R. Kumar

The Effects of an Integrated MCH/FP Programme on Fertility

THE relationship between adoption of contraceptives and reduction in fertility is assumed to be a fundamental one in the measurement of effectiveness of any family planning programme. For a fertility-controlprogramme to be effective, it is imperative that an inverse correlation is found between contraceptive use and fertility indices. The greater the magnitude of this relationship, the more successful the fertility programme, is the general model which guides impact assessment of programmes aiming at reducing fertility through contraceptivesuse. The extent of causal relationship is of extreme importance for advocating adoption of programme promotional techniques, determining cost-effectiveness of the model and for decision-making for programme replication. The lesser the magnitude, the higher per unit cost for a given sum.

Possible effects of a family planning program can be grouped in two categories : (i) indirect effects, and (ii) direct effects. "The probable indirect effects of a family planning programme (through fertility change) on infant and child mortality, female labour force participation and so forth, vary markedly from country to country and within nations, insofar as strategies and goals of social economic development differ. The direct effects of a family planning programme, however, are not so variable. A successful family planning programme is expected to lengthen a child spacing interval and reduce family size for women of child-bearing ages, resulting in a decrease in the rate of natural increase in the target area" (Teachman *et al,* 1978, 113).

Teachman *et al.* (1978, 114) in their article cited above, refer to four sets of techniques used in measuring the impact of family planning on levels of fertility : "(i) procedures focusing on birth rates (Wolfers, 1968; Freedman *et al.* 1969;Bogue, 1971), (ii) multivariant approach (Hermaline, 1968; Schultz 1978)

compares the rate of fertility change in an area(s) prior to the introduction of family planning program with the rate of change after the program is begun. Any acceleration in the rate of decline in fertility that coincides with the onset of program activities is attributed to the program, (iii) a third set of techniques is control or match group procedure (Chow, 1968; Chong *et al.*, 1969; Chow *et al.*, 1969) is similar to the one that focuses on birth rate, but the expected trend for the target area in the absence of a program, is based upon the trends in a similar area which has no program, (iv) The fourth set of procedures focuses on birth averted (Mouldin, 1968; Kelly, 1971)" In these techniques the number of women years protected by contraception are converted into the number of births averted. The number of births averted is then taken as a measure of family planning program effectiveness. The component method designed by Teachman *et al.* (1978) studies contraception and birth relationship by decomposing the amount of total contraception protection into within and outside program sources.

United Nations (1978, 4) has classified different methods that have been proposed to examine the impact of family planning on fertility into the following categories :

(a) standardization approach;
(b) trend analysis;
(c) experimental designs;
(d) couple-year of protection (CYP);
(e) component projection approach;
(/) analysis of reproductive process;
(g) regression analysis (including path analysis)
(h)) simulation models.

Evaluation of a fertility control progress could suffer from a number of methodological problem : accurate estimation of numerator and denominator, quantification of the impact of extraneous variables, selection of appropriate indices measuring effectiveness, selection of an appropriate study—design, adequate sample size etc. The United Nation's Department of Economic and Social Affairs (1978, 6) has classified the methodological issues in evaluation of a fertility program into the following six categories :

(1) potential fertility;
(2) data requirement problems;
(3) interaction problems;
(4) uncontrolled variables;
(5) independence of methods; and
(6) cost-precision analysis.

In measuring the impact of contraceptive use on fertility behaviour of a population for this study, a number of problems were encountered. Estimating the accurate number of births, particularly, for the initial phase of the study, was the main problem, which was overcome through the application of a technique based upon regression theory (Kumar, 1981).

The Study

The data used in this analysis are taken from a field trial designed to test under field conditions, the interactions between different combinations of an integrated MCH/FP programme and to measure their impact on fertility behaviour of the experimental populations. The study-design was a factorial experiment consisting of five treatment modalities, four receiving different combinations of maternal, child and family planning services—family planning, women service and child care (FP + WS + CC); family planning and women services (FP + WS); family planning and child care services (FP + CC) and family planning education (FP EDU), and the fifth serving as a pure control. In this paper a comparative analysis of the four treatment modalities (excluding the control) is made to ascertain their impact on fertility indices of the experimental population.

