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Demographic Transition, Family Size and Child Schooling

P.N. Mari Bhat

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P.N. Mari Bhat is with the Institute of Economic Growth, Delhi. Email: mari@ieg.ernet.in

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National Council of Applied Economic Research
Parisila Bhawan
11 Indraprastha Estate
New Delhi 110 002
India

Telephone: (91-11) 2337 9861, 2337 0424, 2337 0323
Fax: (91-11) 2337 0164
Email: infor@ncaer.org
Website: www.ncaer.org

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Abstract

This paper first presents evidence to show that in recent years there has been a substantial fall in fertility among illiterate women in India. Subsequently, using the data from the Human Development Profile Survey of 1994, it shows that child schooling among illiterate parents is inversely related to family size and positively related to contraceptive use. By connecting these two pieces of evidence, the paper argues that fertility is falling and child schooling is rising among illiterate couples because of the quantity-quality trade-off. The detrimental effect of family size on child schooling is found to be more severe on female children and on the first-born of either sex. Perhaps this is because when family size is large, these children are either not sent to school at all or withdrawn early, to supplement the family income or to look after the younger siblings. Consequently, it is argued that the first female child would particularly stand to gain from declines in fertility.

JEL Classification

J 11, J 13, I 12

Keywords

Demographic trends, Fertility, Child schooling

1. INTRODUCTION

It is now widely known that female education exerts strong negative effects on fertility. During the last two decades, numerous articles and several review volumes have testified to this fact and the relationship has come under intense scrutiny (for example, Cochrane, 1979; Jejeebhoy, 1995; Jeffery and Basu, 1996; Bledsoe et al., 1999). But in the meanwhile the possibility of fertility levels influencing child schooling has received scant attention, even though it has been occasionally pointed out that children from large families may receive less schooling because of the resource constraint. However, in recent years, there has been a growing body of interest in the relationship between family size and child schooling (Knodel, Havanon and Sittitrai, 1990; Lloyd and Blanc, 1996; Montgomery and Lloyd, 1999). Generally, wherever fertility has fallen, the observed relationship is found to be negative (for example, Knodel and Wongsith, 1991; Sudha, 1997), but occasionally non-significant, positive relationships are also observed in areas where fertility levels are high (see Sudha, 1997).

It is also widely held that the rising cost of children could be one of the primary reasons for the fall in fertility. One of the main propositions of economic theories of fertility is that couples make decisions regarding their family size taking into consideration both direct and indirect costs involved in raising children. Child schooling entail both direct and indirect costs to parents, and those wishing to educate their children would choose to have fewer of them. Such a trade-off between quality and quantity could cause family sizes to be inversely related to child schooling.

But occasionally a positive, but non-significant relationship between the two could arise for the following reason: In peasant societies with high levels of child mortality, there would be a strong preference to retain children in traditional occupations because not many of the children are expected to survive to adult ages. But an exogenous fall in mortality would cause unanticipated expansion of family sizes, threatening smaller per capita landholding in the next generation. In such a situation, parents might begin to send selectively their later born children to school in order to diversify occupations of their children. This would make child schooling to be positively related to family size. In situations where both trends intersect, one may not observe any significant relationship between family size and child schooling.

There is also the issue of whether quality-quantity trade-off implies a causal connection between fertility and child schooling. Under the dominant economic perspective, both are jointly

determined and it is not right to speak of fertility as the causal determinant of child schooling (Montgomery, Kouame and Oliver, 1995). This may appear so when fertility and child schooling decisions are assumed to be taken well in advance with full information on the net lifetime returns from competing options. However couples generally do not make decisions this way, nor is it necessary to make decisions once for all. It is to be recognised that couples have no complete control over their fertility or children's survival and it pays to take the decisions about child schooling depending on the family size and economic circumstances at the time the child becomes old enough to be enrolled in school. If the household happens to have several children by that time, the eldest child may be withheld from school, either to supplement the family income or to take care of younger siblings. When the youngest child attains the age of schooling, already decisions about family size would have been taken. As a matter of fact, the child may be an 'unwanted' one. Therefore, under the sequential model of decision making, it would seem correct to assume a causal link between fertility and child schooling. Indeed, even those who strongly favour the economic framework seems to have come around to such a thinking (see Montgomery and Lloyd, 1999).

