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Socio-Economic Determinants of School Attendance in India

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Abstract

This paper investigates the socio-economic determinants of school attendance in India, and the possible causes of disadvantage faced by the girl child. Based on Census data for 1981 and 1991, the determinants of inter-district variations in school attendance are explored, separately for boys and girls. A similar analysis is applied to the gender bias in school attendance.

The results indicate that school attendance is positively related to school accessibility and parental education, and negatively related to poverty and household size. Interestingly, a positive association emerges between women's labour-force participation and children's school attendance; possible explanations of this pattern are discussed. The gender bias in school attendance declines with school accessibility and parental education, and rises with household size. Panel data analysis based on the random-effects model supports the cross-section findings.

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1. Introduction

This paper investigates the socio-economic determinants of school attendance in India in the 5-14 age group for boys and girls. Based on Census data for 1981 and 1991, the determinants of inter-district variations in school attendance rates by children in the 5-14 age-group are explored. These are looked at separately for boys and girls in the 5-14 age-group, and possible causes for disadvantages faced by the girl child are also researched. The paper investigates the determinants of schooling at the elementary level (5-14 years) in India by testing the relevance of alternative explanations of why children do/do not attend school in their most formative years.

The possible demand side variables that would be considered include parental education, adult female work force participation rate, poverty, wage rate in the agricultural sector, caste status, household size and urbanisation. The supply-side variables include the proportion of villages having primary schools and teacher-pupil ratios, which will be calculated at the elementary level.

2. Background

Data on school attendance from the 1991 Census[1] reveals that in the 5-14 age group, 50 children out of every 100 attend school in India of which 29 are boys and 21 are girls. In rural India out of every 100 children 45 attend school. 27 are boys and 18 are girls. School attendance in urban India is higher with 66 out of every 100 children attending school. Of this 66, boys constitute 36 and girls 30.

Country level aggregates often hide state level realities. At the state level, school attendance rates at the elementary level vary from 85 percent in Kerala to 35 percent in Bihar. Kerala remains the best performer in rural and urban areas with school attendance rates of 85 percent and 87 percent respectively. Bihar shows the worst performance in the rural as well as urban areas with school attendance rates of 31 percent and 59 percent respectively. For all the major states, school attendance in urban areas outperforms those in rural areas.

[1] Jayachandran 1998.

Another interesting fact is that for all the major states, school attendance rates for males are higher than for females, in rural as well as urban areas. This gender bias in schooling is glaring in Bihar, Rajasthan and Uttar Pradesh where the difference between male and female school attendance is over ten percentage points. In rural areas Andhra Pradesh and Madhya Pradesh also show a similar disparity. In rural Rajasthan, the gender disadvantage is the maximum, with school attendance rates for girls as low as 18 percent, as against 48 percent for boys. In urban areas, gender disadvantage in schooling is most prominent in Rajasthan and Bihar.

The relation between school attendance and the various factors (socio-economic) that play a role in influencing it has generated a lot of interest and a fair amount of research in recent years in the Indian context. Some studies have investigated the possible causes for low levels of participation in primary schooling and high rates of drop-out in the same. Analysing a household choice model, Duraisamy (1988) reports that mother's time is an important determinant of fertility and child schooling while the value of father's time is not as important. The economic contribution of children encourages parents to have more children and discourages investments in their schooling. In the context of backward tribal communities, Sachidananda and Sinha (1989) find that most children belonging to these groups avail of the special programmes planned for them and that in tribal areas, teachers from the same community should be appointed in the schools.

Analysing the impact of incentive programmes such as the noon-meal scheme for Nagarcoil district, Rajan and Jaikumar (1992) find that such programmes have had a positive effect on school attendance and had curbed drop-outs. It has also had a greater impact on the enrolment of backward classes and Muslim communities compared to other communities investigated. Drèze and Saran (1994) attribute the low value attached to female education in India to deep-rooted features of gender relations.

This paper is an attempt to move further on these issues. It examines the determinants of school attendance in India in a multivariate framework, using a district level panel dataset that links the 1981 and 1991 censuses. First, the

determinants of male and female schooling in the 5-14 age group are studied separately for 1981 and 1991 using cross-sectional data for both years. Cross-sectional analysis enables one to highlight differences in educational outcomes among the states and also to investigate the relationship between these outcomes and various socio-economic variables. Then the two datasets are pooled to get a time-series cross-sectional (panel) dataset which is further studied using various econometric tools.

3. Issues and Hypotheses

3.1 Female Education and School Attendance

Adult female literacy can be considered an important determinant of school attendance. Parents who are educated can be expected to have a more enlightened attitude about education and may provide a more conducive environment to education as compared to uneducated parents. To test the importance of parental education, we distinguish between father's and mother's education. This enables us to check whether one of the two parents has more influence on decisions concerning the education of their children. In particular, one may expect adult female literacy to have strong effects on school attendance of girls.

3.2 Female Work and School Attendance

Adult female work force participation can be expected to have either a positive or a negative effect on school attendance depending on how we argue it. Higher levels of work force participation by women could in turn require some of the children to stay at home and tend to household chores and take care of the younger siblings. In particular, it could have a negative effect on the school attendance of female children leading to a disadvantage in schooling for the latter. On the other hand, higher rates of work force participation by women can be expected to bring them higher bargaining power in intra-households decisions. Then, if it is true that women are more concerned about the education of children, higher rates of work force participation by them could lead to higher rates of participation in schooling by their children.

Here it is essential to point out that adult female work force participation is more a social variable than an economic variable and its effect on school attendance should be studied in this light. What is being implied is that in the case of adult female work force participation, there is a high possibility of "social effects" involving externalities, going beyond the standard within household effects. The level of disaggregation here is the district, which captures the social aspect of this variable. Higher work force participation rates by women could lead to their larger participation and involvement in social issues and local politics. This in turn could have an enhancing effect on school infrastructure, effective working of schools and school attendance.

3.3 Other Determinants of School Attendance

Improvements in adult male education can also be expected to raise participation in schooling. However, its impact on female schooling can be expected to be lower than its effect on male schooling. It can be expected that educated males are more concerned about educating their sons than their daughters given that females are expected to, in the long run, look after the household chores while the males go out to earn the living.

Poverty is seen as the biggest barrier to education in India making the direct costs of schooling too expensive for many families. Poor families thus tend to either fail to enroll their children into schools or withdraw them prematurely from primary schools. Poverty can also be expected to be the most pervasive barrier to education for female children and can be expected to have a negative effect on school attendance in general and for the female child in particular. It is important to mention that poverty moves with many other factors. Poor regions show low adult literacy rates and low levels of school attendance. A multivariate analysis enables us to study whether poverty has a positive/negative effect on school attendance, independently of caste, literacy, female work force participation etc.

