4-7-2014

Does Mother's Schooling Matter Most in Rural Bangladesh? Re-contextualizing an Old Debate in a New Era of School Reform

Julia Andrea Behrman
New York University, jab965@nyu.edu

Does Mother's Schooling Matter Most in Rural Bangladesh? Re-contextualizing an Old Debate in a New Era of School Reform

Abstract
This paper explores the dynamic interplay between parental wealth, parental schooling, government schooling initiatives and child schooling outcomes in rural Bangladesh. In doing so, I engage with the vast literature that suggests mother's schooling is the most important predictor of offspring schooling attainment and empirically investigate whether this continues to be the case in the context of recent waves of school reform. Methodologically, I improve upon past estimates by using a gender-disaggregated measure of wealth that is exogenous to decision-making in marriage: men's and women's assets at marriage. I run a series of Cox semi-proportional hazard models estimating factors that predict rates of school entry and duration between entry and exit, as well as OLS regression estimates of grade progression between entry and exit. Findings indicate that mother's schooling, and to some extent father's schooling, are important predictors of offspring attainment even after controlling for government schooling initiatives and improved measures of wealth. Substantively, I argue for a re-contextualization of the literature on household decision-making to better understand the nuanced interplay between household factors and external programs and incentives in the context of mass schooling reform in Bangladesh and around the globe.

Keywords
schooling, the family, intergenerational dynamics, schooling reform, Bangladesh, gender disaggregated assets

Disciplines
Demography, Population, and Ecology | Educational Sociology | Social and Behavioral Sciences | Sociology

Comments
Behrman, Julia Andrea. 2014. "Does Mother's Schooling Matter Most in Rural Bangladesh? Re-contextualizing an Old Debate in a New Era of School Reform." *GCC Working Paper Series*, GCC 14-07.

Does mother's schooling matter most in rural Bangladesh?
Re-contextualizing an old debate in a new era of school reform

Working Paper: please do not cite without author's permission

Julia Andrea Behrman

New York University
Department of Sociology
295 Lafayette Ave, 4th floor
New York, NY 10012
Jab965@nyu.edu
+001 610.389.4207

Background support for this study was provided by the grant *Team 1000+ Saving Brains: Economic Impact of Poverty-Related Risk Factors for Cognitive Development and Human Capital* "0072-03" provided to the Grantee, The Trustees of the University of Pennsylvania by Grand Challenges Canada. I am grateful to Jere Behrman for support and guidance throughout the development of the paper. Pat Sharkey, Larry Wu and Sara Duvisac provided helpful comments on early drafts. Wahid Quabili and Agnes Quisumbing provided instrumental assistance with the data. I benefited from comments from participants of the American Sociological Association annual meeting, Sociology of Development annual meeting, NYU inequality workshop, and NYU graduate student conference.

Abstract

This paper explores the dynamic interplay between parental wealth, parental schooling, government schooling initiatives and child schooling outcomes in rural Bangladesh. In doing so, I engage with the vast literature that suggests mother's schooling is the most important predictor of offspring schooling attainment and empirically investigate whether this continues to be the case in the context of recent waves of school reform. Methodologically, I improve upon past estimates by using a gender-disaggregated measure of wealth that is exogenous to decision-making in marriage: men's and women's assets at marriage. I run a series of Cox semi-proportional hazard models estimating factors that predict rates of school entry and duration between entry and exit, as well as OLS regression estimates of grade progression between entry and exit. Findings indicate that mother's schooling, and to some extent father's schooling, are important predictors of offspring attainment even after controlling for government schooling initiatives and improved measures of wealth. Substantively, I argue for a re-contextualization of the literature on household decision-making to better understand the nuanced interplay between household factors and external programs and incentives in the context of mass schooling reform in Bangladesh and around the globe.

Keywords: schooling, the family, intergenerational dynamics, schooling reform, Bangladesh, gender disaggregated assets

Introduction

Understanding the determinants of schooling attainment has long been a topic of demographic enquiry given the strong relationship between schooling and important demographic outcomes such as fertility and offspring morbidity and mortality (Caldwell 1979; Caldwell 1980; Smith-Greenaway 2013; Gage et al. 2013; McQueston, Silverman & Glassman 2013). Considerable research attention has been spent identifying factors that lead parents to prioritize investment in their children's schooling, with a large body of empirical literature positing that mother's schooling is the single largest determinant of schooling attainment in the next generation across contexts (for reviews of the literature see Behrman 1997; King and Mason 2001; Holmlund, Lindahl and Plug 2011). There are a number of reasons why mother's schooling may be especially important. If mothers serve as the prime caretakers, then more-schooled mothers may be better able to provide higher quality care during the formative early childhood period (Behrman et al. 1999; Carvalho 2012; Kalil, Ryan and Corey 2012). Women's schooling may lead to improved economic circumstances for households that allow for increased investments in children's human capital (Cleland and van Ginneken 1988; Bicego and Boerma 1993; Frost et al 2004). Better-educated mothers may also prioritize investment in schooling and other resources important for accumulation of human capital (Quisumbing and Maluccio 2002). However, the literature's focus on mother's schooling has been critiqued due to concerns about confounding variables—such as wealth or ability—that may affect the level of schooling of both mother and child (Behrman and Rosenzweig 2002; Black, Devereux and Salvanes 2005).

In addition to household factors, governmental educational policy can play an important role in determining children's schooling attainment. Countries throughout the developing world have implemented ambitious school reforms over the course of the last two decades (World Bank 2009; Jones 2012). In many contexts governments have reduced or eliminated school fees in the hopes of reducing financial barriers to attendance (ibid). Many governments have also introduced subsidy or incentive programs geared at improving schooling attainment, perhaps most visibly conditional cash transfer programs (CCTs) (Fiszbein and Schady 2009). In Bangladesh, the focus of this paper, the government has launched an ambitious schooling reform program since the early 1990s including elimination of primary school fees, introduction of a Food for Education program (later replaced by a Primary Education Stipend) and implementation of a Girls Secondary School Stipend program (Schurmann 2009; Baulch 2011). The introduction of these schooling programs raises questions about how parental resource endowments interact with government initiatives aimed at increasing schooling, a topic of enquiry that remains relatively unexplored in the literature.

