Impact of Child Labour on School Attendance and School Attainment: Evidence from Bangladesh

Khanam, Rasheda and Ross, Russell

March 2005

Child Work and Other Determinants of School Attendance and School Attainment in Bangladesh

R. Khanam[i] and R. Ross[ii]

ABSTRACT

The paper examines the linkages between child work and both school attendance and school attainment of children aged 5–17 years using data from a survey based in rural Bangladesh. This paper first looks at school attendance as an indicator of a child's time input in schooling; then it measures the "schooling-for-age" as a learning achievement or schooling outcome. The results from the logistic regressions show that school attendance and grade attainment are lower for children who are working. The gender-disaggregated estimates show that probability of grade attainment is lower for girls than that of boys. Household permanent income, parental education and supply side correlates of schooling (presence of a primary (grade 1-6) school and secondary (grade 6-10) school in the village) are appeared to be significant determinants of schooling in rural Bangladesh. The results of this study further show that the effect of household permanent income, parental education and presence of secondary school is higher for grade attainment than school attendance.

Keywords: Schooling, Child Labour, Logit, Bangladesh

JEL Classification: C25, I21, J13, O12

---

[i] Corresponding author. Rasheda Khanam, Australian Centre for Economic Research on Health (ACERH UQ), University of Queensland, Mayne Medical School Building, Herston Road, Herston Q4006. Email: r.khanam@uq.edu.au

This paper arises from the first author's doctoral research at the University of Sydney. A major revision on this paper is done during the first author's appointment at the Australian Centre for Economic Research on Health (ACERH). The authors are grateful for comments on earlier versions from participants at conferences in Sydney, Leuven, and Tokyo.

[ii] Russell Ross, Department of Economics, University of Sydney, NSW 2006, Australia. Email; r.ross@econ.usyd.edu.au.

1 Introduction

The attainment of universal primary education has been one of the main policy priorities of the Bangladesh government since gaining independence in 1971. Although there has been a steadily increasing trend for school enrolment rates in Bangladesh over these years, the non-enrolment rate, particularly, illiteracy rate - is still high in Bangladesh compared to many low-income countries. Child labour is believed to be the main cause, with many other reasons, of low/non-enrolment and high illiteracy rate in Bangladesh. The most recent evidence, from the Bangladesh labour force survey 1999–2000 indicates that the labour force participation rate of children aged 10–14 was about 39 per cent in 2000. This is a strikingly high rate compared to other countries in the region (for example, India and Pakistan).

In developing countries, children are making significant economic contributions to their families through their labour market activities. Therefore, the opportunity cost of school attendance is expected to be substantial to the parents. This may mean that the return associated with time spent at school might not justify the loss of a child's economic contribution in a rural setting. In this case, parents may be reluctant to send a child to school. It is also argued that there is a trade-off between child labour (current income) and accumulation of human capital through education. Putting a child in productive activities may increase current income but will seriously undermine his or her human capital development. Therefore, the failure of parents to internalise the trade-off between child labour and earnings ability will result in a high incidence of child labour. On the other hand, child labour may impede school attendance and the quality of learning achievements of children. The focus of this paper is to examine the linkages between child work and both school attendance and school attainment of children aged 5–17 years using data from a survey based in rural Bangladesh.

Previous studies of the consequences of child labour on schooling in developing countries have paid attention to the impact of child labour on school attendance or enrolments

ignoring school achievements. These studies have found mixed results. For example, using the 1995-96 Household Expenditure Survey of Bangladesh, Ravallion and Wodon (2000) found that child labour and school enrolment in Bangladesh were not mutually exclusive. Another study by Amin,Quayes, and Rives (2006) using same data set as Ravallion and Wodon examined whether working prevents Bangladeshi children from schooling. They first included all types of work in their definition, and then they separated market work from household work. They found that work reduces the schooling for Bangladeshi children. Arends-Kuenning and Amin (2004) evaluated school incentive programs in two Bangladeshi villages to increase access to education. They found that school incentive programs increased school attendance for children and reduced time spent on work activities. Boozer and Suri (2001) found that an hour of child labour decreases school attendance by only .38 hours for Ghanaian children. Psacharopoulos (1997) found that when a child is working this reduces his/her educational attainment by about two years of schooling. Similarly, Levy (1985) and Rosenzweig and Evenson (1977) reported that child labour market participation lowers both school enrolment and attendance.

More recent empirical studies[i] argue that school enrolment or attendance are not ideal measures of the potential negative effects of child labour on learning because these are only indicators of the time input into schooling, not schooling outcomes. For example, Gunnarsson, Orazem, Sánchez (2004) argued from Latin American experience that an employed child may be enrolled at the same time and could even attend school by sacrificing his or her leisure. Child work still has the potential to harm a child's school outcomes by limiting the time spent on study, or leaving the child too tired to make efficient use of the time in school (Orazem and Gunnarsson 2004). Therefore, it is important to measure school outcomes – such as test scores and/or schooling-for-age - instead of simply measuring a child's time in school (such as school attendance) to explore the real impact of child work on schooling. In a developing country like

Bangladesh, schooling/learning outcome (such as test scores, schooling-for-age) does not reflect the complete picture of learning achievements; because enrolling all school-aged children in school is still a major development challenge for the Bangladesh government. Therefore, school attendance is still regarded as an important measure of educational performance in the context of Bangladesh. However, for the current study "years of schooling" is not an ideal measure of school attainment, as the sample is restricted to young children aged 5–17 years. For this group, schooling will be an actual or potential current activity, not a completed activity. Unfortunately, other measures of schooling outcomes, such as test scores, are not always available for a country like Bangladesh.

As there has been criticism of the use of school enrolment or attendance as an appropriate measure of the potential harm of child labour on education, this paper also uses schooling-for-age to measure schooling outcome. As has been discussed by Orazem et al. (2004), one appropriate measure of school attainment when the sample is younger and potentially still in school is SAGE (Schooling-for-Age). This paper first looks at school attendance as an indicator of a child's time input in schooling; then it measures the "schooling-for-age" as a learning achievement or schooling outcome.

The rest of the paper is organised as follows. Section 2 describes the data set and presents the estimation methodology and estimation issues. Section 3 discusses the results. Section 4 concludes.

