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How are School Dropout Rates Related to Household Characteristics: Analysis of Survey Data from Bangladesh

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Abstract

Introduction

Martin Luther King Jr. once said, "The job of the school is to teach so well that family background is no longer an issue." In reality, however, children's educational outcomes are affected by family, social and economic backgrounds. In Bangladesh, as in many other developing countries, quality of education is always a subject of policy debate. But a bigger issue is whether a child will go to school to complete middle or high school education or will drop out before graduation. Free tuition and transportation is usually inadequate for schools to retain children if a factor such as high poverty, low parental education, or larger family size makes the child work long hours to contribute to family income. Parents' understanding of the importance of education is crucial. An uneducated parent may have a school going child simply because the parent understood the value of education through his or her experiences. In general, a disadvantaged child will face more challenges to fulfill her educational goal than an advantaged child.

To study how the household conditions affect a child's school going decisions in Bangladesh, we turn to data from Bangladesh Demographic and Health Survey (DHS). We examine proximate factors associated with school dropouts by developing OLS and probit models to see if our models can explain the Bangladesh DHS data well. We pay special attention to any differential effects of the gender of the household head or across regions.

Literature Review:

Economic theory that relates to educational attainment of children obviously focuses on social and economic factors characterizing households and the social environment in which children live. Gary Becker (1993) proposed his household production theory in addition to the human capital theory by directly linking household resources and investments to the educational attainment of

children. The resources a family has and how these resources will be utilized are often dependent on the number of household members and how much disposable income the family has to spend on resources. Investment in child education is also constrained by the family's disposable income that may severely limit spending on educational resources such as computers and books.

Ermisch and Francesoni (1997 and 2000) study the relationship between parents' employment and education levels, and subsequent education of their children. They find that if time and money were made available to a child then the child's educational attainment would improve. Children whose mothers work more during the children's early stages of life have less educational attainment compared to children whose mothers spend more time at home with them. For financially constrained parents, it is unclear whether this means that their time at home is more important than money and other resources generated by more parental time at work away from home.

Haveman (1993) shows that parents' education is a powerful predictor of their children's educational attainment. His argues that highly educated mothers motivate their children by instilling a drive for education. Although father's education is important, the mother has a greater impact on the values children later find important.

There are a number of studies focusing on the correlation between family structure and educational attainment. Boggess (1998) finds that living in a mother-headed household or a stepfather-mother family has a negative effect on education levels due to a decreased level of resources. However, once he controls for economic status, he finds the effect of these types of households on education to be insignificant. While income and available resources seem to outweigh the family structure variable in his study, living in a single parent family is likely the cause for the lower economic status.

Garasky's (1995) findings also show that family structure impacts children differently depending on the age of the children. During the early years of a child's life, it is imperative to have a stable family structure. However, as a child ages, the type of family structure becomes less critical to educational attainment because of greater social interaction with others. Hence, family structure is less critical in determining the level of education attained by older children. Consequently, as children move into adulthood, they are better equipped to handle separation or divorce, or handle the possibility of living in single headed households themselves. Religion, race and region also plays important role in determining the educational attainment of a child.

\Overall, the evidence suggests that parental socioeconomic status has a causal effect on children's educational outcomes. But the studies noted cannot identify precisely how increases in parental education or income improve educational outcomes for their children. Moreover, there is paucity of research focusing particularly on the developing economies that have a large number of disadvantaged children from poor socio-economic status. In this study we use data from a large recent survey to study the impact of these conditions on whether the child succeeds with a higher educational attainment or drops out at some point during school. Our study adds to the literature by examining household conditions for schooling in a growing but poor country, Bangladesh.

Data and Methodology

Data:

The data we use to analyze school dropout has been taken from the 2011 Demographic and Health Survey (DHS) for Bangladesh. The survey covers urban as well as rural population to collect information on demographic pattern, asset ownership, access to public services, housing characteristics, and education and health conditions. A household is defined as a person or a group

of people, related or unrelated to each other, who live and share meals together in the same dwelling unit.

The survey is based on a two-stage stratified sample of households. In the first stage, 600 Enumeration Areas (EAs) were selected with probability proportional to the EA size, with 207 clusters in urban areas and 393 in rural areas. A complete household listing operation was then carried out in all the selected EAs to provide a sampling frame for the second-stage selection of households. In the second stage, 17142 households were given the survey. The data used for this study cover 8753 households or 51 percent that have one or more children, eligible to attend school, aged 5 to 18 years.