In this paper I investigate the dynamic interplay between parental wealth, parental schooling, government schooling initiatives and child schooling outcomes in rural Bangladesh. In doing so, I engage with the vast literature that suggests mother's schooling is the most important predictor of offspring schooling attainment and empirically investigate whether this continues to be the case in the context of recent waves of school reform. Methodologically, I improve upon past estimates by using a gender-disaggregated measure of wealth that is exogenous to decision-making in marriage: men's and women's assets at marriage. I run a series of Cox semi-proportional hazard models estimating factors that predict rates of school entry and duration between entry and exit, as well as OLS regression estimates of grade progression between entry and exit. Substantively, I argue for a re-contextualization of the literature on household decision-making to better understand the nuanced interplay between household factors and external programs and incentives in the context of mass schooling reform in Bangladesh and around the globe.

Background

The Relationship between Mother's Schooling and Offspring Schooling: Existing Empirical Evidence and Measurement Issues

The empirical literature largely confirms the positive association between maternal and child schooling in Bangladesh and across a number of other contexts.[1] In a synthesis of 85 micro studies from 23 lower income countries 94% of 237 estimates find a positive relationship between mother's and child's schooling, with 70% of these estimates achieving statistical significance (Behrman 1997). However, Behrman suggests that the emphasis on mothers, as opposed to father's, schooling overlooks the important effect of father's schooling; in in only half of the aforementioned studies were measures of mother's schooling more strongly associated with child attainment then father's schooling. Furthermore, the studies surveyed explore associations only and thus are subject to concerns about unobserved heterogeneity. More recently, scholars have adopted a number of causal identification strategies—including instrumental variables, twin studies and adoption studies—to investigate the effect of mother's schooling on the next generation (see Holmlund, Lindahl and Plug 2011 for a review of 17 studies). Some of these studies have found minimal or no effect of maternal schooling upon adoption of causal methods (Behrman and Rosenzweig 2002; Antonovics and Goldberger 2005; Black, Devereux and Salvanes 2005), while others have re-confirmed the central importance of mother's schooling (Chevalier et al. 2013). While the causal literature on this subject has provided important insight, it is has almost exclusively been carried out in the United States or Europe due to data constraints, thus raising questions about generalizability in other contexts.

A common critique of the literature's focus on maternal schooling is that it is extremely difficult to disentangle the effect of mother's schooling from the effect of wealth (Behrman and Rosenzweig 2002; Black, Devereux and Salvanes 2005). Many studies have attempted to control for wealth by including covariate controls for current household income or assets, however this is methodologically problematic because current levels of household wealth are endogenous to household decision-making and investment strategies (Quisumbing and Maluccio 2002). For example, it could be that parents who invest in children's schooling have less wealth because they are paying for costs associated with schooling. Alternatively, investment in children's schooling may lead to offspring with better labor market outcomes who in turn bolster household wealth. Conceptualizing wealth at the aggregate household level further overlooks the fact that men and women in the household have different stores of wealth and different preferences on how to spend wealth with important implications for children's well-being (Strauss and Thomas 1995; Haddad, Hoddinott and Alderman 1997).

A few studies have used men's and women's assets at marriage as a gender-disaggregated measure of wealth that is exogenous to decision-making in marriage, though endogenous to marriage market selection processes (Quisumbing and Maluccio 2002; Thomas et al. 2002; Hallman 2003).[2] These studies have explored the differential effects of men's and women's

[1] For literature explicitly on the effect of maternal schooling on human capital in Bangladesh see Hossain (1989); Bhuiya and Streatfield (1991); Guldan et al. (1993); Foster & Rosenzweig (2002); Bates, Maselko and Schuler (2007); Sember et al. (2008).

[2] A body of empirical work has demonstrated the importance of assets for wellbeing (Sherraden 1991; Carter and Barrett 2006). Asset accumulation is important for addressing vulnerability and moving out of poverty and has been posited as an improved measure of wealth than income in poor contexts (Narayan 2000).

wealth on (1) household expenditures; and (2) children's health. In the first category, Quisumbing and Maluccio (2002) find women's assets at marriage increase expenditure shares on children's education in Bangladesh and South Africa. However, in Ethiopia the authors find men's asset shares at marriage increase expenditure shares on education, suggesting that culture and context matter for explaining household expenditure patterns. Turning to health outcomes, Hallman (2003) finds a higher share of women's assets at marriage is associated with a lower number of morbidity days for pre-school aged girls in rural Bangladesh. In Indonesia, Thomas, Contreras and Frankenberg (2002) find child health is influenced by relative asset positions of parents at marriage. Mothers who have more assets relative to their husbands have sons with lower reported morbidity, though the opposite relationship is true for fathers and daughters. While this strategy of using assets at marriage as a control has been viewed as promising, very few authors have been able to implement it due to the paucity of gender-disaggregated asset data available.

Schooling Reforms in Bangladesh since 1990

In Bangladesh primary schooling takes place from ages six to ten and is comprised of a Primary Level (years 1-4) and Junior Level (years 5-8). Lower Secondary (years 9-10) and Higher Secondary (years 11-12) follow primary school. Since the early 1990s the government of Bangladesh has implemented a series of educational reforms aimed at improving children's schooling attainment. Starting in 1990 primary education was made free and compulsory and fees were waived for girls in classes 6-8 (Schurmann 2009). The Food for Education program (FFE) was introduced in 1993 in recognition that vulnerable populations, such as the landless poor or female-headed households, still encountered difficulties sending their children to school (Baulch 2011). In the FFE program targeted vulnerable populations were eligible for wheat and flour rice conditional upon sending children to school. FFE was replaced by the Primary Education Stipend (PES) program in 2002 whereby vulnerable households were provided with cash incentives for sending their children to school 85% of the time (ibid). A nationwide Female Secondary School Stipend Project (FSP) was introduced in 1994 with the aim of improving female attainment and delaying childbearing and marriage for adolescent girls (Schurmann 2009).[3] This program pays tuition fees and monthly stipends to girls living in rural areas who attend school at least at a 75% attendance rate, remain unmarried and pass annual examinations.

At the aggregate level the country has made enormous progress in schooling attainment over the last three decades. Between 1980 and 2011 the mean schooling attainment for adults doubled and the gross enrollment rate (GER) for primary school rose from 65% to 114% (UNDP 2011; UNESCO 2011).[4] Nonetheless a number of challenges persist. As of 2009, only 66% of students survived to class five (ibid). Adolescent departure from school in order to marry remains common for girls and the median age of female marriage remains at 15.8 years (DHS 2013). Investigation of the long-term impact of various schooling reforms also provides mixed evidence of program success. An evaluation of the FFE program found that enrollment rates increased particularly for girls (Ahmed and Carlo 2002; Ahmed and Arends-Kuenning 2006). However, the same studies found that the program targeting mechanisms were often flawed, resulting in the exclusion of a

[3] An earlier version of this program had been available in select Upazillas, or sub districts.

