

The Emergency and After—An Evaluation of the Recent Performance of the Indian Family Welfare Programme¹

Introduction

INDIA was the first country to officially adopt family planning as one of the aims of Central Government Policy. In April 1951 when the First Five-Year Plan was scheduled to start, the Planning Commission recognized the need for birth control and apportioned some funds for research into the methods of birth control.

Since then the program has been given greater emphasis in succeeding Five-Year Plans and in recent years has become a central issue in Indian politics. The program was initially set up to promote : (a) acceptance of a small size family; (b) better health for mothers; and (c) ready availability of supplies and services. Upto 1961 the program retained this passive approach and achieved disappointing results. The discouraging results of the 1961 census hastened a switch from this 'clinic approach', where the government confined its role to the establishment of clinics and the supply of contraceptives, to the 'cafeteria system'—a more active extension approach in which attempts were made to educate the public about the various contraceptives and to promote their adoption. From then on family planning was given a greater priority in Central planning

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culminating in the National Population Policy statement of 16 April 1976 that stressed that the population problem could not wait for the slow process of development and that a more decisive approach was required. States were given the right to authorize mandatory sterilization. The use of targets for sterilizations in the various States moved people to abuse power in fulfilling them. The policy proved unpopular at the polls in 1977. Since then the program has been in a state of flux and has followed no clear direction. However, the recently released results of the 1981 census have been disappointing and moves are afoot to set the program back on course.

A glance through the history of the program indicates that the experiment with sterilization was similar to earlier experiences with Intra-Uterine Devices (IUDs) and condoms. With each contraceptive there was an encouraging initial acceptance that slowly trailed off because of shifting government emphasis or adverse publicity or excessive program promotion (*see* Cassen, pp. 190-191). Through the 'cafeteria approach' the program promoted IUDs, then condoms and finally sterilizations (see Table 1). Each of these attempts at promoting a single contraceptive program was unsuccessful.

In searching for a different policy for the future the Government is considering a report by the Working Group on Population Policy. They advocate mortality decline as a policy goal as well as a regional approach to family planning in which the program would concentrate on development in less developed States and on contraception in developed States (Government of India, March 1979).

The model presented in this paper looks at Statewise rural data on the birth rates, contraceptive acceptances, family planning program variables and related socio-economic variables. The first stage looks at the effect of program and socio-economic variables on the acceptance of contraceptives. The next stage then looks at the effects of the use of contraception on the birth rate. We thus look at the success of the Government in promoting contraceptive use and then see how effective contraception is in reducing the birth rate.

The results show that acceptance of contraception can be well explained by the program and socio-economic variables. Thus the program has been effective in increasing the use of contraceptives. However, our model shows this is not enough because contraceptive use exerts a minor influence on the birth rate. The contraceptives are not being used effectively and further results from our model show that low literacy rates may explain part of the problem.

Several other models, some discussed later in the paper, have attempted to explore the effectiveness of the program and our conclusions—not very different from those of other models—are accurately summed up by Asok Mitra "Family planning must form an important element of the total package of the development and democratic processes. They are the two legs on which the country must walk towards a time-bound goal." (Mitra, 1978 : 746). We would go a

TABLE 1—FAMILY WELFARE ACCEPTORS BY METHODS—ALL INDIA

<i>Year</i>	<i>Sterilizations</i>	<i>I.U.D. insertions</i>	<i>Equivalent C. C. users</i>
1956	7,153	—	—
1957	13,736	—	—
1958	25,148	—	—
1959	42,302	—	—
1960	64,338	—	—
1961	104,585	—	—
1962	157,947	—	—
1963	170,246	—	297,613
1964	269,365	—	438,903
January 1965 to March 1966	670,823	812,713	582,141
1966-67	887,368	909,726	464,605
1967-68	1,839,811	668,979	475,236
1968-69	1,664,817	478,731	960,896
1969-70	1,422,118	458,726	1,509,378
1970-71	1,329,914	475,848	@-1,962,725
1971-72	2,187,336	488,368	@-2,354,904
1972-73	3,121,856	354,624	@-2,397,904
1973-74	942,402	371,594	@-3,009,995
1974-75	1,353,859	432,630	@-2,520,939
1975-76	2,668,754	606,638	@-3,527,606
1976-77	8,261,173	580,700	@-3,692,291+
1977-78	948,769	325,680	@-3,252,570+
1978-79*	1,483,080	551,808	@-3,602,663+

@-Net of Nirodh distributed free to vasectomised cases.

* Provisional.

+ Includes equivalent oral pill users also.

1 Includes users of conventional and other contraceptives (condoms, jelly, foam tablets, pills, etc.)

SOURCE : Family Welfare Yearbook 1978-79, Table D. 1.

step further and say that a greater emphasis should be placed on development till such time when the population increases its own basic motivation for family planning and improves the efficiency of the program's efforts.

Theory

In the recent past several models have been estimated to gauge the effectiveness of the family planning program. One by Parthasarthy studied the correlation between the percentage of couples protected by contraception and the percentage urban population, the percentage of working females and the percentage of literate females. He concluded that the proportion of urban population exerted a stronger influence on acceptance of contraception than female literacy. His data ran up to March 1972.

Earlier Agarwala took data from 1967-70 and regressed a composite variable of the acceptance rates of sterilizations, IUDs and conventional contraceptives against 18 dependent variables grouped under the headings of manipulative and non-manipulative variables. Manipulative variables included program personnel and expenditure per 100 eligible couples. Non-manipulative variables included the percentage of urban population, the per capita income and the general literacy rate among the population aged 15 years and above. He estimated that of the 87% of the total variation in contraception explained by the two variables 19% was explained by non-manipulative variables, 56% by manipulative variables and 12% by interaction (Models from Jain, pp. 22-23).

Bhaskar Misra estimated a model to measure the differential performance of the States. His dependent variable was the cumulative performance of IUD and sterilizations per 1000 population until 1971-72. His independent variables consisted of two 'program' variables—medical and para medical personnel per 10,000 eligible couples and annual expenditure on family planning per 1000 eligible couples—and two 'development' variables—per capita income and per capita consumption of electricity. He found that one 'program' and one 'development' variable could explain 80% of the variation in acceptance of contraception. No explanatory variable was better than any other and additional variables did not add to the explanatory power of the regression (Misra, pp. 1778-79).

All the previous models we have considered, regressed contraceptive use against program and socio-economic variables. They estimated contraceptive usage as a function of the program inputs, income and development variables. We have used a similar approach in one stage of our estimation but the structural framework of our model is different and the period is 1975-78.

