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Determinants of Aggregate Fertility in Pakistan

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INTRODUCTION

Experiencing high fertility and declining mortality levels, the developing countries are today faced with the problem of relatively high rates of natural increase in their populations. This pace of growth in population, influenced by high fertility levels, impedes the overall development planning. As pointed out in a document prepared by the Planning Commission of Pakistan, 'A vicious circle is set in motion in which high fertility and socio-economic stagnation breed upon each other' [5]. In the developing countries, development programmes including birth control programmes are in operation. The sustained high fertility levels, therefore, call for more insights into the mechanisms operating in the society and influencing fertility. Studies of fertility behaviour are conducted at both micro and macro levels. The difference between micro and macro is a matter of emphasis rather than one of kind, and both approaches are concerned with each level of social aggregation. Macro-level studies describe the level and pattern of change resulting from the ongoing socio-economic development in the society as a whole and do not explain variations in fertility at the household level [12]. However, development programmes, which are implemented at aggregate levels defined by geographical boundaries, influence the population in terms of socio-economic status and fertility behaviour. There are many factors which affect human fertility individually or collectively. Attempts have been made to identify these factors, and conceptual frameworks have been developed to explain the causal hypotheses. In this context mention may be made of the demographic transition theory, which is often applied to study fertility behaviour.

The demographic transition theory was evolved on the basis of the experiences of industrial countries where both fertility and mortality declined in association with the changes in socio-economic development, delayed marriages, celibacy and some use of traditional birth-control methods [1]. Within this perspective, fertility behaviour can be studied by looking at the institutional variables influencing supply, demand and cost of fertility regulation.

The supply theory of fertility or natural fertility deals with biological constraints in which no deliberate attempt is made to regulate the fertility. The demand or choice constraints theory suggests that parents have a utility function in

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which they trade off fertility aspirations and other consumer goods within the constraints of a given budget in which children have a price. Within the conceptual framework of demand for and supply of children, the interplay of these two forces reaches a point where supply equals or exceeds the demand and enhances the motivation for fertility regulation. The regulation of fertility is dependent on availability of means and the costs of birth control. The cost, it may be mentioned, includes not only the economic but also the social and psychological costs valued at the community level. The objective of this paper is to investigate and identify policy-relevant factors which influence fertility at an aggregate level by looking at the supply, demand and cost factors of fertility regulation.

DATA AND THEIR LIMITATIONS

The data for this study were obtained from the Government of Pakistan's Census Organization and the Population Welfare Division [6;7;8]. The information on fertility, mortality, nuptiality and other socio-economic variables was gathered for the 63 districts of Pakistan. The three districts of Karachi division were lumped together as there appeared to be no appreciable variation among those districts. The total fertility rate was estimated indirectly from the age structure of district populations given in the population census of 1981. The information on age at marriage, infant mortality, enrolment, female labour force participation, electrification and urbanization was obtained from the district reports and other bulletins of the population census. The information on family planning clinics was obtained from the Population Welfare Division. (The family planning clinics were renamed as Family Welfare Centres in 1981 [3].) It may be mentioned here that due to the moratorium on family planning activities since 1977, the number of clinics remained almost the same up to 1981.

Analysis of this type at an aggregate level is rather difficult because of the facts that the pace of development process is normally slow and that its effect on fertility is indirect. Another factor that renders it difficult to observe the effect of development on fertility is that of variations in the inputs of different programmes operating simultaneously in a given area, which make it very difficult to isolate and specify the impact of each programme on fertility behaviour. Moreover, development data suffer from many limitations, chief of which are simultaneity, incompleteness, time lags, and multicollinearity [15]. Simultaneity between two variables may lead to spurious inferences. Incompleteness of development data on explanatory variables or the exclusion of important variables from the model may fail to bring out the factors affecting fertility. Time lags allowed for effect between variables may be inadequate. Changes in fertility are not a short-term phenomenon, nor are they intermediate variables responsible for transformation of the effect of development on fertility. Multicollinearity among explanatory variables may be so high as to influence their individual effect on fertility.