The *caste status* of a child could be expected to act as a deterrent to his/her access to primary education. Lack of exposure and access to education could lead to low levels of literacy among persons belonging to scheduled castes and scheduled

tribes. Cultural factors such as the lower classes not considering education as something required for upliftment could be possible reasons for their low levels of enrolment and attendance. Discrimination could also exist within the schooling system e.g. in the form of hostile teacher's attitudes towards children belonging to disadvantaged communities.

It could be supposed when starting out that *urbanisation* would exercise a positive influence on school attendance rates following the appearance of better infrastructure, more developed education facilities and a reinforcement of the Constitutional requirement of mandatory education for children over the age of 5 years.

Household size can be expected to have a negative impact on school attendance rates, mainly for the girl child. In large families with many children, the work load increases, and this may have a particularly detrimental effect on school participation of elder daughters, who are often kept back at home to engage in domestic work, minding siblings and a myriad of other household chores (see also PROBE Team, 1999).

Alongwith various socio-economic factors that could affect the demand for schooling, we also include a supply side factor viz. the proportion of villages in each district which have a primary school. This is included to capture *school accessibility* and the hypothesis is that *ceteris paribus* school attendance rates should be positively associated with the availability of schooling and more so for the girl child. It would be reasonable to think that the inavailability, inaccessibility and malfunctioning of school facilities has a negative impact on school attendance. In fact, many villages have no primary school, no books and teaching aids, single teachers, overcrowded classes and teacher absenteeism. But data for these parameters is not available and the only data available is for the proportion of villages with primary school in the district. It can be supposed that the higher the proportion of villages having a primary school in a district, the higher the participation rates in schooling since easy school availability and accessibility would reduce direct costs of schooling such as transportation costs.

3.4 Gender Bias in School Attendance

Aside from analysing the determinants of male and female school attendance, we shall examine the determinants of gender bias in school participation. The gender bias is captured by the ratio of male to female school attendance in the 5-14 age group. The explanatory variables are the same as in the analysis of school attendance.

4. Statistical Analysis

4.1 Data

The dependent variable analysed in this paper is the school attendance rate for male and female children in the 5-14 age-group. This has been calculated using information from the Census of India for 1981 and 1991. It is derived from the Census by taking number of children 5-14 years attending school as a percentage of total children in the 5-14 age-group, for males and females separately. The analysis here is at the district level as it is the basic unit of administration in India. Also, it captures the social dimension of participation in education at the elementary level, which is not possible at the household level.

We now turn our attention to the explanatory variables (listed in Table 1). Adult female literacy is our indicator for female education in the 15+ age group and same is the case with male education. Adult female work force participation measures the involvement of women in the 15+ age-group in the labour force. The female wage rate is the wage rate prevailing in the agricultural sector for unskilled female labour. Poverty is measured by the rural head count index (the proportion of rural population below the poverty line). The shares of scheduled castes and scheduled tribes in the population are used as indicators of the social composition of the population at the district level.

The proportion of villages having a school is used to measure accessibility of schooling. The ratio of female to male school attendance rate is used to capture any disadvantage that the female child faces in schooling. Three dummy variables are

used to identify any regional patterns in schooling and these are: 'North' includes districts in the states of Haryana, Punjab, Madhya Pradesh, Rajasthan, Uttar Pradesh, Bihar, Himachal Pradesh and Jammu & Kashmir; 'South' refers to Andhra Pradesh, Karnataka, Kerala and Tamilnadu; 'West' refers to Gujarat and Maharashtra. The Eastern region (Orissa, West Bengal, Assam, Arunachal Pradesh) is the default region.

The information on the various indicators used is available from the 1981 and 1991 Censuses. The only exceptions are poverty and the female wage rate. The estimates for poverty for the 1981 dataset have been obtained from Jain, Sundaram and Tendulkar (1988). One limitation of using this variable is that its reference year is 1972-73 rather than 1981. However, it is not unreasonable to assume that relative poverty levels in different regions have remained fairly stable in the intervening period.

Another point to be noted is that the poverty indicators here relate to NSS regions. Indicators of income or expenditure are not available at the district level for India. The NSS, which is the basic source of information of per capita expenditure, finds the sample size too small for many districts and therefore does not generate data at that level. It generates region-specific estimates, the NSS region being an intermediate unit between the district and the state. The justification here for using regional level estimates for each district within a region is the assumption that intra-regional variations in poverty are small. Given that NSS regions are supposed to be relatively homogeneous in terms of agro-climatic and socio-economic features, such an assumption is quite plausible. But there is a loss of information in such an exercise and the results should be assessed keeping in mind the imprecise nature of the poverty indices used at the district level. For the 1991 dataset, poverty estimates have been taken from Drèze and Murthi (2000).

For the 1981 dataset, the female wage rate has been taken from Acharya (1989) where real wages have been calculated for 58 regions separately for male and female labourers for the period 1980-81. For purposes of the 1991 dataset, wage data from Sarmah(2001) have been used. Annual series of district-level real agricultural wages have been constructed by Sarmah (2001) from data published in the Ministry

of Agriculture's annual *Agricultural Wages in India* (AWI) which provides wages at the district level for different categories of labour. All wages are measured in rupees per day and the AWI reports monthly averages of daily wages. Unweighted averages of the monthly wage rates have been taken to obtain the average annual wage rate. The NSS region-level nominal wage rates are then calculated as weighted averages of the relevant district-level nominal wage rates, with the weights reflecting the size of the agricultural labour force.

Looking at Table 1 overleaf, we note that male school attendance increased by 3.3 (from 52.8 to 56.1) percentage points between 1981 and 1991. Female school attendance for the same period, increased by close to 10 percentage points (from 33.0 to 43.0). During the same period, there were improvements in adult female and male literacy. In 1991, adult female literacy was as low as 30 percent, about half the corresponding figure for males. The adult female work force participation rate increased by less than one percentage point (from 32.6 to 33.1) between 1981 and 1991.