Perhaps more importantly, the rising aspirations for child schooling, could force people to make greater efforts to reduce their fertility. Thus, if fertility decline is not the *cause*, it could certainly be regarded as a *means* to achieve higher levels of schooling. As the true causes for rising aspirations must influence fertility in order to change child quality, it can truly be regarded as a 'proximate' determinant of child schooling.

In this paper, we will first present evidence to show that in recent years there has been a substantial fall in fertility among illiterate women in India. Using the data from the Human Development Profile Survey of 1994, we will also show that child schooling among illiterate parents is inversely related to family size and positively related to contraceptive use. By connecting these two pieces of evidence, it will be argued that fertility is falling and child schooling is rising because couples have begun to make a quantity-quality trade-off.

2. DECLINING FERTILITY OF ILLITERATE WOMEN

Those who give female education a place of pre-eminence in the demographic transition generally believe that the relationship between education and fertility has always been uniformly inverse and unchanging. Subscribers to this view also believe that decline in fertility occurs mainly because of the change in the composition of women by level of education: Fertility is high initially because most people are illiterate and low at the end demographic transition because of most are well-educated, or at least, literate.

But how faithful is this view to reality? In Table 1, data on levels of total fertility rate by educational attainment of women during the 1980s and 1990s have been assembled from several sources. These estimates of total fertility are based on data on births reported during a reference period that varied from one to three years before a census or a survey. However, as births reported in the 1981 and 1991 censuses were grossly deficient, the estimates of TFR were derived from the data on birth order and age of mother for births that occurred during the one-year period preceding the respective censuses (see Bhat, 2000). The data presented in Table 1 do indeed show the familiar inverse relationship between female education and fertility at a given point in time. Total fertility is highest among illiterates and lowest among women educated up to matriculation or beyond. But it does not show that the relationship has been static. Fertility levels have fallen among women belonging to every educational level. The decline has been impressive even among illiterate women, among whom TFR has fallen by nearly 1.5 births per woman between the early 1980s and late 1990s. Using this data, it can be shown that more than half of the reduction in total fertility in recent years has been due to the decline in fertility among illiterate women, while the change in the educational composition of women (i.e., improvement in female education) accounted for less than 20 percent of the fall (see Bhat, 2000). In other words, fertility declined primarily from the change in its level within the same educational class rather than from women attaining higher educational levels. One arrives at the same conclusion by analysing the trend in contraceptive practice by educational level of women (not shown).

It is beyond the scope of this paper to analyse the reasons for the substantial fall in fertility among illiterate women. But it is of interest to know whether this fertility decline was associated with

a quantity-quality trade-off, and if so, has this affected the schooling of children of illiterate parents.

3. EFFECT OF PARENTAL SCHOOLING ON CHILD SCHOOLING

The determinants of child schooling have been analysed using data from the Human Development Profile Survey conducted by the National Council of Applied Economic Research in 1994. This survey covered about 35,000 households spread over 1,765 villages in 16 major states of India (Shariff, 1999). There have been several other analyses of the rich data on education and child schooling this survey has thrown up (for example, Sipahimalani, 1998; Duraisamy, 2000). The current effort differs from the previous ones owing to its emphasis on the demand-side of the issue and on the quantity-quality trade-off. As family size, contraceptive use and birth order of children are critical to our analysis, data used here pertain to children in the age group of 6-14 years of mothers in the age group of 20-49 years and whose sex-specific birth order can be ascertained from the data set.

First, it is useful to remind ourselves of the self-generating principle in child schooling: educated parents beget educated children. The chance of a child going to school rises significantly even if only one of the parents is literate. Table 2 shows the rate of current school enrolment of children aged 6-14 years by literacy status of the father and the mother. It is seen that only 49 percent of the children are enrolled in school when both the parents are illiterate. But it rises to 73 percent when the father alone is literate and 92 percent when both parents are literate. With respect to female children, it is found that only 40 percent go to school when both parents are illiterate but it jumps to 64 percent if the father is literate and to 90 percent when both parents are literate. Interestingly, more children go to school when the mother alone is literate than with only the father literate. But as cases of the former are few compared to the latter, the growth in female literacy ought to be seen as the second-generation effect of the growth in male literacy.

