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## **Contribution of Some Socio-Economic Variables Towards Explaining the Level of Adoption of Various Family Planning Devices in India During 1987**

### **Introduction**

It is well known that India with long established family planning programme still has low level of contraceptive use. Apart from this, the method wise performance of contraceptive devices varies from state to state on a large scale. Therefore, the general question may be as to why family planning performance should differ from state to state when the organisational set-up for running the programme is almost same in all the states. What are the factors which affect the method-wise performance? Also to accept the IUD or to use conventional contraceptives somewhat different factors, from those which cause the acceptance of sterilisation, may be responsible. Thus, the topic of family planning offers a wide spectrum of areas for investigation. The foregoing is meant as a quick review of the family planning programme in the country. We do not intend to go into greater detail as a host of literature on such topic is available. In the present paper, the path analysis is applied to the data of the year 1987 to discuss some of the above mentioned issues.

Having access to the complete data file and adequate computational facilities, it is always preferable to use a procedure such as path analysis (Pullum 1978). This procedure is unique for examining the complex system of relationships in a systematic manner by virtue of its component analysis of correlations and determinations in terms of direct, indirect, net and joint effects which is not possible by simple correlation analysis. Path analysis is nothing but a standardised multiple regression analysis. The partial regression coefficients thus obtained are independent of physical units and measure the direct effect of one variable on another. The set of variables considered here may not be exhaustive enough to describe the complete cause effect system. However, it may be made closed by introducing a dummy variable 'X' so as to account for the influence of the unidentified variables for all other causes not included in our model. Further, the dummy variable may be dropped if one is interested in the components of R-square only. Also it is a difficult task to consider the characteristics of individual couples which are responsible for the contraceptive use. These

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characteristics may, however, be summed up in the form of several socio-economic and other characteristics of geographical units, e.g. states. It is worthwhile to note that the observations made at the state level may provide clues to the factors responsible for such differential performance by methods. It is needless to mention that these clues contain policy implications relevant to the population and family planning programme in the country.

### Material and Methods

A large number of variables affect the performance of the family planning programme (Srikantan1989). Some of the socioeconomic variables are education, rural and urban residence the roles and status of the wife within and outside the family and relevant characteristics of the husband. In addition, demographic variables such as age structure of the couples in the reproductive age group, age at marriage and family size also play important role regarding performance of the programme (Srikantan et al, 1988). The choice of variables thought to be associated with contraceptive use is, of course, problematic specially in case of paucity of reliable data. However, Jain (1971), Agarwala (1972), Vig (1972) and Pathak and Prasad (1976a) have carried out studies to assess variations in the overall state-wise performance in family planning with the help of certain socioeconomic and programme execution variables which have been able to explain a major portion of the variance (over 70 per cent). However, as the selection of variables to be included in the model must be quite restricted under path analysis, we have taken into consideration a common set of four variables (Pathak and Prasad, 1976b). These variables are the number of service centres per 10,000 eligible couples ( $X_1$ ), per capita income ( $X_2$ ), percentage of urban population ( $X_3$ ) and general literacy rate i.e., number of literate persons per 100 population ( $X_4$ ).

The data on the variable  $X_2$  to  $X_4$  alongwith those on family planning acceptance rates per thousand couples by method ( $X_5$ ) were taken from Statistical Outline of India, Year Book (89-90). However, the data on variable  $X_1$  was obtained from the data on state-wise service centres as well as eligible couples statistics reported in the Family Planning Year Book (88-89). The data pertain to sixteen major states of India. The correlation matrix ( $r_{ij}$ ) based on the data for the year 1987 is presented in Tables 1 and 2. The statistical model adopted for the present analysis is a simple linear model to describe the cause-effect system of the variables considered above. The model alongwith detailed analytical procedure has been described by Pathak and Prasad (1977).

TABLE 1 : CORRELATIONS BETWEEN INDEPENDENT VARIABLES AND METHODWISE ACCEPTANCE RATES FOR 1987

Method-wise performance variables	Independent variables			
	$X_1$	$X_2$	$X_3$	$X_4$
$X_5$	-0.18497	0.48288	0.49708	0.63452
$X_i$	0.31540	0.84713	0.22899	0.11940
$X_c$	0.02002	0.78600	0.20415	0.10540