Table 2 reports the state-specific means and standard deviations for the 15 major Indian states (those which have a population above 10 million). There exists considerable cross-sectional variation in the data as seen by the results in the table. In 1981, school attendance rates ranged from 44 percent in Bihar to 73 percent in Kerala for males and from 16 percent in Rajasthan to 70 percent in Kerala for female children. In 1991, it ranged between 43 percent in Bihar to 85 percent in Kerala for male children and from 23 percent in Rajasthan to 85 percent in Kerala for female children. The rates of increase in school attendance have also been uneven. It increased by over 7 percent in the states of AP, Haryana, Karnataka, Kerala, Madhya Pradesh and Tamilnadu. The states of Gujarat, Maharashtra, Orissa, Punjab and Rajasthan saw increases of less than 4 percent

Table 1

Variable Definitions, Sample Means & Standard Deviations

Variable name	Definition	1981	1991
Male school attendance	Proportion of males 5-14 years attending school (%)	52.8 (12.8)	56.1 (13.5)
Female school attendance	Proportion of females 5-14 years attending school (%)	33.1 (17.38)	42.9 (18.0)
Gender Bias in Schooling	Ratio of school attendance rate, males to females	1.9 (0.9)	1.4 (0.4)
Adult female work force participation	Proportion of women aged 15 and above who are working, main and marginal (%)	32.6 (19.4)	33.1 (19.3)
Adult Male Literacy	Proportion of men aged 15 and above who are literate (%)	51.6 (14.6)	58.9 (13.7)
Adult Female Literacy	Proportion of women aged 15 and above who are literate (%)	22.5 (16.3)	29.8 (16.9)
Poverty	Proportion of population below the poverty line	45.9 (16.4)	34.2 (13.7)
Scheduled Castes	Proportion of scheduled castes in district population (%)	15.6 (7.7)	15.9 (7.7)
Scheduled Tribes	Proportion of scheduled tribes in district population (%)	8.2 (14.8)	11.16 (18.5)
School Accessibility	Proportion of villages in the district having primary schools (%)	59.6 (21.3)	78.5 (17.8)
Urbanisation	Proportion of urban population (%)	19.8 (15.4)	21.4 (16.2)
Household size	Average number of persons per household (Tot distt population as a proportion of total households in the distt)	5.6 (0.9)	5.6 (0.7)
Sample Size (no. of Districts)		356	413

Notes : Means are unweighted. Standard Deviations in parentheses.
Source: Except for poverty, all the other variables have been calculated from the Census of India 1981 and 1991.

Table 2 : Sample Means and Standard Deviations for Major States, 1981 and 1991

	Male school attendance		***Female school attendance***		***Adult female work Partn***		***Adult male Literacy***		***Adult female Literacy***	
	1981	1991	1981	1991	1981	1991	1981	1991	1981	1991
Andhra Pradesh	48.9 *8.1*	56.2 *7.1*	31.3 *11.4*	41.6 *9.5*	50.5 *10.3*	50.8 *12.7*	43.0 *10.2*	49.20 *8.92*	18.5 *10.8*	24.8 *11.1*
Arunachal pradesh	-	46.6 *51.1*	-	35.6 *6.8*	-	85.7 *3.2*	-	476.97 *8.04*	-	22.1 *7.4*
Assam	-	50.6 *7.6*	-	43.9 *7.5*	-	37.7 *16.1*	-	59.69 *7.27*	-	36.7 *7.8*
Bihar	44.1 7.6	42.5 9.2	21.4 6.6	25.9 8.5	19.9 9.9	26.3 14.2	45.1 8.3	48.58 9.44	13.2 4.5	17.1 6.6
Gujarat	59.8 6.3	62.5 5.9	44.2 10.2	51.5 8.8	33.4 12.7	40.4 14.0	57.5 14.7	67.49 10.49	30.2 9.7	40.2 13.9
Haryana	58.8 7.6	66.4 5.9	33.4 8.1	53.5 8.9	17.0 7.3	16.4 7.5	52.2 9.4	64.20 8.33	20.7 6.3	31.3 8.3
Karnataka	52.9 7.6	62.3 8.8	36.9 10.5	51.4 11.9	40.2 9.3	44.9 8.7	57.1 9.2	62.73 10.19	25.5 13.0	36.3 13.8
Kerala	73.4 14.9	85.4 2.9	69.4 20.1	85.4 3.5	28.8 8.6	23.6 7.7	78.2 14.5	91.76 4.06	59.7 20.7	82.3 7.3
Maharashtra	63.3 8.5	66.3 8.5	46.4 12.7	55.2 14.7	50.4 11.8	55.6 11.7	64.7 7.7	71.05 8.10	30.7 11.5	40.2 13.1
Madhya Pradesh	45.2 9.7	52.1 8.2	22.2 9.2	36.7 10.3	43.8 16.8	47.4 0.3	46.6 11.1	54.61 11.00	16.1 8.6	21.7 9.4
Orissa	53.1 12.4	55.6 8.5	30.4 9.2	40.7 10.8	32.9 15.4	35.1 16.9	53.6 12.2	58.97 13.29	18.9 9.3	26.0 12.1
Punjab	62.9 9.6	65.6 7.53	53.4 11.7	59.7 10.1	9.2 3.3	6.9 2.4	50.1 8.7	61.17 10.06	24.5 27.8	42.8 10.0
Rajasthan	45.0 7.4	50.6 6.9	16.3 5.4	23.6 7.2	33.5 11.3	43.2 11.7	38.5 14.9	49.86 9.15	13.5 10.7	15.1 5.9
Tamilnadu	65.2 7.9	73.4 4.1	50.6 11.8	6.2 6.2	37.4 11.1	43.7 12.3	65.8 10.5	70.07 8.75	35.2 13.7	43.7 12.8
Uttar Pradesh	47.1 11.5	46.7 10.6	23.7 11.5	30.1 11.8	16.9 20.2	24.2 19.8	47.2 11.8	55.09 11.86	16.8 14.5	21.3 5.6
West Bengal	49.6 11.2	48.9 10.1	37.8 12.1	41.1 10.8	14.5 9.7	19.2 11.8	57.6 11.5	64.32 11.35	30.7 13.7	38.7 14.6

Table 2 (continued) : Sample Means & Standard Deviations for Major States, 1981 and 1991

