The Effect of Female Education on Marital Matches and Child Health in Bangladesh*

Youjin Hahn[a], Kanti Nuzhat[b], Hee-Seung Yang[c]

[a] School of Economics, Yonsei University, Korea

[c] Department of Economics, North South University, Bangladesh

[b] Department of Economics, Monash University, Australia

Abstract

This paper examines the effects of female education on marriage outcomes by exploiting the exogenous variation generated by the Female Secondary School Stipend Program in Bangladesh, which made secondary education free for rural girls. Our findings shows that an additional year of female education leads to an increase in 0.71 years of husband's education and better educated women match with spouses who have better occupations and are closer in age to their own. Those women seem to experience greater autonomy in making decisions on receiving their own health care and have fewer children. Furthermore, their children have better health outcomes, as measured by height-for-age and weight-for-age. Overall, our results provide supporting evidence of assortative mating, suggesting that the marriage market is one of the primary channels through which women's education affects their life outcomes.

Keywords: Female education, school stipend program, assortative mating, spouse characteristics, child health, Instrumental variable, Bangladesh

JEL: I25, J12, J13, O12

* We thank Julie Cullen, Asadul Islam, Pushkar Maitra, Russell Smyth, Haishan Yuan, and seminar participants at Monash University.

1. Introduction

It is well known that education plays an important role in shaping women's economic and socioeconomic outcomes through various channels such as increased opportunities in the labor market, better health, financial independence, and empowerment. While education has such a direct influence on individuals' own life outcomes, it also has important implications for their partners' characteristics and other marital outcomes such as their children's health (Gronqvist and Hall, 2013; Güneş, 2015). In particular, women's schooling is strongly related to their husband's education level. There is substantial empirical evidence showing a positive relationship between a couple's educational attainments (Mare 1991; Pencavel 1998; Lewis and Oppenheimer 2000; Behrman and Rosenzweig 2002; Fernandez, Guner, and Knowles 2005; McCrary and Royer 2011; Anderberg and Zhu 2014). Earlier studies pose several reasons for this positive association. First, education facilitates social interactions with potential partners, increasing the likelihood of meeting a potential partner with similar levels of education at a low search cost. This effect is amplified because education is also likely to affect one's occupational choice and social contacts (Nielsen and Svarer 2009; Anderberg and Zhu 2014; Mansour and McKinnish 2014). Second, education increases future earnings, which makes educated individuals more attractive to a skilled potential partner (Anderberg and Zhu 2014).

Although several studies have found evidence of positive assortative mating in education, which implies resemblance in education and age between partners, there have been empirical challenges that make it difficult to identify causality: unobserved factors affecting education might have an independent impact on marriage decisions. In order to address the concerns of potential endogeneity, studies on the effect of education on marriage outcomes have employed compulsory schooling laws or timing of births as exogenous variation predicting educational attainment. For instance, Anderberg and Zhu (2014) find that an increase in education has a positive effect on the probability of marrying a husband with some academic qualification, using variation in years of education caused by changes in the compulsory schooling laws in the United Kingdom. Similarly, using data from the United States, McCrary and Royer (2011) show that women born just after the school entry date have substantially lower schooling and thus, have younger and less educated husbands compared to women who were born just before the school entry date. Lefgren and McIntyre (2006) find that women's education increases husband's income using the quarter of birth as an instrument for education.

Assortative mating also has important implications for intergenerational outcomes. Decisions relating to how many children to have and whether to invest in children's health and

education might be affected not only by the mother's education, but also by her spouse's characteristics or preferences (Fafchamps and Quisumbing 2008; Lavy and Zablotsky 2011). Thus, spouse's education may play a vital role in a woman's well-being as husbands' and wives' education may be complements and can jointly lead to better outcomes within marriage, such as higher household income and greater marital stability, which can increase the social return to education (Weiss and Willis 1997).

However, much of the existing evidence is from developed countries and research on the role of education in marriage outcomes in the context of developing countries is still sparse (Lochner 2011).[3] Our paper contributes to the literature on assortative mating and child health in the context of a developing country by exploring how increased female education affects spouse's characteristics and other marital outcomes using the Female Secondary School Stipend Program (FSSSP) in Bangladesh as an instrumental variable (IV). The FSSSP was launched by the Government of Bangladesh in 1994 with the aim of encouraging female education in rural areas. Earlier studies show that the stipend program substantially increased rural girls' secondary school enrolment (Khandker et al., 2003; Hahn et al., 2016). The timing of the introduction of the program generated exogenous variation in the duration of exposure to the program for rural girls of secondary school age. We use eligibility for the stipend program as an IV to estimate the causal effects of female education on marital outcomes and child health.

Conceptually, the effect of increased female education on her partner's quality is ambiguous in developing countries such as Bangladesh, where there is a strong preference for younger brides and teenage marriage for women is prevalent (Foster and Kahn 2000; Mahmud 2003; Field and Ambrus 2008). For example, the mean age at marriage of girls in Bangladesh was 14 years old in 1990.[4] Women with more education are likely to delay marriage because they are in school for longer periods and may have better labor market prospects.

There is also a cost in delaying marriage for women in developing countries such as Bangladesh; Chowdhury and Mallick (2014) show that highly educated women paid more dowry (a payment from the wife's family to the husband at the time of marriage and before consummation) than comparable less educated women, and this may not be due to education

[3] Boulier and Rosenzweig (1984) and Fafchamps and Quisumbing (2005) examine the positive assortative matching in rural Ethiopia and in the Philippines, respectively. Boulier and Rosenzweig (1984) use father's education, female unemployment rate, and infant mortality as instruments for female education. Fafchamps and Quisumbing (2005) examine the correlations between characteristics of husbands and wives at the time of marriage.

[4] Source: Bangladesh Bureau of Statistics 2012.

per se but rather due to their delayed marriage. Moreover, the cost of searching for a partner may rise even further for more educated women, as their delayed marriage may increase competition for scarce grooms in the marriage market, eventually influencing the quality of their spouses. This potential negative impact of education from the perspective of women in less developed countries is in contrast to the findings suggested by previous studies on assortative mating, which predict that more educated individuals are likely to meet partners with similar levels of education because of their preferences or due to low search cost. Thus, it is an empirical question to examine the effect of female schooling on mate quality in developing countries.