$X_5$  : sterilisation,  $X_i$  : IUD insertions,  $X_c$  : conventional

TABLE 2: INTER-CORRELATIONS OF INDEPENDENT VARIABLES FOR 1987

Variables	$X_1$	$X_2$	$X_3$	$x_4$
$X_1$	1.0000	0.20827	-0.16326	0.32073
$x_2$	0.20827	1.00000	0.47278	0.33812
$x_3$	-0.16326	0.47278	1.00000	0.34370
$x_4$	0.32073	0.33812	0.34370	1.00000

## Results

The results based on path analysis are presented in Tables 3 and 4. The direct effect of variable  $X_i$  on variable  $X_5$  is given by  $P_{5i}$  and the indirect effect of the variable  $X_i$  on  $X_5$  through  $X_j$  by  $r_{ij} P_{5j}$ . Further, the net effect of the variable  $X_i$  on  $X_5$  is given by  $P_{5i}$  and  $2P_{5i}P_{5j} r_{ij}$  gives the joint effect of the variables  $X_i$  and  $X_j$  on  $X_5$ . The observations made under the present article are presented under successive paragraphs.

The value of  $P_{54}$  clearly demonstrates that literacy rate (0.65453) played a very dominant role in motivating couples for accepting sterilisation. Further, per capita income (0.34024) was noted to exert more effect on sterilisation than that by urbanisation (0.036110). Negative effect on sterilisation was noticed by service centres (-0.45985). The maximum indirect effect on sterilisation was exerted by per capita income (0.22131), urbanisation (0.22496) and service centres (0.20993) through literacy rate. The indirect effects of both urbanisation as well as literacy rate through per capita income were also noticeable. However, other indirect effects were quite low. Like direct effect, the net effect of literacy rate (0.42841) on sterilisation was also found to be quite significant. Further, the net effect of service centres (0.21146) and per capita income (0.11576) were also noticeable. However, urbanisation exerted quite low net effect (0.00131) on sterilisation. The joint effect of only per capita income and literacy rate was found to be noticeable positive (0.15060). But, the negative joints; effects of service centres and per capita income (-0.06517) were causing low values of the coefficient of determination,  $R^2$ . However, the predictability of these variables came to be about 68% showing the adequacy of the present set of variables for explaining variations in the performance of sterilisation.

In the case of IUD insertions, per capita income exerted maximum direct effect (0.93724) followed by service centres (0.17012). However, the direct effects of urbanisation (-0.11306) as well as literacy rate (-0.21320) were observed to be negative. But, the indirect effects of all other variables urbanisation (0.44311), literacy (0.31690) and service centres (0.19520) through per capita income were noteworthy. Other indirect effects were almost negligible. The net effect of only per capita income (0.8784) was noted to be significant. The negative joint effects causing low values of the coefficient of determination,  $R^2$ , were of per capita income with both urbanisation and literacy as well as of service centres and literacy. However, it is noteworthy that the predictability of the present set of variables for explaining variations in the IUD insertions came to be about 80 per cent.

TABLE 3: COMPONENT ANALYSIS OF SIMPLE CORRELATION COEFFICIENTS BY FAMILY PLANNING METHODS FOR 1987

	$X_s$	$X_i$	$X_c$
$r_{35}$	0.49708	0.22899	0.20415
$P_{53}$	0.03619	-0.11306	-0.26942
$r_{34} P_{54}$	0.22496	-0.07328	-0.02296
$r_{32} P_{52}$	0.16086	0.44311	0.46283
$r_{31} P_{51}$	0.07508	-0.02777	0.03370
$r_{45}$	0.63452	0.11940	0.10540
$P_{56}$	0.65453	-0.21320	-0.06679
$r_{34} P_{53}$	0.01244	-0.03886	-0.09260
$r_{34} P_{52}$	0.11504	0.31690	0.33101
$r_{34} P_{51}$	-0.14749	0.05456	-0.06620
$r_{25}$	0.48288	0.84713	0.78600
$P_{52}$	0.34024	0.93724	0.97896
$r_{23} P_{53}$	0.01711	-0.05345	-0.12738
$r_{26} P_{54}$	0.22131	-0.07209	-0.02258
$r_{21} P_{51}$	-0.09577	0.03543	-0.04299
$r_{15}$	-0.18497	0.31540	0.02002
$P_{51}$	-0.45985	0.17012	-0.20643
$r_{13} P_{53}$	-0.00591	0.01846	0.04399
$r_{14} P_{54}$	0.20993	-0.06838	-0.02142
$r_{12} P_{52}$	0.07086	0.19520	0.20389

As regards to the use of conventional contraceptives, per capita income exerted maximum direct effect near unity (0.97896) indicating its extra-ordinary contribution regarding performance of conventional contraceptives. Further, all the remaining three variables had negative direct effects being -0.26942 of urbanisation, -0.20643 of service centres and -0.06679 of literacy. However, like in case of ILJD insertions, noteworthy indirect effects of these variables through per capita income were 0.46283, 0.20389 and 0.33101 respectively. The net effects of these variables were quite less. But, the net effect of per capita income was near unity (0.9584) in this case also. The joint effects of literacy, service centres and urbanisation with per capita income and that of service centres and urbanisation were negative causing low values of the coefficient of determination,  $R$ . However, predictability of the present set of variables for explaining variations in the state level use of conventional contraceptives came to be about 70 per cent.

