

Female Education, Modernity and Fertility : A Study in the Indian Context

Introduction

SOCIAL demographers interested in the area of fertility have attempted to investigate the causes and consequences of fertility variations in diverse socio-cultural contexts. Similarly, fertility of Indian couples of different social and economic strata have been subjected to meticulous investigation in different geographical areas. Despite the evidence now available, we do not yet understand clearly the causes for the persistent high growth rate of population in India. Given their academic curiosity and professional research interest, however, social scientists continue their search for the probable factors affecting fertility. This study investigates the hypothesis that female education and modernity affect fertility. The purpose is both theoretical and practical. On the theoretical level, we are interested in the additional explanatory power of education and modernity on fertility after taking into account standard demographic and socioeconomic characteristics. On a practical level, we are interested in the additional predictive power of measures of individual modernity because most fertility surveys in the past have neglected to measure this factor directly. Is this an important failing?

The concept of modernity is central to this study. But defining modernity is difficult because it has a multitude of facets and has been defined in numerous ways. For the purpose of this study, modernity is defined as "participation in social, political and economic institutions associated with urban-industrial society, and the holding of attitudes associated with such participation" (De

Vos, forthcoming). Modernity is associated with a marked sense of personal efficacy, independence and autonomy from traditional sources of influence especially in making basic decisions about the conduct of personal affairs. A modern person is "ready for new experiences and ideas" and "relatively open-minded and cognitively flexible" (Inkeles and Smith, 1974 : 290).

We have seen a plethora of analyses of differentials in fertility by education and modernity in recent years (Kahl, 1968; Bogue, 1969; Williamson, 1970; Fawcett and Bornstein, 1973; Holsinger and Kasarda, 1976; Cochrane, 1979; Rindfuss *et al.*, 1980; Caldwell, 1980; Nag, 1980; Ramnath, 1980; Jain, 1981; Blake and Delpinal, 1982; Stycos, 1982). These studies were conducted at both the macro (aggregate) and micro (individual) levels and have treated education as an endogenous as well as an exogenous variable. Further, writing on the relationship of fertility to several facets of social structure, some writers have placed great faith in mass education as a sure means of reducing population growth (Bogue, 1969; Simon, 1974; Caldwell, 1982). That faith has been affirmed by research evidence that has found schooling to exhibit a stronger and more consistent relationship to fertility than does any other single variable. Where this has not been found, this can be explained by the nature of the sample (Jain, 1981).

In contrast, there have been few studies linking direct measures of individual modernity to fertility. The relationship is consequently less well understood. Nag, for instance, speculates that social modernization may create conditions which tend to increase fertility (1980 : 571). Potentially, then, on the individual level there may not be a clear inverse relationship between individual modernity and-fertility. On the other hand, the negative relationship between education and fertility is speculative due to the effect of education on modernity and through this on fertility. This postulates a negative relationship between modernity and fertility.

Holsinger and Kasarda have observed that education may influence fertility directly, by altering attitudes and behavioural patterns of individuals, and indirectly, by affecting such factors as age at marriage, acceptance of family planning and infant and childhood mortality (1976 :174). Those attitudes and behaviour thought by Holsinger and Kasarda to directly affect fertility have been considered by others to be "modern" as opposed to more traditional orientations. Fawcett and Bornstein argue that fertility studies must include those individual personality traits that form a part of modernization. Education receives a high priority in the resulting conceptual schema (1973 : 107)

Miller and Inkeles (1974) have argued that acceptance by an individual of birth limitation is a function of holding modern attitudes and values, which in turn result from exposure to modern institutions such as school and the mass media. Using data on adult male factory workers in East Pakistan (now Bangladesh), India, Israel and Nigeria, the writers reach the conclusion that experience

with such institutions as the school and factory leads to acceptance of family limitation through the influence of modern attitudes and values.

These ideas need to be subjected to close empirical scrutiny. Studies on the individual level, based on sample surveys that are small and localized, can be useful (Cochrane, 1979 : 142; Caldwell, 1982 : 155). This study, therefore, tests whether, after controlling for other things, either individual modernity or education of respondent has an independent effect on fertility. We collected data on a sample of wives of readers and professors working at Andhra University, Visakhapatnam, India, during 1981. We measured standard demographic and socioeconomic characteristics, and several more direct indicators of individual modernity. This allowed us to focus on the impacts of education and individual modernity on fertility after controlling for other potentially confounding factors. In other words, we estimated a multivariate equation to see if education and a modernity scale affected fertility independently; then measured both the amount by which the zero-order correlation was reduced by controlling for other factors, and how much of an independent effect remained.