Among developed countries, there are lots of studies that look at the role of maternal education in improving child health outcomes, but they find mixed results (for instance, see Currie and Moretti 2003; McCrary and Royer 2011). Most of them have studied the effect of primary school completion using natural experiments. For instance, Güneş (2015) shows that mother's primary school completion improves child health, measured by height-for-age and weight-for-age using a change in the compulsory schooling law in Turkey as an instrument. Only a few studies have examined the causal effects of female secondary school education on child health in developing countries. Higher levels of schooling may be more important than primary schooling (Lochner 2011). One notable exception is Grepin and Bharadwaj (2015), who find that increased maternal education leads to a decline in infant mortality using rapid expansion of access to secondary schools in Zimbabwe as a natural experiment.

In estimating the effect of women's education on marital outcomes, using the stipend program as an instrument, our first-stage result shows that stipend-eligible women received 1.2 years of additional schooling compared to non-eligible women. An extra year of education among married women increases husband's education by 0.71 years. We also find that women with more education married husbands who had a better occupation and who were closer in age to their own. More educated women experience greater autonomy in making decisions about their own health care and their children have better health outcomes, measured by height-for-age, weight-for-age, and hemoglobin level. We also examine child health outcomes using different sample restrictions, in order to provide robustness to the analysis of the effects of mothers' education on child health.

Overall, our results provide support for educational assortative mating and improvement in women's life outcomes, suggesting that the marriage market is one of the primary channels through which women's education affects their welfare in the context of Bangladesh (Lefgren and McIntyre 2006; Chiappori, Iyigun, and Weiss 2009).

The remainder of the paper is organized as follows. Section 2 describes the background of the stipend program in Bangladesh. In Section 3, we discuss our identification strategy. After describing the data in Section 4, we present the results of our estimation and robustness check in Section 5. Section 6 concludes.

2. Education System and Female Stipend School Stipend Program in Bangladesh

The education system in Bangladesh is divided into three levels: primary (grades 1-5, ages 6-10), secondary (grades 6-10, ages 11-15), and tertiary (grades 11 and higher, ages 16 and higher) levels. Primary education is free and compulsory for all children up to grade 5 after the Primary Education Compulsory Act was introduced in 1990. In contrast, the secondary education requires payment of tuition fees along with other school expenses such as transportation, stationery, books, and examination fees, and thus enrolment in secondary schools had been much lower than that in primary schools, especially for girls. For example, in 1991, the enrolment rate in primary schools was 75 percent for girls and 85 percent for boys, while it was only 14 percent for girls and 25 percent for boys in secondary schools.[6] The gender disparity in the attainment of secondary education may be due to low returns to female schooling in Bangladesh.[7] The secondary school attendance among girls, however, showed a marked increase since the mid-1990s: in 2001, the number of girls attending secondary schools increased by about three times compared to enrollment in 1991, while the number of boys in secondary schools increased by 76 percent over the same period.[8] As a result, the ratio of females to males in secondary schools was reversed in 2000, and in 2001 the female-to-male ratio in secondary school enrolment increased to 109.[9]

The substantial increase in girls' secondary school enrollment in Bangladesh is often attributed to the introduction of the Female Secondary School Stipend programs (FSSSP) (Asadullah and Chaudhury 2009). The FSSSP was introduced in 1994 by the government of Bangladesh to mitigate gender disparity in secondary schools. The main goals of the program are to increase female secondary school enrolment and completion rates, and thereby raise the supply of educated women who can fully contribute to the economic and social development of the country (Khandker et al. 2003; World Bank 2003; Directorate of Secondary and Higher Education 2015). The stipend is offered to rural girls in secondary schools from grades six to

[6] Source: 1991 Bangladesh Preliminary Census.
[7] One of the possible explanations for the low returns to female schooling is that there is a high opportunity cost of greater schooling in the sense that it results in a less desirable spouse or higher dowry (Field and Ambrus 2008).
[8] Authors' calculation based on BANBEIS.
[9] Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.

ten to cover the bulk of the educational expenses including tuition fees with the stipend amount differing by grade level. In order to receive a stipend, a girl needs to satisfy three criteria. First, she is required to maintain 75 percent attendance rate in school. Second, she needs to achieve satisfactory academic proficiency, namely 45 percent test score in annual school exams. Finally, she must remain unmarried. Earlier studies suggest that the FSSSP has had a positive impact on female education (Khandker et al. 2003; Mahmud 2003; Hahn et al. 2016).[11]

Girls enrolled in grades 6-10 were the target recipients of the FSSSP. But the program was not introduced for all grades from its beginning as shown in Table 1 (a). In 1994, the program awarded a stipend only to rural girls enrolled in grades 6 and 9. In 1995, the stipend was awarded to girls in all grades except grade 8. Since 1996, all female students meeting the eligibility requirements have received the stipend (Khandker et al. 2003). Thus, some girls received the stipend for five years, while other girls received the stipend only for two years. There were no cohorts receiving stipends for one, three or four years. The girls who were already in grade 10 and higher in 1994 received no stipend. We use this exogenous variation in duration of stipend receipt generated by the timing of the introduction of the program to examine the causal effect of female education.

[Table 1]

3. Empirical Strategy

Identifying the effects of female education on husband's characteristics or children's health using OLS estimation is problematic as there might be unobserved factors leading to a correlation between the error term and female education. For instance, households with positive attitudes toward girls' education tend to invest more in their daughter's education and encourage them to pursue their economic and social objectives. For children's health, unobservable preferences tend to affect both women's own education and their children's health. Thus, the positive correlation between female education and husband's characteristics or children's health might be driven by unobserved household preferences and such omitted variables are likely to lead to biased OLS estimates.