	Poverty		***Scheduled Castes***		***Scheduled Tribes***		***Distance from school***		***Urbanisation***	
	1981	1991	1981	1991	1981	1991	1981	1991	1981	1991
Andhra Pradesh	43.0	21.2	15.0	15.9	6.4	15.9	77.6	92.3	22.8	26.1
	3.5	6.5	3.5	3.7	5.7	3.7	14.2	11.0	17.8	44.7
Arunachal pradesh	-	-	-	0.5	-	65.4	-	42.6	-	10.1
		-		0.4		19.3		20.1		9.2
Assam	-	33.7	-	7.3	-	16.9	-	82.4	-	10.2
		5.5		3.7		17.5		12.9		7.0
Bihar	58.7	52.2	14.9	13.8	6.9	10.7	52.5	71.9	12.6	15.7
	5.8	0.7	5.4	5.9	14.5	18.4	12.6	13.0	11.1	16.2
Gujarat	42.8	26.9	6.7	7.3	17.6	18.0	87.6	96.8	26.4	31.0
	14.4	10.0	3.1	3.2	25.9	26.2	9.2	2.9	15.9	16.9
Haryana	14.2	14.9	18.9	19.8	0.0	0.0	66.9	91.9	21.4	23.8
	2.5	5.0	3.3	3.5	0.0	0.0	10.6	6.8	8.2	9.2
Karnataka	40.3	28.5	15.4	16.6	5.1	4.7	64.2	88.8	25.4	26.5
	6.0	8.7	4.8	5.0	3.7	3.7	10.4	8.5	12.4	15.4
Kerala	49.1	32.6	10.2	9.8	2.9	2.2	86.6	98.8	16.8	23.4
	6.9	7.1	4.8	3.7	4.6	4.5	16.6	1.7	10.4	15.2
Maharashtra	60.4	40.7	7.1	11.8	9.9	10.0	82.7	92.9	26.0	27.5
	4.0	8.6	3.6	4.7	10.0	10.8	12.5	7.3	18.9	19.4
Madhya Pradesh	50.3	37.2	14.4	15.3	20.9	21.5	45.4	74.5	19.7	22.5
	10.5	8.8	6.0	5.7	20.4	20.2	10.1	10.1	15.3	15.3
Orissa	72.0	55.5	14.4	15.4	27.8	27.5	55.6	71.2	11.6	12.9
	14.1	13.3	4.0	4.0	20.2	20.0	8.5	9.6	6.7	7.4
Punjab	14.9	11.0	26.7	28.3	0.0	0.0	58.8	90.9	26.7	27.9
	0.8	2.1	4.3	5.1	0.0	0.0	12.6	5.8	7.5	8.9
Rajasthan	40.4	33.9	16.7	17.0	13.8	13.8	51.9	76.2	19.3	20.7
	19.2	11.6	4.9	5.1	17.9	18.4	11.9	12.6	10.1	9.8
Tamilnadu	48.7	40.7	17.0	18.6	1.1	1.0	78.5	91.6	32.3	32.2
	4.4	10.7	6.3	5.4	1.2	1.1	6.8	5.1	21.6	19.9
Uttar Pradesh	41.9	32.4	20.5	21.2	0.5	0.4	43.5	63.3	17.8	19.1
	1.3	12.1	5.7	5.6	1.6	1.3	14.3	15.1	12.3	14.8
West Bengal	63.4	41.8	23.1	24.8	6.9	6.7	64.7	80.4	23.2	25.1
	5.7	9.7	10.3	10.8	6.7	6.4	13.8	10.6	24.0	23.4

Note : Variable means are unweighted, Standard Deviations are in parentheses.

Table 2 (continued) : Sample Means & Standard Deviations for Major States, 1981 and 1991

	Household Size		***Female disadv. In school attendance***	
	1981	1991	1981	1991
Andhra Pradesh	5.0 0.4	4.8 0.5	1.7 0.3	1.4 0.2
Arunachal pradesh	-	4.9 0.5	-	1.3 0.2
Assam	-	5.8 0.4	-	1.2 0.0
Bihar	6.1 0.6	6.1 0.6	2.2 0.4	1.7 0.2
Gujarat	5.7 0.4	5.4 0.5	1.4 0.3	1.2 0.2
Haryana	6.5 0.3	6.3 0.5	1.8 0.3	1.3 0.1
Karnataka	5.8 0.4	5.5 0.6	1.5 0.2	1.2 0.1
Kerala	5.7 0.4	5.3 0.5	1.1 0.3	1.0 0.0
Maharashtra	5.4 0.3	5.2 0.4	1.4 0.3	1.3 0.4
Madhya Pradesh	5.7 0.4	5.7 0.6	2.4 1.9	1.5 0.3
Orissa	5.2 0.5	5.2 0.4	1.8 0.4	1.4 0.2
Punjab	6.3 0.7	6.0 0.0	1.2 0.1	1.1 0.1
Rajasthan	5.9 0.5	6.1 0.7	3.0 0.8	2.3 0.7
Tamilnadu	4.8 0.3	4.5 0.5	1.3 0.2	1.1 0.1
Uttar Pradesh	5.7 0.6	6.1 0.6	2.2 0.6	1.7 0.3
West Bengal	5.6 0.2	5.4 0.5	1.4 0.3	1.2 0.1

for boys but between 7 to 10 percent for girls. Bihar actually saw a drop in school attendance rates for boys over the ten year period of about 1.5 percent, followed by W Bengal (1 percent) and UP (0.4 percent). For girls in these states Bihar saw a rise of 4.5 percent, West Bengal a rise of 3.3 percent and UP a rise of 6 percent.

4.2 Estimation

In our study we are dealing with panel data, i.e. successive observations over time for the same districts. It can be expected that pooling the data for several years increases the number of observations and therefore, increases efficiency in estimation and power in hypothesis testing. We will also be able to exploit the fundamental advantage that a panel

data set has over a cross-section, viz., greater flexibility in modelling differences across districts (such as the possibility of controlling for 'district effects').

The basic regression model for such a framework would be:

$$\mathbf{SCHATT\ dt = \alpha d + \beta' x\ dt + \gamma t + \varepsilon\ dt} \qquad \mathbf{(1)}$$

where SCHATT is the school attendance rate in district d at time t, α_d is a district specific effect, β is a vector of coefficients, γ_t is a time dummy and ε_{dt} is an error term. The explanatory variables are adult literacy rates (male and female), adult female work force participation rate, female wage rate, poverty, caste, tribe, availability of schooling and regional location. The missing major state is Assam where no Census took place in 1981. In the tables below, we present Huber-White robust estimates of standard errors[2]. Compared with ordinary standard errors, these are more robust to failure to meet assumptions concerning normality and homogeneity of variance of the residuals.

District specific effects α_d can be thought of in two different ways- fixed effects or random effects. In the *fixed effects model*, the individual effect is α_d, which is taken to be exogenous and constant over time, t, and to vary across districts. This is equivalent to taking "first differences" and proceeding with OLS estimation.

In the *random effects model*, the district specific effect is modelled as an additional time invariant error tem for each district i.e., this model specifies α_d as group specific disturbances. So we have now a composite error term $(\alpha_d + \varepsilon_{dt})$. The estimation technique used will be Generalised Least Squares (GLS) with the error term having a particular covariance structure. The random effects model assumes that the district specific random error is uncorrelated with the other explanatory variables, which may not be the case.

Before attempting panel estimates (section 6), we present cross-section regressions for 1981 and 1991 separately (section 5).

[2] The statistical programme used for the econometric analysis is STATA 6.0.