Our model is a utility maximization model. We assume that every household attempts to maximize utility as a function of the number of children they have (n), the goods they consume (X) and of their tastes (s). In maximizing utility

a household sets an optimal rate of child production (births). Each household has a particular level of fertility that would give rise to their uncontracepted family size (\bar{N}). The number of children they actually have is n and so the number of births averted is $(\bar{N} - n)$. Depending upon the number of births averted that coincides with their utility maximization level, households have a derived demand for contraceptives (C_i). The choice of contraceptive is made on the basis of its price (P_{C_i}) and effectiveness in reducing births. The total consumption of the household is governed by its income Y .

So we have the following model :

$$\text{Maximize } U = U(n, X, \varepsilon)$$

$$\text{subjected to } \bar{N} - n = a(C_1 \dots C_n)$$

$$\text{and } Y = P_x X + \sum_{i=1}^k P_{C_i} \cdot C_i$$

Upon applying the Lagrangian multiplier to this system, we get a set of simultaneous equations as our first order conditions.² Upon solving the system of simultaneous equations we get the following equations

2. We want to solve the Lagrangian

$$L = U(n, X, \varepsilon) + \lambda(Y - P_x X - \sum P_{C_i} C_i)$$

with the additional constraint $\bar{N} - n = a(C_1 \dots C_k)$. When we substitute in this constraint into the utility function we get

$$L = U(\bar{N} - a, X, \varepsilon) + \lambda(Y - P_x X - \sum P_{C_i} C_i)$$

Differentiating the Lagrangian with respect to the C_i s we get

$$\frac{\partial L}{\partial C_i} = \frac{\partial U}{\partial n} \cdot \frac{\partial n}{\partial C_i} + \lambda(-P_{C_i}) = 0 \text{ (set to zero at maximum)}$$

or

$$-\left(\frac{\partial U}{\partial n} \cdot \frac{\partial a}{\partial C_i}\right) - \lambda P_{C_i} = 0.$$

We get k equations of this form as well as the following two

$$\frac{\partial L}{\partial X} = \frac{\partial U}{\partial X} - \lambda P_x = 0.$$

and

$$\frac{\partial L}{\partial \lambda} = Y - P_x X - \sum P_{C_i} C_i = 0.$$

These are the first order conditions and we have $k + 2$ equations and $k + 2$ unknowns. Upon solving this system of simultaneous equations we get the contraceptive demand equations.

$$\begin{aligned}
C_1 &= C_1 (P_1 \dots P_k, P_x, \epsilon, Y) \\
C_2 &= C_2 (P_1 \dots P_k, P_x, \epsilon, Y) \\
&\cdot \\
&\cdot \\
&\cdot \\
&\cdot \\
C_k &= C_k (P_1 \dots P_k, P_x, \epsilon, Y) \\
X &= X(P_1 \dots P_k, P_x, \epsilon, Y)
\end{aligned}$$

which are the derived demand equations for the various contraceptives.

The births averted equation can be rewritten as :

$$n = \bar{N} - a (C_1 C_2 \dots C_k)$$

and can therefore be estimated as a birth rate equation.

We thus have two parts to our model. In the first part we estimate the derived demand functions for the contraceptives and in the second part we estimate a birth rate production function that includes the use of different contraceptives as production inputs.

Our theory would lead us to expect certain signs on some of the coefficients we are estimating. We would expect a reduction in the price of contraceptives to cause the utility maximizing consumer to substitute towards greater use of contraceptives. But at the same time there is an income effect because a reduced price of contraceptives would lead to a higher real income. If we assume children are normal goods the increased income resulting from the income effect would lead to a greater demand for children and an accompanying reduction in the demand for contraceptives. Hence the effect of a reduction in the price of contraceptives on contraceptive use is indeterminate.

In the birth rate production function equation we can be less ambiguous about our predictions because we expect an increase in contraceptive use (the production inputs) to increase the number of births averted (the goods produced) and hence reduce the birth rate. Thus, if the birth rate is our dependent variable we expect the signs on the contraceptive variables to be negative if in fact the contraceptives are effective in reducing the birth rate.

With this underlying theoretical framework we proceeded to examine the available data and selected the data that best quantified our conceptual model. We made some compromises and the theory behind the legitimacy of the compromises appears in the data section.

Data and Specification of the Model

The analysis dealt with data for the period 1975-78 for the seventeen major States in India, giving us 68 separate observations. The smallest State selected

was Jammu and Kashmir. Only rural areas were considered, constituting 78.3 percent of the Indian population (see Yearbook). Much of the data was obtained from the Family Planning (later Family Welfare) Yearbooks that were published regularly from 1974-75 onwards.

The four main areas analyzed were birth rates, contraceptive usage, 'price' of contraceptive and miscellaneous taste and income variables. Crude live birth rates were available for all the States through the Sample Registration System. Contraceptive usage was split up into three basic categories—sterilizations, IUDs and other contraceptives. Sterilizations included both vasectomies and tubectomies. The category of other contraceptives was dominated by condoms but also included foam tablets and jelly. Towards the end of the period the oral pill was introduced and was included under this heading. A rural/urban break-up was available for all these variables except for conventional contraceptives. The only figure available on the rural/urban breakup of condoms was a national figure for India published in the report on family planning by the Operations Research Group (ORG) in Baroda. A national figure was not of use in the model. A combined rural and urban model was considered but was abandoned because, as S. P. Jain puts it, "the two areas represent different worlds so far as the family planning program is concerned" (Jain, 1975 : 26). However, in the condom equations we had to use combined rural and urban data for lack of any better alternative.

In measuring the price of contraceptives we resorted to using three program variables as proxies for the prices of contraceptives³—the number of health centres, family planning centres and the total number of employees in the rural family welfare programs per eligible rural married couple. The health centre variable was a simple sum of the rural health centres and sub-centres and was divided by the number of rural married couples between the ages 15-44—what we termed as the eligible group. Data on the eligible group was obtained from the 1971 census and so was held constant over the years of analysis but varied

3. Assume only one form of contraceptive and let P_1 = price of the contraceptive = f (Program) and C_1 = use of the contraceptive = $C_1(P_1)$ (see theory section). Since we want to estimate $\partial C_1/\partial P_1$ we can use program inputs as proxies for the price of the contraceptive.