While evaluating the impact of different combinations of MCH and FP services on fertility, the author has used a number of methods. For comparing performance of each treatment group the basic design was experimental in nature (2 x 2 factorial). Within this experimental design, comparative-time-trend analysis technique was used to determine the relationship between contraceptive use and decline in fertility in the different treatment modalities. The standarised approach was applied to quantify the total impact on fertility over the experimental period without relating it to potential fertility, as the main objective was to determine the comparative decline in fertility among the different treatment groups.

The empiricial evidence gathered is not conclusive because of some methodological problems, yet it provides an extremely interesting insight into fertility behaviour of the experimental populations and points to some important guidelines for policy formulation.

Impact on Fertility Indices

Assessment of the impact of increase in the percentage of eligible couples using contraceptives on fertility indices presupposes a negative correlation. Though establishment of such a relation could suffer from a number of methodological problems yet from a sound population policy point of view, it is imperative that such a relation be determined and its strength measured.

In attempts to determine the nature and extent of this relationship, the increase in the percentage of ever (FPE) and current (FFC) users and changes in CBR and GFR in different treatment modalities was traced for the experimental period (Table 1).

TABLE 1—PERCENTAGE OF EVER AND CURRENT USERS OF FP METHODS, DIFFERENT FERTILITY INDICES BY YEAR AND TREATMENT GROUPS

Treatment group	*Year*	*Percentage of*		*Fertility indices*	
		Ever users (FPE)	*Current users (FPC)*	*CBR*	*GFR*
FP + WS + CC	1970	21.06	19.60	31.35	194.99
	1971	32.23	29.24	28.91	181.82
	1972	40.14	33.61	32.64	211.44
	1973	46.43	37.23	26.75	178.90
FP + WS	1970	25.66	23.89	31.17	188.37
	1971	33.87	30.65	28.90	174.94
	1972	41.19	34.99	35.15	212.64
	1973	49.57	40.19	26.19	162.00
FP + 8	1970	N.A.	N.A.	27.12	172.74
	1971	18.73	17.93	31.15	199.:0
	1972	32.57	25.03	25.03	161.21
	1973	42.50	30.65	25.34	168.66
FP Edω	1970	N.A.	N.A.	N.A.	N.A.
	1971	N.A.	N.A	N.A.	N.A.
	1972	12.43	11.11	24.79	163.68
	1973	32.51	27.35	30.68	203.05

N.A. stands for data not available.

it shows the relationship between increase in the percentage of ever and current users and changes in birth rate (point-prevalence rates). Though the pattern is marked with fluctuations, the overall change points to the downward trend. It also suggests that in FP 4- WS -\- CC treatment group, almost after one year of introduction of family planning services, the CBR started to decline. During the following year it registered an increase and then again declined. Within this "N-shaped" pattern an overall decline in CBR is evident.

The pattern exhibited by FP + WS treatment model is similar to the one shown by FP 4- WS 4- CC. Trends shown by FP + CC and FPEdu groups of villages are rather difficult to interpret. During the first year CBR showed an upward trend in FP -]- CC treatment modality and then during the following year it stabilized. Instead of registering decrease (like the other two treatment groups), CBR in this treatment group showed an upward trend during the first year of family planning services. Perhaps it is because of child care services which were being provided to the experimental population long before the introduction of the family planning services (because there was a common treatment group shared between the two experiments). Nothing much can be said about FP Edu. group of villages as there are only two observation points. With increase in the percentage of ever and current users, the CBR also showed an increase. The observed pattern in CBR could either be attributed to the contraceptive-use-behaviour of the previous year or it may reflect the problems with the data collected during the first year of the experiment or the fluctuations that CBR has shown in all other treatment groups.

Total decline in CBR (between June 70 and June 73) in FP + WS + CC group of villages is estimated to be 4.6 points (Table 2). Increase in the percentage of ever and current users during the same period is 25.37 and 17.63 respectively. The observed data show that in FP 4 WS + CC group of villages for one point decline in CBR an increase of 5.52 and 3.83 in the percentage of ever and current users respectively was needed. For the same period, total decline in FP + WS group of villages was observed to be 4.99 points, an increase of 4.79 and 3.27 in the percentage of ever and current users for one point decline in CBR. For estimating total decline in CBR among FP + CC group of villages, we used the period between June 71 and June 73 as family planning services in this treatment group only started during 1971. A decline of 5.81 points in CBR was observed in this treatment group. For one point decline in CBR, increase in the percentage of ever and current users works out to be 4.09 and 2.19 respectively. Among villages receiving FP Edu. treatment an increase of 5.89 points in CBR is observed, which could be either because of the fluctuations in the CBR or the problems with the data.