The Data

The data comes from a random sample of 150 wives of readers and professors at Andhra University, out of a total population of about 300. Information was collected from the sampled wives and their husbands. This controlled for the sub-cultural ethos, the educational levels and the income of the husbands. A sample of highly educated women with less educated husbands would have refined our research design, but, realistically speaking, this sort of sample is not available in the prevailing conditions in India. The instrument for generating the data was an interview schedule with structured questions, measures from which allowed us to use correlation and regression analysis.

Table 1 gives basic facts of the sampled respondents. The respondents' ages ranged from 22 to 44 years, the mean being 36.7 years. Almost 70 percent of the respondents were between the ages of 35 and 44, and the rest were below the age of 35. The mean age of the husbands was 42.6 years within the broad range of 32 to 56 years. Hindus constituted 95 percent of the sample. Despite the socioeconomic homogeneity of the husbands, the female respondents' educations ranged from 5 to 20 school years with an average of 12.4 years. Fifty-one percent were educated above high school. A majority of the respondents (78 percent) were housewives. Of those who were employed, the average monthly income was Rs. 1013, within the range of Rs. 175 to 2,600. The average family income was Rs. 2,595 a month within the range of Rs. 1,760 to 5,460. Data on family size indicated that 90 percent of the families ranged from 4 to 7 members, averaging 5.5. About 61 percent of the respondents lived in nuclear

TABLE 1—THE SAMPLE : DESCRIPTIVE STATISTICS

<i>Variable</i>	<i>Range</i>	<i>Mean</i>
1. Respondents' Age	22-44 years	36.7 years
2. Husbands' Age	32-56 years	42.6 years
3. Respondents' Education	5-20 school yrs.	12.4 years
4. Respondents' Monthly Income	Rs. 175-2600	Rs. 1,013
5. Monthly Family Income	Rs. 1760-5460	Rs. 2,595
6. Family Property	Rs. 50,000-750,000	Rs. 97,920
7. Age at Marriage	9-27 years	18.2 years
8. Effective Age at Marriage	13-30 years	19.0 years
9. Duration of Married Life	1-30 years	17.6 years
10. Family Size	2-9	5.5
11. Number of Pregnancies	1-12	3.7
12. Number of Live births	0-7	3.2
13. Number of Living Children	0-6	3.1
14. Average Birth Interval	0-132 months	29.7 months

families. The respondents exhibited a substantial variation in their age at marriage, ranging from 9 to 27 years of age. The mean age at marriage was 18.2 years. In India, however, it is not the age at marriage itself but the effective age at marriage which should be considered for fertility analysis, since there will be some gap between age at marriage and the age at consummation in most cases. Age at consummation ranged between 13 to 30 years, the average being 19 years. The average duration of married life for the sample was 18 years, although it ranged from 1 to 30 years. The number of live births ranged between 0 and 7, averaging 3.2. While 27 percent had experienced either spontaneous or induced abortions, 28 percent experienced infant or child deaths, some as many as 3.

Measures

Number of live births was the dependent variable. Education was measured in terms of number of school years. The indicators of modernity were possession and use of modern gadgets, exposure to mass media, religiosity, participation in non-familial activities, modernity performance, aspiration and achievement motivation, interspouse interaction, and knowledge, attitude and practice of contraception. These variables were combined into modernity scores for the respondent, the husband and the couple.¹ Other measures examined include respondents' age (years completed), husband's age, income, family size, number of earning adults, number of infant deaths, effective age at marriage, family property, duration of married life, average birth interval and average breast-feeding period.