METHODOLOGY

The unit of analysis in this study is a district which, as an administrative unit, ranks in importance after a province and a division. In this study, the dependent variable of an aggregate fertility measure is Total Fertility Rate (TFR). The TFR was indirectly measured from the age structure through the application of the stable population model [10]. The basic approach followed by Rele was to derive a relationship between the Child/Woman Ratio (CWR) and Net Reproduction Rate (NRR) in a set of stable populations. The CWR derived from stable populations showed an almost linear relationship between CWR and NRR for any given level of mortality. The linearity of relationship was further improved by selecting the age range of CWRs C(0–4) and C(5–9). A zero degree polynomial was fitted to convert CWR into GRR for various levels of mortality in the stable population. The underlying assumption in this method is that the mean length of the generation of population concerned lies between 28 and 29 years. The estimates of TFR would be robust if the mean length of generation ranges in the assumed length of period. The mean length of generation in case of Pakistan comes out to be 28.2 years, which is a well-assumed range. Rele derived measures of TFR for the European population that appeared to be very close to the actual measures of TFR for those European populations which were exposed to substantial internal as well as international migrations. As pointed out earlier, the conversion of CWR into TFR can only be done at a given mortality level. The average life expectancy, $\overset{0}{e}$, between the 1972–1981 inter-censal period was estimated to be 54 years for both the sexes. In order to avoid the possible under-or over-enumeration in the age structure of children, the 0–4 age group was adjusted by applying the stable population model to the mortality level of $\overset{0}{e}$ 54. The conversion of CWR (0–4) into TFR was achieved by applying regression beta coefficients obtained through linear interpolation. The derived level of TFR appeared to be 6.9, which is slightly higher than a similar PLM Survey estimate of 6.5.

In this study, simple regression has been applied to examine the effect of explanatory variables (Xs) on the TFR serving as the dependent variable (Y). However, some explanatory variables, e.g. electrification and urbanization, showed high correlations with each other. One of these variables was, therefore, dropped in the equation. Even when the deletion approach of the variable was applied, other variables still appeared to be correlated with one another. A composite variable, ranked on the Z score for all socio-economic and development indices, was constructed through the application of the Z–SUM standardization technique, with zero mean and a unit standard deviation as follows.

$$Z_{ij} = \frac{X_{ij} - \bar{X}_j}{S_i}$$

where i refers to the individual variable and j refers to the individual district, X_i is the original average of the variable, and S_i is the standard deviation. This exercise was carried out for 63 districts of Pakistan. It may be mentioned that the composite *Z–SUM* indicator is reflective of six social indicators and one development indicator, viz. electrification. (See appendix for the ranking of the districts.)

$$Z\text{–}SUM = \sum_{i=1}^{63} Z_{ij}$$

where Z_{ij} is the estimate of the ith Z-score of the jth district. The robustness of the *Z–SUM* score was checked against similar scores derived through the principal component method which identified the same districts at the top and bottom levels in terms of the degree of their development [9]. Srinavasan observed that regression on Zs, compared with similar exercises on Xs, provides coefficients which are more meaningful and reliable [14]. In this study, a composite variable was used with family planning input variable to study their individual effects on fertility and against the socio-economic development indicators used separately.

Following Easterlin [2], we have used in our study such variables as emphasize four major components of modernization, viz.

1. innovations in public health and medical care;
2. innovations in formal schooling;
3. urbanization; and
4. introduction of new goods.

The analysis was carried out using the OLS estimation technique. The estimated equation takes the following form:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 \quad \ldots \quad (A)$$

where

Y = Total Fertility Rate;
X_1 = Age at Marriage;
X_2 = Infant Mortality Rate;
X_3 = School Enrolment;
X_4 = Female Labour Force Participation;
X_5 = Electrification;
X_6 = Urbanization; and
X_7 = Family Planning Clinics.

In order to avoid the multicollinearity problem, which may affect some of the variables in Equation (A), the estimation will take the following form of equation.

$$Y = B_0 + B_1Z + B_2X_7 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (B)$$

where Z is the composite variable explained above.

Theoretical Considerations

The study utilizes a set of socio-economic development variables. The variables have been conceptualized, according to the economic theory of fertility, within the macro theoretical perspective, which takes into consideration the supply, demand and cost aspects of fertility regulation.

Age at Marriage: The choice of this nuptiality variable was made within historical perspective of the demographic transition theory where delayed marriage was the major determinant of fertility. Changes in nuptiality were a by-product of the socio-economic development of European countries during the Industrial Revolution. In this study, this variable is taken as a supply variable, which is affected positively by the process of socio-economic development and, in turn, affects fertility negatively.