[4] GER is calculated by dividing the number of children actually in school by the number of children who are of school age. The percent for this ratio can be greater than 100 because students outside of the primary school age range may still be in school.

sizeable proportion of poor households and inclusion of less poor households. In addition, increases in class size due to the reform led to a negative effect on learning for non-recipients. In an assessment of the long-term impact of the PES program, Baulch (2011) finds the program had minimal impact on overall school enrollment and had negative effects on grade progression for boys from poor households who were unable to receive stipends targeted to females.

The Interaction between Parental Resources, Government Schooling Initiatives and Child Schooling: an Emerging Topic of Enquiry

A large literature explores the implications of intra household bargaining dynamics and decision making for offspring well being (Strauss and Thomas 1995; Haddad, Hoddinott and Alderman 1997; Quisumbing 2003). A separate literature evaluates the impact of large-scale schooling programs (Fiszbein and Schady 2009). However, very little literature has considered how all of these factors interact, particularly in the context of a major increase in school reforms globally over the last two decades. One recent exception comes from Guatemala where Yount et al. (2013) find that, as social investments reduce the cost of schooling over a 27 year period, the magnitude of the association between parental resources and children's schooling declines and becomes increasingly gender equitable. The implication of this study is that household level factors may become less important in determining school attainment over time in the face of new structural conditions. However, results also indicate that older boys continue to benefit more than girls from social investment in schooling, raising questions about the persistence of the gender-schooling gap even after reform. Further questions remain about the interaction between household factors and external programs and incentives in other settings.

Data

Data come from an International Food Policy Research Institute (IFPRI) survey of 1012 households in 47 rural villages between 1996 and 2006. The data were originally collected as a part of an evaluation of two different agricultural technology packages in the 1996-1997 calendar year with follow-up surveys conducted in 2006.[5] Villages were chosen from three different geographically distinct sites in Bangladesh: Saturia, part of the Manikganj district in the center of the country not far from the capital Dhaka; Jessore, a district located in the southwestern part of the country; and Mymensingh, a district in the northeastern part of the country. Because I am interested in the relationship between parent's resources and child schooling outcomes I limit the analysis to biological children of the household head and spouse who are ages 18 and younger at baseline. The final sample for this analysis includes 1342 children from 632 households[6]. The rationale for focusing on this sub-sample of children is twofold. First of all, the children from

[5] Prior to data collection in each of the three survey sites a census of households was conducted in 1) villages where the new technologies had been introduced by the NGO and 2) comparable villages where the NGO also operated but where the new technologies had *not yet* been introduced. Three different types of households were selected to be part of the final sample in equal numbers: 1) households that adopted the technology in villages where the technology had been introduced; 2) comparable households deemed likely to adopt the technology in the future in villages where the new technology had not yet been introduced; 3) a random sample of other households in both types of villages to represent the general population.

[6] In order to ensure comparability between models I excluded children who were missing data on key variables of interest (such as parental assets). In total 403 children from 107 households were excluded from the final sample due to missing data. In supplementary analyses I re-ran all models including these children when possible. Results were not different from those presented in this paper and are available upon request.

this sub-sample were directly affected by changes in schooling policy in the early 1990s, which is of central interest for this analysis. Additionally, full schooling data were collected for this sub-sample of children and they are young enough at baseline that I am able to follow the children over the timeframe of the survey. The concern with only looking at children in the household under 18 at baseline is that I may introduce bias if higher birth order adult children have already left home or if children of one sex leave home at earlier ages. To account for this my models include controls for child gender and birth order (*Table I*).

Though not nationally representative this dataset has several unique advantages for this analysis. Firstly, it contains detailed information on the type, quantity and value of the assets men and women owned prior to marriage, thus providing a gender-disaggregated measure of wealth exogenous to household decision-making in marriage. While these assets at marriage variables have been used to look at child morbidity and expenditure outcomes (see Quisumbing and Maluccio 2002; Hallman 2003), this is the first time anyone has used these measures to explore long-term schooling outcomes. Additionally, the longitudinal nature of the data allows for detailed follow-up of children's schooling outcomes over a ten-year period between 1996 and 2006. Finally, the time frame of the survey corresponds with the introduction of a number of major changes in educational policy including introduction of free compulsory education in 1990, introduction of FFE in 1993 (replaced by PES in 2002) and FSP in 1994. In total, 73 % (n=978) of children in the sample were exposed to free primary schooling for their entire schooling career (e.g. from age six) and 18% (n=239) of the children in the sample took part in at least one of the stipend programs (*Table I*).[7]

Empirical Strategy

This analysis focuses on two key dimensions of schooling attainment: age of entry into school and duration of time between school entry and exit. The latter outcome is conditional on starting school in the first place and reflects final exit from school as opposed to seasonal or short-term breaks in schooling. I use survival analysis methods to model the factors predicting school entry and exit. Survival analysis offers advantages over Ordinary Least Squares (OLS) regression by allowing the risk set to change over time as individuals enter or exit from school. Right-censored observations are incorporated into survival models whereas OLS would exclude such observations, potentially introducing bias into estimation because sub-populations who do not experience the event by the end of survey may be different on observed and unobserved characteristics. The key dependent variable in survival models is the hazard function, *h(t)*, also known as the conditional failure rate, which can be conceptualized as the intensity with which the event of entering of leaving school occurs. In the hazard function, specified in *Equation 1*, *h(t)* is the limiting probability that event failure occurs in a given interval conditional upon the subject having survived to the beginning of the interval, divided by the width of the interval where *T* is a nonnegative random variable denoting the time to a failure event.

$$(1) h(t) = \lim_{\Delta t \to 0} \left(\frac{\Pr\left(t + \Delta t > T > t | T > t\right)}{\Delta t} \right.$$

[7] Respondents were queried if each child had ever participated in any of the programs at baseline. Follow up in 2006 assessed whether the child was currently participating or had ever participated in FES, PES, or FSP. Indicators were created to signal participation in any of the programs at some point of time up to 2006.

