

# **Factors Affecting Fertility Control in Developing Countries**

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## **I. INTRODUCTION**

In recent years, a significant attention is being paid to the relationship between practice of contraception with motivation and cost of regulation. This theory, known as 'synthesis framework' of fertility determination conjectures that practice of contraception in any population is the outcome of the combined effect of motivation or the pressure to use contraception and the cost of practising contraception (Easterlin; 1975, 1978; Easterlin et. al. 1980). The fundamental idea behind this theory is that contraception is not practised for the spacing of births but to limit family size. The typical couple's decision about whether or not to limit family size is viewed not as a highly formal decision but as a gradual response to the balance between several type of pressures.

In this article, we apply the theory of 'synthesis framework' of fertility determination to analyse factors affecting fertility control in the developing countries. The key question is whether increased practice of contraception is associated with greater motivation and lower cost of regulation. Simultaneously, we explore how far differences in economic and social conditions affect motivation and cost of regulation.

## **II. THEORY**

The theory on which the present analysis is based was first propagated by Easterlin and is discussed in detail in Easterlin and Crimmins (1982) and in Srinivasan et. al. (1984). This theory

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is based on certain concepts commonly found in sociological studies of fertility determination (Freedman, 1961-62; Peterson, 1969) and linking these concepts to microeconomics of fertility.

These notions can be formalised in terms of three concepts:

- 1. Cost of fertility regulation ( $R_c$ ):** This combines a couple's attitude towards and access to fertility control services and supplies and includes both subjective disadvantages of regulation and economic cost of control.
- 2. Desired family size ( $C_d$ ):** This is the number of surviving children a couple would want to have in a perfect contraceptive society. Here, a perfect contraceptive society is one where cost of regulation is negligible. It reflects the taste, income and price considerations of the economic theory of household decision making including value and cost of children.
- 3. Potential family size ( $C_n$ ):** This is the number of surviving children a couple would have if it did not regulate its fertility deliberately. Potential family size is the product of natural fertility ( $N$ ) and child survival rate ( $s$ ).

The excess of potential family size over desired family size  $C_n - C_d$  is the number of unwanted children couple would have in the absence of deliberate fertility control. The larger this excess, the greater is the potential burden of unwanted children and consequently greater is the motivation to limit fertility. The value of  $C_n - C_d$  may be negative, indicating that a couple is in deficit fertility situation. In this case there is no motivation at all and natural fertility would be a logical outcome.

But if  $C_n - C_d$  is positive, it does not necessarily mean that a couple will practice contraception deliberately. This pressure of motivation is weighted against the cost of regulation. If the cost is high, motivation, alone can not be sufficient enough for practice of contraception. In general, probability of practice of contraception is higher, the greater the degree of motivation and the lower the cost of regulation. Thus practice of contraception is directly related to motivation and inversely relate to cost of regulation.

### III. DATA AND METHOD

The analysis is primarily based on household survey data of nineteen developing countries collected through World Fertility Survey Programme. The study population is currently married females close to the end of their childbearing period, those aged 40-44 years. The analysis com-

compares nineteen countries, using household data to estimate country-level parameters such as  $C_n$ ,  $C_d$ ,  $S$ , level of motivation, cost of regulation and so on. Most of the data for analysis come directly from or are based on World Fertility Survey. The actual measures used in the analysis are approximations to conceptual ideal. The emphasis, in the analysis, is on simple measures and techniques so as to make understanding of the mechanism underlying practice and use of contraception easier.

Natural fertility for each country was calculated by the application of Bongaarts model of proximate determinants of fertility (Bongaart, 1980). This model involves four principal intermediate variables effecting fertility age at marriage, prevalence of contraception, incidence of induced abortion and fertility inhibiting effect of breastfeeding. It may however be made clear that the application of the Bongaart's model provide only approximate value of natural fertility, in fact it slightly overestimates the natural fertility. But the difference in the observed natural fertility and that estimated by the application of Bongaart's model is almost negligible.

Most of the variables of the conceptual measures of independent variables are discussed independently in the analysis. The selection of these variables is based on two criteria: availability of suitable data for analysis and simplicity of the variables. It may, however, be noted that in many situations, these variants are only approximations as conceptual ideals are difficult to formulate in empirical terms. In estimating relationship among variables, linear regression by technique of ordinary least square has been used throughout.

#### **IV. RESULTS**

In the nineteen countries, analysed here, on average, 53 percent married women of age 40-44 years reported use of contraception any time during their reproductive period. This percentage was lowest in Nepal (6%) and highest in Costa Rica (82%). In the subsequent analysis we focus chiefly on the ever use of contraception. The other measure, length of use has not been employed here as there is a perfect correlation between the two. Likewise all tables in this analysis are ranked according to this measure.