2 Data Description and Estimation Issues

The data set used in this study comes from a survey titled 'Micronutrient and Gender Study (MNGS) in Bangladesh'. This survey, which was administered by the International Food Policy Research Institute (IFPRI) collected data from three survey sites: Saturia, Mymensingh and Jessore in 1996-1997. The MNGS sampled a total of 957 households from 47 villages and

collected data on 5,541 individuals residing in the sample households. It provided economic, demographic, agricultural, and gender information. The survey also contained information about the schooling, and employment status of each child in the household.

The survey was a four round survey. This study restricts the sample only to the children of the first round of the survey, because the second, third and fourth rounds included only those adult household members who were away from home at the time of the first round of the survey. These household members were very few in number; hence it is expected that they do not affect the analysis. The present analysis is based on data for children aged 5–17 years living in rural households in which the mother and father are both present. There are 1713 children in this age group, although 95 were discarded as they were in one-parent households, and a further 187 had to be omitted due to missing information on their schooling. These restrictions result in a usable sample size of 1,441 children.

This study uses two dependent variables: (i) school attendance; (ii) school attainment. School attendance is treated as a dichotomous variable taking the value 1, if the child is reported to be enrolled in school, and 0, if otherwise. A commonly used measure of school attainment is "schooling-for-age" (SAGE). This measures schooling attainment relative to age. Patrinos and Psacharopoulos (1997) and Ray and Lancaster (2005) used "grade-for-age" or "schooling-for-age" (SAGE) to measure schooling outcome.[ii] It is given by

$$SAGE = (\text{Years of Schooling/Age-E}) * 100 \qquad (1)$$

where E represents the country-specific usual school entry age. SAGE will therefore take values in the range 100 (indicating attended school for the maximum number of years possible to date) to 0 (i.e. never attended school). A score of less than 100 indicates that the child is 'falling behind' in their education. Consequently, all those with a score under 100 are considered as having below normal progress in the school system. In this study, SAGE is

converted to a dichotomous variable that takes the value 1 if a child has below normal progress (that is, SAGE < 100), i.e. is falling behind in the schooling system, and 0 otherwise.

Both dependent variables are measured by the logistic estimation procedure in which the model is of the following form.

The model expresses the probability (*P*) of a child being enrolled in school/falling behind in grade attainment as a function of a set of regressors as

$$P_j = \frac{1}{1+e^{-\sum \beta_i x_i}} \qquad (2)$$

Where 'j' is either 'enrolled in school' or 'falling behind'. The set of regressors cover a range of child-specific, parental, household and community characteristics. The coefficients are partial derivatives that indicate the direction of change in the probability of enrolment (or falling behind in grade attainment) relative to a unit increase in the independent variable. The magnitude of the marginal effect is

$$\frac{\delta P_j}{\partial X_i} = \beta_i P_j (1 - P_j) \qquad (3)$$

where P_j refers to the dependent variable probability of the event, β to the logit coefficient, and *X* to the relevant independent variable.

An Issue with the Construction of the SAGE Variable

The formula for SAGE presented in Equation (1) above highlights several issues when using data on young children. For children who are in their first year of schooling, a strict interpretation of SAGE will give an infinite value since the denominator is zero (since Age – E = 0). Further, if a child starts school before they reach the minimum age, then SAGE potentially can be greater than 100. In Bangladesh, the official enrolment age is six years, which indicates that by the age of six years a child should be enrolled.[iii] Many parents, however, send their

child to school at four years old even at three years. The sample (children aged 5–17) used in this study suggests that among the five-year-olds 57 per cent[iv] of children are enrolled in school. Therefore, enrolment age (E) can be considered from four or five years in the SAGE equation.

The aim of measuring SAGE is to find out the correct grade/schooling-for-age for the children. As this study has used the children aged 5–17 years, therefore E = 6 cannot be used for the entire sample in constructing SAGE. If E = 6 is used then SAGE will take negative value for five-year-olds children and infinite for six-year-olds children. Therefore, E should be less than the minimum age of children considered in the sample. In this case, one could argue that E = 4 could be used for the entire sample. However, if E = 4 is used for the entire sample, there will be more children who are falling behind in schooling than the actual ones, i.e. this will understate the number of children who are following the 'standard' education pattern. For example, if E = 4 is used in SAGE equation, then only 4.9 per cent of children are in the right grade for their age, which does not seem logical. Hence, E = 4 and E = 5 are considered for the children five years old and six years old respectively and E = 6 for the remainder in constructing SAGE variable.

However, if the above-mention procedure is used (for five years old, E = 4; for six years, old E = 5 and for the rest E = 6), then 37.7 per cent (544 children out of 1,441) of children are in the right grade for their age. This figure of 37.7 per cent of children is more acceptable than that of 4.9 per cent of children in the correct grade. About 62.2 per cent of children are falling behind (SAGE < 100) their correct grade, among them 11.3 per cent are completely falling behind (SAGE = 0) and the information for SAGE (years of schooling) is missing for 11.4 per cent of children. The above procedure of measuring SAGE is justified.

Choice of Explanatory Variables

Child work and school attendance might be jointly determined outcomes of the child's time allocation process. If, so, treating child work as exogenous could provide biased estimators. However, Child labour has been treated as both exogenous and endogenous in previous studies. For example, Patrinos and Psacharopoulas (1997), Psacharopolos (1997), Sánchez et al. (2003), Heady (2003) and Amin et al (2006) treated child labour as exogenous and so did not consider any tests for the possibility that child labour may be endogenous. . In line with the most of the previous studies, this paper also treats child labour as an exogenous determinant of schooling. It is acknowledged that, if child labour is the result of poor academic performance in school, then the estimated coefficients may be biased.

A small number of studies (among them are Bhalotra, 1999, Gunnarson et al. 2003, 2004; Ray and Lancaster 2003, 2005) have tried to control for endogenous child labour, mainly because of unavailability of valid instruments in their data set. To obtain unbiased estimates of the coefficients, there needs to be a valid instrument for child labour that affects child labour without directly affecting schooling. According to Ray and Lancaster (2003, p. 23) "such variables are difficult to think of, let alone find, in the data set". One valid instrument is the child's own current wage rate as this affects the probability of child labour but not the child's current schooling. Unfortunately, data on child wage rates is unavailable in the vast majority of studies, and in those where it is reported it is only available for those children actually working.

