The Impact of Maternal Education on Child Health; Evidence from Bangladesh

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ABSTRACT

A mother's education is widely posited to affect positively her own and her children's health and nutrition in developing economies. This study analyzed the mother's year of schooling and its effect on child's growth controlling most common factors, that affect mothers education along with others variables. By using data from HIES 2010, collected by Bangladesh Bureau of Statistics, this study have tried to find out the relation between maternal education and growth of child. OLS regression implies that while father's education is positively correlated with child immunizations, mother's education is more critically associated with longer term health outcomes. IV estimates suggested that mother's education is highly associated with her own parental family education and within the home, mother's education have significant positive impact on child's height for age Z score.

Keywords: Instrumental variable, maternal education, child health, Bangladesh

INTRODUCTION

It is generally agreed that investments in human resources play an important role in economic growth. There is a vast literature showing that education is a key determinant of improved performance in the labor market, in one's business, on the farm and even in the home in the sense of its influence on the outcomes of one's children. Like schooling, health is a form of human capital and it is also correlated with improved functionality and productivity (Thomas, D. 1990). But health is a good which there is no market for, and is therefore, produced within the household. Given household endowments and child rearing technology, the way parents allocate family resources has a direct impact on the child health. These decisions, in turn, affect not only the productivity of the children at school and at their jobs when grown up, but also influence their life expectancy. Conditions within the household are therefore expected to be important determinants of child health. The mother plays the central role in household domestic activities especially those which pertain to child rearing. As a result, the mother has been commonly described as the most important health worker. How well a mother performs this task may depend on her schooling which equips her with general and specific knowledge, and the means and confidence to seek new ideas. These enhance her ability to control her immediate environment. One might therefore expect maternal education to contribute positively to child health.

The literature on child health and nutrition in different aspect has been analyzed by several authors. Health survey in Bangladesh 2010 shows that only 65 percent of total child within age 0 to 5 years has completed the immunization in time, even though this service is provided free by the government in Bangladesh. Hence, importance of parental education in the production of child health is very important (Behrman & Deolalikar, 1988; Strauss & Thomas, 1995). Indeed, it has even been argued that education has contributed more to

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mortality decline than the provision of health services (Mosley, 1985). Since Caldwell's (1979) seminal work it has been generally maintained that mother's education is the more critical determinant of child health. This is consistent with a division of labor within the household in which child-care is the larger responsibility of the mother (Grossman, 2006). Actually, studies in several developing countries demonstrate that there is no "threshold" level of maternal education that needs to be reached before the benefits of maternal education on child health materialize and even small levels of education improve child survival (Hobcraft, McDonald, & Rutstein, 1984; Mensch, Lentzner, & Preston, 1985). Several studies have attempted to identify more direct pathways through which maternal education may translate into improved child health.

A study by Thomas, Strauss, and Henriques (1990) in Brazil analyzes the role of income, mother's literacy and information processing, and the interaction of maternal schooling with community services. The authors find that almost all the impact of maternal schooling on child height can be explained through mother's access to information. Although, many researchers prove that the larger association of mother's than father's education with child health, some studies find otherwise. For instance, Breievrova and Duflo (2004) find that mother's and father's education is equally important in reducing child mortality in Indonesia. In Bangladesh, father's education is found to be a more consistent determinant of childhood stunting than maternal education (Semba et al., 2008). Fewer studies have focused on the role of father's education in determining health largely because fathers play a less obvious role in care-giving to children.

However, as Chen and Li (2009) note, father's education may be important because fathers are often more educated than mothers in developing countries. In Bangladesh, for instance, the average father in our sample has 3 more years of education than the average mother and if the highest level of education matters in a household, father's education may be an important determinant of child health. Another explanation for the role of father's education rests on low social status and empowerment of mothers that potentially limits the influence they have in decision-making regarding child health (Semba et al., 2008). Alternatively, it may be that fathers play a more active role in certain kinds of health decisions such as immunization decisions or participation decisions particularly if they require travel to a health clinic. Mothers, on the other hand, may be involved in the day-to-day decisions on general hygiene and nutritional intake of a child. Regardless of the reason, further insight is needed into the role of parent's education in children's health as formal education may be critical in breaking the intergenerational cycle of poor health (Semba et al., 2008).

Although, many researchers have tried to explore the relationship between parental education and child health in different ways, there have a few researches which consider the mother's parental family educational influence on her education effect. Additionally, availability of quality data is the most important constraint in this investigation, that noted by different researcher. Moreover, In Bangladesh, this relationship is still unexplored, which this study has tried to analyze.