The program, as a proxy for the price of contraceptives, can be used to determine the sign of the effect of the underlying price of the contraceptives on contraceptive use in the following manner :

$$\frac{\partial C_1}{\partial \text{Prog}} = \frac{\partial C_1}{\partial P_1} \times \frac{\partial f}{\partial \text{Prog}}$$

We assume that program inputs reduce the price of the contraceptive to users so that $\partial f/\partial \text{Prog}$ must be negative. Knowing that, we can get the sign of $\partial C_1/\partial P_1$ from the sign of $\partial C_1/\partial \text{Prog}$. So we can effectively use program inputs as proxies to determine the sign of $\partial C_1/\partial P_1$.

across the States. The family planning variable was also a sum of the rural family planning centres and sub-centres but included in addition the family planning clinics set up under the Minimum Needs Program.⁴ The personnel variable included all personnel employed by the family welfare program including volunteers, regardless of their level of skill. Both the family planning centre and worker variables were also divided by the eligible group. There was some overlap between the variables for health centres and family planning centres because on several instances both were housed under the same roof. However, when they were not, the effect was significant because a family planning clinic without an accompanying health centre for backup post-operative care is likely to be much less effective.

Politics led to the promotion of camps in 1971 and the de-emphasis of condoms in 1974-75. Politics also led to the Emergency and the stepped up program in 1976-77. To account for that we added a dummy variable for 1976.

Choosing the income and taste variables was difficult and we had to find variables to estimate the effects of literacy, income, earnings and religion. In determining fertility, female literacy is more important than total literacy (Javali, 1978) and so we used the figure for the percentage of literate females above 15 years of age. In measuring the level of earnings we felt the child and female wages were important for the purposes of family planning. If we controlled for both of these the income variable would pick up most of the effects of the male wage rate. Since we had a rural model we chose to use child and female agricultural wages for 1970-71. For the income variable we used the Net Domestic Product of each State per capita at current prices. We would have liked to have had an agricultural per capita series for our rural model but had to settle for the total industrial and agricultural Net Domestic Product per capita. The final variable we chose was the religion variable which was the prorortion of Hindus in each State because prevalent religious attitudes towards contraception could affect the program. We considered including a variable for the percentage of Muslims in each State but found that religious differences were not great enough to justify the inclusion of two separate religion variables. The per capita series was an annual series and the wage rate series were for 1970-71. All the taste variables were from the 1971 census. All the income and taste variables except for the per capita series were fixed through the period of analysis.

We expected certain signs on the coefficients of our income and taste variables. The effect of literacy was expected to increase the level of contraception and reduce the birth rate because literate people are more likely to have smaller

4. Family planning sub-centres established under the program after 4/1/1974 were shown to be established under the Minimum Needs Program because there was a ban on establishment of subcentres under the Family Planning Program (Yearbook 1975-76. p. 106).

families, preferring to spend more time on activities other than child raising. Also, if we assume children are normal goods, we would expect the effect of the income variables on contraception to be negative. But it is possible that children could be inferior goods and that a higher standard of living would encourage households to reduce the family size and improve the quality of their children's lives.

One important detail in the choice of data was that we had no measure of the fecundity of the population. In the production function and in the derived demand equations we had no variable to measure the fecundity of the population and this left us with a missing variable and a possibility of biased error terms. However we accounted for that in our model specification.

The Model

The main problem facing us, as we have already discussed, was the problem of missing variables. We had no measure of fecundity and could not obtain any data on couples practicing rhythm or abstinence. With all these extraneous factors in our error term for the demand equations we did not want our equation for the production function to be distorted. Hence the basic specification of our model was a first stage in which we estimated the demand for contraception using independent instruments such as program inputs, income and taste variables and a second stage using the fitted values of contraception demand obtained from the first stage in an equation estimating the production function of the birth rate. We used two-stage least squares and our results in the second stage measured the effect of contraceptives on birth rates having controlled for the missing variables in the first stage. If we had regressed contraceptive use directly on the birth rate we would have had biased error terms because of the missing variables we have discussed. If instead we used exogenous program, income and taste variables as instruments, to estimate fitted values of the contraceptives that were uncorrelated (in the limit) with the error terms, we would get consistent estimates of the contraceptive parameters (Maddala, p.232).

We have

$$BR = f_1(C, F, I, \varepsilon) \quad F = \text{Missing Vars} \quad C = \text{Contraceptives}$$

$$I = \text{Income}$$

$$\text{and} \quad C = f_2(F, I, \varepsilon) \quad \varepsilon = \text{Tastes}$$

We estimated $\hat{C} = f_3(I, \varepsilon) + U_1$ and then estimated $BR = f_4(\hat{C}) + U_2$ in the second stage. The error term U_1 in the first stage was biased because of the missing variables. By using fitted values for contraceptive usage obtained from the first equation, in the second equation i.e. using two stage least squares, we minimized the bias caused by the missing variables on the estimates provided

by the second equation.

The first step in our investigation was to estimate the demand functions for the different forms of contraceptives to see how effective program inputs were in promoting contraception. We could not obtain a satisfactory index to weigh the effects of the different contraceptives so as to get one series for total contraception and so we estimated separate demand functions for sterilizations, IUDs, conventional and other contraceptives and for cumulative sterilizations. This was the first stage of our two stage least squares model.

In the second stage of our model we measured the effect of contraception on the birth rate. We only had one equation with the crude birth rate as the dependent variable and fitted values of IUD, conventional contraceptives and cumulative sterilization acceptances (from the first stage) as the independent variables. We chose cumulative sterilizations over annual sterilizations in estimating this birth rate production function because sterilizations are terminal and once performed are good for the patient's lifetime. Hence sterilizations performed in the past have a bearing on the fertility of the population today.

To investigate the effects of literacy in making the use of contraceptives more effective we interacted the female literacy rate with the use of IUDs and other contraceptives and added the two variables to both stages of the model. The theory behind the step was that literate women would know more about IUDs and other contraceptives and so would make their use more effective in averting births.

The birth rate equation in the second stage regressed the crude live birth rate against contraception a year earlier. Hence the birth rate data ran from 1975-78 while the other data extended through the period 1974-77. This allowance was made in order to account for the nine month period of conception.

Basic variable definitions : The following is a list of the variables used in the model along with their model names. Table 2 has summary statistics on each of them.