The studies that have tried to control for endogeneity of child labour have relied on some strong and rather arbitrary identification restrictions, such as community agricultural wages and cross-country variations in the legal system affecting child labour. Bhalotra (1999) used community level agricultural wages to proxy child wages. Ray and Lancaster (2005) used household's income status and its portfolio of assets and community facilities such as radio, telephone, and access to water and electricity as instruments. Gunnarson et al. (2004) used the

variability in the starting age of schooling and other variation in legal environment across countries as instruments for endogenous child labour in multi-country data sets.[v] However, none of these studies has tested the validity of instruments used in their studies. Therefore, the validity of these instruments is not beyond question. This present study does not try to test for endogeneity of child work because of such doubts about this validity, and, pragmatically, because in the data set analysed there is no valid instrument that will affect child labour without directly affecting schooling. We caution our readers about the potential endogeneity of our results if child labour is actually the results of poor academic performance in the school.

Table 1 presents the definitions and descriptive statistics of the explanatory variables used in the estimation. The log of household per capita is used to proxy household permanent income as suggested and used by Maitra (2003). As Maitra (2003) notes "Total household expenditure is easier to measure compared with total household income and is typically measured with less error. Moreover, total expenditure is typically a better proxy for permanent income because, while income might be subject to transitory fluctuations, households typically use a variety of mechanisms to smooth consumption over time. Finally, using per adult household expenditure helps to avoid the contamination of the permanent income variable by the fertility schooling choices that households make jointly."

In contrast to Amin et al (2006) and Maitra (2003) we include supply-side correlates of schooling such as presence of primary (grade 1-5) and secondary (grade 6-10) school in the village to capture the cost of schooling. In the absence of such supply variables of schooling the results might be biased. Distance to nearest school is considered as good measure of cost of schooling in developing countries. However, there are many cases where data on distance to nearest school is missing in the present data set. So, we might lose a large part of the sample.

To measure child work, this study focuses on only the primary activity of a child. "Work" is a discrete variable that takes the value 1 if the child is reported to be working (work

includes housework, agricultural work and non-agricultural work[vi]) as his or her primary activity or main activity, and 0 otherwise.

{{ insert Table 1 here }}

This study examines the association between work (considering whether a child is working or not) and both current school enrolment and schooling outcomes, the latter as measured by SAGE, for children aged 5-17 years.

3. Estimation Results

The final sample is stratified by gender, and separate models are estimated for boys and girls. The sample is also stratified into separate demographic groups, and separate estimates are computed for the younger age group, ages 5–11, and for the older age group, ages 12–17. The motivation behind this disaggregation by age is to look at the effect of work on the schooling progress of these two groups, as ILO Convention No. 138, Article 7(b) stipulates that only light work may be permitted for children aged 12 or 13 if work does not hamper their school attendance and learning. One of our motivations is to look at the schooling outcomes of the children ages 12-17. Because the children of our study come from a basically rural household survey, so most of the working children in this age group are either engaged in household work or agricultural work, which are presumably light work. We have estimated two separate model to see the association between different types of child work, for example, household work, agricultural work and non-agricultural work and schooling of children: one for all children and the other for the children ages 12-17. The estimated results are reported in Tables 6.

Tables 2–5 present the maximum likelihood logit estimates for school attendance and SAGE.[vii] Marginal effects[viii] are also reported, as they can be interpreted easily. Though the main hypothesis is to examine the linkages between work and schooling attainment, a number

of variables, such as a child's characteristics, household and parent's characteristics, are also used as controls.

School Attendance

Tables 2 and 3 report the estimates for the school attendance of children. The results support the main hypothesis that work is negatively associated with a child's current school enrolment and schooling progress. Corresponding marginal effects indicate that work has, more or less, a three times more negative effect on school enrolment than grade attainment. Column 3 of Table 2 reveals that relative to a non-working child, a working child is 88 percentage points less likely to be enrolled in school. The gender-disaggregated estimates show that working girls are 75 per cent less likely to be enrolled (Column 7, Table 2); on the other hand, working boys are 88 per cent less likely to be enrolled in school (Column 5, Table 2).

{{ insert Tables 2 and 3 about here }}

Though the main focus of this study is to examine the association between child work and schooling, there are some important results emerging from this study that deserve special attention. For example, being a son/daughter of the household head, the age of the child, the parents' education, household's permanent income and presence of a school in the village appear to be significant determinants of school attendance in Bangladesh. An increase in the household's permanent income increases the probability of enrolment for all children with the exception of older (children aged 12-17) and male children. Being a child of the household head significantly increases the likelihood of current school attendance with the exception of the younger sample (children aged 5–11).

The estimated coefficients of age are always very significant. The significant and positive coefficients of age indicate that the probability of school attendance/enrolment increases with the age of the child. This is consistent with Maitra's (2003) study on Bangladesh

using Matlab Health and Socio-Economic Survey (MHSS). Age squared is also included as a regressor to examine the non-linearity in impact of the age variable. The estimated coefficient on age-squared is negative and significant, indicating non-linearity in the age effect. However, for the age-disaggregated sample (Table 3) the result does not show a significant age effect for school enrolment.

All the estimated coefficients of female variables, in school enrolment equations show positive signs, implying that female children are more likely to be enrolled. The coefficient is, however, statistically significant only in the older children's sample (aged 12–17).[ix] These results confirm that the probability of school enrolment is higher for girls aged 12–17 than that of boys.