For this analysis I use the Cox semi-proportional hazard model (Cox 1972) specified below in *Equation 3*. In the Cox model the baseline hazard function is unspecified, which means the model makes no assumptions about the functional form of the hazard rate. However, the model does assume proportionality of the covariates. In other words, the model assumes that covariates multiplicatively shift the baseline hazard function so that one subject's hazard is a multiplicative replica of another's.

$$(2) h(t|x_1, x_2, \dots, x_k) = h_0(t) exp(\beta_1 x_1 + \beta_2 x_{2+\dots+} \beta_k x_k)$$

For each outcome I run a series of nested models to see how coefficients and significance levels vary upon introduction of new covariates. Covariates include mother's schooling, father's schooling, mother's pre-marital assets, father's pre-marital assets, child sex, child birth order, district of origin, participation in FFE or PES[8], participation in FSP and full exposure to free compulsory schooling from age six (as opposed to partial exposure). Categories of assets at marriage in this survey include land, livestock, housing, jewelry, clothing, food and other household durable assets and include both assets owned prior to marriage and assets transferred in the form of gifts or dowry payment at the time of marriage. To account for dependence among children within households I cluster on households in all estimates.

One limitation of this approach is that duration between entry and exit does not capture grade repetition or short-term absences that do not result in exit, thus raising questions about whether duration correlates with overall schooling attainment if repetition or dropout and reentry are common. To better understand the relationship between parental resources, government schooling initiatives and schooling attainment I run OLS regression for an additional outcome: pace of school progression. I create the school progression variable by dividing the last class completed by the difference between age of exit and age of entry. If the student is "on track" and is progressing at a pace of one class per year then this variable will equal one whereas if the student is "behind" and progressing by less than one class per year then this variable will equal less than one.

The hazard and OLS models used in this analysis explore causality only under the strong assumption that all omitted variables are not correlated with the included variables. This is a strong assumption because unobservable characteristics correlated across generations, such as intelligence or ability, are likely also correlated with right-side variables. If this assumption does not hold, the model provides predictions, though not causal estimates.

Results

For the first outcome of interest, age of entry into school, the baseline model shows no significant difference in the hazard of entry by gender or birth order, though district level differences are apparent (*Table II Model 1)*. In the subsequent model, I introduce controls for parental schooling attainment (*Table II Model 2*). Findings indicate that maternal schooling is an important predictor of the rate of children's school entry: maternal attendance of some primary school increases the hazard rate of child entry by 0.24 ($p<0.01$), maternal completion of primary school increases the hazard by 0.42 ($p<0.001$) and maternal attendance of some secondary school

[8] Because the PES replaced the FFE program, thus eligibility for one implies eligibility for the second, I include one covariate control for participation in either program.

increases the hazard by 0.40 ($p<0.001$).[9] None of the paternal schooling variables significantly increase the hazard of entry. I introduce the assets at marriage variables into the next model and find that controlling for wealth does not alter the coefficients or significance of the parental schooling variables (*Table II Model 3)*. In the following model I include controls for participation in stipend programs and exposure to free compulsory schooling from age six (*Table II Model 4)*. Full, as opposed to partial, exposure to free compulsory schooling significantly increases the hazard for entry by .32 ($p<0.001$); however participation in stipend programs does not significantly increase the hazard of entry.[10] Finally, I include interaction terms for gender and birth order and find minimal evidence of significant interactions (*Table II Model 5)*. Throughout the models the parental schooling variables remain unaltered by inclusion of additional controls: mother's schooling significantly increases the hazard for entry and father's does not.

The second outcome of interest is duration of time between school entry and exit conditional on starting school (*Table III*). In the baseline model, being female significantly reduces the hazard rate for exit by 0.33 ($p<0.01$), thus indicating that females are leaving school at lower rates than their male counterparts (*Table III Model 1*). None of the birth order coefficients are significant, suggesting a minimal role of birth order in rates exit. In the next model, I include the parental schooling attainment variables (*Table III Model 2)*. Attendance of some secondary school significantly decreases the hazard rate for school exit by 0.95 ($p<0.001$) for mothers and 0.49 ($p<0.01$) for fathers. None of the other parental schooling variables are significant in this model. Though the absolute values of coefficients of the mother's and father's secondary school attendance variable appear quite different, a Wald test indicates that these coefficients do not significantly differ from each other.[11] Upon inclusion of the covariate controls for wealth the father's schooling variable coefficient becomes -0.43 ($p<0.05$) (*Table III Model 4)*. I also find the mother's asset at marriage variable significantly reduces the hazard of exit by -0.12 ($p<0.05$). In the next model, I include controls for government schooling initiatives (*Table III Model 4)*. Participation in the FSP strongly and significantly reduces the hazard for school exit by 1.22 ($p<0.001$). Once this control is included the female indicator variable is no longer significant, suggesting that lower rates of female school exit are strongly influenced by participation in this stipend program. Interaction terms show no significant interaction between gender and participation in stipend programs or between gender and birth order (*Table III Model 5)*. The parental schooling variables remain relatively unaltered throughout these last two models.

Finally I conduct OLS regression analysis to explore the factors that predict the pace of school progression between entry and exit (*Table IV)*. As in the survival analysis models, parental schooling variables emerge as important predictors of children's school progression. On average, children of women who have completed primary school have a progression score 0.08 ($p<0.001$)

[9] Exponentiated coefficients can be interpreted as the ratio of the hazard for a one unit change in the corresponding covariate. Thus, maternal primary school attendance increases the hazard for entry by 27% compared to women who never attended school because exp(0.24)=1.27.

[10] When exposure to free education is not included in the model, the FEE/PES variable is highly significant, however upon inclusion of free education FFE/PES is no longer significant. This suggests that gains in primary enrollment came principally from the elimination of fees and corresponds with the findings of Baulch (2011) who does not find that PES increased enrollment.

[11] chi2(1) = 1.81 Prob > chi2 = 0.1780.

higher than those of women who never attended school.[12] Likewise, children of women who have attended some secondary school have an average progression score 0.08 ($p<0.01$) higher than children of women who never attended school.[13] Husband's schooling is also an important predictor of children's school progression: Children of men who attended some primary school have an average progression score 0.06 ($p<0.01$) higher than children of men who never attended school and children of men who completed secondary school have a progression score 0.06 higher ($p<0.01$) than children of men who never attended.[14] Interestingly, on average female children have a progression score 0.05 points lower ($p<0.01$) than males. Thus, even though hazard models show females are leaving school at lower rates than males, they may also be failing to complete grades at the same pace as boys. Over time the female stipend program may come to play a role in rectifying this discrepancy; participation in the female stipend program increases the progression score by an average of 0.09 ($p<0.001$).