To circumvent these problems, we use eligibility for the stipend program (i.e., variation in the exposure to the program across cohorts and areas) as an instrument for educational

[11] Mahmud (2003) cautiously points out that the effects of the FSSSP on female school participation are mixed and remain unclear in the absence of a rigorous impact assessment study since while there has been increased enrolment and attendance, retention and performance have been poorer.

attainment. The exclusion restriction requires that the stipend program affects marriage outcomes only through women's education. We discuss the validity of the eligibility for the program as an IV in more detail in the next section. The first-stage model is as follows:

$$Edu_i = \alpha_0 + \sum_{j=1}^{2} \beta_j Cohort_{ji} + \delta\, Rural_i + \sum_{j=1}^{2} \pi_j Cohort_{ji} \times Rural_i + \lambda X_i + v_i, \qquad (1)$$

where Edu_i is the outcome of interest, which is years of schooling for woman i.[12] *Rural* is a dummy variable indicating whether woman i currently resides in a rural area.[13] $Cohort_{ji}$ $\{j = 1, 2\}$ indicates dummies for the two cohorts, which are defined based on the number of years during which the girls would have been eligible for the stipend program if they were in rural areas. As shown in Table 1 (b), the staggered introduction of the program allows us to define the age cohorts used in equation (1). Cohort 1 is a dummy variable equal to 1 for girls who were eligible for a stipend for five years had they continued their secondary education. They were 6 to 11 years old when the stipend program was introduced in 1994 (i.e., grades 1 to 5 in primary school or in grade 6 in secondary school) and born between 1983 and 1998. Cohort 2 includes girls who were eligible for a stipend only for two years. They were 12 to 14 years old in 1994 (i.e., grades 7 to 9 in secondary school) and born between 1980 and 1982.[14] The base category is Cohort 3, which includes female students who were not eligible for the stipend. They were 15 to 23 years old in 1994 (i.e., grade 10 and above) and born between 1971 and 1979 and thus did not receive any stipend. The vector *X* includes the following set of controls: religion (whether Muslim or not), wealth index (scale of 1 to 5, 5 being the richest), and extended family (as opposed to nuclear family).

The main source of identifying variation is the exposure of a woman to the program in her childhood. One aspect of our exposure (or eligibility) measure is that younger women had greater exposure to the stipend program. In addition, access to secondary education may vary by year and area, and unobserved sub-district characteristics might be correlated both with female education and partner choice. To account for this selection, we also control for fixed effects of age, survey year, and geographical division (six divisions in Bangladesh). The sample

[12] We also use a dummy as a dependent variable indicating whether women *i* completed secondary schooling. The result is reported in Appendix X.

[13] We do not have information where they had lived during their secondary school ages. The internal migration rate in Bangladesh, however, is very low (Bangladesh Population and Housing Census 2011).

[14] Students in grade 7 did not receive a stipend in 1994 and 1995, but they received it for two consecutive years in 1996 and 1997 (in their grades 9 and 10). Students in grade 8 did not receive a stipend in 1994 but received it for two years in 1995 and 1996 (in their grades 9 and 10). Students in grade 9 received a stipend in 1994 and 1995.

is limited to women whose birth year is between 1971 and 1988. We put an upper limit of 23 years old in 1994 for cohort 3 to focus on girls who just missed out on receiving a stipend.

We expect π_j to have a positive sign if the FSSSP encourages girls to remain in school and attain higher education. The coefficient estimate of π_1 reflects the effect of receiving a stipend for five years and π_2 for two years. π_1 is expected to be larger than π_2 as girls in cohort 1 received more stipends than those in cohort 2, and thus, girls in cohort 1 are likely to have more schooling than cohort 2.

We then estimate the causal effect of female education on their marriage outcomes using the instrumental variable (IV) approach. The second stage equation is specified as follows:

$$Y_i = \sigma_0 + \sum_{j=1}^{2} \eta_j Cohort_{ji} + \rho\, Rural_i + \theta \widehat{Edu} + \sigma X_i + \mu_i, \quad (2)$$

where Y is the outcome of interest, such as husband's education, occupation, age gap between spouses, women's autonomy measures, and children's health outcomes. Female education is instrumented using the first stage regression and estimated using 2SLS. The same variables as in the first stage equation are controlled for, excepting the variable of eligibility ($Cohort_{ji} \times Rural_i$). We cluster standard errors at the level of intervention, i.e., birth year × rural/urban level.

We note that the IV estimates correspond to the Local Average Treatment Effect (LATE). That is, our estimates consider the effect of education only for women whose educational attainment was affected by the FSSSP. For instance, our IV estimates may reflect the experience of women from low socioeconomic backgrounds if poor households are more likely to comply with the stipend program while rich families would have sent daughters to school even without the stipend. On the other hand, the estimates may reflect the outcomes for more motivated women who are interested in education, and who thus take advantage of the stipend program.

4. Data and Descriptive Statistics

This study uses the most recent Demographic and Health Survey (DHS) conducted in Bangladesh in 2011 and 2014. It is a nationally representative survey covering the entire population residing in non-institutional dwelling units in the country. The 2004 and 2007 DHS cover 361 sample points (clusters), while the 2011 DHS covers 600 sample points; sample points are divided into urban and rural areas. For each cluster, an average of 30 households

were selected. The DHS is designed to provide information on demographic and socioeconomic characteristics of the household, including age, sex, educational attainment, religion, and marital and employment status. It also provides data on fertility, childhood mortality, family planning methods, maternal and child health, nutrition, knowledge regarding sexually transmitted infections, and community-level data on the availability of health and family planning services. As we look at marital outcomes including spouse characteristics and child health, we limit our sample to ever-married women aged 6 to 23 years when the FSSSP was introduced in 1994; thus, these women were 23–40 in 2011 and 26–43 in 2014 as in Table 1 (b).

Table 2 provides descriptive statistics of the variables used in the study. Panel A shows that 32–40 percent of women in the sample are from cohort 1 and 22–26 percent of women are eligible for the full stipend for five years as they reside in rural areas, which depends on survey years. From 17 to 19 percent of women are from cohort 2 and around 11 percent are eligible for the partial stipend for two years. About two-thirds of the sample lives in rural areas and nearly half of married women live in extended families with their in-laws. The average age for women in the sample is 28 and the age gap (husband's age − wife's age) is about 9 years. Women in the sample were married at less than 16 years old. Around 90 percent of women are Muslim and their average years of schooling are 4.83.