The analysis now focuses on interpreting the results of household's permanent income, parents' education and occupation. The variable, household expenditure is always positive indicating a higher probability of enrolment if household's permanent income increases. The probability of school enrolment increases by 6 percentage points in the combined sample (Table 2, Column 3) and nearly by 5 percentage points in the young sample (ages 5-11) (Table 3, Column 3). The father's education appears to be more important for school enrolment than the mother's education. The marginal effects (Column 3 of Table 2) show that, relative to the reference category (illiterate father), the probability of current school enrolment is higher by 4.0 percentage points if the father can sign only, is higher by almost 6.0 percentage points if the father can sign and read. Surprisingly, mother's education does not appear to have a significant role in the enrolment decision of the children. Mother's education starts to affect child's schooling after a certain threshold of education. For example, mother education is significant when a mother can read and write and only for boys and younger children. The age-disaggregated sample shows that the parent's education increases the enrolment probability of young children (aged 5-11). However, the effect of father's education is stronger than the

mother's education. The probability of school enrolment among younger children increases by nearly 6.0 percentage points if the father can sign and write relative to the reference case (illiterate father); on the other hand, the corresponding increase in the probability is 4.1 percentage points if mother can read and write relative to an illiterate mother. The estimated coefficients from older children reveal that parents' education has no effect to increase the enrolment probability among older children. [x]

The combined sample shows that relative to the children from farming households, the probability of current school enrolment is lower by 4.7 percentage points for children, whose fathers are day labourer/wage labourer, is lower by 5.8 percentage points, if father's occupation is trade. The similar trend is also observed for younger children (Table 3, Column 3). The boys' sample reveals that the probability of school attendance decreases by 9.1 percentage points for male children, whose father's occupation is trade. The father's occupation has no significant effect on the probability of enrolment for girls. Like the father's education, the father's occupation also has no impact on the probability of the current school enrolment of older children (aged 12–17). Parental occupation may also reflect their earnings potentiality, which can be considered as the income effect in the standard economic tradition. Therefore, day or wage labourer fathers indicate lower income potentiality that deprives children from schooling.

Another important result emerge from this paper is the availability of schools in the village, which is a good proxy for cost of schooling. For example, the presence of a primary school in the village increases the probability of school enrolment for girl and younger children (5-11). The Younger sample (ages 5-11) shows that the presence of a primary school in the village increases the enrolment probability of boys by 3 percentage points (Table 3, Column 2). This is an important policy related finding, which could motivate the policy makers to focus on

the availability of primary school to increase the enrolments of girls and also reduce the probability of late enrolment.

There are some other results that are worth noting. For example, the estimated coefficients of the number of children aged 5–17 (school-aged children) are always negative for school attendance with the exception of boys' sample but insignificant with the exception of the girls' sample. The girls' sample suggests that an increase in the number of children aged 5–17 reduces the probability of the enrolment of girls, but the corresponding marginal effects indicate that this effect is very negligible.

Schooling-for-Age (SAGE)

The results for SAGE are reported in Tables 4 and 5. The significant and negative coefficients of "work" variable provide evidence that work has the potential to harm a child's schooling progress (with the exception of the young sample, children aged 5–11), though the detrimental effect of work is relatively lower on schooling progress than school attendance. For example, relative to a non-working child, a working child is 28 per cent more likely to fall behind in grade attainment (Table 4 Column 3). The gender specific results demonstrate that work has a more harmful effect on girls' grade attainment than that of boys. The corresponding marginal effects suggest that a working girl is 34 per cent more likely to fall behind in schooling progress (Table 4, Column 7) while a working boy is 25 per cent more likely to fall behind (Table 4, Column 5).

{{ insert Tables 4 and 5 about here }}

The age-disaggregated sample reveals that older working boys aged 12–17 years are 19 per cent more likely to fall behind in their schooling progress. Surprisingly, the coefficients of work indicator variables turn out to be insignificant for younger children. Although work is negatively associated with school attendance or current enrolment for young children (aged 5–

11); if they are enrolled once, surprisingly, work has no effect on their school attainment. There are two possible explanations for this result. Firstly, these children might be enrolled in school in due time; so they were not falling behind in the schooling system. Secondly, young children who are enrolled may be less involved with work than older children; therefore, work does not have any negative effect on their schooling progress.

Attention will now be paid to the other determinants of SAGE. The estimates of the school attendance equation show that whether a child is the son/daughter of the household head is an important determinant for current school enrolment/school attendance. Results from combined sample for "schooling-for-age" document that sons and daughters of the household head are 9 per cent less likely to falling behind in the school (Table 4, column 3). The estimated coefficients of age provide mixed results for SAGE. For younger children aged 5–11, age has no significant effect for school enrolment, while it has a significant positive effect on grade attainment. This implies that young children who are enrolled are less likely to fall behind up to the age of 11 years.

Now let us turn to the results of the permanent income of the household, the education and occupation of parents. Household permanent income is very important for grade attainment. The coefficient of this variable is negative and statistically significant for all models. The corresponding marginal effects of this variable show that boys are 16 percentage points, girls are 27 percentage points, younger children are 17 percentage points, and older children are 20 percentage points less likely to fall behind in the school if there is an increase in the household income. These findings about household income are consistent with Maitra (2003) and Amin et al(2006). All models in schooling-for-age confirm that the mother's education has a stronger effect on grade attainment than school attendance. The effect of mother education is higher than that of father. For the entire sample, relative to the reference category of an illiterate father, the probability of falling behind is lower by 9 percentage points

for children whose father can sign only, is lower by 11 percentage points for children whose father can read and write. On the other hand, compared to the baseline category (illiterate mother), the probability of falling behind in grade attainment is lower by 16 percentage points if the mother can read only, is lowered by 24 percentage points if the mother can read and write. The age-disaggregated sample shows that the father's education has no effect on the grade attainment of older children. The mother's education, for example, if the mother can read and write relative to being illiterate, decreases the probability of falling behind by 25 percentage points for younger children and 17 percentage points for older children. Hence it can be concluded that parents' education plays an important role in improving a child's schooling progress. All these findings about the impact of parental education are consistent with the finding of Ray and Lancaster (2003). Ray and Lancaster (2003:32) argued that "better educated adults will, by ensuring that their children make more efficient use of the non labour time for study, will help to reduce the damage done to the child's learning by her work hours".

Turning to parental occupations, male and older children (12-17) from service holder fathers are respectively 14 percentage points and 11 per cent less likely to fall behind in grade attainment. There are two possible explanations for this result. Firstly, if the father's occupation is service, it generally indicates that the father is better educated, and generally, a better-educated father earns more. Secondly, if the father's occupation is service rather than farming, then there will be a lesser amount of work at home that needs to be done by children. The mother's occupation is found to be insignificant for current enrolment and for schooling-for age.