The specific research question that we really want to focus is, how the maternal education affects the child health in relation to the educational background of mother's parental family. The findings of this study will help the policy makers to take the long run decision on child health, which will explore the window of new research and will help to find the alternative way to enhance the health knowledge of the parents regarding child health and growth.

This paper is organized as follows; Section 2 discusses the empirical methodology used; Section 3 presents the data description and some key descriptive statistics; Section 4 presents the empirical findings and Section 5 concludes.

EMPIRICAL METHODOLOGY

To fulfill our research purpose the following health function has used in this study:

$$H_i = f(x_i, x_h, x_c, \varepsilon_i) \text{ - - - - - - - } (1)$$

Where H_i is the health outcome of child i; in our study this are IMMU (immunization) and HAZ (height for age normalized Z score), x_i is a vector of child characteristics such as age of child, and gender, x_h is a vector of household-level characteristics such household size and parental characteristics such as mother's education and father's education, x_c is a vector of community characteristics if the household have access to community clinic for quality of health services, and ε_i is a composite error term of unobserved child. OLS regression estimate has employed to measure the health outcomes depending on the explanatory variables. One of the problems in estimating Eqn. (1) is that it assumes that health inputs (including parental schooling) are exogenous. This can be a strong assumption if unobserved parental/household characteristics correlated with parental schooling (such as greater motivation or ability or certain values or traits) also influence child health directly. If this is the case, then a positive coefficient on say maternal schooling in the health function may reflect the cross-section correlation between unobserved maternal traits on the one hand and both maternal schooling and child health on the other, rather than representing a causal effect of maternal schooling on the health outcome being measured. In order to address this endogenity problem Instrumental Variables (IV) have used that are correlated with the endogenous variable (say mother's education) and uncorrelated with the unobservable ε_i. We have treated the number of siblings' mother's have, brother's years of schooling and sister's years of schooling as instrumental variables to influence mother's education.

Table 1. Description of variables used

Variable	*Description*
IMMU	Immunization score (giving a score of 1 if individual is immunized/treated against any of the following: Polio, TB, Diphtheria, Whooping Cough, Measles, Mumps, Rubella, Hepatitis, or Goiter, 0 otherwise
HAZ	Height-for-age z-scores
Male	Dummy equals 1 if male, 0 otherwise
Agem	Age of child in months
$Agem^2$	Age squared
HHSize	Household size
lnPCE	Natural log of per capita monthly expenditure
Feduc	Father's years of schooling
Meduc	Mother's years of schooling
Cclinic	Dummy equals 1 if access to community clinic in the area, 0 otherwise
MSIB	Number of siblings mother's have
MESISEDU	Mother's sister's completed years of schooling
MEBROEDU	Mother's brother's completed year of schooling

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Since data on child's initial health endowment is not available, anthropometric status is often used to determine the extent of malnourishment among children. The following measures are frequently used: stunting (or insufficient height-for-age), being underweight (or insufficient weight for- age), and wasting (or having insufficient weight-for height, indicating acute malnutrition). Since children are growing and their anthropometric measures depend on age and gender, heights are standardized by age and sex to solve the purpose of this study (data on weight were not available). Standardization is achieved by fitting a standard normal distribution to the growth curves of a healthy population of children using an age and gender specific distribution of weights with reference to WHO chart.

The z-score of any given measure is calculated by subtracting the sample average (in a given age-range and of a given gender) from the index child's health measure, and dividing the difference by the standard deviation of the health outcome. A child with a z-score of zero is exactly at the mean in terms of the measure being used (such as height-for-age) while one with a negative z-score is below the mean (for instance shorter than average) and one with a positive z-score is above the mean (for instance taller than average) of the distribution. The extent of stunting among children is then calculated as the percentage of children under 5 that fall below minus two standard deviations from the median/mean height-for-age of the standard WHO reference population.

DATA DESCRIPTION

In this study the authors have used the Household Income and Expenditure Survey' (HIES) 2010 data collected by the Bangladesh Bureau of Statistics (BBS). HIES-2010 is a nationally representative household survey, covering all areas of the country. A two stage stratified random sampling technique was followed in drawing sample for HIES 2010 under the framework of Integrated Multipurpose Sample (IMPS) design developed on the basis of Population and Housing Census 2001. The survey was conducted during 1st February, 2010 to 31st January, 2011. A total of 12,240 sample households have selected covering all district of Bangladesh of which 869 sample household were selected considering child having families aged within 0 to 5 years. The table 2 shows the summary statistics of the variables used in this study.