Since most of the literate parents send their children to school, there is not much insight to be gained by including these children in the analysis. What is crucial is to know the characteristics of illiterate parents who are sending their children to school. As fertility has begun to fall in this group, it would be rewarding to know what part this has played in raising the school enrolment. Hence only the children of illiterate parents have been retained for further analysis.

4. SCHOOLING OF CHILDREN OF ILLITERATE PARENTS

The analysis described below is focused on current school enrolment rate among children aged 6-14 years and the probability of completing primary-level schooling among children aged 10-14 years. Owing to problems of sample size, the attainment of primary level of schooling has been analysed using the all-India data only. On the other hand, the determinants of current enrolment rates have also been analysed for rural northern India, comprising of the states of Bihar, Uttar Pradesh, Rajasthan and Madhya Pradesh as they are in the early stages of demographic transition. As we expect the determinants of schooling to be different in the case of male and female children, and also in the case of first- and later-born children, the analysis has been carried out separately by sex and order of the child.

Table 3 shows the definition, mean and standard deviation of the variables included in the analysis. The mean and standard deviations shown in the table refer to the all-India sample of 7,498 male and 6,531 female children aged 6-14 years whose mothers belonged to the age group 20-49 years at the time of the survey. It has been assumed that demand for schooling is determined by characteristics of children, their parents and also the household and community they are part off. The child attributes included in the analysis are age and order of the child by sex. The parental characteristics included are mother's age, her work-status, number of living children and current use of contraception. Mother's age has been included in the analysis to capture the cohort changes in tastes and to guard against any truncation error resulting from the inclusion of women who have not completed their reproductive span.

The household-level variables included in the analysis are caste and religion, size of land owned and proportion of irrigated land in the gross-cropped area of the household. The community-level variables used in the analysis are village population, the presence of a bus stop and middle school in the village and a composite index measuring amenities and infrastructure in the village (see Shariff, 1999). Although the village development index is likely to be strongly correlated with other three community-level variables, it has been included in the analysis to see whether development of the village and rising opportunities for non-agricultural employment induce parents to send children to school.

As the dependant variables of the analysis are binary, logistic regression has been used in examining the determinants of child schooling. The results of current enrolment regressions using the all-India data are shown in Table 4. The analysis has been made separately for the first son, later-born sons, first daughter and later-born daughters. The key results are with respect to living children

of parents and contraceptive use. It can be seen that family size (i.e, number of surviving children) has a strong negative effect on current school enrolment of children, except in the case of higher-order sons. It is interesting to note that detrimental effect of family size on child schooling is larger for daughters and those who are first-born. The result supports the hypothesis that in a large family, first-born children are either not enrolled in the school, or withdrawn early to either supplement the family income or to attend to younger siblings. It also shows that the resource dilution in a large family affects the schooling of girls more than boys, perhaps because more girls are 'unwanted' than boys.

The results also show that contraceptive use has a strong positive effect on child schooling independent of its effect through family size. That is, in the case of parents having the same number of children, it is the contraceptive users who enroll more of their children in school. This effect is seen among both boys and girls and first and later-born children. This is a strong confirmation of the possibility that illiterate parents have begun to make a trade-off for a better quality of the next generation, as they are controlling their family size. In terms of magnitude, the effect of contraceptive use on the schooling of male children is about the same as the difference in schooling between scheduled castes and caste Hindus. In the case of females, it is even larger.

We shall only briefly report the findings regarding other determinants. There is a strong negative effect of mother's work status on the schooling of first daughters. But the effect is present only if the mother is engaged as a wage labourer. This is obviously because such women cannot afford to hire someone else to attend to household chores. Interestingly this effect is strong only in the case of the first-born daughter. Muslims, scheduled tribes and scheduled castes send less of their children to school than caste Hindus, but the differences are larger for boys than girls. This is an indication of greater sex-discrimination in child schooling among caste Hindus.