On the surface, the preceding analysis suggests that of all the treatment modalities, FP 4- CC has registered maximum decline in CBR (excluding FP Edu. treatment group) though the difference is negligible.

TABLE 2—RELATIONSHIP BETWEEN INCREASE IN CONTRACEPTIVE USE AND CHANGES IN CBR OVER THE EXPERIMENTAL PERIOD BY DIFFERENT TREATMENT MODALITIES

Treatment group	*Increase in the percentage of (June 70 to June 73)*		*Changes in CBR — = decline + = increase (June 70 to June 73)*	*Increase in percentage of ever users for one point decline in CBR*	*Increase in percentage of current users for one point decline in CBR*
	Ever users	*Current users*			
FP + WS 4- CC	25.37.	17.63	-4.60	5.52	3.83
FP + WS	23.91	16.30	—4.99	4.79	3.27
FP + CC	23.77*	12.72*	—5.81	4.09	2.19
FP Edu	20.08@	16.24@	+ 5.89	3.41	2.75

* Increase from June 71 to June 73
@ Increase from June 72 to June 73

Perhaps, as people constituting FP + CC treatment group were receiving child care services (as part of the Nutrition Project) long before the introduction of family planning services, the child care services could have been responsible for acceleration in the decline of birth rate (which could be attributed to the child survival hypothesis). Or perhaps we happend to select a point prevalence birth rate which was at the upper end of the "fluctuation". Out of the two treatment groups which seem to have least "problems", provision of the family planning services in conjunction with the women health services has proved to be most effective in reducing CBR. As compared to 5.52 increase in percentage' of ever users in FP + WS + CC group of villages for one point decline in CBR, the FP + WS group of villages needed an increase of 4.79. The corresponding figures for current users for FP + WS + CC and FP + WS is 3.83 and 3.27 respectively.

The Pearson product moment correlation between CBR and percentage of ever and current users gave value of the coefficient for FP + WS + CC group of villages to be -.4590 and -.2949 respectively (Table 3). For FP + WS treatment modality value of the coefficient for the same variables works out to be —.3182 and —.3111. These coefficients indicate that though the magnitude of the relationship is not very strong, there exists an inverse correlation between CBR and percentage of ever and current users of family planning methods. Again a small number of observations (maximum of four for a treatment group) may to some extent affect reliability of this test. The Pearson product moment correlation for FP Edu. group of villages is meaningless as there are only two observation points.

TABLE 3—PEARSON PRODUCT MOMENT CORRELATION BETWEEN CBR AND FPE, FPC AND DURATION BY TREATMENT GROUPS

Treatmen group	*Pearson product moment correlation between CBR ami*					
	FPE		*FPC*		*Duration*	
	r	r^{r2}	*r*	*r2*	*r*	*r2*
FP + WS + CC	—0.4590	0.2107	—0.2949	0.0869	—0.4972	0.2447
FP + WS	—0.3182	0.1013	-0.3111	0.0968	—0.2959	0.876
FP + *CC*	—O.8683	0.7539	—0.9805	0.9604	-O.S427	0.7101
FPEdu	*	*	*	*	*	*

* Because of only two observation points, *r* is meaningless.

The Pearson product moment correlation also shows that 21 per cent of the variance *(r2)* in CBR in FP + WS + CC treatment group was attributed to the percentage of eligible couples using contraceptive—FPE (Table 3). This variable in FP + WS group of villages only accounted for 10 percent of the variance. However, the value of r^{r2} for FP -',- CC group of villages shows that FPE accounted for 75 per cent of the variance in CBR. The higher value of *r2* for FP + CC treatment modality may be because of a comparatively small number of observations. The Pearson product moment correlation between CBR and FPC in FP + W S + CC and FP + WS groups of villages accounted for approximately 10 per cent of the variance. Variance explained by duration for which family planning services were provided in FP + WS + CC and FP -H WS treatment modalities works out to be 24 and 9 percent respectively. However, it explains 71 per cent of the variance in FP +- CC group of villages.