[Table 2]

Panel B in Table 2 presents husband's characteristics, including education, employment status, occupation, and whether he has a bank account. Husband's completed years of schooling are 5.20 on average, which is slightly higher than wives' education level. Of all husbands, 98 percent participate in the labor force: on average, 26 percent are employed in the agricultural sector, 36 percent in the informal sector, and 38 percent in the formal sector. The agricultural sector includes farmers, agricultural workers, fishermen, and poultry farming workers. The informal sector include semi-skilled labor such as rickshaw drivers, carpenters, domestic servants, and factory workers, while the formal sector includes skilled labor such as doctors, lawyers, accountants, entrepreneurs, traders, religious leaders, and factory workers who are skilled and trained. Panel C presents statistics on the use of contraceptives: on average, 59 percent of women use contraception and 14 percent use some type of contraceptive method that is observable by their husbands, such as condoms or male sterilization as well as abstinence or withdrawal. Women have a say in decisions on household matters, such as getting their own

health care and purchasing household goods, as well as visiting families, only 10–20 percent of the time. The last panel presents statistics for children's health outcomes. Height-for-age is a commonly used measure for long-term health status, while weight-for-age is a measure for current health and malnutrition status (Thomas, Strauss, and Henriques 1991; Güneş 2015). On average, children's height-for-age and weight-for-age are 1.51 and 1.72 standard deviations below zero.

5. Results

5.1. First Stage Results on Women's Education

Table 3 presents the first-stage regression results of the impacts of the FSSSP on women's education based on equation (1). Column 1 reports the baseline results without including controls, such as religion, wealth index, and family type as well as age, survey year, and division fixed effects. We gradually include control variables from columns 1 to 3. We do not interpret the coefficients of these control variables, as they are not causally estimated. The control variables are significant predictors of outcome variables but have little effect on our key variables of interest, i.e., treatment effects of (*Cohort 1* × *Rural*) and (*Cohort 2* × *Rural*). In column 3, for rural girls in cohort 1, the exposure to the stipend program increases years of education by 1.21 years. This corresponds to about 25 percent of the average years of schooling. For girls in cohort 2, the eligibility for the stipend program increases years of education by 0.67 years, corresponding to a 13.6 percent increase in the mean years of schooling. The results indicate that the instrument is highly significant with positive coefficients in each specification. The *F*-statistic is 104.80 in column 3, supporting the validity of the instrument.

[Table 3]

Table 4 presents two placebo tests. For the difference-in-differences methodology to provide unbiased estimates, there should be parallel-trends between early and later cohorts for both rural and urban areas. That is, the underlying trend in educational attainment for Cohort 1 and Cohort 2 would have been parallel to that for Cohort 3 in the absence of the treatment. In Panel A, we divide Cohort 3 (base group) into two sub-cohorts: those who were born between 1975 and 1979 (Cohort 3_1) and between 1971 and 1974 (Cohort 3_2). If the change in education over these two cohorts is significantly different, this would violate the assumption of parallel-trends. Panel A in Table 4 shows that the coefficient for *Cohort 3_1* × *Rural* is not

statistically different at the 10 percent level from that for *Cohort 3_2* × *Rural*, which means that there has been no differential trend across ages between rural and urban.

[Table 4]

Another placebo test is to use cohorts all of whom were not eligible for the stipend program since they were born before 1979. Panel B in Table 4 uses the sample of those who were born between 1961 and 1978: Pseudo Cohort 1 was born in, or after, 1973; Pseudo Cohort 2 was born between 1970 and 1972; Pseudo Cohort 3 was born in 1969 or before, and thus all sample women were not eligible for the program and the FSSSP is expected not to have significant effects on them. Panel B confirms that those pseudo cohorts are not significantly affected by the program, suggesting that the difference-in-difference estimates in the first-stage might not be biased.

5.2. Age Gap between Spouses and Spousal Characteristics

Having shown that the FSSSP affected female education, we now report the OLS and IV estimates to provide evidence on the effects of education on marriage outcomes for women whose educational attainment was affected by the FSSSP. All estimations control for the same variables in column 3 of Table 3.

In column 1 in Table 5, the OLS specification with all controls shows that women's education increases husband's education by 0.694 years, implying that women with more education married more educated partners. The OLS estimation, however, might be biased due to omitted variables and endogeneity as discussed above. In column 2, the IV specification is reported based on equation (2). The resulting coefficient of 0.717 is quite similar to the OLS estimate. The IV estimate suggests that women's additional year of schooling increases husband's education by 0.717 years on average, which is consistent with positive educational assortative mating. Our estimate of the increase in husband's education is double the size of that in previous studies in developed countries, such as in the U.S., where it was found that husbands' education increased by 0.385 years as a result of an additional year of female education (Behrman and Rosenzweig 2002). These differences reflect the fact that the base levels of education for both males and females are low in Bangladesh compared with developed countries.

[Table 5]

Columns 3 and 4 in Table 5 present the results on the age gap between spouses, another matching element. Education has changed the long-standing practice of women marrying much older men in Bangladesh. The OLS estimate in column 3 shows a reduction of 0.153 years in the age gap between spouses, while the IV estimate in column 4 shows a reduction of 0.396 years in the age gap. There has been a large age difference between spouses in Bangladesh: the mean in our study is 9.2 years (Table 2). Thus, increased female education has reduced the age gap between spouses by 4.3 percent in rural areas. Our result is consistent with that of Mansour and McKinnish (2014), who document that educational attainment and age differences among couples are inversely related.

Table 6 reports the effects of women's education on husbands' occupations; i.e., whether they work in the agricultural sector, the informal sector, or the formal sector. We do not examine the effect on the likelihood of husband's labor market participation as most husbands in the sample (98 percent) are reported to be working. Likewise, women's labor supply was not affected as women usually do not participate in the labor force in Bangladesh. Spouse's occupation is one of the most important factors on which marriage decisions are based. In Bangladesh, educated women in rural areas prefer marrying partners employed in the formal sectors, which require higher education and skill, as getting married to a partner with a professional job often leads to higher income for the family. The IV estimates in panel B show that as women receive more education, the likelihood that they marry men who work in the agricultural or informal sectors declines by 5.1 percentage points and 1.3 percentage points (not statistically significant), while their partners are more likely by 6 percentage points to work in the formal sector. Although we do not have data on wage income, we can surmise that those employed in the formal sector earn more than those employed in the agricultural or informal sector.