Pattern of current contraceptive use among exposed women of age 40-44 years is similar to that of ever use. The Spearman's rank correlation between the two is 0.92 which shows an almost perfect relationship.

Our model conjectures that the variation in contraceptive use across countries should be

directly related to variations in the motivation to control fertility. In analysing motivation, we first concentrate on potential number of children ( $C_n$ ), then on the desired number of children ( $C_d$ ) and then on motivation.

If a woman of age 40-44 years did nothing to control her fertility then she is expected to have

**Table 1. Percentage of Married Women (40-44 yrs) Ever Using any Contraceptive Method and Percentage of Exposed Women (40-44 yrs) Currently Using Any Contraceptive Method**

Country	Married Women			Exposed Women		
	Ever use			Current use		
	I	E	T	I	E	T
Costa Rica	12	70	82	17	60	77
Panama	10	61	70	9	55	64
Fiji	13	56	60	7	55	62
Korea, Rep. of	4	62	66	15	39	52
Colombia	16	41	57	19	26	45
Phillipines	20	36	56	29	19	48
Jordan	5	49	54	14	37	51
Jamaica	8	46	54	2	37	39
Malaysia	11	39	50	16	27	43
Guyana	8	42	50	6	33	39
Sri Lanka	21	25	46	22	26	48
Peru	27	19	46	28	11	39
Dominican Rep.	10	34	44	10	25	35
Thailand	7	35	42	5	41	46
Mexico	10	30	40	12	27	39
Indonesia	5	29	34	7	36	43
Bangladesh	7	11	18	5	6	11
Pakistan	4	12	16	4	7	11
Nepal	1	5	6	0	4	4

I: Inefficient methods, E: Efficient methods, T: Total

**Table 2. Values of N, s, C<sub>n</sub>, C<sub>d</sub>, C<sub>n</sub>-C<sub>d</sub>, C-C<sub>d</sub>, C and C<sub>w</sub> for Married Women of Age (40-44) Years**

Country	N	s	C <sub>n</sub>	C <sub>d</sub>	C <sub>n</sub> -C <sub>d</sub>	C-C <sub>d</sub>	C	C <sub>w</sub>
Costa Rica	11.4	.895	10.21	6.32	3.89	-8.32	6.0	6.3
Panama	10.5	.914	9.59	5.24	4.35	.06	5.3	5.5
Fiji	10.6	.903	9.57	5.63	3.94	-.03	5.6	5.8
Korea, Rep. of	8.6	.882	7.59	3.59	4.00	.91	4.5	4.5
Colombia	8.9	.864	7.69	4.89	2.80	.81	5.7	6.6
Phillipines	10.6	.895	9.49	5.26	4.23	.74	6.0	5.8
Jordan	10.0	.837	8.37	7.70	.67	-.50	7.2	7.3
Jamaica	10.5	.907	9.53	5.03	4.50	-.13	4.9	5.3
Malaysia	11.3	.885	10.00	4.61	5.39	.79	5.4	5.8
Guyana	11.8	.891	10.51	5.82	4.69	-.12	5.7	6.0
Sri Lanka	7.4	.891	6.59	4.61	1.98	.29	4.9	5.1
Peru	9.2	.788	7.25	4.47	2.78	.73	5.2	5.6
Dominican Rep.	9.1	.833	7.58	5.93	1.65	-.43	5.5	6.1
Thailand	7.8	.836	6.52	4.09	2.43	1.01	5.1	5.3
Mexico	10.4	.857	8.91	5.38	3.53	.62	6.0	6.2
Indonesia	6.7	.774	5.18	5.25	-.07	-1.15	4.1	4.8
Bangladesh	6.1	.718	4.38	5.01	-.63	.09	5.1	4.5
Pakistan	7.7	.714	5.50	4.59	.91	.41	5.0	5.2
Nepal	6.3	.696	4.39	4.35	.04	-.45	3.9	4.6

about ten children in Guyana while only four children in Bangladesh (Col. 3, Table 2). This potential number of children is arrived at by multiplying the natural fertility (N) by the probability of survival (s) and thus reflects the variation in both natural fertility as well as chances of survival.