Another important result emerges from the present study is the presence of a secondary (grade 6-10) schools in the village, which increases the probability of school attainment. For example, presence of a secondary girls' school lowers the probability of falling behind in grade attainment for girls by 40 percentage points. On the other hand, presence of a secondary boys'

& girls' school lowers the probability of falling behind in grade attainment for boys by 18 percentage points, for young children by 13 percentage points and for older children by 15 percentage points.

There are some other results that are noteworthy. For example, the positive sign of the variable "school-age (children aged 5–17 years)" in all sample indicates that an increase in the number of school-aged children increases the probability of falling behind in grade attainment. The coefficient of school-aged children indicates that an increase in the number of school-aged children will decrease school attainment for girls by 7.8 percentage points (Table 4, Column 7) and for younger children by 7.8 percentage points (Table 5, Column 3). Maitra (2003) and Amin et al (2006) also found similar effects in their studies on Bangladesh. Maitra (2003) found that the probability of current enrolment is significantly lower for the child who has three siblings in the age group 6–17 years compared to a child who has no siblings in this age group. Amin et al (2006) revealed that an increase in the number of children decreases the probability of being continuously in school by about 3 percentage points for older rural boys for market work. This finding may shed light in favour of quantity-quality trade-off and sibling competition effects (Maitra 2003). Further, it is argued that large numbers of school-aged children demand more resources to be put into their education, which, in turn forces them to be employed in case of parental resource constraints, to make school possible for themselves and for their siblings. This may have a negative impact on their schooling outcome. The gender-disaggregated sample suggests that both school enrolment and school attainment of girls will suffer if there are more school-aged children (aged 5–17). This finding supports the earlier evidence that girls are disadvantaged in large households.

Types of Work

This paper first examines the association between child work (considering whether a child is working or not) and both current school enrolment and schooling-for-age (SAGE). Then it disaggregates the "work" variable by type of work performed by a child and estimates two separate models, one for all children and the other for older children. The justification of this disaggregation is to identify if any particular activity of a child, for example, housework, has a stronger affect on child's learning achievements than agricultural or non-agricultural work. The estimates for different types of work have only been reported in Table 6, although same controls have been used in these two models as well.

{{ insert Tables 5 about here }}

A separate model is estimated for the children aged 12-17 to see whether light work, such as household work, does not hamper schooling of this age group. However, the results indicate a negative association between all types of work and schooling of these children. The schooling outcomes of these children are worse compared to non-working children even though they are engaged in household work, which is considered as light work for older children (ages 12-17). Therefore the results suggest that no matter whether it is light work or not, there is a trade-off between child work and schooling.

4. Conclusions

This study examines the association between child work and schooling of Bangladeshi children by controlling a wide variety of variables including parental education, household permanent income (proxied by log of per capita household expenditure), supply side variables of

schooling. The results of this study show that child work adversely affects the child's schooling, and this is reflected in lower school attendance/enrolment and lower grade attainment. School attendance, however, suffers more compared to grade attainment. The gender-disaggregated estimates indicate that grade attainment is lower for girls than that of boys. Further, although ILO Convention No. 138, Article 7(b) stipulates that light work may be permitted for children aged 12 or 13 if the work does not hamper their school attendance and learning, the findings of this empirical investigation suggest that the schooling progress of the working children of this age group (12–17) is definitely lower compared to non-working children of the same age group.

The results of the present study show that presence of a primary school is important for school enrolment, particularly for girls and young children. Presence of a secondary school significantly increases the probability of school attainment. Parental education has a much greater effect on schooling-for-age than school attendance. The mother's education has a stronger effect on schooling-for-age than that of the father. An increases in household permanent income increases both school attendance/current enrolment and school attainment, however, the effect is stronger for grade attainment. Though the entire sample tends to suggest that girls are more likely to be enrolled relative to boys, however, the statistical significant coefficient of the variable "school-aged children (aged 5–17)" in gender-disaggregated sample indicates that both the school enrolment and schooling progress of girls will be lower if there are more children in the age group of 5–17 years. This result documents a specific gender gap in large households in Bangladesh.

[i] See for instance, Heady (2003), Gunnarsson et al. (2004) and Rosati and Rossi (2003).

[ii] Illahi (2000), Psacharopoulos and Yang (1991), Patrinos and Psacharopoulos (1995) also used grade-for-age for schooling attainment.

[iii] The official enrolment age is not enforced in Bangladesh. Therefore, late enrolment is a common phenomenon in Bangladesh, particularly in rural areas.

[iv] Of the 115 children aged five years, 66 were enrolled at school.

[v] However, most of the variation in child labour is within country and not across countries, so the use of these instruments is somewhat arbitrary. The usefulness of these instruments is limited by the extent to which child labour varies across countries as opposed to within countries. In this case, valid instruments would be those that vary within countries as well as across countries.

[vi] Non-agricultural work: all income-generating activities, except agricultural work and housework, are included, as well as service, business, self-employment and permanent labour.

[vii] The analysis was conducted using LIMDEP 8.0.

[viii] As can be seen from equation (3), the marginal effects for binary models are unambiguous, as a positive coefficient implies a positive change in the probability (Powers and Xie 2000).

[ix] The estimated coefficient of the female variable is not statistically significant, though positive, for younger children.

[x] If household's permanent income and presence of a school in the village are not controlled for, parental education becomes more significant and the magnitude of the variable also increases in the school enrolment equations. These results are not shown here but can be obtained from the authors on request.

References

Amin, S., Quayes, M. S. and Rives, J. M. (2006b). "Market work and household work as deterrents to schooling in Bangladesh" **World Development,** 34(7):1271-1286.

Arends_Kuenning, M., & Amin, S. (2004). School Incentive Programs and Children's Activities: The Case of Bangladesh, **Comparative Education Review,** 48(3) 295-317.

Bhalotra, S. (1999) **Is Child Work Necessary?** mimeo, Cambridge University.

Boozer, M. A. and Suri, T. K. (2001) **Child Labor and Schooling Decisions in Ghana**, mimeo, Yale University.