Comparing the OLS and IV estimates, the IV estimates are often higher in magnitude than the OLS estimates and they even change the sign for the likelihood of husband working in the formal sector, indicating that the OLS estimates are likely to suffer from bias. In addition, IV estimates are specific to the subpopulation of women whose education was affected by the school stipend program. That is, IV estimates reflect the effect of female education only for a subset of women who would not have enrolled in secondary school in the absence of the stipend program and thus, increased education might have had a large impact on the marriage outcomes.

[Table 6]

5.3. Women's Decisions on Contraceptive Methods and Autonomy

Schooling may improve knowledge about the use of contraceptive methods (Rosenzweig and Schultz 1989). About 59 percent of women in the sample reported using some form of contraception. Of these, the pill and injection are concealable methods while condoms, male sterilization, abstinence, and withdrawal are not. The IV estimates suggest that although women's education does not influence the overall likelihood of using any contraceptive method, it increased the probability of using contraception that is observable by their husband by 2.1 percentage points. Ahmed et al. (2010) also show that the likelihood of women using modern contraceptives is higher among women who have completed primary education in developing countries. Use of observable contraceptives can serve as a proxy for determining women's autonomy in decision making. Our results indicate that increased education encourages women to use more observable actions to control their fertility and that this might show their improved empowerment. Given that in Bangladesh women often do not use contraception because their husbands do not approve of family planning (Kamal 2000), women's education might influence husband's perception of family planning and use of contraceptive methods.

[Table 7]

The DHS data contain information on women's decision-making regarding their own health care, household purchases, and visits to family or relatives. Women's education may change her own and her husband's perception of gender norms and increase women's autonomy within a relationship. In columns 3 to 5 in Table 7, we examine whether increased education affects women's autonomy. The effect on women's autonomy should reflect not only increased female education, but also perceptions of their more educated husbands. Thus, we expect the effect on female autonomy to be larger. Women's education increased the probability of making independent decisions about their own health care by 2 percentage points, or about a 12.5 percent increase from the baseline of 16 percent, while education does not have much influence on purchasing household goods and visiting relatives. Overall, the results in this section suggest that the increase in women's education may serve a role in the use of birth control measures as well as increasing the likelihood of independent decision making in some measures through the potential channels of women's bargaining power and changes in their partner's recognition of female autonomy.

5.4. Effects of Women's Education on Fertility and Children's Health

So far, we have documented that a woman's increased level of schooling has a positive effect on husband's education and occupation, use of contraception, and woman's autonomy in seeking health care. The natural question arising from these results is whether the positive outcomes carry over to the next generation. In Table 8, we present the results for children's health outcomes.[15] Column 1 in panel B shows that a women's additional year of schooling reduces fertility by 0.238 on average, which is larger than the OLS estimate. The reduction in fertility is roughly 10 percent of the baseline fertility of 2.4. This finding is consistent with previous studies in the context of developing countries.[16]

[Table 8]

Table 8 also shows the effect of women's education on children's health outcomes.[17] The first two health measures, height-for-age and weight-for-age measured in standard deviation, are available in all survey years, while information on hemoglobin and anemia is available only in 2011. According to WHO, low height-for-age reflects under-nutrition or suboptimal health, while low weight-for-age is influenced by both the height-for-age of the child and his or her weight-for-height. Stunting among children is a common problem in Bangladesh, where 43 percent of children under the age of five are stunted and 41 percent are underweight (UNICEF 2009). Hemoglobin and anemia are commonly used measures for the severity of iron deficiency.

The IV results show that an extra year of mother's education increased children's height-for-age by 0.11 standard deviations and weight-for-age by 0.08 standard deviations. These estimates are comparable to the findings by Chen and Li (2009). They found that an extra year of maternal education increases the height-for-age of own birth children by 0.028–0.091 standard deviations and of adopted children by 0.028–0.064 standard deviations in China. Güneş (2015) also found mother's primary school completion is likely to affect infant and child health. The finding in Güneş (2015) is comparable to Chen and Li (2009) and our estimates, when converted to per year basis of increased education.

[15] We also tried to examine the effect on child's education (i.e., whether school-aged children are currently enrolled in school). However, the DHS contains much missing information on mother's line number, which makes it difficult to link a mother and a child, especially when there are multiple women in the household.
[16] Breierova and Duflo (2004), Osili and Long (2008), and Duflo, Dupas, and Kremer (2015) found that increased schooling led to a reduction in fertility in Indonesia, Nigeria, and Kenya, respectively.
[17] Child health outcome measures are based on the oldest child who was born within five years of the survey.

One concern in attributing the maternal education as a conduit for the positive children's health outcomes is survival bias; that is, the children who survive at the time of the survey are likely healthier than those who do not survive. In a related paper, Grepin and Bharadwaj (2015) show that an increase in maternal education due to expanding access to secondary schools in Zimbabwe led to a greater reduction in children mortality by 21 percent. Their results indicate that there is a less concern for survival bias as now more children, including those who are marginal children, are likely to survive as a result of increased maternal education.

A woman's education may affect her child's health outcomes through several channels. For instance, more educated women might have greater efficiency in producing better child health (Rosenzweig and Schultz 1989). This is pertinent given that our findings in Table 7 implies that having more education increased the probability of a woman making independent decisions regarding her own health care. Thus, education may affect a women's health-seeking behavior not just for herself but also for her children. In the context of the United States and Turkey, Currie and Moretti (2003) and Gunes (2015) find that an increase in mother's education improves infant health, and it also increases use of prenatal care and reduces smoking, suggesting that education may encourage women to have healthier behavior. Another potential channel through which woman's education affects children's health outcomes is assortative mating: as shown in Table 5, more educated women are likely to marry more educated husbands, which, in turn, reinforces better child health outcomes. Higher income may be another channel affecting health outcomes. Although we do not have a direct income measure, the higher probability of husbands' working in the formal sector as shown in Table 6 implies that children might benefit from growing up in a family with higher household income. In this study, however, we cannot distinguish between direct effects of woman's education and other indirect effects due to changes in husband's characteristics that may also affect children's health outcomes.