Discussion

The findings from this study signal a number of important shifts in schooling attainment in Bangladesh over the past two decades. Variables such as sex and birth order have historically played a large role in shaping available opportunities, with females and lower birth order children facing particular disadvantage. Results indicate that in this sample of rural children these variables may be of declining importance in determining schooling attainment. This analysis finds no significant difference in rates of school entry by gender or birth order. In fact, girls leave school at significantly lower rates than their male counterparts. This finding corresponds with national Bangladeshi statistics and with global trends indicating that females are increasingly outperforming males in schooling even in developing contexts (Grant and Behrman 2010; DHS 2013). However, the fact that girls continue to lag behind boys in school progression suggests that while girls are staying in school longer, they may not be progressing through grades at the same pace as their male peers. Further investigation is needed to understand the social or structural barriers girls continue to face that impede their grade progression. Future research should also explore the changing educational landscape for male children in Bangladesh given evidence that boys in Bangladesh face increasing schooling disadvantage because stipends at higher levels are targeted to females (Baulch 2011). An education differential between young males and females could have ramifications for labor market opportunities and for household dynamics, particularly in a context with notably high levels of violence against women.

Results from this study indicate that participation in the female stipend program, and to a lesser extent, free compulsory primary schooling, play an important role in predicting schooling attainment, especially for females. Nonetheless, mother's schooling continues to be an important predictor of children's schooling attainment even upon controlling for government schooling initiatives and an improved gender-disaggregated measure of wealth. Mother's schooling significantly increases the hazard for entry, decreases the hazard for exit and increases children's school progression. However, it is not clear that mother's schooling is a more important predictor

[12] Values of the school progression variable range from 0 to 1. If the student is progressing by one class per year then this variable will be one whereas if the student is progressing by less than one class per year then this variable will be less than one.

[13] Wald tests indicate that as a group the women's schooling coefficients are jointly significant: F(3, 631) = 5.82 Prob > F = 0.0006

[14] Wald tests indicate that as a group the men's schooling coefficients are jointly significant: F(3, 631) = 3.76 Prob > F = 0.0107.

than father's schooling. Though father's schooling does not significantly increase the hazard for entry, it does decrease the hazard for exit and increase school progression. In the analyses of school exit and school progression the absolute values of mother's and father's schooling coefficients appear quite different, however Wald tests indicates that the coefficients do not significantly differ from each other. Thus, this paper provides evidence that parental, as opposed to solely maternal, resources continue to matter even in the presence of social protection programs. Interestingly, this finding differs from Yount et al. (2013) who find that as social investments reduce the cost of schooling, the magnitude of the association between parental resources and children's schooling declines. The fact that in Bangladesh parental schooling remains an important predictor even after controlling for schooling initiatives draws attention to the importance of doing studies over a number of contexts given social, cultural and policy differences.

There may be a number of reasons why parental education continues to be important even in the context of a changing educational landscape. In cases where schooling programs are targeted to specific groups, parents human capital may be especially important for navigating social, economic and administrative barriers to access. In rural Bangladesh where children play large roles in domestic chores, agriculture and income-generating activities less educated parents may prefer not to send children to school even in spite of policy incentives. Social or cultural stigma may further prevent parents from prioritizing children's schooling, particularly female children who often marry young. Government schooling programs operate under the assumption that actors will have full access to information and opportunities and will make decisions rationally; this may not always be the case. Indeed, in a qualitative evaluation of conditional cash transfer programs in El Salvador, Nicaragua, Mexico and Turkey Adato, Roopnaraine and Becker (2011) find that often cultural and social norms play a role in shaping how and why people take advantage of governmental safety net programs. Understanding how parental resources and household dynamics affect whether or to what extent the poor are able to take advantage of social protection programs is a rich, yet neglected, area of study and is essential for understanding and improving the design and implementation of social safety net programs. Future research on household decision-making needs to better understand the nuanced interplay between household factors and external programs and incentives.

Table I. Descriptive statistics

VARIABLES	N	Mean	SD	Min	Max
Age of entry into school	1342	7	2	4	23[a]
Age of exit from school	1255	14	4	4	28[b]
Highest class passed child	1342	5	3	0	16
School progress child	1342	0.72	0.25	0	1
Female	1342	0.48	0.5	0	1
First born (reference)	1342	0.25	0.43	0	1
Second born	1342	0.25	0.43	0	1
Third born	1342	0.19	0.39	0	1
Fourth born	1342	0.13	0.34	0	1
Fifth born or higher	1342	0.18	0.38	0	1
Saturia (reference)	1342	0.31	0.46	0	1
Jessore	1342	0.31	0.46	0	1
Mymensignh	1342	0.38	0.49	0	1
No school wife (reference)	1342	0.63	0.48	0	1
No school husband (reference)	1342	0.45	0.5	0	1
Some primary school mother	1342	0.13	0.33	0	1
Some primary school father	1342	0.13	0.33	0	1
Completed primary school mother	1342	0.1	0.3	0	1
Completed primary school father	1342	0.09	0.3	0	1
Some secondary school mother	1342	0.14	0.34	0	1
Some secondary school father	1342	0.33	0.47	0	1
Highest class passed mother	1342	2	3	0	14
Highest class passed father	1342	4	4	0	16
Assets at marriage mother (taka)[c]	1342	13266	18501	0	170898
Assets at marriage father (taka)	1342	79090	138644	0	3384738
Received any educational stipend	1342	0.18	0.38	0	1
Received FFE or PES	1342	0.09	0.28	0	1
Received FSP	1342	0.09	0.28	0	1
Free primary school since age six	1342	0.73	0.44	0	1

(a) Respondents who never had the event of school entry were censored at age of last observation.
(b) Age of exit from school is conditional upon entry into school, thus students who never enter are excluded.
(c) 40.65 Taka equal 1 US dollar as of January 1 1996.