5. Main Results

5.1 Socio-economic Determinants of School Attendance

The main results are presented in Table 3 below. Let us begin by first studying the individual cross-sectional results for 1981 and 1991 regressions with robust standard errors. In Table 3, columns (1) & (2) report regression estimates for 1991 and column (3) and (4) for 1981.

First looking at the results for 1981, we find that three-fourths of the variation in male and female school attendance across districts is accounted for by the explanatory variables. For 1991, 81 percent of the variation in male school attendance and 87 percent of the variation in female school attendance is accounted for by the explanatory variables. *Adult female work force participation* turns out to have a positive and highly significant effect on school attendance, both male and female, in 1991, and also on male attendance in 1981 (the coefficient for female school attendance in 1981 is not significant). This is an important finding, possibly reflecting the fact that higher rates of work force participation by women give them greater bargaining power in household decisions; since women can be expected to be more concerned about the education of their children, this could in turn enhance school participation by the children. In other words, women's labour force participation could enhance their influence on schooling decisions making them less male centred[3].

[3] In the case of female school attendance, there is also an effect in the opposite direction: when adult women work outside the household, daughters (especially elder daughters) are often expected to stay at home to look after younger siblings and do household chores. This may be the reason why the positive effect of female labour-force participation on school attendance is larger for males than for females (in fact, for females the effect is negative, though not significant, in 1981).

Table 3 : School Attendance (5-14 years) in India : Main Results 1991 &1981

	1991 : OLS	**1991 : OLS**	**1981:OLS**	**1981:OLS**
	Male School Attendance	**Female School Attendance**	**Male School Attendance**	**Female School Attendance**
Constant	8.9 (1.9) *4.6*	3.0 (0.6) *5.2*	29.4 (4.5)** *6.5*	7.2 (0.7) *10.5*
Adult female work force participation	0.2 (5.4)** *0.03*	0.1 (2.9)** *0.03*	0.1 (1.9)* *0.03*	-0.04 (1.0) *0.04*
Adult Female Literacy	0.1 (1.9) *0.1*	0.6 (10.2)** *0.1*	0.1 (1.6) *0.1*	0.4 (2.1)* *0.2*
Adult Male Literacy	0.7 (11.6)** *0.1*	0.4 (6.2)** *0.1*	0.6 (4.5)** *0.13*	0.6 (3.6)** *0.2*
Poverty	-0.1 (5.0)** *0.03*	-0.1 (4.2)** *0.03*	-0.2 (2.7)** *0.1*	-0.2 (2.9)** *0.1*
Scheduled Castes	0.1 (1.6) *0.1*	0.2 (2.6)* *0.1*	-0.1 (1.5) *0.1*	-0.04 (0.5) *0.1*
Scheduled Tribes	-0.03 (0.8) *0.03*	0.04 (1.3) *0.03*	0.04 (0.7) *0.1*	0.1 (2.3)* *0.1*
School Accessibility	0.1 (5.2)** *0.02*	0.1 (4.9)** *0.02*	0.04 (1.4) *0.03*	0.2 (3.7)** *0.04*
Urbanisation	0.02 (0.8) *0.02*	-0.02 (0.8) *0.03*	-0.04 (1.1) *0.04*	-0.01 (0.2) *0.5*
Household Size	-1.1 (1.9) *0.6*	-2.4 (3.9)** *0.6*	-0.9 (1.1) *0.9*	-2.7 (1.8) *1.3*
R^2	0.81	0.87	0.73	0.76
F (n1, n2) (p-value)	213.7 (0.00)	311.43 (0.00)	62.44 (0.00)	106.48 (0.00)
Sample Size	363	363	296	296

Note : Absolute t-ratios in parentheses. Robust standard errors in *italic*.
* significant at 5% level, ** significant at 1% level

Another important line of interpretation builds on the notion that adult female work force participation can be taken as not just an indicator of productive employment but also of the role of women in society and public life. Given the social effects of this variable, its positive association with school attendance could imply higher participation of women in social issues including the effective functioning of community schools leading to higher participation rates in education. Thus we not only have a household

level argument for the positive effects of adult female labour force participation on schooling, but also a social argument.

Although the precise links here are not obvious, it can be argued that higher labour force participation by women could lead to their more active participation in society and local politics. If schools can be considered a local public good, then, the quality of schooling would be dependent on local politics and the extent of monitoring by parents. If women have a say not only within the household but also in public life, it can have important implications for the effective working of the schooling system including enhancing effects on the availability of schooling facilities, the quality of schooling and ultimately school attendance. To be able to capture such important social effects, it becomes important to work with a level of aggregation higher than the household level. This is one of the motivating factors of the district level study carried out here.

Another line of argument here could be in terms of the economic returns to female education. A high level of female labour force participation raises the economic returns to female education. If there exist higher work opportunities for adult women, educating girls now could mean higher incomes. Such a line of argument though does not apply to male school attendance.

For male school attendance the coefficient for adult male literacy is positive and highly significant while adult female literacy does not have a significant coefficient in both 1981 and 1991. Female school attendance is seen to be positively related to both adult male and female literacy in both years with the coefficients for both adult male and female literacy highly significant. Hence we can infer that if parents are literate, they are more inclined towards sending their children to school, thus leading to high levels of school attendance.

What is interesting to note here is that in the case of the male child, adult male literacy has a higher effect on school attendance compared to adult female literacy. And for the female child, adult female literacy has a larger effect on school attendance as compared to adult male literacy. Thus, *the effect of adult literacy on school attendance in the 5-14 age group is much stronger for a given sex than across sexes.* Literate parents

care more about the education of children of their sex, an interesting finding which suggests that higher adult female literacy could lead to an advantage within the household for the girl child. Educated women are better able to understand the ramifications of being educated. With the same bargaining power, there is a change in preferences of adult literate women, encouraging school attendance of their female children. This within sex group effect is true for both 1981 and 1991.

One important qualification that needs to be mentioned here is that any omitted variables that specifically promote adult male and female literacy would tend to increase the effect of these variables on school attendance. This could in turn lead to an upward bias in the effect of adult male and female literacy on school attendance. Large rates of male and female school attendance could thus be a consequence of spurious correlations and adult literacy on its own may not have such a large effect.

Poverty has a negative and significant effect on male and female school attendance rates in 1981 and 1991. This indicates that the effect of poverty on participation in schooling at the elementary level is significant and poverty does have a retarding effect on the same. For 1991, the negative and significant coefficient for poverty implies that a rise of one percentage point in poverty leads to a fall of 0.13 percentage points in male and female school attendance.