Table 2. Summary statistics of variable used

Variable	*Mean*	*Standard Deviation*
IMMU	3.542	1.982
HAZ	-1.123	1.530
Male	1.426	0.495
Agem	30.112	16.251
$Agem^2$	1389.032	1167.521
HHSize	3.259	1.182
lnPCE	9.673	.5666
Feduc	5.357	4.670
Meduc	2.354	5.338
Cclinic	0.738	0.587
MSIB	2.150	0.565
MESISEDU	4.439	13.584

MEBROEDU	8.634	11.660

The HIES survey data covers all aspects including household level information and personal level data as well from one individual. Household level data collects information about total expenditure and auto-consumption/production by the household, agricultural land ownership and detailed information about each plot, non-agricultural businesses, non-labor income, asset ownership (wealth), saving decisions, formal and informal credit, debts, economic household shocks, crime and victimization suffered at the house, business or plot, and detailed information about every event; total non-labor household income, dwelling characteristics, living arrangements and environmental shocks suffered by the household/community.

On the other hand, individual information covers information from every member of the household on schooling; retrospective histories of migration, marriage, births and deaths of children, labor force participation, labor income of adults; monetary and in kind transfers, time allocation of adults and children, credits and loans, human capital investment levels and decision-making; socio-demographic and geographic information of the individuals that conform the extended family, individual health status both objective and subjective of all members in the household (own perception; habits and functioning indicators; chronic diseases; morbidity, anthropometric outcomes; hemoglobin levels; as well as demand for health services), reproductive health of all women in the household in fertile age and the use of contraceptive methods.

RESULT AND DISCUSSION

Health-seeking behavior (IMMU) and child health (growth) HAZ equations have estimated on the sample of children aged 0–5 using OLS estimation. In order to detect heteroskedasticity, the study has employed the White's test considering homoskedasticity in the data set in both cases. But, heteroskedastic distribution has found since the chi^2 value were very high and significant at 1 percent level. Therefore, robust OLS estimation have used in the study which eliminated the heteroskedasticity problem by employing robust standard error for the OLS estimators, because OLS estimation will not give efficient test statistic with heteroskedasticity.

Table 3. Reduced form of equation for mother's education

Meduc	*Coef.*	*Robust Std.error*	*t*
MSIB	-0.783***	0.156	-5.019
MESISEDU	-0.264***	0.041	-6.439
MEBROEDU	0.055***	0.007	7.857
Male	-0.001	0.014	-0.071
Agem	-0.052	0.063	-0.825
Agem^2	0.022	0.037	0.595
HHsize	0.201**	0.102	1.971
LnPCE	0.087*	0.052	1.673
Feduc	-0.024	0.029	-0.828
Cclinic	0.034	0.035	0.971
_cons	4.117***	0.453	9.088

*** p<0.01, ** p<0.05, * p<0.1

$F_{(3, 863)} = 14.37$; Prob= 0.000

Table 3 presents the results of reduced form of equation of mother's education (Meduc) on all explanatory variables along with MSIB, MESISEDU, and MEBROEDU, which are our interest to be identified as good candidate for IV on mother's education. It revels from the results that, all these three variables have significant effects on mother's education and these variables are also jointly significant at 1 percent level. Other explanatory variables have used in the regression to avoid the biasness. Therefore, these three variables are good candidate for IV on mother's education.

Table 4. Results of OLS and 2SLS estmates for IMMU and HAZ

	(1)	*(2)*	*(3)*	*(4)*
Variables	*OLS*	*IV_2SLS*	*OLS*	*IV_2SLS*
	IMMU	*IMMU*	*HAZ*	*HAZ*
Male	0.253***	0.233***	-0.164	-0.168**
	(0.089)	(0.097)	(0.154)	(0.084)
Agem	0.167***	0.163***	-0.075***	-0.068**
	(0.020)	(0.022)	(0.019)	(0.031)
$Agem^2$	-0.003***	-0.013***	0.016***	0.016***
	(0.0009)	(0.002)	(0.002)	(0.006)
HHSize	-0.054	-0.054	-0.018	-0.019
	(0.042)	(0.053)	(0.017)	(0.028)
lnPCE	-0.123	-0.128	0.138	0.142
	(0.371)	(0.399)	(0.099)	((0.112)
Feduc	0.069***	0.053**	0.016	0.019
	(0.020)	(0.016)	(0.013)	(0.102)
Meduc	0.052*	0.141***	0.031	0.126***
	(0.029)	(0.033)	(0.022)	(0.036)
Cclinic	0.108***	0.103**	0.216	0.220
	(0.042)	(0.051)	(0.193)	(0.154)
Constant	4.782***	4.135**	5.106***	4.074**
	(1.171)	(1.902)	(1.813)	(1.985)
Observations	869	869	869	869
R-squared	0.573	0.552	0.498	0.481