Greene, W.H. (2002), **LIMDEP Version 8.0: User's Manual**, (New York, Econometric Software, Inc.).

Gunnarsson, V., Orazem, P. F. and Sedlacek, G. (2003) Changing Patterns of Child Labor Around the World Since 1950: the Role of Poverty, Parental Literacy and Agriculture, in P. F. Orazem & G. Sedlacek (eds.) **Eradicating Child Labor in Latin America in the 90s: The Promise of Demand Side Interventions**, (Washington, D.C., World Bank and IDB).

Gunnarsson, V., Orazem, P. F. and Sánchez, M. (2006) **Child Labor and School Achievement in Latin America**, The Word bank Economic Review, 20(1),pp.31-54.

Heady, C. (2003) The Effect of Child Labor on Learning Achievement, **World Development**, 31(2), pp. 385–398.

Lavy, V. (1985) Cropping pattern, Mechanization, Child Labor, and Fertility Behavior in a Farming Economy: Rural Egypt. **Economic Development and Cultural Change**, 33, pp.777–791.

Maitra, P. (2003) Schooling and Educational Attainment: Evidence from Bangladesh, **Education Economics**, 11(2), pp.129–153.

Orazem, P. and Gunnarsson, L. V. (2004) **Child Labour, School Attendance and Performance: A Review**, Working Paper #04001, Department of Economics, Iowa State University.

Patrinos, H. A. and Psacharapoulas, G. (1995) Educational Performance and Child Labor in Paraguay, **International Journal of Educational Development**, 15(1), pp.47–60.

Patrinos, H. A. and Psacharopoulos, G. (1997) Family Size, Schooling and Child Labor in Peru – An Empirical Analysis, **Journal of Population Economics**, 10(4), pp.387–405.

Powers, D. and Xie, Y. (2000) **Statistical Methods for Categorical Data Analysis** *(*San Diego, California and London, Academic Press).

Psacharopolus, G. (1997) Child Labor Versus Educational Attainment: Some Evidence from Latin America, **Journal of Population Economics**, 10(4), pp.377–386.

Psacharopoulos, G and Yang, H. (1991) Educational attainment Among Venezuelan Youth: An Analysis of its Determinants, **International Journal of Educational Development**, 11(4), pp.289-294.

Ravallion, M. and Wodon, Q. (2000) Does Child Labor Displace Schooling? Evidence on Behavioral Responses to an Enrolment Subsidy, **Economic Journal**, 110(462), pp.C158–C175.

Ray, R. and Lancaster, G. (2003) **Does Child Labour Affect School Attendance and School Performance? Multi Country Evidence on SIMPOC Data**, Discussion Paper #2003-04 , School of Economics, University of Tasmania.

Ray, R. and Lancaster, G. (2005) The impacts of Children's Work on Schooling: Multi Country Evidence, International Labour Review, 144(2), pp. 189-210.

Rosati, F. C. and Rossi, M. (2003) Children's Working Hours and School Enrollment: Evidence from Pakistan and Nicaragua, **The World Bank Economic Review**, 17, pp.283-295.

Rosenzweig, M. and Evenson, R. (1977) Fertility, Schooling and the Economic Contribution of Children in Rural India: An Econometric Analysis, **Econometrica**, 45, pp.1065–1079.

Sánchez, M. A., Orazem, P. F. and Gunnarsson, V. (2003) The Effect of Child Labor on Mathematics and Language Achievement in Latin America, in P. F. Orazem & G. Sedlacek (eds.) **Eradicating Child Labor in Latin America in the 90s: The Promise of Demand Side Interventions**, (Washington, D.C., World Bank and IDB).

Table1: Variable Names and Definitions, Summary Statistics[a].

Variables Name	Definition	Mean
Child Characteristics		
ATSCHOOL	1 if attending school, 0 otherwise	0.79
SAGED	1 if a child has below normal progress [i.e. if SAGE < 100, see equation (1)], 0 otherwise	0.62
Female	Gender of child (1 if female, 0 otherwise)	0.39
Son/daughter	1 if son/daughter of the head, 0 otherwise	0.88
Age	Age of child	11.15(3.46)
Age squared	Age of child, squared	136.39(77.18)
Working	1 if the child works, 0 otherwise	0.13
Housework	1 if the child primary activity is housework, 0 otherwise	0.04
Agricultural work	1 if the child primary activity is agricultural work, 0 otherwise	0.04
Non-Agricultural work	1 if the child primary activity is non-agricultural work, 0 otherwise	0.04
Household Characteristics		
Children (5–17)	Number of children 5–17	2.82(1.26)
Children (0–4)	Number of children 0–4	.51(.71)
Total member	Number of people in the household	6.51(2.77)
Household expenditure	Log of per capita household expenditure	2.95(.35)
Parents Characteristics		
Father's age	Age of father, in years	46.72(10.43)
Father's education (ref: illiterate)	1 if father is illiterate, 0 otherwise	0.26
Can sign only	1 if father can sign only, 0 otherwise	0.27
Can read only	1 if father can read only, 0 otherwise	0.03
Can read and write	1 if father can read and write, 0 otherwise	0.44
Father's occupation (ref: farming)	1 if father's occupation is agriculture, 0 otherwise	0.46
Service	1 if father's occupation is service, 0 otherwise	0.12
Trade	1 if father's occupation is business, 0 otherwise	0.16
Day/wage labourer	1 if father is day labour and wage labour, 0 otherwise	0.21
Other occupation	1 if father is engaged in other occupation than the occupation stated above, 0 otherwise	0.04
Mother's age	Age of mother, in years	37.92(9.02)
Mother's education (ref: Illiterate)	1 if mother is illiterate, 0 otherwise	0.35
Can sign only	1 if mother can sign only, 0 otherwise	0.37
Can read only	1 if mother can read only, 0 otherwise	0.04
Can read and write	1 if mother can read and write, 0 otherwise	0.22
Mother's occupation	1 if mother does housework, 0 otherwise	0.94
Cost of Schooling		
Primary school (grade 1-5)	1if there is a primary school in the village	0.65
Secondary girls School (Grade 6-10)	1if there is a girls secondary school in the village	0.04
Secondary boys & girls School (Grade 6-10)	1if there is a boys & girls secondary school in the village	0.12
Region Dummies (ref: Saturia)	1 if household resides in Saturia, 0 otherwise	0.33
Mymensingh	1 if household resides in Mymensingh, 0 otherwise	0.32
Jessore	1 if household resides in Jessore, 0 otherwise	0.34

Number of Observations is 1441.

a. Main entries are arithmetic means. For continuous variables only, standard deviations are shown in parentheses.
b. Decimal is a land area term used in Bangladesh and India. It is equal to $1/100^{th}$ of an acre.