5.5. Heterogeneous Effects on Fertility and Child Health

We estimate equation (1) using sample restrictions based on whether the woman lives in an extended family. We define extended family to be one in which a household member's relation to the head includes: (1) son/daughter-in-law; (2) grandchild; (3) parent; (4) parent-in-law; (5) brother/sister; or (6) other relative. Thus, if the woman's household consists of more than a pair of adults and their children, she lives in an extended family. Roughly half of the women in the sample live with extended families, and the likelihood of living in extended family structures is not affected by women's education (based on the IV estimates).

Generally, extended families are important, in particular, in developing countries, where social safety nets are incomplete and most households are vulnerable to economic shocks (Cox and Fafchamps 2007). However, it is ambiguous whether living with an extended family improves effectiveness of education on children's health outcomes. Earlier, we found that women's education plays a positive role in children's health. When a woman lives in an extended family, she may receive support from in-laws in raising children, making it easier for her to focus on the quality of children's care. The effect of women's education on children's health outcomes, is thus likely to be even higher when they live in extended family structures.

However, the effect of women's education on child health is likely to be undermined if education improves a woman's labor market prospects or if having extra support in child care by family members enables a woman to work more; a woman may spend less time with, and thus not take as much care of, her children under such circumstances. Moreover, in cases in which a woman needs to care for other family members, rather than receiving support, or where she is being monitored by, or under the influence of, her in-laws, the extent to which a woman may assert positive influence on her children through her education is likely to be diminished.

In Table 9, we restrict our sample to women who live in extended families. We focus on after-marriage outcomes such as children's health, rather than pre-marriage outcomes, as the pre-marriage outcomes such as husband's characteristics are likely to be endogenously determined with whether the woman lives with an extended family. Results from panels A and B show that the effect of women's education is larger when women do not live in an extended family. The difference is quite large; the effect of education on children's height-for-age is more than double when women do not live in an extended family compared to when they do, and the effect on children's weight-for-age is roughly four times larger. The results on hemoglobin level and whether the children have anemia also consistently show more positive effects of women's education on their children's health outcomes, suggesting that monitoring of in-laws and providing extra care for elderly parents or other family members may undermine the effect of education.

[Table 9]

6. Robustness Check

One potential concern with the main results relates to the age gap between the oldest girls in the control (Cohort 3) and the youngest girls receiving the full stipend (Cohort 1). One might be worried that the age difference is too large to be a meaningful comparison. To test whether

the previous results are sensitive to the age of those cohorts, we re-estimate the main specifications using a narrower age range. To do so, we eliminate from the sample the youngest girls (bottom two years) in Cohort 1 and the oldest girls (top two years) in Cohort 3. By restricting the sample to a narrower age range, the age of the affected cohorts should be more comparable to the older cohort who already finished secondary schooling at the time of the program introduction. Table 10 [to be added] presents the results. Now the sample consists of girls born between 1973 and 1986, compared to the original sample born between 1971 and 1988. The results are almost identical to the main findings.

[Table 10, to be added]

7. Conclusion

This paper shows that rural women's marital returns to education have impacted their social and economic position through assortative mating. Despite the potential importance of female education, research on the impact of women's educational attainment on marital matches has been limited, particularly in the context of developing countries where there is a high prevalence of early marriage, teenage pregnancy, and thus worse health outcomes for children as well as low women's empowerment. We extend this literature by using the exogenous variation in female education in Bangladesh, which has experienced important demographic changes such as increased female education and lowered fertility rates over the course of the last few decades.

By using the eligibility for a stipend program in Bangladesh as an instrument, we find positive and significant effects of women's increased level of education on marital matches and other marriage outcomes. Our results suggest that, first, more educated women are more likely to marry more educated men, which indicates higher income and wealth of the spouse. Education also has an impact on the age gap between spouses, as women married partners closer to their own age, in a country where traditionally there has been a very large age gap between spouses. We also find that, educated women tend to marry men working in the formal sector rather than in the agricultural or informal sectors. These findings imply that educated women improve their socio-economic status by marrying better educated men who had better jobs and earning prospects, thus improving women's socio-economic conditions over the long term. However, an increase in women's education does not increase the likelihood of their own participation in the labor force. This result implies that one of the primary avenues through

which education is correlated with women's well-being is through the marriage market rather than the labor market.

Second, we also find that educated women have greater autonomy in decision making regarding their own health and other household matters. Women's education has important implications not only for their own life outcomes but also for improvements in the next generation's outcomes through assortative mating. If a woman marries a highly educated partner, they are both likely to have higher aspirations for their children's health, nutrition, and education; women's greater autonomy helps to realize this at the same time. Thus, our results show that women's increased education has positive intergenerational health effects, especially when they do not live with their husband's extended families.

Our estimates are specific to the subpopulation of women whose education was affected by the school stipend program. In particular, the results may disproportionally reflect the experience of women who are induced to obtain higher level of education due to the stipend program. If the compliers of the program are from the poor families, these women might be negatively selected, as their parents were willing to comply with the program because they could not afford to send daughters without a stipend. They could also be positively selected, if among the poor families more motivated parents send the girls to school due to the stipend program. Thus, these results are difficult to generalize to other groups of women.

References

Agüero, Jorge M., and Prashant Bharadwaj. 2014. "Do The More Educated Know More About Health? Evidence From Schooling and HIV Knowledge in Zimbabwe." *Economic Development and Cultural Change* 62(3): 489–517.

Ahmed, Saifuddin, Andreea A. Creanga, Duff G. Gillespie, and Amy O. Tsui. 2010. "Economic Status, Education and Empowerment: Implications for Maternal Health Service Utilization in Developing Countries." *PloS one* 5(6), doi: 10.1371/ journal. pone.0011190.

Anderberg, Dan, and Yu Zhu. 2014. "What a Difference a Term Makes: the Effect of Educational Attainment on Marital Outcomes in the UK." *Journal of Population Economics* 27(2): 387–419.

Anderson, Siwan, and Mukesh Eswaran. 2009. "What Determines Female Autonomy? Evidence from Bangladesh." *Journal of Development Economics* 90(2): 179–191.