Findings

Figures in Table 2 show that, of 26 variable that were selected for the study, 16 variables emerged significantly for their relation with fertility. Among these, as expected, seven variables were positively correlated with fertility—respondents' age, husbands' age, family size, number of infant deaths, duration of married life, average breast-feeding period and religiosity. But unexpectedly, fertility was also positively correlated with average breast-feeding period. The remaining eight variables were significantly and inversely related to fertility—the respondent's education, effective age at marriage, exposure to mass media, aspiration and achievement motivation, interspouse interaction, awareness, attitude and practice of contraception, the total modernity score of the respondent and the total modernity score of the couple. By and large, and consistent with most of our expectations, the demographic or biological variables had a significant and positive effect on fertility, while the variables under the rubric of modernity and education had a negative relationship with fertility. The correlation analysis also shows that economic factors such as respondents income, family income, family property and number of earning adults were not the important predictors of fertility differentials for the sample. The value of the correlation coefficients between each one of them and fertility was very weak and insignificant.

Education was significantly correlated with all the other variables except age, family property and average breast-feeding period. This last null correlation

1. For each modernity item, there was a set of questions asked and a score given depending on the number of answers indicative of modern attitude or behaviour. These scores were combined to form a total modernity score of the respondents ranging from 0 to 69. The inter-correlations between the contributing modernity factors vary (See Table 1A in Appendix). The correlations between the total modernity score and its constituent variables are 0.43 or above except for religiosity.

TABLE 2—ZERO-ORDER CORRELATIONS BETWEEN RESPONDENTS' EDUCATION, TOTAL MODERNITY, NUMBER OF LIVE BIRTHS AND OTHER VARIABLES

<i>S. No.</i>	<i>Variable</i>	<i>Education</i>	<i>Total Modernity</i>	<i>Number of Live Births</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1	Respondents' Age	-0.08	0.04	0.35
2	Husbands' Age	-0.10	0.02	0.27
3	Respondents' Monthly Income	0.51	0.27	-0.06
4	Family Income	0.50	0.27	0.04
5	Family Size	-0.20	-0.11	0.66
6	Respondents' Education	—	0.44	-0.26
7	No. of Earning Adults	0.46	0.20	-0.03
8	Number of Infant Deaths	-0.15	-0.15	0.80
9	No. of Live Births	-0.26	-0.16	—
10	Family Property	0.01	0.07	-0.02
11	Effective Age at Marriage	0.61	0.16	-0.20
12	Duration of Married Life	-0.40	-0.06	0.41
13	First Interval	-0.15	-0.07	0.04
14	Average Birth Interval	-0.10	-0.03	-0.04
15	Open Birth Interval	-0.20	0.03	-0.08
16	Average Breast Feeding Period	-0.06	-0.04	0.19
17	Possession of Modern Gadgets	0.25	0.49	-0.02
18	Respondents' Modernity Performance	0.19	0.60	-0.03
19	Respondents' Exposure to Mass Media	0.27	0.55	-0.12
20	Respondents' Religiosity	-0.20	0.05	0.13

Table 2 (contd. on page 92)

Table 2 (contd. from page 91)

1	2	3	4	5
21	Respondents' Participation in Non-Familial Activity	0.21	0.44	0.05
22	Respondents' Aspiration and Achievement Motivation	0.18	0.45	-0.16
23	Interspouse Interaction	0.33	0.43	-0.17
24	R's Awareness, Attitudes and Practice of Contraception	0.14	0.50	-0.24
25	Total Modernity Score of the Respondent	0.44	—	-0.16
26	Total Modernity Score of Husbands	—	0.21	0.00
27	Total Modernity Score of the Couple	0.33	0.85	-0.12

was unexpected, because education often reduces the breast-feeding period. Education, in fact, was only moderately related to number of live births and to modernity. The correlation between modernity and other variables was more mixed. While modernity was significantly related to number of live births, income, family size, education, infant mortality, effective age at marriage and, of course, the modernity scores of husbands and couples, it was not correlated with age, family property, duration of married life, length of birth intervals and average breast-feeding period. While most of this is in the expected direction, the insignificant correlation between modernity and average breast feeding period is mystifying. The fact that number of infant deaths was negatively correlated with both education and modernity is also noteworthy.

In a second step we used multiple regression to estimate the effect of education and modernity on fertility after controlling for other important factors. These are : respondent's age, number of infant deaths, effective age at marriage and average breast-feeding period. The other variables were eliminated because they were either redundant or not correlated with fertility on the zero-order level. The resultant model can be summarized by the following equation :

$$y = a + b_1 X_1 + b_2 X_2 + \dots + b_k X_k$$

where

y = number of live births,

x_1 = respondents' education,

x_2 = modernity score of the respondents,

x_3 = respondents age,

x_4 = number of infant deaths,

x_5 = effective age at marriage, and

x_6 = average breast feeding period.