Infant Mortality Rate: This is a sensitive index of socio-economic development and strongly reflects the public health and medicare situation. Socio-economic development reduces the level of infant mortality and affects the family reproductive situation that increases the supply of children in the natural fertility society by enhancing the surviving probability of children to adulthood. The infant mortality rate is conceptualized as having a positive effect on fertility. Infant mortality affects the biological mechanism of lactation and, by reducing the birth interval, leads to the next pregnancy. Therefore, higher infant mortality tends to be positively associated with higher fertility.

Enrolment: Enrolment of children is reflective of the availability of educational opportunities and quality concept of children. This is also reflective of parents' education and awareness of the importance of investment in children as well as of the cost of children. Enrolment of children is therefore postulated to have a negative association with fertility.

Female Labour Force Participation: Developmental inputs provide job opportunities which increase the employment chances of females in high-fertility societies where larger numbers of children cause economic pressure for work. In this way, female labour force participation is theorized to have a negative effect on fertility.

Electrification: This is a major composite development variable. Electrification affects social and economic structure such as organization, financial institutions

(including production), employment, and income levels. Electrification exposes the people to innovations. These modernization factors affect fertility negatively.

Urbanization: This is an important modernization variable which induces rural population to migrate to urban areas. Urbanization affects fertility through many factors that are inherent in urbanization, e.g. greater health and educational facilities, declining breast-feeding habits of urban females, and greater knowledge of and access to fertility-control methods and centres. Within the perspective of modernization, this variable is postulated to have a negative effect on fertility.

Family Planning Clinics: These clinics are the major source of birth control services to the population. They provide access to the means of fertility control at reasonably low costs. Since family planning clinics are run at the public expenditure, their services are available at highly subsidized costs, rendering the cost of fertility regulation very negligible. This variable is considered a major cost variable of fertility regulation and is postulated to affect fertility negatively.

ANALYSIS OF RESULTS

The interpretation of results is based on the geographical unit of district. The results based on aggregate data were carefully analysed to avoid the problem of ecological fallacy. This problem arises while making generalizations, on empirical evidence, that the results which hold for a geographical area may not necessarily be true for individual behaviour [4].

The results of the regression analysis are presented in Tables 1–5, which are followed by a correlation matrix of the variables used in the model. Unstandardized coefficients were standardized to rank the effect of explanatory variables. The standardized partial regression coefficients (Betas) can be interpreted as the amount of change in dependent variable in terms of standard deviation units, associated with one standard deviation change in the dependent variable while controlling the other explanatory variable [4].

It may be observed from Table 1 that only two variables appeared significant in their effect on fertility, viz. enrolment ratio and age at marriage, which tended to show a negative effect on fertility when controlled for other socio-economic development variable. In the equation, electrification was dropped because of its strong correlation with urbanization. The effect of urbanization, although insignificant, showed a positive association with fertility, although it was expected to have a negative association. However, this confirms higher levels of fertility in urban areas than in rural areas [11]. This may be due to the effect of modernization in the form of declining lactation in urban areas. In Table 2, the mean age at marriage was dropped from the equation because of its association with infant mortality. Only enrolment appeared to be a significant variable. In the next equation, only three

Table 1

Standardized Partial Regression Coefficients and Coefficient of Determination for Variables Specified in the Model

Variables	Betas	*t*-ratio
1. Age at Marriage	–.23407	2.17647*
2. Infant Mortality	–.00005	0.00004
3. Enrolment	–0.62978	3.25669*
4. Female Labour Force Participation	0.22963	1.27853
5. Urbanization	0.22963	1.27853
6. Family Planning Clinics	0.08328	0.80475

Adjusted R^2 = 0.3724, F-Statistics = 8.35590
*Significant at the 5-percent level.

Table 2

Standardized Partial Regression Coefficients and Coefficient of Determination for Variables Specified in the Model

Variables	Betas	*t*-ratio
1. Infant Mortality	0.02769	0.22972
2. Enrolment	–0.79561	4.33625*
3. Female Labour Force Participation	–0.02700	0.23398
4. Urbanization	0.26217	1.41901
5. Family Planning Clinics	0.09183	0.86029

Adjusted R^2 = 0.31925, F-Statistics = 6.81504
*Significant at the 5-percent level.

variables, including urbanization, were controlled (Table 3) to rank individual variables in respect of their effect on fertility. The results did not show any change from those of the first equation. In the fourth equation (Table 4), electrification substituted for the variable of urbanization. The results did not differ from those of the previous equation. In the fifth equation (Table 5), the composite variable was controlled with the family planning clinics variable. Development appeared to be the only significant variable affecting fertility. As in the case of the previous equation the effect of family planning clinics was insignificant. The insignificant effect of this

Table 3

Standardized Partial Regression Coefficients and Coefficient of Determination for Variables Specified in the Model

	Variables	Betas	*t*-ratio
1.	Age at Marriage	–0.26493	2.23590*
2.	Enrolment	–0.61686	3.36179*
3.	Urbanization	0.21181	0.92503

Adjusted R^2 = 0.35967, *F*-Statistics = 5.97496
*Significant at the 5-percent level.