Methodology:

We analyze the data using Ordinary Least Squares (OLS) and Probit models. The OLS model uses school dropout rate as a continuous dependent variable. The dropout was calculated as the percentage of all living children in the household who dropped out of school. A number of household-specific demographic, socio-economic and regional characteristics serve as explanatory variables. The fitted base model is as follows:

$$Dropout_i = \beta_0 + \beta_{1j}\sum_{j=2}^{7}Region_{ij} + \beta_2Urban_i + \beta_3Islam_i + \beta_4MthrAge_i + \beta_{5j}\sum_{j=2}^{4}MthrEdu_{ij}$$

$$+ \beta_6FthrAge_i + \beta_{7j}\sum_{j=2}^{4}FthrEdu_{ij} + \beta_{8j}\sum_{j=2}^{5}FthrOccu_{ij} + \beta_{9j}\sum_{j=2}^{4}HHAge_{ij}$$

$$+ \beta_{10}HHMale_i + \beta_{11}NumSons_i + \beta_{12}NumDauters_i + \beta_{13}NumChld5_i$$

$$+ \beta_{14}FamSize + \beta_{15}Eleccity + \beta_{16j}\sum_{j=2}^{5}Wealth_{ij} + \varepsilon_i$$

where *Region* variables refer to the seven administrative regions in the country with Barisal (*j*=1) as the reference; *Urban* is a dummy with urban households receiving the value 1 and rural households 0; the *Islam* dummy has the value 1 for Muslim households which constitute an overwhelming majority in Bangladeshi population and 0 for all others; *MthrAge* is a continuous variable for the child's mother's age; *MthrEdu* consists of four dummies for levels of education (no education is the reference level, and others are primary, secondary and higher); *FthrAge* is a continuous variable for father's age; *FthrEdu* has four dummies for levels of education just as for *MthrEdu; Fthroccu* variables are occupation dummies for five types of which agriculture is the reference occupation, and others are business, service, highly skilled, and "others"; *HHAge* refers to recoding of the age of the household head into four groups with those between 15 and 34 years of age serving as the base and others in the following ranges: 35-54, 55-74 and 75+. Since mother's age and father's age in the model are already continuous variables, a one or two year difference in the age between household heads was judged to play a more subsidiary role in children's schooling than if such differences were longer such as a decade. *HHMale* is a sex dummy with a value of 1 if the head is male and 0 if female; *NumSons, NumDauters,NumChld5*, and *FamSize* are all continuous variables with actual numbers of sons, daughters, children under 5 years of age, and all members in the household respectively. Wealth index is a variable that accounts for the household's income, living standards, overall asset and wealth ownership. This

variable categorizes households into 5 wealth quintiles: Poorest, Poorer, Middle, Richer, and

Richest. Furthermore, electricity supply is also a binary variable with the value 1 if electric

power is available for the household and 0 if not. Finally, availability of free transportation to

school is coded as 1 and lack of it as 0.

For the *probit* model, a binary variable was created to indicate whether the household had one

or more children who dropped out of school. If yes, the variable *dropout* equals 1 and if no, then

dropout equals 0. Table 1 shows the summary statistics.

Table 1: Summary Statistics

Variable	Observations	Mean	Std. Dev.
School Dropout percentage	8672	49.653	43.484
Dropout_dummy	8753	0.602	0.490
Region	8753	3.960	2.012
Urban	8753	0.305	0.461
Islam	8753	0.903	0.296
Mother's age	8753	25.574	5.908
Mother's education	8753	1.387	0.884
Father's age	8605	34.386	8.049
Father's education	8747	1.280	1.017
Father's occupation	8753	2.586	1.391
Age of HH head	8753	1.871	0.794
Sex of HH head	8753	0.919	0.272
No. of sons	8753	1.150	1.036
No. of daughters	8753	1.156	1.072
No. of children under 5	8753	1.178	0.750
No. of household members	8753	6.201	2.900
Has electricity	7876	0.600	0.490
Wealth index	8753	2.953	1.436
Dropout (No. of children)	8753	1.341	1.529
Wealth index*Father Education	8747	4.562	4.632
Father education*Father Occupation	8747	3.609	3.702

School Provides Transportation	8744	0.508	0.500

Summary statistics show that the average number of dropouts is 1.34. The average dropout is almost 50 percent, that is, about a half of the sample households have a positive number for dropouts. The average age of the sample mothers and fathers are 26 and 34 respectively. There are around 6 household members in a typical household. On average, the number of boys and girls are about the same, with a difference of less than one percent. Mother's education (1.39 years) exceeds father's (1.28 years) by 8 percent. The average wealth index is 2.95 or close to 3 which is in the middle of wealth distribution.