Contraceptives

- CS* : Cumulative sterilizations since inception of the program/eligible couple
- C* : Conventional and other contraceptive users/eligible couple
- I* : Intra uterine contraceptive device users/eligible couple
- T* : Sterilizations/eligible couple (by year)

Program Variables

- W* : Number of personnel employed (including volunteers) by the family planning program/eligible couple
- F* : Number of family planning clinics and subcentres/eligible couple

TABLE 7—PROFILE OF MODEL DATA

	<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum value</i>	<i>Maximum value</i>	<i>Std. error of mean</i>
Birth rate (<i>BR</i>)	336.53846154	43.56786263	253.0000000	445.0000000	5.40392828
Per Cap. (<i>PCAP</i>)	1027.94117647	288.82189328	596.0000000	1991.0000000	35.02479921
FPC variable (<i>F</i>)	0.00035320	0.00010685	0.00009871	0.00060277	0.00001296
HC variable (<i>P</i>)	0.00629444	0.00007695	0.00016785	0.00052537	0.00000933
IUD variable (<i>I</i>)	0.00601026	0.00809476	0.00005828	0.04886661	0.00098163
Other contraceptive var. (<i>C</i>)	0.03044044	0.03845870	0.00206637	0.20231648	0.00466380
Child wage (<i>CWG</i>)	178.68750000	53.53144010	108.0000000	283.0000000	6.69143901
Female wage (<i>FWG</i>)	258.68750000	103.41208597	133.0000000	500.0000000	12.92651075
Proportion Hindu (<i>PCH</i>)	790.82352941	188.05373487	304.0000000	963.0000000	22.80486506
Sterilization var. (<i>CS</i>)	0.20948698	0.10376668	0.05326359	0.52534535	0.01258356
Female literacy (<i>FLR</i>)	1402.94117647	1200.04857964	340.0000000	5780.0000000	145.52726617
Dummy (<i>DUM</i>)	0.25000000	0.43623217	0.0000000	1.0000000	0.05290092
Worker variable (<i>W</i>)	0.00085596	0.00033498	0.00023508	0.00161992	0.00004062
Condom interaction (<i>FC</i>)	41.01642407	48.67500906	1.26048514	186.36774374	5.90271187
IUD interaction (<i>FI</i>)	8.24620932	11.24094418	0.09207647	49.97612514	1.36316471
Sterilization (Annual) (<i>T</i>)	0.03290477	0.03525927	0.00036704	0.13432982	0.00427581

P : Number of health centres and subcentres/eligible couple
DUM : Dummy for observations in 1976

Income and Wage Variables

PCAP : Net Domestic Product Per capita at current prices

FWG : Average female agricultural wage

CWG : Average child agricultural wage

Literacy and Religion

FLR : Literate women/10,000 women

PCH : No. of Hindus/1000 total population

Other

BR : Crude live birth rate/10,000 population

FC : Product of *FLR* and *C*

FI : Product of *FLR* and *I*

\hat{C} : Fitted value of *C* derived from first stage used in second stage

Note : Eligible couples are rural married couples between the ages 15-44.

Results

There was no data for wages for Jammu and Kashmir and birth rate data for a couple of years for Bihar and West Bengal. Taking these omissions into account there were 61 observations. The results obtained in estimating the derived demand equations for contraceptives are shown in Table 3.

The Derived Demand Equations. We had good explanatory power from the independent variables and all the *R*-squares were above 0.74. All the *F*-ratios were also at 99% level of significance. So the joint significance of the variables was high even if the specification of the equation was not ideal.

In interpreting the results it was difficult to predict the signs of the regression coefficients. Due to the reduction in the price of contraceptives caused by the increase in program inputs, there were both income and substitution effects that affected the use of contraceptives. Also, there was substitution away from the contraceptives whose usage could be recorded, to traditional methods like rhythm and abstinence. Within the recorded contraceptive category there were substitution effects between the non-terminal methods such as condoms and IUDs and the terminal methods such as sterilization. Another factor affecting sterilization data was that during this period sterilizations were a sensitive issue and the consequent misreporting of statistics could show up as 'noise' in our data.

TABLE 3— DERIVED DEMAND EQUATIONS FOR CONTRACEPTIVES

<i>INDEP VARS</i>										
<i>DEP VARS</i>	<i>Intercept</i>	<i>W</i>	<i>P</i>	<i>F</i>	<i>FLR</i>	<i>PCAP</i>	<i>FWG</i>	<i>CWG</i>	<i>DUM</i>	<i>PCH</i>
<i>C</i>	-0.159	22.090	-87.424	63.383	1.20E-5	4.07E-5	3.97E-4	-2.17E-4	4.12E-3	1.04E-3
<i>R</i> ² = 0.8217	(-5.542)	(1.951)	(-2.350)	(1.517)	(-3.774)	(3.330)	(4.809)	(-1.568)	(0.727)	(3.564)
<i>F</i> -Ratio = 26.12										
<i>I</i>	-0.029	3.681	-11.274	19.196	-2.78E-6	-3.58E-6	1.21E-4	-7.84E-5	1.98E-3	2.27E-5
<i>R</i> ² = 0.7423	(-3.980)	(1.272)	(-1.185)	(1.797)	(-3.422)	(-1.147)	(5.720)	(-2.218)	(1.363)	(3.047)
<i>F</i> -Ratio = 16.32										
<i>T</i>	-0.027	32.333	-5.171	-71.520	1.78E-6	1.50E-5	-7.71E-5	1.30E-4	0.667	2.75E-5
<i>R</i> ² = 0.8010	(-0.965)	(2.980)	(-0.145)	(-1.786)	(0.586)	(1.281)	(-0.975)	(0.983)	(12.269)	(0.983)
<i>F</i> -Ratio = 22.81										
<i>CS</i>	-0.151	53.177	-31.597	7.895	2.53E-4	3.55E-4	-1.22E-3	9.08E-4	0.0466	7.73E-5
<i>R</i> ² = 0.8014	(-1.932)	(1.724)	(-0.312)	(0.0694)	(2.921)	(10.666)	(-5.416)	(2.412)	(3.019)	(0.973)
<i>F</i> -Ratio = 22.86										
<i>Note</i> : The figures in parentheses are the <i>t</i> -statistics.										

In considering the effects of the wage variables, it was important to bear in mind the employment patterns in India. Children are sent to work only in the lowest income categories. The employment pattern of females has a bimodal distribution. Females from the lower and upper income categories find employment while the females from the middle income families remain as housewives.

Keeping these factors in mind we obtained the results of the estimations and interpreted them. It is important to keep in mind that three of the equations were estimated on data about annual acceptance of the contraceptive while the cumulative sterilization equation was estimated on data accumulated since the inception of the program. We felt this was necessary given the terminal nature of sterilizations. Also, we regressed cumulative sterilizations on the same independent regressors as the other annual series and this could have meant an error in specification. However, it did provide a consistent estimate for the second stage of the model where fitted values of cumulative sterilizations were used to estimate the birth rate equation.