Somewhat surprisingly perhaps, school attendance does not appear to be significantly lower, ceteris paribus, in districts with higher proportions of scheduled castes or scheduled tribes. If anything, it is the other way round in several cases. *After controlling* for parental literacy, poverty and related circumstances, female school attendance does not seem to be lower among scheduled castes or scheduled tribes than among other groups. This may reflect the influence of various measures aimed at promoting educational opportunities among disadvantaged communities such as incentives for lower caste and tribal children within the schooling system; the running of special schools for children belonging to the scheduled tribes by missionaries (North-East region and certain parts of Bihar) and State Governments (Tribal Development Programme); hiring of teachers specifically for these programmes etc.

Many norm based incentives[4] to promote education among the scheduled castes and tribes have been put into place by the Central and State Governments such as the provision of a primary school in every habitation with 200 and above for SCs as against 300 and above for non-SC populated habitations. Under the aegis of Operation Blackboard special relaxations have been given to encourage SC/ST teachers in SC/ST habitations and states have been advised to give higher priority to the selection of blocks which have a high concentration of SCs and STs with the construction of school buildings as a first charge against NREP and RLEGP funds. In addition to reservation of seats, relaxation in age and qualifying marks, scholarships, teacher fellowships and mid-day meals have also been kept aside for children belonging to this group of the population. All these could possibly be leading to the positive association between school attendance and the caste and tribal factors.

The variable capturing distance from school (*school accessibility*) shows a positive sign for both male and female school attendance and is highly significant in both Census years. This is an important result as it brings out the significant role that school accessibility plays in enhancing participation in education for both boys ad girls. It also confirms the belief that parents are more willing to send their children to school if it is closer to their homes. Another supply-side variable, the *teacher-pupil ratio*, was also introduced in the regression and for both male and female school attendance, it came up with a positive though insignificant coefficient and was thus dropped from the analysis.

Urbanisation is seen to have a negative impact on school attendance for male and female children in 1981, the coefficient though not being significant for either the male or the female child. For 1991, urbanisation shows a positive effect on male school attendance and a negative effect on female school attendance, though both coefficients are not significant. Taking these results together, there is little evidence of any systematic association between school attendance and urbanisation, after controlling for other relevant variables.

[4] Aggarwal and Shibou (1994).

As expected, *household size* has a negative impact on male and female school attendance with the coefficient being significant for female school attendance in 1991, and close to significance in two other cases. This confirms the a priori expectation that with increases in the family size, the children are kept back at home to tend to various domestic chores. The effect is larger for female school attendance. Female children are needed more at home to carry out various household chores and mind the younger siblings as the family size increases.

5.2 Labour Demand Effects

It is useful to distinguish between two different reasons why female labour participation might vary between different districts. First, there may be variations in labour supply, associated for instance with different cultural norms and social practices relating to women's work outside the household. Second, there may be variations in labour demand. The latter would also influence the demand for child labour, and hence, school attendance. For instance, in districts where female labour force participation is relatively high because of a high demand for labour, one might expect the labour-force participation of children to be relatively high also, with an adverse effect on school attendance rates.

To "control" for the labour demand effect, the female wage rate was added in the school attendance regressions (Appendix 1). Variations in female labour force participation at a *given* wage are likely to be driven by variations in labour supply. As it turns out, the results are much the same as in Table 3. In particular, adult female labour-force participation appears with a positive sign and is significant again for both male and female school attendance for 1991, and for male school attendance in 1981.

An interesting difference between the regressions presented in Table 3 and Appendix 1 is that, in the latter case, the "poverty" variable has no significant effect on school attendance. This may be due to the fact that the female wage rate (which has a positive effect on school attendance, as expected) is a better proxy for poverty than the

poverty variable itself, bearing in mind that the latter relates to "regions" rather than "districts".

5.3 Gender Bias in Schooling

Table 3 presents the regression results for gender bias in schooling. The dependent variable, gender bias in school attendance, has been taken as the ratio of male school attendance rate to female school attendance rate in the 5-14 age-group. A positive coefficient in the regression indicates that the relevant variable enhances the gender bias in school attendance; in other words, it boosts male attendance more than female attendance (or reduces male attendance less than female attendance).

The regression results for gender bias show a positive coefficient for adult female work force participation implying that the higher the adult female work force participation rate, the lower is the school attendance by girls vis-à-vis boys, although the coefficients are not significant for both years. The results here are consistent with the findings reported in Table 3, where adult female work force participation enhances male school attendance more than female school attendance (see also footnote 3).

There are a few other results of interest. First, parental literacy (both male and female) reduces the gender bias in school attendance. In the case of adult female literacy, this is as one would expect from the earlier results on the relative strength of same-sex effects and cross-sex effects.[5] Second, after controlling for other relevant variables, there seems to be *less* gender bias in school attendance among scheduled castes and scheduled tribes than among other groups. This is consistent with independent evidence of lower gender bias in general among these communities[6]. Third, school accessibility also comes up with a negative sign and is significant for 1981, implying that increased accessibility to schools reduces the gender bias in school attendance (i.e. it boosts female school

[5] In the case of adult male literacy, it may appear that there is a tension here with the earlier results on cross-sex versus same-sex effects. The tension is resolved if we note that these effects were defined in terms of "absolute" impact of female or male school attendance, whereas the sign of the adult-male literacy coefficient in the gender bias regressions depends on whether the "proportionate" impact of adult male literacy on female school attendance is larger or smaller than the proportionate impact on male school attendance.

[6] Drèze and Sen (1995), chapter 7, and the literature cited there.

attendance more than male school attendance). This finding, once again, is consistent with the results in Table 3.

Finally, household size shows a positive coefficient, which is significant for 1991. The positive coefficient implies that a larger household size discourages female school attendance more than male attendance, as one would expect in the light of the earlier results and discussion.

Table 3 : Gender Bias in Schooling

	1991 : OLS	**1981:OLS**
	Gender bias in School Attendance	Gender bias in School Attendance
Constant	1.8 (7.9)* *0.22*	3.4 (5.9)** *0.6*
Adult female work force participation	0.002 (1.8) *0.001*	0.001 (0.3) *0.02*
Adult Female Literacy	-0.01 (3.6)** *0.002*	-0.01 (1.9)* *0.01*
Adult Male Literacy	-0.01 (2.21)** *0.003*	-0.01 (2.8)** *0.01*
Poverty	0.002 (2.16) *0.001*	0.003 (0.8) *0.004*
Scheduled Castes	-0.004 (2.26) *0.002*	-0.01 (1.9)* *0.01*
Scheduled Tribes	-0.01 (3.97) *0.001*	-0.01 (2.9)** *0.002*
School accessibility	-0.002 (1.72) *0.001*	-0.01 (2.1)* *0.01*
Urban	0.0002 (0.28) *0.001*	-0.0001 (0.01) *0.01*
Hhsize	0.09 (3.63)* *0.3*	0.05 (0.8) *0.7*
R^2	0.50	0.22
F (n1,n2) (p-value)	F(9,353) 45.96 (0.00)	F(9,286) 39.14 (0.00)
Sample Size	363	296

Note : Absolute t-ratios in parentheses. Robust standard errors in *italic*.
* significant at 5% level, ** significant at 1% level

5.4 Regional Effects

Although not presented here, regional dummies were added in separate regressions to capture region specific effects on school attendance. For 1981, only the regional dummy for the South shows a positive and significant coefficient for female school attendance with the South leading in school attendance rates. The results for 1991 indicate that regional location does have a strong influence on male and female school attendance even after controlling for other factors. The coefficients for the North, South and Western region Dummy variables come up as positive and highly significant. This implies that school attendance in these regions for both males and females is higher compared to the Eastern region. Also, school attendance rates in South India are distinctively higher than the Northern and Western regions for both boys and girls.