Motivation to control fertility results from the difference between potential family size (C<sub>n</sub>) and desired family size (C<sub>d</sub>). This motivation varies directly with C<sub>n</sub> and C<sub>d</sub> but the association of motivation with desired family size is insignificant. In only two countries, motivation is negative. In the remaining countries, degree of motivation varies, being highest in Malaysia and lowest in Nepal. In contrast to countries in Asia, the Latin American countries are having a higher degree of motivation. It is also clear that in a country in which the average couple's motivation is high, the

**Table 3. Correlation Matrix for Ever Use and Measures of Motivation**

Variables	$C_n$	$C_d$	$C_n-C_d$	$C-C_d$	C	$C_w$
Ever Use	.75*	.48*	.67*	.25	.67*	.67*
$C_n$		.53*	.87*	.01	.55*	.61*
$C_d$			.13	-.50*	.66*	.74*
$C_n-C_d$				.33	.34	.37
$C-C_d$					.10	.11
C						.91*

\*Significant at .05 level or below.

practice of contraception is also expected to high as there is a strong but insignificant correlation between  $C_n-C_d$  and ever use. The relationship between ever use and other possible measures of motivation is set forth in Table 3. These measures are natural family size, desired family size, number of unwanted children ( $C-C_d$ ), children surviving and wanted family size. Contraceptive use is frequently thought to be related to number of living children (United Nation, 1979) but in our analysis there is no significant correlation between the two. Similar findings have been obtained by Srinivasan et. al. (1984) for ten states of India. Likewise, ever use has not been found to be related with the number of unwanted children but is significantly related to potential as well as desired family size.

But it is not the motivation alone which determines the use of contraception. Use of contraception is also determined by the cost of regulation. Here by cost regulation, we mean a couple's knowledge about contraceptive methods as well as availability of contraceptives services and supplies. Since in most of the developing countries, family planning programmes are supported and promoted by the governments, the government expenditure on health and family planning is an important determinant of availability of contraceptive services and supplies and thus is an important measure of the cost of regulation. On the other hand physical facilities like hospitals and manpower such as doctors, nurses etc. are also determinants of cost of regulation as the contraceptive services and supplies are provided through the hospitals or in the field by the staff involved in the health care delivery system.

The above considerations lead us to the selection of six variables of cost of regulation. These

**Table 4. Family Planning Programme Indicators**

Country	I	II	III	IV	V	VI
Costa Rica	7	29.7	99	1.79	7.16	21.96
Panama	—	—	98	4.40	7.92	6.86
Fiji	—	—	100	5.00	4.33	20.25
Korea, Rep. of	—	—	96	15.22	4.79	19.44
Colombia	28	—	94	3.15	5.08	7.97
Phillipines	7	5.9	94	1.80	3.58	11.74
Jordan	3	3.8	98	1.50	5.38	12.32
Jamaica	34	—	96	1.70	2.85	20.31
Malaysia	—	—	87	2.00	1.34	11.85
Guyana	—	—	75	6.77	1.28	14.18
Sri Lanka	5	3.5	87	3.41	1.60	7.03
Peru	32	5.3	75	4.16	6.36	14.43
Dominican Rep.	12	9.7	97	7.65	5.36	7.72
Thailand	3	4.3	95	0.81	1.21	8.55
Mexico	—	—	87	2.71	8.00	7.16
Indonesia	5	2.5	72	0.79	0.70	4.33
Bangladesh	1	—	81	0.68	0.81	0.25
Pakistan	3	1.6	76	0.91	2.65	2.02
Nepal	1	4.1	22	0.45	0.29	0.77

—Data not available

I: Per capita expenditure on health in US

II: % Government expenditure on health

III: % Women (40-44) knowing any modern method of contraception

IV: Hospital density per 100000 population

V: Doctor density per 10000 population

VI: Nurse density per 10000 population

are per capita expenditure on health and family welfare, percentage of total government expenditure on health and family welfare, percentage of women having knowledge of any modern method of contraception, hospitals per 100000 population, doctors per 10000 population and nurses per 10000 population. Values of these variables for nineteen countries are presented in

**Table 5. Correlation Matrix of Ever Use with Specific Measures of Cost of Regulation**

Variable	I	II	III	IV	V	VI
Ever Use	.67*	.67*	.61*	.65*	.62*	.72*
I. Per Capita Expenditure on Health		.29	.52*	.62*	.53*	.50*
II. % Government Expenditure on Health			.50*	.53*	.61*	.68*
III. % Women Knowing Modern Method of Contraception				.41	.66*	.67*
IV. Hospital Density					.40	.45
V. Doctor Density						.42

\*Significant at .05 level or below.

Table 4. The results of correlation analysis of cost of regulation with ever use of contraception  
Table 5.