Table 2: Logit Estimates of School Attendance.

	All		Boys		Girls	
Variable	**Coefficient**	**marginal effects**	**coefficient**	**marginal effects**	**coefficient**	**marginal effects**
Constant	-13.873***		-13.055***		-17.992***	
Child Characteristics						
Female	0.386	0.285				
Son/daughter	0.881**	0.089	1.071**	0.152	1.140*	0.012
Age	2.096***	0.159	2.035***	0.212	2.727***	0.017
Age^2	-0.086***	-0.007	-0.086***	-0.009	-0.110***	-0.001
Working	-5.684***	-0.885	-5.548***	-0.882	-6.860***	-0.748
Household Characteristics						
Children (5–17)	-0.204	-0.015	0.004	0.000	-0.612**	-0.004
Children (0–4)	0.212	0.016	0.366	0.038	-0.220	-0.001
Total member	0.074	0.006	0.054	0.006	0.159	0.001
Household expenditure	0.820**	0.062	0.628	0.066	1.238*	0.008
Parents Characteristics						
Father's age	0.009	0.001	0.015	0.002	-0.016	0.000
Father Education (ref: Illiterate)						
Can sign only	0.579**	0.040	0.419	0.041	1.029*	0.005
Can read only	0.647	0.038	0.158	0.016	1.209	0.005
Can read and write	0.796**	0.059	0.553	0.056	1.271**	0.008
Father's Occupation (ref: Farming)						
Service	-0.415	-0.036	-0.450	-0.054	-0.897	-0.008
Trade	-0.640**	-0.058	-0.728*	-0.091	-0.630	-0.005
Day/wage labourer	-0.541*	-0.047	-0.582	-0.070	-0.746	-0.006
Other occupation	-0.104	-0.008	0.005	0.001	-0.483	-0.391
Mother's age	0.017	0.001	0.013	0.001	0.034	-0.001
Mother's Education (ref: Illiterate)						
Can sign only	-0.168	-0.013	-0.244	-0.026	-0.093	-0.001
Can read only	-0.127	-0.010	-0.111	-0.012	-0.379	-0.003
Can read and write	0.622	0.041	0.828*	0.073	0.185	0.001
Mother's housework	-0.028	-0.002	0.030	0.003	0.072	0.000
Cost of Schooling						
Primary school	0.287	0.023	-0.150	-0.015	0.981**	0.008
Secondary girls' school	0.635	0.038	0.363	0.033	27.771	0.029
secondary boys' & girls' school	0.232	0.016	0.609	0.054	-0.624	-0.005
Region Dummies (ref: Saturia)						
Mymensingh	0.702**	0.049	0.345	0.034	1.531**	0.009
Jessore	0.804***	0.056	0.272	0.027	2.002***	0.013
Number of observations	1441		875		566	
Chi squared	831.827		527.614		323.505	
Pseudo R2	0.563		0.552		0.632	
Log likelihood function	-322.559		-213.726		-94.334	

Dependent variable is ATSCHOOL. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and * indicates coefficients are significant at 10% level.

Table 3: Logit Estimates of School Attendance for Children Aged 5–11 and Children Aged 12–17.

	Children Aged 5–11		Children Aged 12–17	
	Coefficient	**Marginal Effects**	**Coefficient**	**Marginal Effects**
Constant	-11.888	-0.683	-19.681	-1.510
Child Characteristics				
Female	0.151	0.009	1.526***	0.105
Son/daughter	0.748	0.055	1.857**	0.254
Age	1.440**	0.083	3.113	0.239
Age^2	-0.041	-0.002	-0.119	-0.009
Working	-4.278***	-0.758	-6.372***	-0.891
Household Characteristics				
Children (5–17)	-0.283*	-0.016	-0.165	-0.013
Children (0–4)	0.357	0.021	-0.021	-0.002
Total member	0.008	0.000	0.214*	0.016
Household expenditure	0.848**	0.049	0.668	0.051
Parents Characteristics				
Father's age	0.003	0.000	0.006	0.000
Father Education (ref: Illiterate)				
Can sign only	0.655	0.034	0.553	0.038
Can read only	0.722	0.031	-0.559	-0.054
Can read and write	1.074***	0.059	0.369	0.028
Father's Occupation (ref: Farming)				
Service	-0.778	-0.059	0.619	0.040
Trade	-0.848**	-0.063	-0.005	0.000
Day/wage labourer	-0.680*	-0.046	-0.818	-0.079
Other occupation	-0.670	-0.050	0.991	0.052
Mother's age	0.047	0.003	-0.042	-0.003
Mother's Education (ref: Illiterate)				
Can sign only	0.126	0.007	-0.882	-0.077
Can read only	-0.091	-0.005	-0.489	-0.045
Can read and write	0.859*	0.041	-0.228	-0.018
Mother's housework	-0.375	-0.019	0.368	0.032
Cost of Schooling				
Primary school	0.596*	0.037	-0.392	-0.029
Secondary girls' school	1.097	0.042	-0.232	-0.019
Secondary boys' & girls' school	-0.173	-0.011	1.417	0.072
Region Dummies (ref: Saturia)				
Mymensingh	0.925	0.047	-0.045	-0.003
Jessore	1.088***	0.056	0.317	0.023
Number of observations	747		694	
Chi squared	237.314		608.327	
Pseudo R2	0.362		0.762	
Log likelihood function	-208.912		-95.16	

Dependent variable is ATSCHOOL. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level.

Table 4: Logit Estimates of Schooling-for-Age.