Table II. Cox proportional hazard model for age of entrance into school

VARIABLES	(1)	(2)	(3)	(4)	(5)
Female	-0.02	-0.04	-0.04	-0.05	-0.37***
	-0.05	(0.05)	(0.05)	(0.05)	(0.11)
Second born	-0.09	-0.08	-0.08	-0.09	-0.27**
	-0.06	(0.07)	(0.07)	(0.07)	(0.09)
Third born	-0.15*	-0.13	-0.13	-0.15*	-0.27**
	-0.07	(0.07)	(0.07)	(0.07)	(0.10)
Fourth born	-0.08	-0.05	-0.05	-0.05	-0.26**
	-0.07	(0.07)	(0.07)	(0.07)	(0.10)
Fifth born or higher	-0.01	0.03	0.04	0.03	-0.07
	-0.07	(0.07)	(0.07)	(0.08)	(0.10)
Jessore	0.48***	0.43***	0.41***	0.41***	0.42***
	-0.07	(0.07)	(0.07)	(0.07)	(0.07)
Mymensignh	0.30***	0.18**	0.17**	0.18**	0.19**
	-0.05	(0.06)	(0.06)	(0.06)	(0.06)
Some primary school mother		0.24**	0.24**	0.23**	0.23**
		(0.08)	(0.08)	(0.08)	(0.08)
Completed primary school mother		0.42***	0.42***	0.43***	0.43***
		(0.10)	(0.10)	(0.10)	(0.10)
Some secondary school mother		0.40***	0.42***	0.44***	0.44***
		(0.12)	(0.12)	(0.12)	(0.11)
Some primary school father		-0.02	-0.02	-0.03	-0.05
		(0.08)	(0.08)	(0.08)	(0.08)
Completed primary school father		-0.12	-0.11	-0.10	-0.11
		(0.09)	(0.09)	(0.09)	(0.09)
Some secondary school father		0.10	0.12	0.13	0.10
		(0.07)	(0.07)	(0.07)	(0.07)
Assets at marriage (LN +1) mother			-0.02	-0.00	-0.00
			(0.02)	(0.02)	(0.02)
Assets at marriage (LN+1) father			-0.01	-0.01	-0.01
			(0.01)	(0.01)	(0.01)
FFE or PES				0.15	0.23
				(0.10)	(0.14)
FSP				0.10	0.11
				(0.10)	(0.11)
Free primary school since age six				0.32***	0.24***
				(0.05)	(0.06)
Second born*female					0.35*
					(0.14)
Third born*female					0.22
					(0.15)
Fourth born* female					0.42**
					(0.15)
Fifth born*female					0.16
					(0.14)
Female*FEE					-0.14
					(0.20)
Free primary*female					0.15
					(0.10)
Observations	1,342	1,342	1,342	1,342	1,342

Robust standard errors in parentheses clustered at household level
*** p<0.001, ** p<0.01, * p<0.05

Table III. Cox proportional hazard model for duration of time between entrance and exit from school

VARIABLES	(1)	(2)	(3)	(4)	(5)
Female	-0.33**	-0.33*	-0.30*	-0.05	0.20
	(0.13)	(0.13)	(0.13)	(0.14)	(0.33)
Second born	0.23	0.25	0.27	0.24	0.16
	(0.16)	(0.16)	(0.16)	(0.16)	(0.21)
Third born	0.10	0.11	0.14	0.14	0.04
	(0.18)	(0.19)	(0.19)	(0.19)	(0.23)
Fourth born	0.05	0.02	0.06	0.08	0.11
	(0.21)	(0.21)	(0.22)	(0.21)	(0.27)
Fifth born or higher	0.09	0.05	0.11	0.10	0.08
	(0.20)	(0.21)	(0.20)	(0.21)	(0.25)
Jessore	-0.18	-0.08	-0.14	-0.12	-0.08
	(0.17)	(0.18)	(0.19)	(0.18)	(0.19)
Mymensignh	-0.46**	-0.13	-0.14	-0.17	-0.14
	(0.17)	(0.18)	(0.18)	(0.18)	(0.18)
Some primary school mother		-0.37	-0.37	-0.44*	-0.43
		(0.22)	(0.22)	(0.22)	(0.22)
Completed primary school mother		-0.38	-0.37	-0.38	-0.38
		(0.21)	(0.21)	(0.21)	(0.21)
Some secondary school mother		-0.95***	-0.91***	-0.92***	-0.93***
		(0.25)	(0.25)	(0.26)	(0.26)
Some primary school father		-0.00	0.01	0.02	0.01
		(0.22)	(0.22)	(0.22)	(0.22)
Completed primary school father		-0.03	0.05	0.06	0.05
		(0.25)	(0.24)	(0.24)	(0.24)
Some secondary school father		-0.49**	-0.43*	-0.40*	-0.41*
		(0.18)	(0.19)	(0.19)	(0.19)
Assets at marriage (LN +1) mother			-0.12*	-0.12*	-0.12*
			(0.06)	(0.05)	(0.06)
Assets at marriage (LN+1) father			0.00	0.00	0.00
			(0.02)	(0.02)	(0.02)
FFE or PES				-0.21	0.10
				(0.25)	(0.32)
FSP				-1.22***	-1.30***
				(0.31)	(0.29)
Free primary school since age six				-0.03	0.14
				(0.13)	(0.17)
Second born*female					0.35
					(0.38)
Third born*female					0.37
					(0.41)
Fourth born* female					-0.11
					(0.44)
Fifth born*female					0.09
					(0.40)
Female*FEE					-0.67
					(0.49)
Free primary*female					-0.54*
					(0.28)
Observations	1,255	1,255	1,255	1,255	1,255

Robust standard errors in parentheses clustered at household level
*** p<0.001, ** p<0.01, * p<0.05

Table IV. OLS estimates of factors predicting rate of school progress

VARIABLES	(1) Progress	(2) Progress
Female	-0.04**	-0.04
	(0.01)	(0.02)
Second born	-0.03	-0.03
	(0.02)	(0.02)
Third born	-0.05**	-0.06**
	(0.02)	(0.02)
Fourth born	-0.02	-0.02
	(0.02)	(0.02)
Fifth born or higher	-0.03	-0.03
	(0.02)	(0.02)
Jessore	-0.08***	-0.08***
	(0.02)	(0.02)
Mymensignh	-0.06***	-0.07***
	(0.02)	(0.02)
Some primary school mother	0.04	0.04
	(0.03)	(0.03)
Completed primary school mother	0.08***	0.08***
	(0.02)	(0.02)
Some secondary school mother	0.08**	0.08**
	(0.02)	(0.02)
Some primary school father	0.06**	0.06**
	(0.02)	(0.02)
Completed primary school father	0.04	0.04
	(0.03)	(0.03)
Some secondary school father	0.06**	0.06**
	(0.02)	(0.02)
Assets at marriage (LN +1) mother	0.00	0.00
	(0.01)	(0.01)
Assets at marriage (LN+1) father	0.00	0.00
	(0.00)	(0.00)
FFE or PES	0.00	-0.04
	(0.02)	(0.04)
FSP	0.09***	0.10***
	(0.02)	(0.02)
Free primary school since age six	-0.04***	-0.04*
	(0.01)	(0.02)
Female*FEE		0.06
		(0.05)
Free primary*female		-0.00
		(0.03)
Constant	0.74***	0.74***
	(0.07)	(0.07)
Observations	1,342	1,342
R-squared	0.10	0.10