The results also disclose that landholding has a strong positive effect on schooling of both boys and girls. If more of the land is irrigate, there is an additional effect on child schooling, but interestingly, it is stronger for later-born children than the first-born. Among the community-level variables used in the analysis, the presence of a middle school or the village size do not show significant positive influence on child schooling of either sex. However, the presence of a bus stop and the developmental level of the village do show strong positive effect on child schooling. The significance of these variables suggests that beyond the educational facilities, better transportation

and rising opportunities for non-agricultural employment contribute to child schooling. It is however found that in spite controlling these factors, illiterate parents in northern India send fewer of their children to school compared to their counterparts in rest of the country. This suggests the operation of some undetermined taste factors, shaped perhaps by the size of illiterate population in the community.

Table 5 shows the results of current enrolment regressions for rural areas of four large north Indian states. As these states are in the early stages of fertility transition, one expects the presence of only a weak trade-off between quantity and quality. But the regression results show that here too the contraceptive users are sending more of their children to school. This however, does not contradict our hypothesis because the occurrence of weak trade-off between quantity and quality is reflected in relatively few parents using contraception rather than in the weak effect of contraceptive use on child schooling.

Interestingly, the results with respect to number of siblings are also more or less similar to that obtained using the all-India data. Family size is found to exert a negative effect on schooling of female children, especially the first-born. However, family size has no significant effect on schooling of male children, either first- or later-born. We expected a positive effect of family size on schooling of higher-order sons, but it is not borne out by the data, perhaps because of significant heterogeneity (i.e., in some positive effect and in some negative effect).

Table 6 shows the results of the analysis of the determinants of completing primary-level schooling among children aged 10-14 years. Again the results are similar to those reported using current enrolment rates, though significance levels are somewhat lower because of the reduced sample size. Family size has a significant negative effect on completion of primary-level schooling, especially among female children and those born first. Children of parents who are using contraception are more likely to complete primary education than those whose parents are not regulating their fertility. Thus there is strong evidence to suggest that decline in fertility levels has begun to contribute significantly towards the improvement in education, especially of females.

5. CONCLUSION

The evidence presented in this paper shows that in recent years there has been a substantial fall in fertility among illiterate women in India and more and more illiterate parents have begun to send their children to school. We see a connection between these two trends. Couples have begun to reduce their family size in order to invest more on child schooling. The occurrence of such a trade-off between quality and quantity is evidenced by the higher school enrolment and attainment of primary education among children of parents who are using contraception to regulate their fertility. Although both fertility levels and child schooling may have been changing because of rising aspirations for better quality of life, to the extent the former is reduced to achieve the latter, fertility can be regarded as a proximate determinant of child schooling. We also find the detrimental effect of family size on child schooling to be more severe on female children and on the first-born of either sex. When family size is large, these children are either not sent to school at all, or withdrawn early, to supplement the family income and to look after the young ones. Consequently, the first female child would particularly stand to gain from fertility transition.

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TABLES

Table 1
Estimates of Total Fertility by Educational Level of Women from Various Sources, All India

Educational Level of Women	1981 Census	1984 SRS Survey	1991 Census	NFHS-1 1992-93	NFHS-2 1998-99
Illiterate	4.8	5.1	4.3	4.0	3.5
Below primary level		4.2			
Below middle level	4.3		3.3	3.0	2.6
Primary complete		3.3			
Middle complete	3.6		2.8	2.5	2.3
Matriculate & above	2.4	2.4	2.1	2.2	2.0
All women	4.7	4.5	3.9	3.4	2.9

Table 2
Percentage of Children Aged 6-14 Years Attending School by Parent's Literacy Status, Rural India, 1994

Sex of Child	Both parents Illiterate	Only father literate	Only mother literate	Both parents literate	All children
Total	49.0	72.9	79.5	91.8	68.2
Male	57.1	80.8	84.1	93.2	74.3
Female	39.5	64.0	74.9	90.2	61.2
Sex Difference	17.6	16.8	9.2	3.0	13.0
No. of Children	13728	11184	599	8645	34157

Table 3

Variable Definitions, Sample Means and Standard Deviations
(Sample: Children of 6-14 years of age of illiterate parents, with mothers of the age group 20-49 years in rural India)