Asadullah, Mohammad Niaz, and Nazmul Chaudhury. 2009. "Reverse Gender Gap in Schooling in Bangladesh: Insights from Urban and Rural Households." *Journal of Development Studies* 45(8): 1360–1380.

Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, Government of the People's Republic of Bangladesh. 2013. *Secondary School Dropout Survey (SSDS).*

Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh. 2010. *Statistical Yearbook of Bangladesh*.

Behrman, Jere, and Mark R. Rosenzweig. 2005. "Does Increasing Women's Schooling Raise The Schooling of The Next Generation?" *American Economic Review* 92(1): 323–334.

Bharadwaj, Prashant. 2015. "Impact of Changes in Marriage Law Implications for Fertility and School Enrollment." *Journal of Human Resources* 50(3): 614–654.

Boulier, Bryan L., and Mark R. Rosenzweig. 1984. "Schooling, Search, and Spouse Selection: Testing Economic Theories of Marriage and Household Behavior." *Journal of Political Economy* 92(4): 712–732.

Breierova, Lucia, and Esther Duflo. 2004. "The Impact of Education on Fertility and Child Mortality: Do Fathers Really Matter Less Than Mothers?" NBER Working Paper No. 10513, Cambridge, MA.

Chen, Yuyu, and Hongbin Li. 2009. "Mother's Education and Child Health: Is There a Nurturing Effect?." *Journal of Health Economics* 28(2): 413–426.

Chiappori, Pierre–Andre, Murat Iyigun, and Yoram Weiss. 2009. "Investment in Schooling and The Marriage Market." *American Economic Review* 99(5): 1689–1713.

Chowdhury, Shyamal, Debdulal Mallick, and Prabal Roy Chowdhury. "Evolution of Mehr and Dowry among Muslims in Bangladesh: Evidence from Natural Experiments." Accessed December, 2015. http://www.isid.ac.in/~epu/acegd2015/papers/Shyamal Chowdhury.pdf.

Cox, Donald, and Marcel Fafchamps. 2007. "Extended Family and Kinship Networks: Economic Insights and Evolutionary Directions." *Handbook of Development Economics* 4: 3711–3784.

Currie, Janet, and Enrico Moretti. 2003. "Mother's Education and The Intergenerational Transmission of Human Capital: Evidence from College Openings." *Quarterly Journal of Economics* 118(4): 1495–1532.

Fafchamps, Marcel, and Agnes R. Quisumbing. 2005. "Marriage, Bequest, and Assortative Matching in Rural Ethiopia." *Economic Development and Cultural Change* 53(2): 347–380.

Fafchamps, Marcel, and Agnes R. Quisumbing. 2008. "Household Formation and Marriage Markets in Rural Areas." *Handbook of Development Economics* 4: 3187–3247.

Fernandez, Raquel, Nezih Guner, and John Knowles. 2005. "Love and Money: Inequality, Education, and Marital Sorting." *Quarterly Journal of Economics* 120(1): 273–344.

Field, Erica, and Attila Ambrus. 2008. "Early Marriage, Age of Menarche, and Female Schooling Attainment in Bangladesh." *Journal of political Economy* 116(5): 881–930.

Foster, Andrew, and Nizam Khan. 2000. "Equilibrating The Marriage Market in a Rapidly Growing Population: Evidence from Rural Bangladesh." Working Paper No. 80, University of Pennsylvania.

Grépin, Karen A., and Prashant Bharadwaj. 2015. "Maternal Education and Child Mortality in Zimbabwe." *Journal of Health Economics* 44: 97–117.

Grönqvist, Hans, and Caroline Hall. 2013. "Education Policy and Early Fertility: Lessons From an Expansion of Upper Secondary Schooling." *Economics of Education Review* 37: 13–33.

Güneş, Pınar Mine. 2015. "The Role of Maternal Education in Child Health: Evidence from a Compulsory Schooling Law." *Economics of Education Review* 47: 1–16.

Hahn, Youjin, Asadul Islam, Kanti Nuzhat, Russell Smyth, and Hee-Seung Yang. 2016 "Education, Marriage and Fertility: Long-Term Evidence from a Female Stipend Program in Bangladesh." *Economic Development and Cultural Change* (Forthcoming).

Kamal, Nashid. 2000. "The Influence of Husbands on Contraceptive Use by Bangladeshi Women." *Health Policy and Planning* 15(1): 43–51.

Khandker, Shahidur, Mark Pitt, and Nobuhiko Fuwa. 2003. "Subsidy to Promote Girls' Secondary Education: The Female Stipend Program in Bangladesh." Washington, D.C.: World Bank.

Lavy, Victor, and Alexander Zablotsky. 2011. "Mother's Schooling and Fertility Under Low Female Labor Force Participation: Evidence From a Natural Experiment." NBER Working paper No.16856, Cambridge, MA.

Lefgren, Lars, and Frank McIntyre. 2006. "The Relationship Between Women's Education and Marriage Outcomes." *Journal of Labor Economics* 24(4): 787–830.

Lewis, Susan K., and Valerie K. Oppenheimer. 2000. "Educational Assortative Mating Across Marriage Markets: Nonhispanic Whites in the United States." *Demography* 37(1): 29–40.

Lochner, Lance. 2011. "Non-Production Benefits of Education: Crime, Health, and Good Citizenship." NBER Working Paper No. 16722, Cambridge, MA.

Mahmud, Simeen. 2003. "Female Secondary School Stipend Programme in Bangladesh: A Critical Assessment." Bangladesh Institute of Development Studies BIDS, Dhaka.

Mansour, Hani, and Terra McKinnish. 2014. "Who Marries Differently Aged Spouses? Ability, Education, Occupation, Earnings, and Appearance." *Review of Economics and Statistics* 96(3): 577–580.

Mare, Robert D. 1991. "Five Decades of Educational Assortative Mating." *American Sociological Review* 56(1): 15–32.

McCrary, Justin, and Heather Royer. 2011. "The Effect of Female Education on Fertility and Infant Health: Evidence from School Entry Policies Using Exact Date of Birth." *American Economic Review* 101(1): 158–195.

Directorate of Secondary and Higher Education, Ministry of Education, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh. September 2015. http://www.dshe.gov.bd/images/female_stipend.html.