Results

OLS results when Dropout is continuous

We start with a discussion of the results where the dependent variable *Dropout* is measured as a percentage of all school going children who have dropped out of school. In the following section we describe the results for dropout dummy.

Regions and cities: Regional distribution of dropout rate shows interesting results. Compared to the base region (Barisal), all others, except for Chittagong for which the coefficient (0.53) has zero explanatory power, have dropout rates that are 10 (Dhaka) to 15 (most others) percentage points higher. Across regions, however, the urban households show a lower dropout by 5.7 ppts over rural households.

Education and occupation: Mother's education lowers dropout slightly (2.6 percentage points) if she has a secondary education, relative to the base case of no education. Other levels of

education are either statistically insignificant or produce a negligible impact. After mother's education has been controlled for, father's education, even at the secondary or higher level, does not matter although it has a negative correlation with the dropout rate. On the other hand, father's occupation explains the dropout differences significantly. In particular, relative to agriculture and related activity which is the reference occupation, business and high-skill work both lower the dropout rates. Having a business (most of the businesses are small) lowers dropout by 4.7 ppts whereas the high skill category lowers the rate by 30.0 ppts. It seems as if higher education, which probably is required of most high skill occupations, can matter for dropout reduction only if higher education leads to high skill jobs. Low skill category is insignificant whereas "other" occupations reduce the dropout by 1.9 ppts.

Wealth: When households are divided into five wealth classes of poorest, poorer, middle, richer, and richest with poorest being the reference class, only the two upper classes show negative and significant effects on the dropout rate. Even more starkly than in the case of father's occupation, these two wealth classes have a large difference between them, with the richest class (-54 ppts) showing a 49 ppt lower rate than for the richer class (-4.6 ppts).

Family demographics: Does having more daughters in the family increase dropouts? Yes, we find the dropout rises by 6.4 ppts for each additional daughter. However, we find no difference between more daughters and more sons since the number of sons also has about the same coefficient (6.9). Other aspects of family demographics mostly do not seem to affect dropouts. These inconsequential factors include Islam as religion, mother's age, sex of the household head, and the number of children under 5. Also in the regression, two of the three age groups in the variable *age of the household head* have no significant impact on dropouts. Surprisingly, however, one group of household heads, 75 or older, has a tremendously high

dropout percentage of –42 ppts compared to the base group of 15 to 34 years. It is not entirely clear why this age group should have such a large impact when many of the other family characteristics including those of children's parents have their own controls in the regression. An overwhelming majority of these old people are uneducated. Our hypothesis that younger household heads would be associated with fewer dropouts was thus not verified.

Among the remaining variables in our model, whether a household has electricity at home (65 percent of the households in Bangladesh use electricity) or whether children are provided free transportation to school makes no impact on dropouts.

Interactions: Three interaction terms are added to the base model: (a) between father's education and household wealth, (b) between father's education and father's occupation, and (c) between father's occupation and household wealth. The idea was to see whether the marginal effect of any one of the two variables in each case would depend on the value of the other variable. We find, however, that none of the interaction terms provides any further explanatory power and jointly a combination of any two or all three fails the F-test. Inclusion of interaction terms, therefore, leaves the coefficients of all other variables to retain their size and significance at about the same levels.

Probit results when dropout is binary

A probit model was also estimated for the dependent variable *dropout* whose values in data were either 0 for no dropout and 1 for any positive dropout. Table 2 shows the marginal effects and their significance. The results mostly match with those reported above for the dropout measured as a continuous variable. The marginal effects from the probit model indicate changes in the dropout probability in response to a change in explanatory variables. The regions now report a 5 percent greater dropout probability for Dhaka to 6 percent for all others, except for

Chittagong whose coefficient is zero, as compared to the reference region of Barisal. In the continuous dropout OLS case, our results showed a 10 percentage point greater dropout.