The equations for conventional contraceptives and IUDs had similar signs on the coefficients for most of the regressors but varied in the magnitude of the coefficients with all the coefficients being stronger in the case of condoms. An increase in the number of workers and in the number of family planning clinics both lead to increased use of condoms and IUDs. The effects are stronger in the case of condoms but the coefficient for clinics is more significant in the case of IUDs. This could mean that workers increase the use of condoms more effectively through active promotion while increases in the insertions of IUDs are more likely if there are clinics within easy access to insert IUDs and to service them after insertion. The effect of the primary health centres is different. In the case of condoms we have a strong, significant negative PHC effect while in the IUD case the PHC effect is weaker and of little significance. The effect on condoms could be explained by the fact that the addition of PHCs to an area provides easier post-operative care for IUD acceptors and sterilized patients and so could lead to a substitution away from condoms. There are significant negative female literacy effects on both contraceptives as well as significant negative child wage effects. The female wage has significant positive effects and the religion variable also has significant positive effects on the use of both these contraceptives.

The strong influence of the Emergency on sterilizations comes out clearly in the significance of the dummy variable. There is also a strong positive worker effect and a strong negative clinic effect. The only other variable with some significance is the income effect which is positive. It appears that over the period of analysis the dominant effect on sterilizations was the aggressive promotion policy followed by the Government that included coercion as well as an increase in the number of program workers (especially volunteers, who are in-

cluded in the worker totals).⁵ The negative clinic effect could imply that there are understaffed clinics (because we are controlling for workers in the equation) which are ineffective in promoting sterilizations and lead to substitution to other forms of contraceptives.

The picture that emerges thus far is that family planning workers unambiguously promote every form of contraceptive and are most effective in promoting sterilizations and IUDs because these methods require personnel for implementation. Family planning clinics are also effective in promoting contraception but if understaffed (i.e. the result of a program emphasis on increasing the number of clinics rather than workers per clinic), lead to a bias in favour of non-terminal contraceptives, possibly because sterilizations require the most persuasion and greatest expertise. The effect of the health centres is mostly insignificant except for a negative effect on condom use possibly because the health centers cause people to substitute away from conventional contraceptives by providing easier access to post-operative care for IUD acceptors and sterilization.

The data bears out some interesting income and wage effects on contraception. The income effect on the conventional contraceptives is positive and significant while on IUDs the effect is weak, negative and barely significant. The effect on sterilizations is positive and is stronger and more significant than IUDs. The reason for the negative income effect on IUD use could be that higher income users substitute away from IUDs. The child wage reduces non-terminal contraception but increases sterilization although the sterilization coeffi-

5. During the Emergency out of a national total of 70,333 workers, 12,178 were voluntary workers (Yearbook 1975-76, Table G. 4).

If we take the coefficients for the IUDs and the interactive IUD term and add them to get the total effect of IUDs we get the following results. The literacy variable used is the female literacy rate.

Let $\alpha = \text{coeff for } I$
 $\beta = \text{coeff for } FI.$

Addition gives us

$$\alpha + \beta F$$

But $\alpha = 6951.833$
 $\beta = -2.773$

(a) New \bar{F} = mean unweighted (for population) literacy level = 1402.941. Hence at mean literacy level we get the consolidated coefficient to be 3061.4776. It remains positive.

(b) To get the critical literacy level we set this sum to zero

$$\alpha + \beta F = 0$$

$$F_0 = \frac{-\alpha}{\beta} = \frac{-6951.833}{-2.773} = 2506.97 \quad \text{i.e. 25.07\%}$$

cient is of weak significance. The same is true for female literacy. The reverse is true for the female wage.

The child wage and female literacy effects are similar. Increased child wages and female literacy lead to increased sterilizations and lower use of non-terminal contraceptives. One would expect the signs of the female wage coefficient to follow those of female literacy but they are the opposite. This could be explained by distortions due to the bimodal distribution of female employment or could be due to problems of simultaneity or collinearity in the model.

The religion variable acts to increase contraception but it indicates a bias towards non-terminal contraceptives. Hindus seem to be more likely to adopt contraceptives than non-Hindus. Their preference is for a non-terminal contraceptive preferably conventional contraceptives perhaps because there is a social stigma attached to sterilized males.

The dummy variable is very significant for sterilizations and thus bears out the strong Emergency emphasis on sterilization. There is no significant compensatory decline in the other forms of contraceptives and, if anything, there appears to be a steady increase in both the other forms of contraceptives over that year. We had some concern that the Emergency overwhelmed the effects of the socio-economic variables on sterilizations. Also, for the purposes of the birth rate equation, the terminal nature of sterilizations made annual performance data inadequate. We, therefore, estimated a derived demand equation for cumulative sterilizations.

The equation for cumulative sterilizations reinforced our view that the coefficients for the non-program variables had been dominated by the program and dummy variables. All the literacy, income and wage coefficients became significant and retained the signs of the annual sterilization equation. The dummy remained significant as did the worker coefficient. The PHC variable and the religion variable remained insignificant and the clinic variable changed sign and became insignificant.

This equation did not change any of our interpretations but instead strengthened some explanations and clarified others. The strengthening of the child wage and female literacy effects on sterilizations supported the explanation that increases in child wages and female literacy cause people to switch from non-terminal contraceptives to sterilizations. Finally, if we take the view that cumulative sterilizations represent the long term trend on acceptance of sterilizations we see that understaffed clinics do not promote sterilizations but at the same time they do not cause a reduction in contraception or substitution away from sterilization to other forms of contraceptives as suggested by the earlier sterilization equation.

The Birth Rate Equations. We regressed the birth rate against the fitted values obtained from the demand equations and obtained low explanatory power on

the birth rate. To investigate the effects of literacy in improving the effectiveness of non-terminal contraceptives we added interactive terms of female literacy with IUDs and conventional contraceptive to the equation. We used fitted values of these interactive terms that were consistently estimated using the same instruments as in the demand equations. The interactive terms greatly improved the explanatory power of the equation and increased the joint significance of the variables in the equation (see Table 4).

TABLE 4—BIRTH RATE PRODUCTION FUNCTION EQUATIONS

<i>INDEP VAR</i>	<i>Intercept</i>	$\hat{\alpha}$	$\hat{\beta}$	$\hat{\gamma}$	$\hat{\delta}$	$\hat{\epsilon}$
<i>DEP VAR</i>						
<i>BR</i>	362.918	-709.447	477.655	-174.797	—	—
$R^2=0.1391$	(17.163)	(-0.198)	(0.647)	(-1.779)		
F-Ratio = 3.07						
Literacy Model : <i>BR</i>	345.071	6951.833	-117.131	-41.670	-2.773	-0.331
$R^2 = 0.3548$	(16.669)	(1.160)	(-0.079)	(-0.422)	(-1.271)	(-0.451)
F-Ratio = 6.05						

Note : The figures in parentheses are the t-statistics.