Variable name	Definition	Mean		Standard Deviation	
		Sex of child		Sex of child	
		Male	Female	Male	Female
School attendance	Dummy=1 if child is studying in school	0.57	0.39	0.50	0.49
Age of child	Age of child in completed years	9.72	9.60	2.57	2.52
Age of child square	Square of age of child	101.15	98.55	51.11	49.72
Mother's age	Logarithm of mother's age	3.53	3.53	0.17	0.18
Order of child	Order of child by sex	1.82	1.72	0.97	0.97
Children surviving	**Surviving children of mother**	**4.01**	**4.19**	**1.55**	**1.57**
Contraceptive use	**Dummy = 1 if parents are using contraception**	**0.48**	**0.45**	**0.50**	**0.50**
Scheduled caste	Dummy = 1 for schedule castes	0.29	0.29	0.46	0.45
Scheduled tribe	Dummy = 1 for schedule tribes	0.14	0.14	0.35	0.35
Muslim	Dummy = 1 for Muslims	0.13	0.12	0.33	0.33
Other religion	Dummy = 1 for religion other than Hindus or Muslims	0.03	0.04	0.18	0.20
Mother's work status					
Wage earner	Dummy =1 if mother is agricultural or non-agricultural labourer	0.21	0.23	0.41	0.42
Other work	Dummy = 1 if mother is engaged in any other work, except household work	0.37	0.36	0.48	0.48
Landholding	Land owned by the household in acres	2.53	2.44	6.83	6.71
Landholding square	Square of land owned	53.06	50.96	1823.68	1960.79
Irrigated land	Proportion of irrigated land in gross cropped area of household	0.31	0.29	0.43	0.42
Bus stop	Dummy = 1 if village has a bus stop	0.35	0.37	0.48	0.48
Middle school	Dummy = 1 if village has a middle school	0.35	0.37	0.48	0.48
Village size	Logarithm of village population	7.45	7.40	0.94	0.95
Village development	Index based on village infrastructure				
Medium	Dummy =1 if moderately developed	0.40	0.38	0.49	0.49
High	Dummy =1 if well developed	0.21	0.23	0.41	0.42
Regions					
North	Dummy = 1 for Uttar Pradesh, Bihar, Madhya Pradesh and Rajasthan	0.54	0.50	0.50	0.50
South	Dummy = 1 for Kerala, Tamil Nadu, Andhra Pradesh and Karnataka	0.18	0.21	0.39	0.40
	Number of sample children	7498	6531		

Table 4
Results of Logistic Regression of Determinants of Current School Enrollment
Among Children (6-14 Years) of Illiterate Parents by Sex and Order of Birth,
Rural India 1994

Explanatory variable	First son	Higher-order sons	First daughter	Higher-order daughters
Age of child	1.483***	1.109***	1.165***	1.073***
Age of child square	-0.072***	-0.055***	-0.060***	-0.055***
Mother's age	0.232	0.413	-0.211	-0.057
Children surviving	**-0.098****	**-0.020**	**-0.191*****	**-0.102****
Contraceptive use	**0.401*****	**0.397*****	**0.436*****	**0.273****
Scheduled caste	-0.316***	-0.445***	-0.198*	0.034
Scheduled tribe	-0.494***	-0.562***	-0.392**	-0.184
Muslim	-0.709**	-0.680***	-0.314*	-0.301*
Other religion	0.543*	0.108	0.398*	0.400*
Mother's work status				
Wage earner	-0.116	-0.218*	-0.323**	-0.194
Other work	0.209*	-0.042	-0.108	0.038
Landholding	0.038***	0.027**	0.029*	0.031**
Landholding square	0.000	0.000	0.000	0.000
Irrigated land	0.098	0.303***	0.245*	0.525***
Bus stop	0.321**	0.309***	0.341***	0.531***
Middle school	-0.107	0.039	-0.159	-0.068
Village size	-0.071	-0.087*	-0.017	-0.117*
Village development				
Medium	0.464***	0.213*	0.294**	0.224*
High	0.314*	0.029	0.586***	0.326*
Regions				
North	-0.232*	-0.392***	-0.525***	-0.909***
South	0.116	0.280*	0.100	-0.024
Constant	-7.008***	-5.815***	-4.364***	-3.989**
-2 Log likelihood	4264	4999	4080	3491
Goodness of fit	3443	3950	3406	2896
No. of children	3525	3963	3444	3087