While most of the regional coefficients are highly significant, the urban vs. rural location across regions does not provide any explanatory power to the model. On the other hand, mother's education lowers dropout slightly, by 1.7 percent, if the mother has *higher* education whereas primary or secondary education seems irrelevant for dropout. Father's occupation also seems to lower the dropout by about 1 percent if the occupation is Business. Low or high-skilled occupations for the father are not found to explain the dropout. Greater the number of sons or daughters, greater is the dropout, whereas more children under five years of age is associated with a smaller dropout. As regards the wealth index, only the households belonging to the middle wealth category or higher show lower probability of dropout while the *poorer* wealth category has a higher dropout probability than for the least wealthy households.

Overall, the results for the probit model virtually mirror the OLS results. For example, other factors that do not seem to matter for the dropout include mother's or father's age, father's education, religion, availability of electricity or of school transportation. These variables are inconsequential regardless of the method used. The OLS and probit do not diverge in sign or significance for most other variables either such as urban-rural location and father's education.

Conclusion

Dropout rates in Bangladesh are high. Whether policy can address dropouts depends on its ability to target factors that we find important in this study. Examples are promoting mother's

education up to higher education level, and making it easier to run a business with cheaper interest rates.

We also have questions that can only be addressed with further investigation, such as why does Dhaka have a higher dropout rate than does the division of Barisal? Is it because many members of poor households migrate to Dhaka while the relatively young among them take a job so as to contribute to family income.

References

OLS Model without Interaction Terms:

School Dropout Percentage	Coefficient	School Dropout Percentage	Coefficient
Region:		**Father occupation –cont.**	
Chittagong	0.53 (0.38)	High Skilled	-29.65*** (-14.54)
Dhaka	9.62*** (6.78)	Others	-1.86* (-1.62)
Khulna	14.95*** (9.65)		
Rajshahi	13.20*** (8.76)	**Age of household head:**	
Rangpur	15.37*** (10.35)	35-54	-0.20 (-0.21)
Sylhet	15.48*** (10.67)	55-74	-0.58 (-0.47)
		74-95	-42.00*** (-18.05)
Urban	-5.656*** (-0.15)		

Islam	1.22 (1.00)	Sex of household head	0.43 (0.29)
Mothers age	0.07 (0.67)	No. of sons	6.86*** (13.08)
Mother's education:		No. of daughters	6.42*** (12.60)
Primary	-0.87 (-0.70)	Child under 5	0.79 (1.32)
Secondary	-2.59*** (-2.08)	No. of all HH members	-0.12 (-0.81)
Higher	0.17* (0.08)	Has electricity	0.108 (0.99)
Fathers age	0.10 (1.41)	**Wealth index:**	
Father's education:		Poorer	0.104 (0.88)
Primary	-1.15 (-1.14)	Middle	0.99 (0.70)
Secondary	-1.75 (-1.53)	Richer	-4.559*** (-2.52)
Higher	-1.76 (-1.03)	Richest	-53.50*** (-29.15)
Father occupation		School Provides Transportation	0.04 (0.06)
Low-skill Service	-1.47 (-1.43)	Constant	34.72
Business	-4.69*** (-4.21)		

OLS Model with Interaction Terms:

School Dropout Percentage	Coefficient	School Dropout Percentage	Coefficient
Region:		**Father occupation –contd.**	
Chittagong	0.71 (0.50)	High Skilled	-29.66*** (-14.54)
Dhaka	9.97*** (6.62)	Others	-1.83* (-1.59)