Table 4

Standardized Partial Regression Coefficients and Coefficient of Determination for Variables Specified in the Model

	Variables	Betas	*t*-ratio
1.	Age at Marriage	–0.27279	2.18148*
2.	Enrolment	–0.44005	3.28383*
3.	Electrification	–0.0140	0.10929

Adjusted R^2 = 0.36906, *F*-Statistics = 13.08878
*Significant at the 5-percent level.

Table 5

Standardized Partial Regression Coefficients and Coefficient of Determination for Variables Specified in the Model

	Variables	Betas	*t*-ratio
1.	Composite Variables	–0.55820	5.16864*
2.	Family Planning Clinics	0.05397	0.49976

Adjusted R^2 = 0.2850, *F*-Statistics = 13.35867
*Significant at the 5-percent level.

cost of fertility regulation variable is probably due to the moratorium that was placed on family planning activities from 1977 to 1980, the period under study [13]. The enrolment variable appeared to be the most significant in the equation with the set of other variables. The implication of this significance can be accounted for by the fact that enrolment demonstrates two distinct effects of its own. Firstly, it represents the effect of socio-economic development of geographical units as well as the provision of schooling opportunities. Secondly, it reflects the level of parents' education. Therefore, a higher level of development of the geographical units would, under human capital theory, induce parents to invest more in children for a better quality rather than a greater number of children. The other variable of marriage also depicted significant influence on fertility, which is itself influenced by other socio-economic development. The age at marriage could be regarded as a function of a couple's demand for children in the given mortality regime or the supply of desired number of children in the given mortality situation. The negative coefficient of age at marriage for fertility is suggestive of an onset of such fertility regulations in the light of the reproductive aspirations.

CONCLUSIONS AND POLICY SUGGESTIONS

The analysis of fertility determinants was carried out by employing socio-economic development variables where unit of analysis was a district. The ordinary least-square method of regression was applied to study the effects. To avoid multicollinearity among the independent variables, a composite variable of socio-economic development variables was structured to study the effects of development and family planning programme on fertility. The results revealed that fertility was significantly affected by enrolment and nuptiality variables. Other variables, like infant mortality, female labour force participation, urbanization, and electrification, did not record any significant effect. The effect of family planning clinics on fertility decline appeared to be insignificant. This was probably due to a moratorium on all family planning activities during the period under observation. Moreover, the use rate revealed by the PLM survey was too low to produce any appreciable effect on fertility. Enrolment appeared to be the most significant determinant of fertility in the analysis, which is suggestive of the demand aspect of the fertility theory for quality of children. A suggestion of this analysis which has implications for policy formulation is that improvements in the distribution of educational opportunities should be effectively implemented in all areas of the country. Age at marriage also appeared to be a significant determinant of fertility. A rise in the age at marriage may not be effectively implemented through policy instruments, but overall socio-economic development in all sectors, especially in the field of education, may well help to raise the mean age. Our analysis suggests that both demand and supply factors are important determinants of fertility. The cost of

fertility regulation did not appear to be significant as a determinant of fertility, mainly because of the absence of delivery services.

This analysis is cross-sectional in nature and includes variables, like age at marriage, which have a dual relationship, requiring a longitudinal study based on an application of the simultaneous-equation models for further empirical evidence on the determinants of fertility.

Appendix 1

Correlation Matrix of Variables Used in the Model

	1	2	3	4	5	6	7	8
Total Fertility Rate	1.00000	–0.51137	0.180920	–0.58879	–0.17634	–0.39138	–0.39505	–0.00537
Singulate Mean Age at Marriage		1.00000	–0.27286	0.54005	0.06903	0.47571	0.40930	0.04287
Infant Mortality Rate			1.00000	–0.33302	0.18973	–0.40281	–0.39447	–0.03463
Enrolment Ratio				1.00000	0.27851	0.57265	0.80808	0.12760
Female Labour Force Participation					1.00000	–0.02022	0.2259	0.08458
Electrification						1.00000	0.65684	0.11288
Urbanization							1.00000	
Family Planning Clinics								
Mean	6.93254	19.61587	130.05825	33.83749	3.97032	27.48381	20.28175	0.01210
Standard Deviation	0.85601	1.25253	17.73936	19.04973	1.82915	21.84909	18.80908	0.01642
Coefficient of Variability	0.12345	0.06385	0.13639	0.56298	0.46071	0.79500	0.92739	1.35702