	All		Boys		Girls	
Variable	**Coefficient**	**Marginal Effects**	**Coefficient**	**Marginal Effects**	**Coefficient**	**Marginal Effects**
Constant	4.110***		2.762**		6.184***	
Child Characteristics						
Female	0.030	0.006				
Son/daughter	-0.443*	-0.090	-0.446	-0.085	-0.345	-0.075
Age	0.121	0.026	0.256	0.053	-0.149	-0.034
Age^2	0.005	0.001	-0.001	0.000	0.018*	0.004
Working	1.822***	0.286	1.638***	0.255	2.418***	0.348
Household Characteristics						
Children (5–17)	0.185**	0.040	0.096	0.020	0.345***	0.078
Children (0–4)	-0.026	-0.006	-0.024	-0.005	-0.059	-0.013
Total member	-0.059	-0.013	-0.031	-0.006	-0.092	-0.021
Household expenditure	-0.988***	-0.214	-0.780***	-0.162	-1.225***	-0.277
Parents Characteristics						
Father's age	-0.022	-0.005	-0.020	-0.004	-0.019	-0.004
Father Education (ref: Illiterate)						
Can sign only	-0.408**	-0.091	-0.402	-0.086	-0.408	-0.095
Can read only	-0.024	-0.005	0.764	0.133	-1.047	-0.255
Can read and write	-0.517**	-0.113	-0.319	-0.067	-0.905***	-0.205
Father's Occupation (ref: Farming)						
Service	-0.563	-0.130	-0.657**	-0.148	-0.411	-0.097
Trade	0.304	0.063	0.261	0.052	0.400	0.086
Day/wage labourer	0.064	0.014	0.279	0.056	-0.192	-0.044
Other occupation	0.037	0.008	-0.427	-0.095	1.287*	0.223
Mother's age	-0.006	-0.001	-0.012	-0.003	0.002	0.000
Mother's Education (ref: Illiterate)						
Can sign only	-0.023	-0.005	-0.044	-0.009	-0.047	-0.011
Can read only	-0.717**	-0.169	-0.809	-0.188	-0.828	-0.200
Can read and write	-1.038***	-0.241	-1.238***	-0.281	-0.848**	-0.201
Mother's housework	-0.122	-0.026	0.133	0.028	-0.776	-0.153
Cost of Schooling						
Primary school	0.230	0.050	0.207	0.043	0.307	0.071
Secondary girls' school	-1.149***	-0.276	-0.688	-0.158	-1.700***	-0.400
Secondary boys' & girls' school	-0.711***	-0.166	-0.797***	-0.182	-0.639	-0.153
Region Dummies (ref: Saturia)						
Mymensingh	-0.330	-0.073	-0.456	-0.098	-0.155	-0.035
Jessore	-1.309***	-0.295	-1.170***	-0.259	-1.506***	-0.340
Number of observations	1441		875		566	
Chi squared	456.123		273.368		207.623	
Pseudo R2	0.239		0.240		0.270	
Log likelihood function	-727.582		-433.308		-279.630	

Dependent variable is SAGED. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level.

Table 5: Logit Estimates of Schooling-for-Age for Children Aged 5–11and Children Aged 12–17.

	Children Aged 5–11		Children Aged 12–17	
Variable	**Coefficient**	**Marginal Effect**	**Coefficient**	**Marginal Effect**
Constant	10.513***	2.625	22.83**	
Child Characteristics				
Female	-0.011	-0.003	0.217	0.027
Son/daughter	-0.695*	-0.170	-0.094	-0.012
Age	-1.613***	-0.403	-2.276*	-0.288
Age^2	0.115***	0.029	0.086*	0.011
Working	1.135	0.262	2.058***	0.194
Household Characteristics				
Children (5–17)	0.311***	0.078	0.038	0.005
Children (0–4)	-0.022	-0.006	0.065	0.008
Total member	-0.114**	-0.028	0.009	0.001
Household expenditure	-0.691**	-0.172	-1.618***	-0.205
Parents Characteristics				
Father's age	-0.040*	-0.010	0.002	0.000
Father Education (ref: Illiterate)				
Can sign only	-0.427*	-0.106	-0.314	-0.042
Can read only	0.417	0.103	-0.614	-0.095
Can read and write	-0.711***	-0.175	-0.163	-0.021
Father's Occupation (ref: Farming)				
Service	-0.314	-0.078	-0.774*	-0.119
Trade	0.329	0.082	0.430	0.049
Day/wage labourer	0.135	0.034	0.130	0.016
Other occupation	0.138	0.034	-0.080	-0.010
Mother's age	0.009	0.002	-0.034	-0.004
Mother's Education (ref: Illiterate)				
Can sign only	0.012	0.003	-0.265	-0.034
Can read only	-0.823*	-0.194	-0.927	-0.155
Can read and write	-1.097***	-0.259	-1.106***	-0.170
Mother's housework	-0.414	-0.103	0.108	0.014
Cost of Schooling				
Primary school	0.145	0.036	0.415	0.055
Secondary girls' school	-1.330***	-0.291	-1.120**	-0.195
secondary boys' & girls' school	-0.541*	-0.132	-0.943***	-0.151
Region Dummies (ref: Saturia)				
Mymensingh	-0.170	-0.042	-0.584*	-0.079
Jessore	-1.343***	-0.319	-1.477***	-0.221
Number of observations	747		694	
Chi squared	192.749		192.912	
Pseudo R2	0.186		0.254	
Log likelihood function	421.256		283.0167	

Dependent variable is SAGED. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level.

Table 6: Logit estimates for different types of work performed by the children.

	All Children				Older Children			
	School Attendance		Schooling-for-Age		School Attendance		Schooling-for-Age	
Variable	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects
Household work	-5.764***	-0.892	2.708**	0.306	-7.059***	-0.939	2.961	0.159
Agricultural work	-5.587***	-0.884	1.166**	0.194	-5.792***	-0.895	1.147	0.094
Non-agricultural work	-5.721***	-0.890	2.246***	0.283	-6.550***	-0.925	3.521***	0.165

Dependent variable is ATSCHOOL and SAGED. *** indicates coefficients are significant at 1% level, ** indicates coefficients are significant at 5% level, and *indicates coefficients are significant at 10% level. Estimates for different types of work have only been reported here, although same controls have been used in these two models as well.