Khulna	15.30*** (9.26)	**Age of household head:**	
Rajshahi	13.20*** (8.76)	35-54	-0.18 (-0.19)
Rangpur	15.37*** (10.35)	55-74	-0.60 (-0.48)
Sylhet	15.37*** (10.35)	55-74	-0.60 (-0.48)
Sylhet	15.48*** (10.67)	74-95	-42.00*** (-18.05)***
Urban	-6.33*** (-6.40)		
Islam	1.24 (1.02)	Sex of household head	0.45 (0.31)
Mothers age	0.07 (0.69)	No of sons	6.85*** (13.07)
Mothers education:		No of daughters	6.42*** (12.58)
Primary	-0.88 (-0.80)	Child under 5	0.78 (1.30)
Secondary	-2.60*** (-2.08)	No. of all HH members	-0.12 (-0.81)
Higher	0.13* (0.06)	Has electricity	0.107 (0.98)
Fathers age	0.10 (1.41)	**Wealth index:**	
Father's education:		Poorer	0.105 (0.90)
Primary	-1.13 (-1.12)	Middle	0.98 (0.69)
Secondary	-1.71 (-1.49)	Richer	-0.84** (-0.53)
Higher	-1.70 (-.99)	Richest	-53.51*** (-29.16)
Father's occupation:		Wealth index*Father education	-0.77 (-0.68)
Low skilled Service	-1.45 (-1.41)	Father education*Father occupation	1.56 (1.37)

Business	-4.69*** (-4.21)	School Provides Transportation	0.04 (0.06)
		Constant	34.16

Probit Results:

Without Interaction Terms:

School Dropout	Marginal Effects	School Dropout	Marginal Effects
Region		**Father's occupation –cont.**	
Chittagong	-0.01 (-0.65)	High Skilled	-
Dhaka	0.05*** (4.87)	Others	-0.0009* (-0.26)
Khulna	0.06*** (6.30)		
Rajshahi	0.06*** (6.23)	**Age of household head:**	
Rangpur	0.06*** (6.34)	35-54	-0.0008 (-0.26)
Sylhet	0.06*** (6.34)	55-74	0.0013 (0.37)
		74-95	
Urban	0.002 (0.70)		
Islam	0.001 (0.170)	Sex of household head	0.0021 (0.41)
Mothers age	-0.0004 (-0.91)	No of sons	0.0686*** (10.080)
Mother's education:		No of daughters	0.0688*** (10.15)
Primary	-0.0008 (-0.22)	Child under 5	-0.0046** (-1.86)
Secondary	-0.004	No. of all HH members	-0.0001

	(-1.05)		(-0.260)
Higher	-0.017* (-1.47)	Has electricity	-0.0033 (-1.05)
Father's age	0.0001 (0.230)	**Wealth index**	
Father's education:		Poorer	0.0089*** (2.150)
Primary	0.0004 (0.140)	Middle	-0.0107*** (-2.270)
Secondary	-0.0010 (-0.280)	Richer	-0.0095* (-1.82)
Higher	-0.0022 (-0.40)	Richest	
Father's occupation		School Provides Transportation	-0.0012 (-0.52)
Low skilled Service	0.0007 (0.24)		
Business	-0.0085*** (-2.00)		

Probit With Interaction Terms:

School Dropout Percentage	Marginal Effects	School Dropout Percentage	Marginal Effects
Region		**Father occupation –contd.**	
Chittagong	-0.008 (-0.7)	High Skilled	
Dhaka	0.046*** (-4.38)	Others	-0.0008 (-0.25)
Khulna	0.062*** (5.670)		
Rajshahi	0.061*** (5.610)	**Age of household head**	
Rangpur	0.062*** (5.700)	35-54	-0.0008 (-0.25)
Sylhet	0.063*** (5.690)	55-74	0.0013 (0.370)
		74-95	

Urban	0.002 (0.70)		
Islam	0.001 (0.18)	Sex of household head	-0.0021 (-0.42)
Mothers age	-0.0004 (-0.91)	No of sons	0.0687*** (10.080)
Mothers education:		No of daughters	0.0688*** (10.15)
Primary	-0.0008 (-0.22)	Child under 5	-0.0047* (-1.86)
Secondary	-0.004 (-1.04)	No. of all HH members	-0.001 (-0.260)
Higher	-0.017* (-1.46)	Has electricity	-0.0033 (-1.05)
Fathers age	0.0001 (0.22)	**Wealth index:**	
Fathers education		Poorer	0.0089*** (2.150)
Primary	0.0004 (0.14)	Middle	-0.0106*** (-2.260)
Secondary	-0.0010 (-0.29)	Richer	-0.0095* (-1.820)
Higher	-0.0022 (-0.40)	Richest	
Father occupation:		Wealth index*Father education	-0.0016 (-0.46)
Low Skilled Service	-0.0022 (-0.40)	Father Edu*Father Occu	0.0010 (0.30)
Business	-0.0084*** (-2.00)	School provides transportn	-0.0012 (-0.51)