The Birth Rate Production Function. The two surprising results from this equation were that IUDs were more effective than cumulative sterilization in reducing birth rate and that the use of conventional contraceptives was actually counter-productive. However, the coefficients on the IUD and conventional contraceptive variables were not significant. The sterilization coefficient was smaller than the other two but was of greater significance. One of the reasons for a low sterilization coefficient could be that a lot of the sterilizations performed during the history of the program were done to fulfil targets and could have been performed on widows, old people and spouses of sterilized persons.

This equation underscored the limited effect of contraception in explaining the birth rate. Only one of the coefficients was significant (at the 5 percent level) and so the birth rate may have been independent of the other two contraceptives. The total explanatory power of the equation was 14% and so the birth rate was largely affected by other causes. Also, the F-ratio was 3.07 which gave the equation a significance level of only 96%.

The Literacy Equation. This equation used the interacted female literacy terms to investigate the effects of increased literacy on the use of contraception.

The explanatory power of this equation improved to 35% and the F-ratio increased to 6.05 improving the joint significance of the equation to 98 percent. The high F-ratio meant that we had the right explanatory variables but the low (t-ratios observed pointed to a sub-optimal specification.

The coefficient for the cumulative sterilization variable was low and of low significance again suggesting that sterilizations were not very effective in reducing the birth rate possibly because of aggressive promotion that was sometimes useless.

The coefficients on the conventional contraceptive terms were both negative and insignificant indicating that the effect of conventional contraceptives on the birth rate was weak. The interactive term was marginally more significant indicating that literacy improves the significance of the effect of conventional contraceptives.

The case of the IUDs was more interesting. The zero-literacy level of IUD effectiveness was of weak significance but strongly positive. This was a purely hypothetical zero-literacy rate because none of the States even approximated zero-literacy. However the interactive term was negative and also barely significant indicating that literacy improved the effectiveness of IUDs. At the mean level of literacy the effect of IUDs on the birth rate was positive and the additive sum of the coefficients gave us a critical literacy rate of 25.07%. States with literacy levels lower than this, found the use of IUDs to be counterproductive. The average literacy rate of the States unadjusted for their populations was 14.02% and so, on the average, the States in India were likely to find IUDs ineffective.

This model lent some credence to the theory that non-terminal contraceptives are used more effectively in areas of high literacy. This could occur because illiterate people could use contraceptives incorrectly and thus nullify their effect (e.g. removal of IUDs) or because literate people could dispense advice and administer the contraceptives more effectively. So increased literacy would be an important part of a program to reduce the birth rate through contraception.

Model Inferences and Conclusions

To evaluate the model's results, we considered the effect of an increase of 10% in the levels of the workers, the workers and the clinics and in female literacy. The calculations were done on the non-interactive contraception model and showed that a 10% increase in family planning workers would reduce the birth rate by 0.34% (by 0.1 per 10,000 births); a 10% increase in workers and clinics (i.e. keeping the number of workers/clinic constant) would lead to an increase in the birth rate by 0.126% (by 0.4 per 10,000 births) and an increase by 10% in the female literacy level would lead to a decline by 0.34% in the birth rate

(1.1 per 10,000 births).⁶

These results point to the fact that program inputs have not been very successful in curbing the birth rate and if indeed program inputs are still to be emphasized, the emphasis should be on staffing the clinics rather than opening new clinics.⁷ The existing clinics are understaffed and more workers per clinic are required. The results also bring out the importance of female literacy in reducing the birth rate. It is vastly more effective in reducing the birth rate than any of the program inputs. We had some evidence of this from our literacy model which indicated that female literacy increased the effectiveness of non-terminal contraceptives. Also, in the demand equations we found that female literacy encouraged a switch from non-terminal contraceptives to sterilizations and hence reduced the birth rate. So the indications are that in the overall perspective, the Government may be better advised to focus more on education than family planning.

Regarding the model itself, it should be pointed out that acceptance of contraceptives can be well explained by program and socioeconomic variables and that program variables can influence the adoption of contraceptives to a limited extent. Income, wage and literacy variables are also significant in their effect on the use of contraceptives and a successful promotion of any type of contraceptive would have to involve improvements in these areas in order to complement the effects of the program variables.

6. We took 10% increases in the mean levels of fertility, workers and clinics and multiplied through the coefficients to get the final effect on the birth rate.

e.g.

$$\frac{\partial BR}{\partial L} = \left(\frac{\partial I}{\partial L} \times \frac{\partial BR}{\partial I} \right) + \left(\frac{\partial C}{\partial L} \times \frac{\partial BR}{\partial C} \right) + \left(\frac{\partial CS}{\partial L} \times \frac{\partial BR}{\partial CS} \right)$$

where L = Literacy

I = IUDs

C = Conventional contraceptives

BR = Birth rate

CS = Cumulative sterilizations.

$$\text{Hence } \Delta BR = \left[\left(\frac{\partial I}{\partial L} \times \frac{\partial BR}{\partial I} \right) + \left(\frac{\partial C}{\partial L} \times \frac{\partial BR}{\partial C} \right) + \left(\frac{\partial CS}{\partial L} \times \frac{\partial BR}{\partial CS} \right) \right]$$

7. The result, that an increase in program clinics keeping the workers per clinic constant actually increases the birth rate, can be misleading. It should be clear that increasing the number of clinics increases contraceptive use because all the clinic coefficients in the demand equations are positive. However, clinics promote contraceptives that our birth rate equation finds to be counter-productive in reducing the birth rate and so the net clinic effect is to increase the birth rate.

The missing link in the family planning program occurs at the next stage. The acceptance of contraceptives plays only a small role in the determination of the birth rate and so even though contraceptives are adopted by the population the birth rate remains uncontrolled. This suggests that the program may not be reaching out far enough and that a large proportion of the population does not practice any tabulated form of birth control. This presents the program with a structural problem about how to increase both the demand for its services as well as their effectiveness and we found that increased literacy was certainly one of the answers. Through the experience of the Emergency and the past history of the program we can see that policies of aggressive promotion do not work in India where the whole issue of birth control is a sensitive one.

The view that development may be the answer to improve the performance of the program enjoys great currency. In his book, Cassen suggests that improvements in the areas of female literacy and per capita income would be effective in reducing fertility. In the meantime he feels that the current program should continue and should increase its counselling and other services⁸ because even at today's level of performance the program is cost-effective (Cassen, p. 181). Gulhati recommends that development be used to stimulate demand for contraceptives before stepping up the level of program inputs (Gulhati, p. 42). The Interim Report of the Working Group on Population Policy also recommends that development be a higher priority in some underdeveloped regions to bring them upto a level where there will be increased motivation for family planning. They also recommend that family planning be conducted through multipurpose workers.

