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Impact of Family Planning in Orissa

Introduction

THE overall impact of the population control programme adopted in a region cannot be ascertained only by taking into account the number of couples who are users of some method of family planning. The couples belonging to different age groups have a differential fertility rate which ought to be reflected in an index designed to measure the total picture of the population growth. If a married woman in the higher fertility age group adopts family planning measures her contribution in checking population growth is more than her counterpart in lower fertility age group. Thus for the purpose of assessing the overall impact of family planning measures it is not only necessary to ascertain the overall number of current practitioners but an analysis according to various age groups.

This problem of eliminating the differential fertility rate effect has been considered by Seal and Bhatnagar [3] by introducing the concept of *Standard Couple.* A *standard couple* is a couple whose wife is in the age group 20-24 where the fertility rate is found to be the highest. The couples whose wives are in other age group are converted into standard couples using suitable conversion factors. These conversion factors are based on age specific fertility rates.

The object of this article is to extend the procedure of Seal and Bhatnagar [3] to situations when the sampling design is more complicated and the estinia-

tion procedure is more involved. The method has been applied to the data obtained from a family planning survey in Orissa conducted by the author and his colleagues [1]. Finally, the percentage of standard couples protected in Orissa computed by using this method has been compared with the corresponding all Indian estimates provided by Seal and Bhatnagar [3].

The Method

Table 1 presents (i) the number of couples (frequency) (ii) number of couples currently using some method of family planning—such as vasectomy, tubectomy, IUCD and (iii) a factor for converting couples of any age group to standard couples. It shows the type of data required for computation of overall impact of family planning.

TABLE 1

Age Group of Mother	*Frequency*	*Conversion Factor*	*Current Practitioners*
15-19	f_1	c_1	p_1
20-24	f_2	c_2	p_2
25-29	f_3	c_3	
30-34	f_4	c_4	p_4
35-45	f_5	c_5	p_5

The total number of *standard* couple is given by $\sum_{i=1}^{5} f_i c_i$. Hence the percentage of *standard* couple protected due to the use of the particular method of family planning is

$$\sum_{i=1}^{5} p_i c_i \times 100 \Big/ \sum_{i=1}^{5} f_i c_i \qquad (1)$$

Seal and Bhatnagar [3] used the above technique to compute the percentage of standard couples protected by (i) Sterilization (ii) IUCD and (iii) Conventional Contraceptive at all India level. The values of c_1, c_2, c_3, c_4 and c_5 were taken as .72, 1.00, .90, .71, .41, respectively. Thus the women of age group 20-24 were assumed to have the highest fertility rate. The women in the first age

group were considered to be 72% as fertile as the women of the second age group, the women of the third age group were assumed to be 90% as fertile as the women of the second age group and so on.

The procedure described in the previous paragraph can be extended to estimate the percentage of standard couple protected when the observations have been collected using *stratified sampling*. Suppose the population under consideration is divided into s strata and in the jth stratum ($j=1, 2, \ldots, S$) the number of couples in the ith age group is f_{ji}. The corresponding expression for the number of couples using a certain method of family planning is given by p_{ji} ($i = 1, 2, 3, 4, 5$). Further, suppose that the sampling design is such that the estimate of the number of couples in the ith age group is

$$\sum_{j=1}^{s} w_j f_{ji} \tag{2}$$

The *estimate* of the number of couples using a certain method of family planning (such as vasectomy, tubectomy, IUCD, conventional contraceptive) in the ith age group is

$$\sum_{j=1}^{s} w_j p_{ji}. \tag{3}$$

Then an estimate of the percentage of standard couple protected is given by

$$100 \sum_{i=1}^{5} \sum_{j=1}^{s} w_j c_i p_{ji} \Big/ \sum_{i=1}^{5} \sum_{j=1}^{s} w_j c_i f_{ji}$$

$$100 \sum_{j=1}^{s} W_j B_j \Big/ \sum_{j=1}^{s} W_j A_j \tag{4}$$

where

$$B_j = \sum_{i=1}^{5} p_{ji} c_i,$$

$$A_j = \sum_{i=1}^{5} f_{ji} c_i,$$

$$j = 1, 2, 3, 4, 5, 6, 7, 8. \tag{5}$$

Application of the Technique to the Family Planning Survey in Orissa

We now apply this technique to the data of the Orissa family planning survey referred to earlier. The state was divided into *eight stratums* on the basis of literacy rate, actual performance of family planning and the general socio-economic and cultural pattern. The details of the sampling design is available elsewhere [2] and will not be presented here. The weights w_j ($j = 1, 2, 3, 4, 5, 6, 7, 8$) are given below :

$$
\begin{aligned}
w_1 &= 117.33 \\
w_2 &= 126.00 \\
w_3 &= 165.00 \\
w_4 &= 444 \\
w_5 &= 512 \\
6 &= 498 \\
w_7 &= 970 \\
w_8 &= 1262
\end{aligned}
$$