Robust standard errors in parentheses clustered at household level
*** p<0.001, ** p<0.01, * p<0.05

APPENDIX

Figure A.I Smoothed hazard estimates for age of entry into school and duration of time between school entry and exit

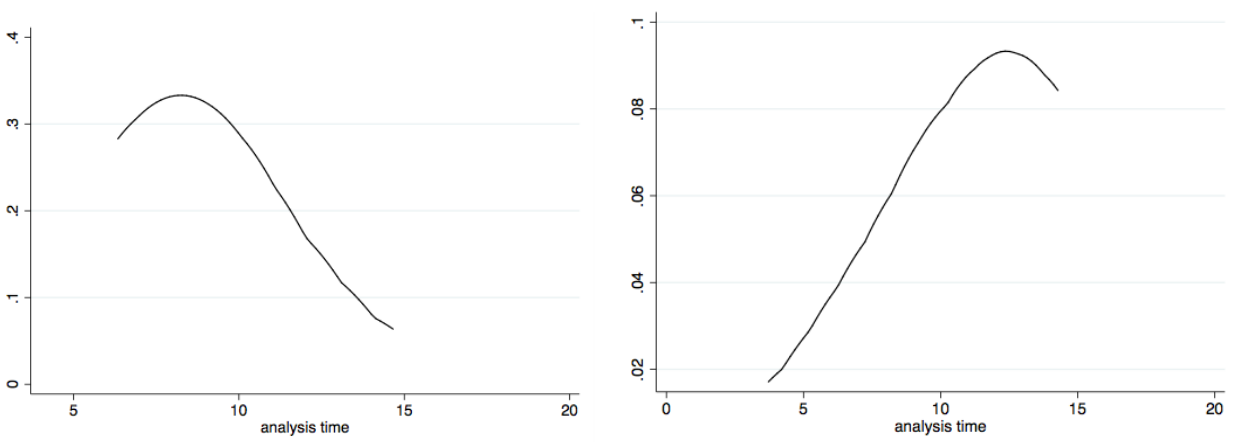
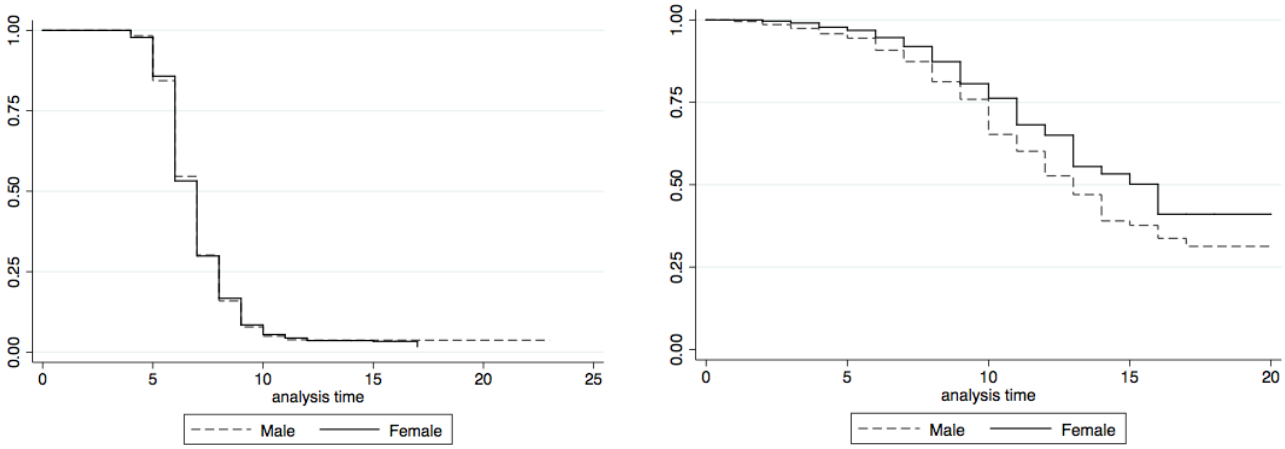


Figure A.II Kaplan-Meier survival estimates for age of entry into school and duration of time between entry and exit disagregated by child sex



Works Cited

Adato, M., Roopnaraine, T., & Becker, E. (2011). Understanding use of health services in conditional cash transfer programs: Insights from qualitative research in Latin America and Turkey. *Social Science & Medicine*, *72*(12), 1921–1929.

Ahmed, A. U., & Arends-Kuenning, M. (2006). Do crowded classrooms crowd out learning? Evidence from the food for education program in Bangladesh. *World Development*, *34*(4), 665–684.

Ahmed, A. U., & del Nino, C. (2002). The Food for Education Program in Bangladesh: An evaluation of its impact on educational attainment and food security. *Food Consumption and Nutrition Division Working Paper*. Washington, DC: International Food Policy Research Institute.

Antonovics, K. L., & Goldberger, A. S. (2005). Does increasing women's schooling raise the schooling of the next generation? Comment. *American Economic Review*, 95(5): 1738–44.

Bates, L. M., Maselko, J., & Schuler, S. R. (2007). Women's education and the timing of marriage and childbearing in the next generation: evidence from rural Bangladesh. *Studies in Family Planning*, *38*(2), 101–112.

Baulch, B. (2011). The medium-term impact of the primary education stipend in rural Bangladesh. *Journal of Development Effectiveness*, *3*(2), 243–262.

Behrman, J. R. (1997). Mother's schooling and child education: A survey. *Working Paper*. Philadelphia: University of Pennsylvania.

Behrman, J. R., Foster, A.,D., Rosenzweig, M. R., & Vashishtha, P. (1999). Women's schooling, home teaching, and economic growth. *Journal of Political Economy*, 107(4), 682-714.

Behrman, J. R., & Rosenzweig, M. R. (2005). Does increasing women's schooling raise the schooling of the next generation? Reply. *American Economic Review*, 95(5): 1745–51.

Bhuiya, A., & Streatfield, K. (1991). Mothers' education and survival of female children in a rural area of Bangladesh. *Population Studies*, *45*(2), 253–264.

Bicego, G., T., & Boerma, J., T. (1993). Maternal education and child survival: a comparative study of survey data from 17 countries. *Social Science and Medicine,* 36(9), 1207-1227.

Black, S. E., Devereux, P., J., & Salvanes K., G. (2005). Why the apple doesn't fall far: understanding intergenerational transmission of human capital. *The American Economic Review*, 95(1), 437-49.