Appendix 2

Socio-economic Development Ranking of 63 Districts of Pakistan: 1981

S. No.	District	*Z*-scores	Rank
1.	Chitral	0.48769	24
2.	Dir	–3.52191	55
3.	Swat	–3.95075	58
4.	Malakand	–2.10188	47
5.	Kohistan	–0.76907	36
6.	Mansehra	–3.20545	52
7.	Abbottabad	0.21007	27
8.	Mardan	0.14172	28
9.	Peshawar	3.72258	10
10.	Kohat	–2.09319	48
11.	Bannu	1.14426	18
12.	D.I. Khan	0.32311	26
13.	Attock	–0.40025	32
14.	Rawalpindi	2.05727	15
15.	Jhelum	1.01762	19
16.	Gujrat	3.50471	11
17.	Mianwali	0.88063	20
18.	Sargodha	2.34963	12
19.	Faisalabad	3.86823	9
20.	Jhang	1.28275	17
21.	Sialkot	3.96836	8
22.	Gujranwala	4.14362	6
23.	Sheikhupura	4.28105	5
24.	Lahore	10.24789	1
25.	Kasur	2.02882	16
26.	D.G. Khan	–1.05338	41
27.	Muzaffargarh	–2.57804	48
28.	Multan	0.70203	23
29.	Vehari	–0.16681	31
30.	Sahiwal	2.23017	14
31.	Bahawalpur	0.74059	22
32.	Bahawalnagar	2.26697	13
33.	Rahimyar Khan	0.41980	25
34.	Jacobabad	–5.88495	63
35.	Sukkur	–0.10539	30

Continued –

Appendix 2 – (*Continued*)

S. No.	District	*Z*-scores	Rank
36.	Shikarpur	–1.03044	40
37.	Larkana	–1.56576	44
38.	Nawabshah	–0.90154	37
39.	Khairpur	–2.63399	49
40.	Dadu	0.12467	29
41.	Hyderabad	4.00901	7
42.	Badin	–3.42547	57
43.	Sanghar	–0.97117	39
44.	Tharparkar	–3.50710	54
45.	Thatta	–3.62079	56
46.	Karachi	10.03923	2
47.	Quetta	4.58250	4
48.	Pishin	–0.94933	38
49.	Loralai	–0.44197	33
50.	Zhob	–1.51264	43
51.	Chagai	–3.24348	53
52.	Sibi	–0.49701	34
53.	Nasirabad	–5.38574	61
54.	Kachhi	–0.58135	35
55.	Kohlu	–5.73605	62
56.	Kalat	–4.31808	59
57.	Khuzdar	–3.12983	51
58.	Kharan	–4.32531	60
59.	Las Bela	–1.36377	42
60.	Turbat	–2.96753	50
61.	Gwadar	0.80142	21
62.	Panjgur	–1.82735	45
63.	Islamabad	8.49583	3

Note: Six district-level socio-economic development variables, namely age at marriage, infant mortality, enrolment, female labour force participation, electrification and urbanization were taken into consideration while estimating the *Z*-scores.

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Comments on "Determinants of Aggregate Fertility in Pakistan"

The fact that aggregate fertility in Pakistan seems to be basically unresponsive to development efforts, including family planning, has turned demographers into sleuths, hunting eagerly for differentials and determinants. Hoping to find the tiniest signs of variation that would tell policy-makers what to do about the high growth rate of population, certain trusty researchers remain undiscouraged despite many difficulties. I commend Mr Soomro for facing this challenge and confronting the development – fertility relationship, an issue of urgent interest, particularly in Pakistan. In Pakistan, the lack of fertility differentials is well known [3]; so one might wonder why the determinants would be interesting to study. Research which describes the links between development and fertility in Pakistan is essential for evaluating development programmes in the past, and for policy development in the future.

Among the questions posed by this paper is one which seeks to know why there is a high growth rate in Pakistan when development has included a family planning component. The paper also seeks to determine whether the dynamics of demand and supply or the costs, are more important in determining fertility. The policy-relevant factors of fertility at the aggregate level are examined, as are the relative contributions of development variables and family planning clinics.