Table 2 shows the computation of B_j and A_j according to (5) for the eight strata separately for Sterilization (vasectomy and tubectomy combined), IUCD and Conventional Contraceptives. Tables 3 to Table 5 show the computation of the percentage of standard couples protected by these three methods.

Seal and Bhatnagar [3] computed the number of standard couples protected by sterilization, IUCD and conventional contraceptives in India on the basis of two age distributions. These results and the corresponding percentages are shown in Table 6. The percentages of standard couples protected by different methods compare favourably with the corresponding percentages obtained from the Orissa Survey.

References

1. Mustafi, C. K., Roy, R., Sarkar, S. R., 1972, *Survey on Family Planning in Orissa*, IIMC project sponsored by Ministry of Health and Family Planning, Government of India.
2. Mustafi, C. K., 1978, Family planning : some highlights of the Orissa survey, *Decision*, 5(1), 33-46.
3. Seal, K. C., and Bhatnagar, N. K., 1974, On a method of assessment of overall impact of family planning, *Studies on Population and Family Planning in India*, 91-96.

TABLE 2—SHOWING THE COMPUTATION OF A_j AND B_j IN DIFFERENT STRATUMS

Age Group	Conversion Factor (c_i)	Frequency (f_{ji})	Current Practitioners (p_{ji})		
			Sterilisation	IUCD	Conventional Contraceptive
Stratum I					
15-19	.72	147	—	—	5
20-24	1.00	388	8	1	40
25-29	.90	379	30	6	54
30-34	.71	233	40	6	28
35-45	.41	332	62	3	16
	Total :	1479	140	16	193
			$A_1 = 1136.49$	$A_1 = 1136.49$	$A_1 = 1136.49$
			$B_1 = 88.82$	$B_1 = 11.89$	$B_1 = 118.36$
Stratum II					
15-19	.72	186	—	—	7
20-24	1.00	317	2	—	21
25-29	.90	318	24	5	26
30-34	.71	242	33	4	25
35-45	.41	389	55	13	26
	Total :	1452	114	22	105
			$A_2 = 1068.43$	$A_2 = 1068.43$	$A_2 = 1068.43$
			$B_2 = 69.58$	$B_2 = 12.67$	$B_2 = 77.85$

Table 2 (*contd. on page* 206)

Table 2 (*contd. from page* 205)

Stratum III					
15-19	.72	158	—	—	2
20-24	1.00	293	2	2	19
25-29	.90	262	14	4	25
30-34	.71	211	30	3	18
35-45	.41	367	49	12	17
	Total :	1291	95	21	81
			$A_3 = 942.84$	$A_3 = 942.84$	$A_3 = 942.84$
			$B_3 = 55.99$	$B_3 = 12.65$	$B_3 = 62.69$
Stratum IV					
15-19	.72	274	1	—	2
20-24	1.00	314	14	—	6
25-29	.90	283	34	4	7
30-34	.71	225	43	1	10
35-45	.41	376	63	6	4
	Total :	1472	155	11	29
			$A_4 = 1079.89$	$A_4 = 1079.89$	$A_4 = 1079.89$
			$B_4 = 101.68$	$B_4 = 6.77$	$B_4 = 23.68$
Stratum V					
15-19	.72	515	—	—	10
20-24	1.00	678	13	3	31
25-29	.90	720	53	4	28
30-34	.71	557	64	3	14
35-45	.41	1045	204	10	14
	Total :	3515	334	20	97
			$A_5 = 2520.72$	$A_5 = 2520.72$	$A_5 = 2520.72$
			$B_5 = 189.78$	$B_5 = 12.83$	$B_5 = 79.08$

Table 2 (*contd. on page* 207)