Examination of correlation coefficient among the six measures of cost of regulation shows that all of them are significantly associated with the ever use of contraception. The highest correlation of ever use has been observed with the nurses density followed by government expenditure on health. Thus the analysis shows that, in the developing countries, cost of regulation is significantly affected by the presence of paramedical workers in the community. In most of the developing countries where majority of population dwells in rural areas, the services and supplies of contraceptives can be made available only through the workers in the field as the hospitals, the usual outlet for family planning services, are few and far. In order to use a contraceptive method, a woman not only must know what the method is and from where it can be obtained but she must also be able to reach a source of supply or service. In rural areas of most of the developing countries, it is the paramedical worker who takes contraceptive supplies to the villagers and delivers them at their door. Availability of paramedical persons reduces the travel time required for a couple to obtain contraceptive services which has been found to be an important determinant of contraceptive use (Morris, et. al. 1981).

What is the combined effect of motivation and cost of regulation on ever use of contraception? In general, the expectation is that contraceptive use will vary directly with motivation and

**Table 6. Spearman's Rank Order Correlation Between Measures of Motivation and Cost of Regulation**

Measure of Cost of Regulation	Measures of Motivation				
	$C_n$	$C_d$	$C_n-C_d$	$C_n-C_w$	$C_w$
I. Per Capital Expenditure on Health	.47	.33	.48	.32	.41*
II. % Government Expenditure on Health	.66*	.24	.66*	.01	.59*
III. % Married Women Knowing Modern Method of Contraception	.82*	.66*	.45*	-.14	.88*
IV. Hospital Density	.65*	.43	.58*	.12	.54*
V. Doctor Density	.85*	.60*	.58*	-.08	.87*
VI. Nurse Density	.85*	.45	.70*	.13	.82*

**Table 7. Regression of Ever Use on Specific Measures of Motivation and Cost of Regulation**

Number	Motivation			Cost of Regulation			$R^2$	F
	$C_n$	$C_n-C_d$	$C_w$	I	III	VI		
1.	.56			.41			.69	17.81
2.		.46		.46			.60	12.00
3.			.56	.41			.65	14.86
4.	.74				-.01		.54	9.39
5.		.52			.38		.56	10.18
6.			.73		.07		.53	9.02
7.	.48					.32	.59	11.51
8.		.72				.49	.83	39.06
9.			.24			.53	.54	9.39

inversely with the cost of regulation. In order to test this hypothesis, we have selected three motivation variables ( $C_n-C_n$ ,  $C_n$ , and  $C_w$ ) and three measures of cost of regulation (Per capita expenditure on health and family welfare, knowledge of modern method contraception and nurses density). These variables have been tried in various combinations in multivariate regression analysis with ever use of contraception. Results of this exercise are compiled in Table 7 whereas in Table 6, correlation analysis of measures of motivation with cost of regulation are presented. Interestingly,

number of unwanted children are not associated, significantly, with any measure of cost of regulation.

Results of multivariate analysis show that both motivation as well as cost of regulation do have telling impact on ever use of contraception, as, in any case, the explanatory power of multivariate regression model is 50 percent and above. The highest explanatory power has been obtained in the combination of  $C_n$ - $C_d$  with nurses density, thus confirming the oft-concluded belief that it is not the attitude but rather the availability of contraceptive supplies and services which is the main determinant of cost of regulation. In fact problem of distributing supplies and disseminating information is and is expected to remain a critical problem for many family planning programmes in many developing countries (Berelson, 1969).

## V. CONCLUSIONS

Why does the use of contraception vary widely in the developing countries? Our results show that both the motivation to control fertility as well as the cost of regulating fertility play their role in their own way. The general pattern is that higher degree of motivation and lower cost of regulation is associated with higher level of ever use of contraception. In the developing countries, unregulated fertility is much more likely to lead to a family size considerable in excess of that desired, and, hence, there is greater pressure to use contraception to avoid unwanted children. Even more important is the fact that because of high natural fertility and low chances of survival, in these countries unregulated fertility would result in higher number of surviving children. Hence if the desired family size is kept constant for all countries, even then contraceptive use will vary mainly because of differences in the supply of children.

Coming to the cost of regulating fertility, our analysis reveals that it is the availability of contraceptive methods which matters most. This is expected because in a number of developing countries, family planning programme has failed to become a population movement and still depends heavily on government money and efforts. The basic infra-structure for a contraceptive services and supplies network is lacking in most of the developing countries and till a couple is not in a position to obtain a contraceptive method when it requires it, there is very little role of its attitude towards fertility regulation as well as its knowledge about fertility regulation methods. Thus both motivation as well as cost of regulation in their own way, are major determinants of contraceptive use.

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