The results of the 1981 Census were recently published and the population increase in the decade 1971-81 was 24.75 per cent—only a minor improvement over the previous decade (New York times, March 19, A13). The family planning program has slipped badly over the decade but hopes to recover some lost ground through increased program personnel and a developmental approach (i.e. the multipurpose worker). They are going to concentrate on the welfare component of the family welfare program. The results from our model support that approach.

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8. Counselling services need to be improved because there is often a communication gap between family planning personnel and the illiterate population. The program would benefit from developing local talent to serve as counsellors.

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APPENDIX

TABLE 1—VARIABLES FIXED OVER THE PERIOD OF REGRESSION

<i>State</i>	<i>Rural Married Couples 15-44</i>	<i>Child Agricultural Wages</i>	<i>Female Agricultural Wages</i>	<i>Hindu per 1000 Popn.i</i>	<i>Female Literacy Rate</i>
1. A. P.	6,346,612	133	192	876	1,050
1. Assam	2,015,955	183	283	725	1,780
3. Bihar	9,597,511	200	233	835	610
4. Gujarat	3,165,479	142	233	893	1,710
5. Haryana	1,351,966	250	433	892	920
6. H. P.	561,506	283	350	961	1,310
7. J & K	645,524	—	—	304	400
8. Karnataka	3,656,813	108	155	865	1,290
9. Kerala	2,500,119	208	358	594	5,780
10. M.P.	6,291,959	117	167	937	570
11. Maharashtra	6,125,955	150	193	819	1,580
12. Orissa	3,525,674	150	175	963	1,140
13. Punjab	1,457,466	250	500	375	1,650
14. Rajasthan	3,820,565	142	192	896	340
15. Tamil Nadu	4,895,738	133	133	890	1,650
16. U. P.	13,698,860	160	225	838	590
17. West Bengal	5,153,519	250	317	781	1,480

1. Number of married couples in the Age Groups 15-44 (Rural): Census 1971.

SOURCE : Family Welfare Yearbook 1978-79, Table A-8.

2. and 3. Agricultural Wages 1970-71. SOURCE : Agricultural Wages in India 1970-71.

4. Hindus per milie as at 1971 census.

SOURCE : Family Welfare Yearbook 1978-79, Table F 3.2.

5. Literacy rate/IOCO rural women among population 15+.

SOURCE : Shri P. K. Jain from 1971 Census Data. Presented in *Journal of Family Welfare*, Vol. XXI, No. 4, June 1975, p. 25.

TABLE 2(a)- FAMILY PLANNING AND SOCIOECONOMIC VARIABLES, 1974

	<i>IUD Acceptance¹</i>	<i>Conventional and Other Contracep- tive Users²</i>	<i>Cumula- five Steriliza- tions³</i>	<i>Family Planning Personnel⁴</i>	<i>Family Plann ing Centers⁵</i>	<i>Health Centers⁶</i>	<i>Per Capita Income⁷</i>
1. A. P.	6,695	50,575	902,694	5,237	2,185	1,666	877
2. Assam	4,266	13,374	107,377	491	239	423	776
3. Bihar	10,634	19,832	708,508	2,544	2,348	2,348	718
4. Gujarat	16,637	103,985	657,275	2,784	1,384	1,037	1,038
5. Haryana	35,186	130,362	203,727	1,018	565	356	1,217
6. H. P.	889	3,611	51,895	132	130	290	1,037
7. J & K	2,959	4,069	41,146	261	142	266	835
8. Karnataka	9,678	55,140	566,158	2,340	1,554	1,064	784
9. Kerala	11,006	26,202	372,762	2,982	1,480	602	861
10. M. P.	26,698	73,696	1,045,497	5,068	2,063	1,840	794
11. Maharashtra	2,538	172,445	2,109,253	3,445	2,386	1,634	1,251
12. Orissa	15,867	25,398	657,993	2,437	1,346	1,256	738
13. Punjab	24,644	151,974	240,955	1,531	606	508	1,482
14. Rajasthan	10,219	42,349	264,228	2,461	1,160	928	819
15. Tamil Nadu	12,426	139,757	1,123,952	3,183	1,907	1,518	942
16. Uttar Pradesh	87,118	146,586	1,103,500	8,482	4,111	3,500	812
17. West Bengal	8,931	63,784	803,810	2,900	1,320	880	1,065

TABLE 2(6)-1975

	<i>IUDs</i>	<i>Other Users</i>	<i>Sterilization</i>	<i>Program Personnel</i>	<i>FPCS</i>	<i>HCS</i>	<i>Per Cap.</i>
1. A. P.	9,320	52,291	1,013,194	7,870	2,185	1,667	919
2. Assam	10,838	19,421	187,287	756	320	449	850
3. Bihar	24,734	42,477	831,550	4,691	2,591	2,348	596
4. Gujarat	16,198	186,762	765,925	4,008	1,384	1,037	1,195
5. Haryana	41,741	207,107	243,890	1,849	598	356	1,296
6. H. P.	2,723	10,404	64,968	356	164	294	1,050
7. J & K	3,469	4,548	46,354	436	142	264	883
8. Karnataka	15,403	80,956	653,403	3,334	1,643	1,061	785
9. Kerala	21,617	23,748	456,398	4,050	1,507	602	909
10. M.P.	28,640	85,560	1,123,650	7,674	2,278	1,808	793
11. Maharashtra	3,385	223,162	2,552,988	6,057	2,351	1,659	1,330
12. Orissa	18,711	42,256	768,589	3,059	1,378	1,256	785
13. Punjab	32,202	164,621	282,820	2,188	606	512	1,575
14. Rajasthan	12,583	71,262	314,611	2,276	1,160	928	894
15. Tamil Nadu	12,701	111,823	1,249,012	6,724	2,117	1,516	901
16. U. P.	136,992	355,590	1,203,252	9,893	5,250	3,530	781
17. West Bengal	15,402	223,025	948,838	4,635	1,532	983	1,046