Because of the unreliable quality and availability of data in Pakistan [4], it is difficult to have the variables, both dependent and independent, that might be optimal for demonstrating a particular relationship. My discussion focuses on the gap between the variables available to us and the conditions we are trying to glimpse.

The Variables

The dependent variable, the Total Fertility Rate, was derived indirectly, using the Child/Woman Ratio and stable population theory with Rele's coefficients. There are two problems with this.

First of all, the model stable-population age distribution used to smooth district age distributions, adjusts the number of children 0–4. While this segment of the population *is* traditionally substantially undercounted; such smoothing would remove the variation among districts which results from migration. We know that the processes of development and urbanization entail substantial migration in a

country like Pakistan. By smoothing the age distribution with a model stable population, we might be losing important information on variation among districts.

The second problem with being obliged to estimate the TFR indirectly is that Rele's coefficients for converting the Child/Woman Ratio into the TFR are based on certain levels of mortality. In Pakistan, the ratio of the expectation of life for men and women varies from district to district. By assuming a level of mortality that is the same for men and women, this variation, which may be relevant as an indicator of development, is ignored.

The author mentions that there are social and psychological costs of fertility regulation. He does not, however, acknowledge them in his discussion of the independent variable measuring the prevalence of family planning clinics. The presence of family planning clinics is regarded by the author as a factor making the costs of fertility regulation negligible. I question the soundness of this judgement. For most women, childbearing is a major source of status. While they may wish to practise contraception, going to a family planning clinic may pose substantial costs in terms of the marital relationship and their position in the extended family. For women in *purdah,* the fact of going to a clinic and seeing a doctor is a cost in itself.

Where females are not valued highly, more emphasis is put on the woman's role as a childbearer, and the society is less receptive to birth control. As one author has said about Pakistan,

> "The totality of the socio-economic – psychological barriers, ... the strong religious and social values in favour of high fertility and strong resistance to any change, probably make the 'setting' in Pakistan one of the most difficult in the world for the successful introduction of a sudden large-scale family planning scheme." [5, p. 281].

The family planning coefficients and *t*-values show that the cost, in the more superficial sense of fertility regulation is not the main issue, but demand is – and demand is what underlies the influence of the development variables. The moratorium on family planning activities between 1977 and 1980 is suggested as an explanation of the extremely limited influence of family planning clinics on the TFR. This has probably worked indirectly, the conservative atmosphere in Pakistan reinforcing people's traditional ideas about fertility regulation.

Urbanization as a blanket variable is problematic because it covers so many things, perhaps not all of them identified by the demographers who use it. There is no variable measuring the per capita income of an area, certainly a difficulty for this analysis. Per capita income, and an estimate of the equity of income distribution in an area, are important measures of development. Future research might do well to focus on agricultural modernization and the structure of the family, each of which influences fertility in complex ways.

Social Changes

It seems to me that this paper says little about the social conditions and attitudes prevailing in Pakistan. It is not surprising that the most important independent variables are social ones, possibly measuring attitudinal differences among the districts. The singulate mean age at marriage and the enrolment rate are the only two single independent variables with significant negative effects on fertility.

I take issue with the idea of age at marriage as a simple function of the demand or supply of children at a given level of mortality. I must disagree with researchers in the past who have argued that marriage is consciously used as a means of controlling fertility. It is other attitudes, resulting in variation in age at marriage, that affect fertility [2]. It is helpful to think of the singulate mean age at marriage as a dependent variable itself, keeping in mind that the characteristics that produce it are not so easy to measure.

In both urban and rural areas, age at marriage is positively related to level of schooling [6] and to female labour force participation; these in turn result from the way women are valued in a particular area. As Chaudhury [1] has noted, "the issue of enhancing female status appears to be of crucial importance in creating an environment in which women would want to practise contraception in order to reduce fertility" [1, p. 352].

Would a policy, raising the age at marriage, have a significant impact on the number of children couples have? Probably not, as this would be treating the symptom and not the condition. Mass education is more likely to get to the root of the issue – it can change what produces the fertility differentials associated with the singulate mean age at marriage: the fundamental social conditions which persist in spite of different levels of development.

Modifications in the status of women, and in the value of children are among the changes that bring about significant fertility decline. But these lie beyond the author's analysis. In our eagerness to find some explanations for the high levels of fertility in Pakistan, let us not be discouraged by the limited quantifiable variables available to us. At the same time, we must focus on what these variables indicate, even more than on what they measure.

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