TABLE 4: COMPONENT ANALYSIS OF COEFFICIENT OF DETERMINATION BY FAMILY PLANNING METHODS FOR 1987

Components of determination	$X_3$	$X_1$	$X_2$
<i>Net Effect</i>			
$P_{34}^2$	0.42841	0.0455	0.0045
$P_{33}^2$	0.00131	0.0122	0.0726
$P_{32}^2$	0.11576	0.8784	0.9584
$P_{34}^2$	0.21146	0.0289	0.0426
Total	0.75694	0.9650	1.0781
<i>Joint Effect</i>			
$2P_{33}P_{34}r_{34}$	0.01628	0.0166	0.0124
$2P_{33}P_{32}r_{32}$	0.01164	-0.1002	-0.2494
$2P_{33}P_{31}r_{31}$	0.00543	0.0063	-0.0182
$2P_{34}P_{32}r_{42}$	0.15060	-0.1351	-0.0442
$2P_{34}P_{31}r_{41}$	-0.19307	-0.0233	0.0088
$2P_{32}P_{31}r_{21}$	-0.06517	0.0664	-0.0842
Total	-0.07429	-0.1693	-0.3748
$R_{3,1234}^2$	0.68265	0.7957	0.7033

### Concluding Remarks

On the basis of the observations made in the present article one may associate variations in inputs and economic variables with variations in the number of adoption of method wise family planning among the states during 1987. Also, changes over time may be discussed considering the observations made by Pathak and Prasad (1977) for the years 1967-70 and 1970-73 and Dwivedi and Pandey (1986) for the year 1981.

It may be worthwhile to note that since last two decades, literacy has played an extra-ordinary role in motivating couples for accepting sterilisation. There was consistent increase in its direct influence over time. Moreover, there has been significant indirect influence of all the three variables namely service centres, per capita income and urbanisation through literacy on sterilisation performance. Also, joint effect of per capita income and literacy was noticeable. However, service centres were noted to have negative direct influence on sterilisation with its increasing magnitude over time. In contrary to the above observations, service centres exerted maximum direct effect on sterilisation followed by per capita income during 1967-70. Also, literacy and urbanisation exerted negative direct influence service centres. Similar observations were made in terms of net and joint effects. Also, the present set of variables almost indicated improvement in its predictive value over time ranging from 47 per cent to 68 per cent in explaining the statewide variation in

sterilisation performance. In view of the above mentioned facts, it may be summarised that for last two decades there has been greater contribution of education in motivation of the couples to adopt sterilisation. Accordingly, there is need of improvements in the level of literacy and education particularly among housewives and the adult male population which may contribute significantly in their motivation raising the level of sterilisation performance. It may, however, be noted that with the break-up of the total sterilisation done in and outside camps it would have been easier to study the nature of the factors responsible for the statewise variations in sterilisation performance.

As concluded by Pathak and Prasad (1976) and Dwivedi and Pandey (1986), the per capita income was still found the most dominant variable influencing IUD insertions and use of conventional contraceptives. A very high direct effect of near to unity clearly indicates the outstanding contribution of the economic status of the states. The service centres played the second important role. However, in the case of conventional contraceptive users, its direct effect for the period 1987 was observed as negative indicating dependency of conventional contraceptives on the day to day wish of the users. The direct effects of urbanisation and literacy were noticed as negative everytime but their maximum indirect effects were also registered through per capita income. Thus it may be summarised that further improvement in the economic condition of the states may be expected to exert strong and immediate effects on IUD insertion and conventional contraceptive use. This is in agreement with a very strong plea made by Gupta (1975). Considering the values of coefficient of determination, it may be said that this set of variables is adequate to explain the variations in IUD insertion and conventional contraceptive use among the states. Thus, it may be concluded that improvements in economic status and literacy of the states may strengthen the overall performance of the family planning programme.

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