			Stratum VI		
15-19	.72	286	—	1	3
20-24	1.00	367	11	—	15
25-29	.90	338	16	7	9
30-39	.71	225	18	2	3
35-45	.41	465	74	6	—
	Total :	1681	119	16	30
			$A_6 = 1227.52$	$A_6 = 1227.52$	$A_6 = 1227.52$
			$B_6 = 68.52$	$B_6 = 10.90$	$B_6 = 27.39$
			Stratum VII		
15-19	.72	171	—	—	1
20-24	1.00	280	4	1	4
25-29	.90	277	13	4	11
30-34	.71	178	18	4	1
35-45	.41	378	33	2	2
	Total :	1284	68	11	19
			$A_7 = 933.78$	$A_7 = 933.78$	$A_7 = 933.78$
			$B_7 = 42.01$	$B_7 = 8.26$	$B_7 = 16.15$
			Stratum VIII		
15-19	.72	—	—	—	—
20-24	1.00	64	—	—	—
25-29	.90	106	3	—	—
30-34	.71	64	2	—	—
35-45	.41	125	15	—	—
	Total :	359	19	—	—

$A_8 = 256.09$
$B_8 = 10.27$

TABLE 3—SHOWING THE COMPUTATION OF PERCENTAGE OF STANDARD COUPLES PROTECTED BY TERMINAL METHODS

Stratum	*Vasectomy and Tubectomy combined*		
	A_j	B_j	W_j
1.	1136.49	88.82	117.33
2.	1068.43	69.58	126.00
3.	942.84	55.99	165.00
4.	1079.89	101.68	444.00
5.	2520.72	189.78	512.00
6.	1227.52	68.52	498.00
7.	933.78	42.01	970.00
8.	256.09	10.27	1262.00

A_j = Sample total number of standard couple.
B_j = Sample total number of standard couple protected by terminal method.

$$\sum_{j=i}^{8} A_j W_j = 4033872.09 \qquad \sum_{j=i}^{8} B_j W_j = 258573.36$$

P. C. of standard couples protected

$$= 100 \sum_{j=i}^{8} B_j W_j \Big/ \sum_{j=i}^{8} A_j W_j = 6.41$$

TABLE 4– SHOWING THE COMPUTATION OF PERCENTAGE OF STANDARD COUPLES PROTECTED BY IUCD

Stratum	A_j	B_j	W_j
1.	1136.49	11.89	117.33
2.	1068.43	12.67	126.00
3.	942.84	12.65	165.00
4.	1079.89	6.77	444.00
5.	2520.72	12.83	512.00
6.	1227.52	10.90	498.00
7.	933.78	8.26	970.00
8.	256.09		1262.00

$$\sum_{j=i}^{8} A_j W_j = 4033872.09 \qquad \sum_{j=i}^{8} B_j W_j = 28989.98$$

P. C. of standard couples protected

$$100 \sum_{j=1}^{8} B_j W_j \Big/ \sum_{j=i}^{8} A_j W_j = 0.72$$

TABLE 5—SHOWING THE COMPUTATION OF PERCENTAGE OF STANDARD COUPLES PROTECTED BY CONVENTIONAL CONTRACEPTIVES

Stratum	A_j	B_j	W_j
1.	1136.49	118.36	117.33
2.	1068.43	77.85	126.00
3.	942.84	62.69	165.00
4.	1079.89	23.68	444.00
5.	2520.72	79.08	512.00
6.	1227.52	27.39	498.00
7.	933.78	16.15	970.00
8.	256.09	0.00	1262.00

$$\sum_{0=i}^{8} A_j W_j = 4033872.09 \qquad \sum_{j=i}^{8} B_j W_j = 114348.73$$

P. C. standard couples protected

$$100 \sum_{j=i}^{8} B_j W_j \Big/ \sum_{j=i}^{8} A_j W_j = 2.83$$

TABLE 6—SHOWING THE SEAL-BHATNAGAR ESTIMATES OF THE STANDARD COUPLES PROTECTED BY DIFFERENT METHODS OF FAMILY PLANNING ALONG WITH THE CORRESPONDING ESTIMATES OF THE ORISSA SURVEY

Method	*No. of standard couples (All India) : in thousand*		*No. of standard couples protected (All India) : in thousand*		*Percentage (All India)*		*Percentage in Orissa Survey*
	Age of Distribution I	*Age of Distribution II*	*Age of Distribution I*	*Age of Distribution II*	*I*	*II*	*(Orissa)*
1. Sterilization	73287	73287	5504	4455	7.51	6.08	6.41
2. I. U. C. D.	73287	73287	1221	1134	1.69	1.55	0.72
3. Conventional Contraceptives	73287	73287	1637	1521	2.23	2.08	2.83