(Note: robust standard errors in parentheses)

*** p<0.01, ** p<0.05, * p<0.1

Table 4 summarizes all the estimated results for IMMU and HAZ by using OLS and 2SLS as well. Although child's age shows the significant positive relation with immunization and height for age Z score, but there still prominent gender discrimination exist. In terms of the remaining variables in Table 4, while boys have a greater likelihood of being immunized compared to girls, there is no evidence of gender differentiated treatment in child health outcomes. Once again, this could reflect the nature of the decision-differential treatment may be more visible in participation decisions rather than more long-term health-input decisions. The signs on child age and its square imply that immunization scores increase at a decreasing rate as the child becomes older which is consistent with normal immunization behavior. This findings also supported by Rahman & Chowdhury, 2006.

In the HAZ equation, there is a convex relationship between child height and age, since, HAZ decrease with age though with a decreasing slope, implying that HAZ are worse for older children. Because, at the beginning of child age, (2 to 10 months) children's are most vulnerable with some disease like diarrhea and stomach disorders. However, between 18 and 24 months of a child's life, a child has been exposed to most commonly found germs and there is no decrease in HAZ. By the time a child is between 24 and 30 months old, weaning effects have bottomed out and health may even recover a little bit. (Health report-2011)

Estimated coefficient of father education implies that though father's years of schooling positively affect the child's immunization, but it has no effect on height for age of children, Glewwe (1999) reports similar findings using Moroccan data. The most important findings that found by using IV on mothers education have shown by the comparison between the coefficients estimated by OLS and 2SLS estimates. For instance, mother's years of schooling were significant at 10 percent level for immunization in OLS, but it is highly significant at 1 percent level in 2SLS estimation. Again, mother's years of schooling have found significant positive effect of child's height for age Z score whereas it was insignificant in OLS estimation. Therefore, mother's years of schooling have greatly positive relationship with both immunization and height of the children; this may be because an educated mother has greater consciousness about health of their children. This result has justified this study for using mother's parental family education as IV for mother's education. Again though, the community clinic facility access facilitates the child's immunization, but no significant relationship have found with height for age score. The reason may be that the community clinic in the study area mainly provides the immunization services.

CONCLUSION

The study investigates the relationships between mother's year of schooling and child's health considering mother's parental family education influence on her education. The most important findings, that revels in this study implies that mother's year of schooling greatly affected by her parental family education, consequently mother's education crucially important for child's health seeking behavior and growth. Children of more educated mothers have better height-for-age scores. Estimates reveal that father's education is also positively associated with health-seeking behavior but mother's education is largely associated with child health outcomes. The findings little bit contradicts with Chen and Li (2009), as he noted that father's education may be important then mother because fathers are often more educated than mothers in developing countries. This study have only considered immunization as health seeking behavior and height for age normalized Z score as the health outcomes, while weight for height may be another important outcome. Again, fathers parental side influence have not considered, so, it demands more investigation to generalize its findings.

Very young children are commonly accepted to be the most vulnerable group in terms of nutritional stress, morbidity and mortality. Concern for their welfare has led to programs of direct assistance to this group. These empirical findings suggest that an improvement in the human capital of the mother is one possible avenue of assistance. In particular, maternal schooling is found to be associated with better child health. Maternal schooling, however, is one way of enhancing human capital. Programs which directly provide health information and training to the mother may also lead to an improvement in her skills and ability to efficiently use and effectively allocate health inputs for better child health, without going through a roundabout general education program. Primary health care programs should focus not only on direct assistance to the child but should also seek ways of improving the mother's ability at child rearing. This is particularly true in the case of very young children whose health shows relatively greater sensitivity to the mother's human capital. Moreover, as less educated mother comes from relatively poorer families in developing countries, policy makers should address them while to distribute the primary health care education in the country.

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