The analysis presented indicates that overall (except FP Edu. group of villages) there were marked fluctuations in the trends exhibited by CBR. Though on the whole there is a downward trend, the "noise" appears to overshadow it. Lack of significant *r* is primarily because of the "short" experimental period. Had that experiment continued for a longer period providing more observation points, both statistical tests and trends, most likely, would have exhibited a definitive declining trend. Absence of statistically non-significant correlation is not necessarily an indication of lack of evidence of decline in fertility.

In attempts to measure the impact of methods of contraception on fertility, the second indicator that was used is general fertility rate (GFR). Again, like CBR a negative correlation was hypothesized between increase in the percentage of ever and current users and changes in GFR.

Patterns exhibited by changes in GFR and increase in percentage of eligible couples using contraceptives are shown in Table 1.

The observed pattern showing relationship between contraceptive use and GFR is almost similar to the one shown in the case of CBR. Though, on the whole, there is a downward trend, marked fluctuations, again, make it difficult to make an explicit statement. The fluctuations in the trends are perhaps primarily due to the short experimental period. Had the experiment continued for a larger period, thus giving us more observation points, these fluctuations would presumably have stabilized to show a definite pattern. The patterns shown by other treatment groups are also similar to the ones shown in case of CBR.

TABLE 4—RELATIONSHIP BETWEEN INCREASE IN CONTRACEPTIVE USE AND CHANGES IN GFR OVER THE EXPERIMENTAL PERIOD BY DIFFERENT TREATMENT MODALITIES

Treatment group	*Increase in the percentage of (June 70 to June 73)*		*Changes in GFR — — decline + = increase (June 70 to June 7.1)*	*Increase in percentage of ever users fur one point decline in GFR*	*Increase in percentage of current users for one point decline in GFR*
	Ever users	*Current users*			
FP + WS + CC	25.37	17.63	- 16.09	1.58	1.10
FP + WS	23.91	16.30	-26.37	0.91	0.62
FP + CC	23.77*	12.72*	— 4.08	5.83	3.12
FP Edu	20.08@	16.24@	+ 39.37	0.51	0.41

* Increase from June 71 to June 73
@ Increase from June 72 to June 73

A decline of 16.09 points was observed in GFR among the villages receiving FP + WS + CC services (Table 4). The observed decline shows that for one point decline in GFR an increase of 1.58 in the percentage of ever users and 110 for current users was needed. Corresponding figures for FP + WS group of villages is 0.91 and 0.62 respectively. For one point decline in GFR an increase of 5.83 in the percentage of ever users and 3.12 in the percentage of current users was needed among villages receiving FP + CC services. FP Edu. group of villages showed an increase in GFR which may be for the reasons discussed earlier. From this analysis also it is evident that FP + WS group of villages proved to be the most effective mix in terms of decline in GFR as it required the least increase in the percentage of eligible couples using method of contraception.

One of the interesting observations which deserves attention is the relationship between decline in GFR and increase in the percentage of people using

Contraceptives. There appears to be a marked difference in the increase in the percentage of people using contraceptives for one point decline in GFR in the different treatment groups. With almost the same increase in the percentage of ever and current users in FP + WS + CC and FP + WS groups of villages, decline in GFR in FP + WS group of villages is 1.64 times more than FP + WS -I- CC treatment group. In terms of duration for which the Family Planning services were provided to these two treatment modalities, both have received them for almost the same length of time. Hence, duration cannot be considered as a variable which could be attributed to the difference. Another possibility could be difference in the pattern of contraceptive use. Again, there appears to be no significant difference in the utilization pattern among the two treatment groups. Other factors such as drop-out rate, duration of use etc. are similar and hence are not helpful in explaining the variance. Further research would be useful in this area.

References

1. Teachman, Jay D., Dennis, P. Hogan and Doland, T. Boguc. 1978, A component method for measuring the impact of a family planning program on birth rates, *Demography*, 15(1).
2. United Nations, 1978, *Met/tods of Measuring the Impact of Family Planning Programmes on Fertility : Problems,* New York, Department of Economic and Social Affairs.