Regional dummies were also added to the gender bias regressions to capture region specific effects. For 1981 and 1991, although the dummy variables for all the regions exhibit positive coefficients, only the dummy variable for the Northern region exhibits a significant coefficient. Thus, belonging to the Northern region leads to lower levels of school attendance for the girl child (vis-à-vis boys) as compared to the Eastern region. Since for the Southern and Western regions the coefficients are not significant, no valid inferences can be made for school attendance in these regions.

6. Panel Analysis – Pooling the 1981 and 1991 data

The next step is to pool the 1981 and 1991 datasets, allowing for district specific effects and a different intercept in 1991. Table 4 presents the results of the panel analysis. Here we present the "random effects" results. The fixed effects model does not work too well here as we have only two reference years and it is effectively equivalent to taking first differences which in turn compounds measurement errors in the respective reference years. It is also found that when the district specific effects are taken as fixed, the standard errors of the coefficients increase sharply implying that the coefficients have been estimated with less precision. To be able to apply and test the fixed effects model, the data for 1971 will be added to the dataset in forthcoming research on the subject.

Table 4 : PANEL ANALYSIS (RANDOM EFFECTS MODEL)

School Attendance in India : Main Results

	Panel 1981-91:	
	Male School Attendance	**Female School Attendance**
Constant	21.8 (5.6)*	1.8 (0.34)
Adult female work force participation	0.1 (5.6)*	0.03 (1.2
Adult Female Literacy	0.1 (4.6)*	0.4 (10.7)*
Adult Male Literacy	0.6 (16.5)*	0.5 (13.8)*
Poverty	-0.1 (5.7)*	-0.1 (4.7)*
Scheduled Castes	0.1 (1.1)	0.1 (1.3)
Scheduled Tribes	-0.2 (0.9)	0.1 (2.4)*
School Accessibility	0.1 (4.5)*	0.2 (7.9)*
Urbanisation	0.03 (1.1)	0.1 (0.7)
Household Size	-0.9 (2.0)*	-2.3 (4.1)*
1991 time dummy	-5.1 (8.8)*	-2.4 (3.6)*
R^2 (between)	0.82	0.87
Wald, χ^2 (10) (p-value)	1570.6 (0.00)	2467.0 (0.00)
Sample Size	659	659

Note: Absolute z-ratios in parentheses. * significant at 5% level, ** significant at 1% level

The random effects model broadly confirms the cross-section findings. For both male and female school attendance, adult male and female literacy have positive and significant effects. Poverty has a negative and significant effect on school attendance by both sexes while school accessibility has a positive and significant effect on school attendance by both males and females. The scheduled tribe effect is positive and significant at the 5 percent level for female school attendance. Household size comes up negative and significant for school attendance by both boys and girls. Taken together, these results conform to the earlier cross-section findings and give a consistent picture of the relationship between male and female school attendance and these explanatory variables.

7. Concluding Remarks

Some important lessons and confirmations emerge from the results presented in this paper. *First*, the results indicate a positive association between adult female work force participation and school attendance. The coefficient is stable to the inclusion of other variables and also to district effects, suggesting that there is a direct link between adult female work and school attendance for both male and female children. This finding illustrates the crucial role played by women in educating children specially so when the women are working as that increases their say in the intra-household decision making process as well as in the society at large

Second, the findings highlight adult (parental) education as an important determinant of schooling at the elementary level. Literate parents are more likely to send their children to school. The interesting finding here is that the same-sex effects are stronger than the cross-sex effects. Higher levels of adult female literacy lead to higher rates of school attendance by the female child and similarly, higher levels of adult male literacy lead to higher rates of school attendance by the male child. This result also suggests that higher adult female literacy could lead to an advantage within the household for the female sex. Educated women are better able to understand the ramifications of being educated and in turn encourage school attendance by their female children. Also, with the same bargaining power, there could be a change in preferences of literate women with more importance being given to the education of the female child. As discussed in the text, an important qualification that needs to be kept in mind whilst dealing with adult male and female literacy as explanatory variables is the possibility of an upward bias in the estimated coefficients due to omitted variables.

Third, school accessibility emerges as an important determinant of attendance. In our study, we have included only one supply-side variable and it is possible that it also captures the effect of various other supply side variables. Paucity of data on more such variables compelled us to restrict ourselves to this single determinant of school accessibility. Teacher-pupil ratios though included were dropped from the analysis, as they did not throw up significant regression coefficients. The highly significant and positive coefficient for school accessibility reasserts the importance of school

infrastructure and its availability in school participation. Alongwith the various socio-economic determinants that influence decision making about participation of children in schooling, the supply-side covering all the factors that go into school provisioning is also of importance.

Fourth, the results show that *poverty* remains an important determinant of male and female school attendance. Poor households can be seen to keep their children from going to school because of their inability to afford the direct costs of schooling such as school fees, study material, transportation costs etc. Incentive measures specially targeted at poor households to encourage them to send their children to school are needed to overcome this barrier to school participation.

Fifth, household size exerts a negative influence on female school participation implying that as the family size increases, the proportions of girls attending school decreases. This could be reflecting the fact that with larger numbers of family members, the elder daughters are required to stay home and carry out household chores, look after younger siblings among other jobs at home.

Sixth, a somewhat unexpected result is that, ceteris paribus, school attendance rates are no lower in districts with higher proportions of scheduled castes and scheduled tribes than in other districts. This could be a consequence of the various legislative and other interventions which are in operation to provide equal educational opportunities to the children belonging to the deprived and backward communities, including many norm based incentives through the initiatives of the central and state governments and many other such measures.