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5
Results of Logistic Regression of Determinants of Current School Enrollment Among Children (6-14 Years) of Illiterate Parents by Sex and Order of Birth, Rural North India 1994

Explanatory Variable	First son		Higher-order sons		First daughter		Higher-order daughters	
Age of child	1.302	***	0.989	***	1.048	***	0.931	***
Age of child square	-0.060	***	-0.047	***	-0.052	***	-0.046	**
Mother's age	0.047		0.553		-0.253		0.026	
Children surviving	**-0.054**		**-0.010**		**-0.221**	***	**-0.090**	*
Contraceptive use	**0.324**	**	**0.311**	**	**0.449**	***	**0.321**	*
Scheduled caste	-0.339	**	-0.266	*	-0.241		-0.245	
Scheduled tribe	-0.725	***	-0.396	*	-0.181		-0.059	
Muslim	-0.567	**	-0.354	*	0.258		-0.218	
Other religion	0.667		-0.013		0.084		0.524	
Mother's work status								
Wage earner	-0.019		-0.477	**	-0.148		-0.357	
Other work	0.121		-0.198	*	-0.097		-0.053	
Landholding	0.027	*	0.022		0.014		0.026	
Landholding square	0.000		0.000		0.000		0.000	
Irrigated land	0.058		0.392	***	0.195		0.528	***
Bus stop	0.507	***	0.067		0.185		0.180	
Middle school	-0.238		-0.124		-0.020		-0.270	
Village size	-0.178	**	-0.237	***	-0.140	*	-0.039	
Village development								
Medium	0.490	***	0.307	**	0.352	**	0.375	**
High	0.295	*	0.082		0.567	*	0.497	*
Constant	-5.323	***	-5.218	***	-3.488	*	-5.089	**
-2 Log likelihood	2318		2803		1952		1588	
Goodness of fit	1809		2145		1718		1407	
No. of children	1793		2106		1689		1446	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 6
Results of Logistic Regression of Determinants of Primary-Level Schooling Among Children (10-14 Years) of Illiterate Parents by Sex and Order of Birth, Rural India 1994

Explanatory Variable	First son		Higher-order sons		First daughter		Higher-order daughters	
Age of child	2.467	**	2.254	**	1.745	*	2.369	*
Age of child square	-0.088	**	-0.082	**	-0.063		-0.087	*
Mother's age	0.923	*	0.545		0.141		0.767	
Children surviving	**-0.088**	*****	**-0.008**		**-0.175**	*******	**-0.163**	******
Contraceptive use	**0.425**	*******	**0.222**	*****	**0.205**		**0.287**	*****
Scheduled caste	-0.129		-0.584	***	-0.374	**	-0.059	
Scheduled tribe	-0.578	**	-0.423	*	-0.683	**	-0.690	**
Muslim	-0.572	**	-0.193		-0.396		-0.368	
Other religion	0.095		0.249		0.505		0.438	
Mother's work status								
Wage earner	-0.082		0.020		-0.653	***	0.013	
Other work	-0.156		-0.199		-0.235		-0.201	
Landholding	0.035	*	0.063	***	0.036		0.035	*
Landholding square	0.000		-0.001		-0.001		0.000	
Irrigated land	0.186		0.136		-0.044		0.643	***
Bus stop	-0.058		-0.085		0.141		0.354	*
Middle school	0.117		0.008		-0.138		-0.053	
Village size	-0.025		0.026		-0.086		-0.046	
Village development								
Medium	0.393	**	0.257	*	0.606	***	0.354	
High	0.448	*	0.435	*	0.580	**	0.196	
Regions								
North	0.309	*	0.041		-0.020		-0.575	**
South	0.500	**	0.716	***	0.620	***	0.475	*
Constant	-20.674	***	-18.168	***	-12.380	*	-19.001	**
-2 Log likelihood	2263		2425		1807		1314	
Goodness of fit	1873		2021		1818		1450	
No. of children	1885		2031		1823		1434	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.