TABLE 2(c)—1976

	<i>IUDs</i>	<i>Other Users</i>	<i>Sterilizations</i>	<i>Program Personnel</i>	<i>FPCs</i>	<i>HCs</i>	<i>Per Capita</i>
1. A. P.	5,749	47,574	1,600,791	7,965	2,271	1,663	917
2. Assam	7,298	17,619	327,698	785	377	449	858
3. Bihar	14,758	35,160	1,418,882	4,864	3,302	2,286	700
4. Gujarat	19,733	208,361	1,004,910	3,581	1,384	1,037	1,341
5. Haryana	66,066	273,525	391,169	1,754	615	356	1,472
6. H. P.	6,557	29,390	140,395	578	165	295	1,056
7. J & K	5,064	4,781	58,697	484	202	267	897
8. Karnataka	19,768	94,602	964,343	3,277	1,889	1,070	1,002
9. Kerala	10,718	24,846	570,885	3,999	1,507	602	968
10. M. P.	13,608	60,184	1,959,396	7,488	2,283	1,808	845
11. Maharashtra	471	169,076	3,180,692	6,464	2,305	1,726	1,498
12. Orissa	15,416	40,573	1,059,633	2,853	1,406	1,256	700
13. Punjab	31,877	143,289	388,028	2,224	778	509	1,840
14. Rajasthan	5,672	68,530	563,240	2,321	1,160	928	885
15. Tamil Nadu	17,510	133,821	1,693,477	5,003	2,117	1,519	941
16. U. P.	139,885	261,589	1,871,617	9,399	5,250	3,530	872
17. West Bengal	19,196	234,344	1,620,964	4,635	1,558	943	1,047

TABLE 2(d)—1977

	<i>IUDs</i>	<i>Other Users</i>	<i>Sterilizations</i>	<i>Program Personnel</i>	<i>FPCs</i>	<i>HCs</i>	<i>Per Capita</i>
1. A. P.	4,588	34,031	1,696,576	5,774	2,275	1,679	1,002
2. Assam	1,719	16,901	334,512	564	408	449	866
3. Bihar	4,832	25,965	1,436,794	5,500	3,660	2,286	735
4. Gujarat	19,035	171,573	1,084,860	3,408	1,385	1,037	1,452
5. Haryana	19,260	160,963	394,900	1,360	648	356	1,700
6. H. P.	2,280	11,993	140,899	374 "	172	295	1,154
7. J & K	1,784	4,740	62,596	370	266	2.69	986
8. Karnataka	13,911	81,432	1,025,301	2,707	2,183	1,326	1,129
9. Kerala	8,733	23,456	611,861	3,218	1,512	605	990
10. M. P.	7,696	52,514	1,976,877	6,099	3,140	1,813	896
11. Maharashtra	357	116,308	3,218,7.63	4,476	2,631	1 662	1,628
12. Orissa	8,533	37,636	1,133,727	2,992	1,382	1,256	825
13. Punjab	22,104	137,848	397,524	1,591	778	512	1,991
14. Rajasthan	4,048	70,461	566,075	2,235	1,656	928	925
15- Tamil Nadu	6,797	1 00,790	1,771,247	4,953	2,122	1,520	1,031
16. U. P.	63,873	226,137	1,876,645	10,606	5,847	3,530	892
17. West Bengal	1,923	80,749	1,632,103	3,411	1,813	965	1,225

1. Rural IUD insertions. SOURCE: Family Welfare Yearbooks 1974-79. Table F 1.4.

2. Total (rural and urban) use of conventional and other contraceptives. SOURCE: Family Welfare Yearbooks 1974-79. Table D. 7.

3. Cumulative Sterilization since inception of program. Data computed for 1974 from rural/urban total and then updated using data on rural sterilization. SOURCE: Family Welfare Yearbook 1974-75, Table D. 10 and subsequent updates from Table F 1.3 in subsequent year-books.

4. Total staff position at rural family welfare centres and subcentres. SOURCE: Family Yearbooks 1974-79. Table G-3.

5. Sum of rural family welfare centres, subcentres and centres established under the minimum needs program.

6. Sum of rural primary health centres and subcentres. SOURCE: (5) and (6) Family Welfare Yearbooks 1974-78 Table G-1.

7. Per capita Net Domestic Product at current prices. SOURCE: Family Welfare Yearbooks 1974-79 Table C-2 and supplemented by mimeo from Central Statistical Office, Delhi.

TABLE 3-CRUDE BIRTH RATES* 1975-78

	1975	1976	1977	1978
1. A. P.	359	346	333	346
2. Assam	307	337	306	313
3. Bihar	277	314	—	—
4. Gujarat	389	390	378	374
5. Haryana	397	376	357	348
6. H. P.	335	332	333	276
7. J & K	345	346	336	345
8. Karnataka	297	311	272	297
9. Kerala	281	281	261	253
10. M. P.	417	410	393	385
11. Maharashtra	299	301	268	276
12. Orissa	338	353	302	333
13. Punjab	325	324	318	302
14. Rajasthan	381	347	350	368
15. Tamil Nadu	327	322	307	298
16. U. P.	445	412	415	416
17. West Bengal	301	341	353	—

*Crude live birth rates per 10,000

SOURCE : Office of the Registrar-General of India

Sample Registration Bulletin Table 1, Vol. XIII, No. 2, Dec. 1979.

TABLE 4—PROFILE OF MODEL DATA

	<i>Mean</i>	<i>Standard deviation</i>	<i>Minimum value</i>	<i>Maximum value</i>	<i>Std. error of mean</i>
Birth rate (<i>BR</i>)	336.53846154	43.56786263	253.00000000	445.00000000	5.40392828
Per Cap. (<i>PCAP</i>)	1027.94117647	288.82189328	596.00000000	1991.00000000	35.02479921
FPC variable (<i>F</i>)	0.00035320	0.00010685	0.00009871	0.00060277	0.00001296
HC variable (<i>P</i>)	0.00029444	0.00007695	0.00016785	0.00052537	0.00000933
IUD variable (<i>I</i>)	0.00601026	0.00809476	0.00005828	0.04886661	0.00098163
Other contraceptive var. (<i>C</i>)	0.03044044	0.03845870	0.00206637	0.20231648	0.00466380
Child wage (<i>CWG</i>)	178.68750000	53.53144010	108.00000000	283.00000000	6.69143001
Female wage (<i>FWG</i>)	258.68750000	103.41208597	133.00000000	500.00000000	12.92651075
Proportion Hindu (<i>PCH</i>)	790.82352941	188.05373487	304.00000000	963.00000000	22.80486506
Sterilization var. (<i>CS</i>)	0.20948698	0.10376668	0.05326359	0.52534535	0.01258356
Female literacy (<i>FLR</i>)	1402.94117647	1200.04857964	340.00000000	5780.00000000	145.52726617
Dummy (<i>DUM</i>)	0.25000000	0.43623217	0.00000000	1.00000000	0.05290092
Worker variable (<i>W</i>)	0.00085596	0.00033498	0.00023508	0.00161992	0.0004062
Condom interaction (<i>FC</i>)	41.01642407	48.67500906	1.26048514	186.36774374	5.90271187
IUD interaction (<i>FI</i>)	8.24620932	11.24094418	0.09207647	49.97612514	1.36316471
Sterilization (Annual) (<i>T</i>)	0.03290477	0.03525927	0.00036704	0.13432982	0.00427581