The estimated equation is shown in Table 3. As expected, education had a significant net effect on fertility. In contrast to our hypothesis, however, the total modernity score of the respondents failed to have an independent effect. Since the modernity scale comprised only a Subset of indicators that might be considered important, we might or might not have obtained different results using more indicators. But it appears that the effect of modernity is being adequately included in our measure of education or other standard demographic measures such as effective age at marriage. For some predictive purposes, then, it may not be necessary to include direct measures of modernity in a fertility survey. Indirect indicators such as female education and the probability of experiencing a child death will be sufficient. May be, it would be more fruitful to investigate independent effects of certain aspects of individual modernity, such as exposure to mass media or interspouse interaction, rather than using a more general measure.

Unexpectedly, given our sample of higher socioeconomic status women, infant mortality was found to have a significant independent effect on fertility. Education, while it may have an effect on infant mortality, does not account for the whole effect of infant mortality on fertility. That is, both material education and infant mortality have significant independent effects on fertility. While infant mortality may have contributed to greater fertility, it is also possible that women with more births were more at risk of experiencing an infant death. (However, a recent study found that out of 21 socioeconomic and family planning program input variables, the mortality rate can explain more than anything else the variation in the birth rates of Indian states : Nag, 1982, citing King *et al.*, 1974. This is, of course, an aggregate level finding.) But our conclusions are consistent with the findings of other researchers that material educational level influences the number of live births, and that the average number of children ever

TABLE 3—REGRESSION VALUES FOR THE SIX PREDICTOR VARIABLES

S. No.	Variable	•O' Order Correlation Coefficient	Beta Coefficient	T- Value
1	Respondents' Age	0.35	-0.1035	0.5312
2	Respondents' Education	-0.26	-0.0609**	1.6127
3	Number of Infant Deaths	0.80	1.2946*	12.9277
4	Effective Age At Marriage	-0.20	0.0604	0.2962
5	Average Breast Feeding Period	0.19	-0.0007	0.0343
6	Total Modernity Score of the Respondent	-0.16	-0.0001	0.0010

** Significant at 10.0 percent level

* Significant at 1.0 percent level

$R_2 = 0.69$ (69 percent); Standard Error = 1.11;

F Value = 25.7

born is higher among those women who have lost at least one child (Ramnath 1980; Schultz 1976; Caldwell 1979; Srinivasan 1979).

Neither respondents' age, nor effective age at marriage, nor the average breast-feeding period had any independent effect on fertility. Perhaps, given the small size of the sample and the large number of variables used, these variables proved collinear with each other or with education and modernity, masking independent effects.

Summary

In conclusion, we have examined, for a sample of women of relatively high socioeconomic status, the relationship between education, modernity and fertility. While the analysis is limited by the circumscribed characteristics of this population, we find the results suggestive in a number of respects. First, education is found to have a significant effect on fertility after controlling for the modernity score and the other factors. On the other hand, modernity, as measured by a number of characteristics, is not found to have an independent effect on number of live births after controlling for education, age, infant mortality effective age at marriage and average breast-feeding period. A significant relationship is shown between infant mortality and fertility. While the causality of this latter relationship is open to question, we find it intriguing, suggesting that poli-

cies aimed both at increasing education of females and at reducing infant mortality are important for decreasing fertility.

