 per cent of the total population in India is rural. Even if the prevalence of sterilisation were to increase in the coming years in India, its demographic effectiveness would not be great unless there is concomittant trend towards early timing. The possibilities for shifting of early timing of sterilization in India appears to be bleak because of high mortality of infants and young children. Unless the couples

are given an assurance that their children would survive, the motivation for the early acceptance of sterilization may be weak.

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