Caldwell, J. C. (1979). Education as a factor in mortality decline: an examination of Nigerian data. *Population Studies*, 33(3), 395–413.

Caldwell, J. C. (1980). Mass education as a determinant of the timing of fertility decline. *Population and Development Review*, 6(2), 225–255.

Carter, M. R., & Barrett, C. B. (2006). The economics of poverty traps and persistent poverty: An

asset-based approach. *Journal of Development Studies*, *42*(2), 178–199.

Carvalho, L. (2012). Childhood circumstances and the intergenerational transmission of socioeconomic status. *Demography*, *49*(3), 913–938.

Chevalier, A., Harmon, C., O'Sullivan, V., & Walker, I. (2013). The impact of parental income and education on the schooling of their children. *IZA Journal of Labor Economics*, *2*(1), 8.

Cleland, J. & Van Ginneken, J. (1988). Maternal education and child survival in developing countries: the search for pathways of influence. *Social Science and Medicine* (27)12, 1357-1368.

Cox, D. R. (1972). Regression models and life-tables (with discussion). *Journal of the Royal Statistical Society*, Series B 34: 187-220.

Demographic Health Survey (DHS). (2013). Bangladesh DHS 2011 final report. Dhaka, Bangladesh & Calverton, Maryland: National Institute of Population and Training, Mitra and Associates & MEASURE DHS, ICF International.

Fiszbein, A. & Schady, N. (2009). Conditional cash transfers: reducing present and future poverty. *Wold Bank Policy Research Report*.Washington, DC: The World Bank.

Foster, A. D., & Rosenzweig, M.R. (2002). Household Division and Rural Economic Growth. *The Review of Economic Studies*, 69(4), 839-69.

Gage, T. B., Fang, F., O'Neill, E., & DiRienzo, G. (2013). Maternal education, birth weight, and infant mortality in the United States. *Demography* 50:615–635.

Grant, M. J., & Behrman, J. R. (2010). Gender gaps in educational attainment in less developed countries. *Population and Development Review*, *36*(1), 71–89.

Guldan, G. S., Zeitlin, M. F., Beiser, A. S., & Super, C. M. (1993). Maternal education and child feeding practices in rural Bangladesh. *Social Science & Medicine,* 36(7): 925-935.

Haddad, L, J. Hoddinott, & H. Alderman, eds. (1997). *Intrahousehold resource allocation in developing countries: models, methods, and policy*. Baltimore: Johns Hopkins University Press.

Hallman, K. (2003). Mother-Father resources, marriage payments, and girl-boy health in rural Bangladesh. In A. R. Quisumbing (Ed.), *Household decisions, gender and development: A synthesis of recent research* (pp. 115-120). Baltimore: Johns Hopkins University Press.

Holmlund, H., Lindahl, M., & Plug, E. (2011). The causal effect of parents schooling on children's schooling: a comparison of estimation methods. *Journal of Economic Literature*, *49*(3), 615–651.

Hossain, S. (1989). Effect of public programs on family size, child education and health. *Journal of Development Economics,* 30, 145-158.

Frost, M., R. Forste & D. W.Haas. (2005). Maternal education and child nutritional status in Bolivia: finding the links. *Social Science & Medicine,* 60, 395–407.

Jones, P.W. (2012). World Bank financing of education: lending, learning and development. Washington DC: The World Bank.

Kalil, A., Ryan, R., & Corey, M. (2012). Diverging destinies: maternal education and the developmental gradient in time with children. *Demography*, *49*(4), 1361–1383.

King, E. & Mason, A., D. (2001). Engendering development: through gender equality in rights, resources, and voice. *World Bank Policy Research Report*. New York: World Bank and Oxford University Press.

McQueston, K., Silverman, R., & Glassman, A. (2013). The efficacy of interventions to reduce adolescent childbearing in low and middle income countries: a systematic review. *Studies in Family Planning Family,* 44(4): 369-387.

Narayan, D., Patel, R., Schafft, K., Rademacher, A., & Koch-Schulte, S. (2000). *Voices of the poor: Can anyone hear us? New* York: Oxford University Press for the World Bank.

Quisumbing, A.R., Maluccio, J. (2003). Resources at marriage and intrahousehold allocation: evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. *Oxford Bulleting of Economics and Statistics,* 65 (3): 283 – 327.

Quisumbing, A.R. (2003) (Ed.), *Household decisions, gender and development: A synthesis of recent research*. Baltimore: Johns Hopkins University Press.

Schurmann, A. T. (2009). Review of the Bangladesh Female Secondary School Stipend Project using a social exclusion framework. *Journal of Health, Population, and Nutrition*, *27*(4), 505.

Semba, R. D., de Pee, S., Sun, K., Sari, M., Akhter, N., & Bloem, M. W. (2008). Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. *The Lancet*, *371*(9609), 322–328.

Sherraden, M. (1991). *Assets and the poor: A new American welfare policy*. Armonk, NY: ME Sharpe Inc.

Smith-Greenaway, E. (2013). Maternal reading skills and child mortality in Nigeria: A reassessment of why education matters. *Demography*, *50*(5), 1551–1561.

Strauss, J. & D. Thomas. (1995). Human resources: Empirical modeling of household and family decisions. In Jere Behrman and T. N. Srinivasan (Eds.), *Handbook of development economics (pp. 1885-2023)*. Amsterdam: North-Holland Publishing Company.

Thomas, D., Contreras, D., & Frankenberg, E. (2002). Distribution of power within the househosld and child health. Mimeograph. Los Angeles: University of California Los Angeles.

United Nations Development Program (UNDP). (2011). Bangladesh country profile. Available online:http://data.un.org/CountryProfile.aspx?crName=Bangladesh
Accessed December 4th 2013

United Nationals Educational, Scientific and Cultural Organization (UNESCO). (2011). Bangladesh Country Statistics. Available online:

http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121&IF_Language=en&BR_Country=500
Accessed December 4th 2013

Yount, K. M., Maluccio, J. A., Behrman, J. R., Hoddinott, J., Murphy, A., & Ramakrishnan, U. (2013). Parental resources, schooling achievements, and gender schooling gaps: Evidence of change over 25 years in rural Guatemala. *Population Research and Policy Review*, *32*(4), 495–528.

World Bank. (2009). Abolishing school fees in Africa: Lessons from Ethiopia, Ghana, Kenya, Malawi and Mozambique. *Research Report*. Washington DC: The World Bank.