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References

1. Blake, J. and Delpinal, J., 1982, Educational attainment and reproductive preferences: theory and evidence. In : C. Hohn and R. Mackensen (Eds.), *Determinants of Fertility Trends : Theories Re-Examined*, Liege : International Union for the Scientific Study of Population (IUSSP).
2. Bogue, Donald J., 1969, *Principles of Demography*, New York : John Wiley and Sons.
3. Caldwell, John C., 1979, Education as a factor in mortality decline : an examination of Nigerian data, *Population Studies*, 33(3).
4. _____, 1980, Mass education as a determinant of the timing of fertility decline. *Population and Development Review*, 6(1).
5. _____, 1982, *Theory of Fertility Decline*, New York : Academic Press.
6. Cochrane, Susan Hill, 1979, *Fertility and Education : What do We Really Know?* Baltimore : Johns Hopkins University Press.
7. De Vos, Susan, Forthcoming, "The old age economic security value of children and its demographic consequences : the Philippines and Taiwan." Papers of the East-West Population Institute Series No. 60.
8. Fawcett, James T. and Bornstein, Marc H., 1973, Modernization, individual modernity and fertility. In : James T. Fawcett (Ed.), *Psychological Perspectives on Population*, New York : Basic Books.
9. Holsinger, Donald B. and Kasarda, John D. 1976, Education and human fertility : sociological perspectives. In : Ronald O. Ridker (Ed.), *Population and Development*, Baltimore : The Johns Hopkins University Press.
10. Inkeles, Alex and Smith, David H.. 1974, *Becoming Modern ; Individual Change in Six Developing Countries*, Cambridge, Mass. : Harvard University Press.
11. Jain, Anrudh K., 1981, The effect of female education on fertility : a simple explanation, *Demography* 18(4), 577-595.
12. Kahl, J. A., 1968, *The Measurement of Modernisms : A Study of Values in Brazil and Mexico*, Austin : The University of Texas Press.
13. King, Timothy et al, 1974, *Population Policies and Economic Development* (A World Bank Staff Report), Baltimore : The Johns Hopkins University Press.
14. Miller, Karen A. and Inkeles, Alex, 1974, Modernity and acceptance of family limitation in four developing countries, *Journal of Social Issues*, 30 (4), 167-188.
15. Nag, Moni, 1980, How modernization can also increase fertility, *Current Anthropology*, 21(5), 571-587.
16. _____, 1982, Modernization and its impact on fertility : the Indian scene. The Population Council Working Paper No. 84 (May), New York. Also published in *India International Centre Quarterly* 8(3 and 4).

17. Ramnath, S. T., 1980, The influence of maternal education on live births, childhood mortality and their interrelationship, *Journal of Family Welfare*, 27(1), 26-34, Bombay.
18. Rindfuss, Ronald R., Bumpass, Larry and John, Craig St., 1980, Education and fertility : implications for the roles women occupy. *American Sociological Review*, 45(June), 431-447.
19. Schultz, T. Paul, 1976, Interrelationships between mortality and fertility. In : Ronald G. Ridker (Ed.), *Population and Development*, Baltimore : The Johns Hopkins University Press.
20. Simon, Julian L., 1974, *The Effects of Income on Fertility*, Monograph, 19, Chapel Hill, North Carolina : Population Center University of North Carolina.
21. Srinivasan, K., 1979, Association of high fertility with infant mortality : a review and an empirical investigation. In : K. Srinivasan et al. (Eds.), *Demographic and Socioeconomic Aspects of the Child in India*, Bombay : Himalaya Publishing House.
22. Stycos, J. Mayone, 1982, The decline of fertility in Costa Rica : literacy, modernization and family planning. *Population Studies* 36(1), 15-30.
23. Williamson, J. B., 1970, Subjective efficacy and ideal family size as predictors of favourability toward birth control, *Demography*, 7, 329-339.

APPENDIX

TABLE 1-A CORRELATION MATRIX BETWEEN TOTAL MODERNITY SCORE AND ITS CONSTITUENT VARIABLES

	<i>Total Modernity Score</i>	<i>Possession of Modern Gadgets</i>	<i>Modernity Performance</i>	<i>Exposure to Mass Media</i>	<i>Religiosity</i>	<i>Participation in Non-familial Activity</i>	<i>Aspiration and Achievement Motivation</i>	<i>Interspouse Interaction</i>	<i>Awareness, Attitude and Practice of Contraception</i>
Total Modernity Score	1.00								
Possession of Modern Gadgets	0.49	1.00							
Modernity Performance	0.60	0.25	1.00						
Exposure to Mass Media	0.55	0.27	0.52	1.00					
Religiosity	0.05	-0.05	-0.07	0.02	1.00				
Participation in Non-familial Activity	0.44	0.16	0.32	0.38	0.03	1.00			
Aspiration and Achievement Motivation	0.45	0.06	0.11	0.08	-0.00	0.09	1.00		
Interspouse Interaction	0.43	0.29	0.12	0.11	-0.13	0.04	0.28	1.00	
Awareness, Attitude and Practice of Contraception	0.50	0.11	-0.02	0.01	-0.08	-0.06	0.12	0.14	1.00