Seventh, the gender bias results highlight the fact that the gender bias in school attendance tends to decline as parental literacy and school accessibility increase, and to rise with household size. In addition, there is some evidence of lower gender bias in school attendance among scheduled castes and scheduled tribes (after controlling for other socio-economic variables) than among other communities. Regional effects bring out that in both 1981 and 1991 the gender bias in school attendance was particularly high in the Northern region.

Finally, the results of the panel analysis show that the random effects model supports the main findings of the cross-section estimations.

References

Acharya, S (1989), "Agricultural Wages in India: A Disaggregated Analysis", *Indian Journal of Agricultural Economics,* 44.

Aggarwal, Y and Shibou, S (1994), "Educating Scheduled Castes – A Study of Inter-District and Intra Caste Differentials", NIEPA, New Delhi.

Colclough, C (1982), "The Impact of Primary Schooling on Development: A Review of the Evidence", *World Development*, 10.

Drèze, J, Murthi, M and Guio, A-C (1995), " Mortality, Fertility and Gender Bias in India: A District Level Analysis", Discussion Paper, Development Economics Research Programme, STICERD, London School of Economics.

Drèze, J and Murthi, M (2000), "Fertility, Education and Development: Further Evidence from India", The Development Economics Discussion Paper Series, STICERD, London School of Economics.

Drèze, J and Saran, M (1993), "Primary Education and Economic Development in China and India: Overview and Two Case Studies", Discussion Paper, Development Economics Research Programme, London School of Economics.

Drèze, J and Sen, A K (1995), "Basic Education as a Political Issue" *Journal of Educational Planning and Administration*, 9.

Drèze, J and Sen, A K (1995), Economic Development and Social Opportunity (New Delhi: Oxford University Press).

Drèze, J and Srinivasan, PV (1996), "Poverty in India: Regional Estimates, 1987-8", Working Paper, Centre for Development Economics, Delhi School of Economics.

Duraisamy, P (1988), "An Econometric Analysis of Fertility, Child Schooling and Labour Force Participation of Women in Rural Indian Households" *Journal of Quantitative Economics*, 4.

Government of India (1986), "Study on Distribution of Infrastructural Facilities in Different Regions and Levels of Urbanisation" Census of India 1981, Occasional Paper 1 of 1986 (New Delhi: Office of the Registrar General).

Government of India (1987), Census of India 1981, Series 1 - Part III-B(i)-B(iv) General Economic Tables, (New Delhi: Office of the Registrar General).

Government of India (1988), Census of India 1981, Series 1 - Part IV-A (iv) Social & Cultural Tables (New Delhi: Office of the Registrar General).

Government of India (1991), Census of India 1991; selected district-level data available on CD-ROM, Office of the Registrar General, New Delhi.

Green, W H (1997), Econometric Analysis (Prentice Hall).

Jain, L R, Sundaram, S and Tendulkar, S D (1998), “Dimensions of Rural Poverty: An Inter-Regional Profile”, *Economic and Political Weekly*, November (Special Issue)

Jayachandran, U (1997), “The Determinants of Primary Education in India”, M. Phil Thesis, Delhi School Of Economics, Delhi.

Jayachandran, U (2001), “Understanding School Attendance and Children’s Work Participation in India” *Journal of Educational Planning and Administration, 15 (1).*

Psacharopoulos, G (1985), “Returns to Education: A Further International Update and Implications”, *Journal of Human Resources 20 (4)*

Psacharopoulos, G and Woodhall, M (1985), "Education For Development: An Analysis of Investment Choices" Oxford University Press for the World Bank.

PROBE Team (1999), “Public Report on Basic Education in India”, Oxford University Press, New Delhi.

Rajan, S I and Jaikumar, A (1992), "Impact of Noon-Meal Programme on Primary Education-An Exploratory Study in Tamilnadu" *Economic and Political Weekly*, October 24-31.

Sarmah, S (2000), "Agricultural Wages: Trends and Determinants", M. Phil Thesis, Delhi School of Economics, Delhi.

Weiner, M (1991), “The Child and the State in India”, Oxford University Press, New Delhi

World Bank (1997), “Primary Education in India: Development in Practice” The World Bank, Washington D.C.

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APPENDIX 1
School Attendance Regressions – Female Wage rate Included

	1991 : OLS	1991 : OLS	1981:OLS	1981:OLS
	Male School Attendance	**Female School Attendance**	**Male School Attendance**	**Female School Attendance**
Constant	5.34 (0.73) *7.36*	-1.31 (0.16) *8.2*	20.94 (3.00)** *6.97*	-8.81 (0.81 *10.83*
Adult female work force participation	0.21 (4.64)** *0.04*	0.14 (2.94)** *0.05*	0.09 (2.83)** *0.03*	-0.003 (0.70) *0.04*
Female wage rate	0.11 (1.46) *0.76*	0.06 (0.57) *0.09*	2.14 (2.95)** *0.72*	5.07 (4.74)** *1.07*
Female 15+ Literacy	-0.02 (0.31) *0.08*	0.48 (5.44)** *0.09*	0.12 (1.49) *0.08*	0.24 (1.63) *0.15*
Male 15 + Literacy	0.74 (8.89)** *0.08*	0.50 (5.09)** *0.09*	0.59 (4.52)** *0.13*	0.58 (4.52)** *0.13*
Poverty	-0.04 (0.94) *0.04*	-0.05 (1.03) *0.04*	-0.12 (1.95)* *0.06*	-0.008 (0.14) *0.62*
Scheduled Castes	-0.02 (0.13) *0.11*	0.07 (0.69) *0.09*	-0.07 (0.92) *0.08*	-0.03 (0.34) *0.09*
Scheduled Tribes	-0.09 (2.13)* *0.04*	-0.02 (0.55) *0.04*	0.10 (1.64) *0.06*	0.13 (1.92)* *0.07*
School Accessibility	0.12 (3.12)** *0.04*	0.11 (2.57)** *0.04*	0.01 (0.46) *0.03*	0.14 (3.78)** *0.04*
Urbanisation	0.02 (0.51)* *0.03*	-0.01 (0.29) *0.04*	-0.01 (0.13) *0.05*	0.10 (1.69) *0.06*
Household Size	-1.81 (2.10)* *0.86*	-2.75 (3.02)** *0.91*	-0.71 (0.82) *0.88*	-3.09 (2.53)** *1.22*
R^2	0.79	0.87	0.76	0.82
F (n1, n2) (p-value)	F(10,163)=77.91 (0.00)	F(10,163)=117.82 (0.00)	F(10,228)= 82.68 (0.00)	F(10,228)= 157.87 (0.00)
Sample Size	174	174	239	239

Note : Absolute t-ratios in parentheses. Robust standard errors in *italic*.
*significant at 5% level, ** significant at 1% level