Nielsen, Helena Skyt, and Michael Svarer. 2009. "Educational Homogamy How Much is Opportunities?" *Journal of Human Resources* 44(4): 1066–1086.

Osili, Una Okonkwo, and Bridget Terry Long. 2008. "Does Female Schooling Reduce Fertility? Evidence from Nigeria." *Journal of Development Economics* 87(1): 57–75.

Pascaline Dupas, Esther Duflo, and Michael Kremer. 2015. "Education, HIV, and Early Fertility: Experimental Evidence from Kenya." *American Economic Review* 105(9): 2257–2297.

Pencavel, John. 1998. "Assortative mating by schooling and the work behavior of wives and husbands." *The American Economic Review* 88(2): 326–329.

Rosenzweig, Mark R., and T. Paul Schultz. 1989. "Schooling, Information and Nonmarket Productivity: Contraceptive Use and its Effectiveness."*International Economic Review* 30(2): 457–477.

Thomas, Duncan, John Strauss, and Maria-Helena Henriques. 1991. "How does mother's education affect child height?" *Journal of Human Resources* 26(2): 183–211.

UNICEF Bangladesh. 2009. *Report on Quality Primary Education*. Dhaka.

Weiss, Yoram, and Robert J. Willis. 1997. "Match Quality, New Information, and Marital Dissolution." *Journal of Labor Economics* 15(1): S293–S329.

World Bank. 2003. *Project Performance Assessment Report Bangladesh Female Secondary School Assistance Project*. 2003. Credit 2649, Report No. 26226, Washington, D.C.: World Bank.

Table 1: Eligibility for the FSSSP and Treatment Intensity

(a) Grade Eligibility by Birth Year

Birth Year	1994	1995	1996	1997	1998	1999	2000	Cohort
1988						6	7	Cohort 1
1987					6	7	8	
1986				6	7	8	9	
1985			6	7	8	9	10	
1984		6	7	8	9	10		
1983	6	7	8	9	10			
1982	7	8	9	10				Cohort 2
1981	8	9	10					
1980	9	10						
1979	10							Cohort 3
…								
1971								

Note: Eligibility is shaded. Girls born after 1983 were eligible for 5 years from 1994 when they were in grade 6, while girls born between 1980 and 1982 were eligible for 2 years. Girls born before 1979 were not eligible as they were already in grade 10 in 1994.

(b) Age Eligibility by Data Years (2004, 2007, and 2011)

Birth Year	1994	2004	2007	2011	Cohort
1988	6	16	19	23	Cohort 1
1987	7	17	20	24	
1986	8	18	21	25	
1985	9	19	22	26	
1984	10	20	23	27	
1983	11	21	24	28	
1982	12	22	25	29	Cohort 2
1981	13	23	26	30	
1980	14	24	27	31	
1979	15	25	28	32	Cohort 3
…	…	…	…	…	
1971	23	33	36	40	

Table 2: Summary Statistics

Variables	2004		2007		2011	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
A. Individual Characteristics						
Cohort 1	0.32	0.47	0.37	0.48	0.40	0.49
Cohort 2	0.19	0.39	0.17	0.38	0.17	0.38
Cohort 1 × Rural	0.22	0.42	0.23	0.42	0.26	0.44
Cohort 2 × Rural	0.12	0.33	0.11	0.31	0.11	0.31
Rural	0.66	0.47	0.62	0.49	0.65	0.48
Wealth index (1-5; 5 is the richest)	3.15	1.45	3.21	1.45	3.17	1.44
Extended family (vs. nuclear family)	0.53	0.50	0.51	0.50	0.45	0.50
Women's Age (years)	24.51	4.98	27.06	5.18	30.70	5.23
Religion (Muslim = 1)	0.90	0.30	0.90	0.30	0.89	0.32
Women's education (years)	4.28	3.92	5.05	4.49	5.06	4.21
Age at first marriage	15.22	2.69	15.80	2.94	15.94	3.16
Age gap between spouses	9.71	5.36	9.35	5.26	9.06	5.50
B. Husband's Characteristics						
Husband's education (years)	4.73	4.61	5.33	5.03	5.43	4.95
Husband's age	34.22	7.21	36.41	7.33	39.77	7.68
Husband's working in agricultural sector	0.25	0.43	0.24	0.43	0.27	0.44
Husband's working in informal sector	0.45	0.50	0.45	0.50	0.25	0.43
Husband's working in formal sector	0.35	0.48	0.29	0.45	0.46	0.50
C. Contraception Use and Autonomy						
Contraceptive Use (yes=1)	0.54	0.50	0.56	0.50	0.64	0.48
Contraceptive observable to husband	0.12	0.33	0.13	0.33	0.16	0.37
Usually decide on own health care	0.18	0.38	0.17	0.38	0.15	0.36
Usually decide on large household purchases	0.09	0.28	0.11	0.32	0.08	0.28
Usually decide on visits to family or relatives	0.12	0.33	0.16	0.37	0.11	0.31
D. Child's Health Outcomes						
Height for age (standard deviation)	-1.61	1.28	-1.46	1.28	-1.42	1.36
Weight for age (standard deviation)	-1.76	1.11	-1.76	1.11	-1.67	1.17
Total number	7,012		6,892		10,425	

Note: Bangladesh Demographic and Health Surveys, 2004, 2007 and 2011. Samples are restricted to ever married women. The number of observations for three decision measures ("Usually decide on …") are 7,010, 6,892, and 9,892. The number of observations for child's height and weight for age are 4,090, 3,679, and 4,182 for 2004, 2007 and 2011, respectively.

Table 3: Effect of the FSSSP on Women's Education (Year)

	(1) Women's education	(2) Women's education	(3) Women's education
Cohort 1 × Rural	1.431 (0.275)***	1.209 (0.287)***	1.210 (0.089)***
Cohort 2 × Rural	0.655 (0.266)**	0.681 (0.267)**	0.666 (0.078)***
Cohort 1	0.852 (0.181)***	0.925 (0.194)***	-0.814 (0.129)***
Cohort 2	0.561 (0.178)***	0.472 (0.183)**	-0.507 (0.096)***
Rural	-2.528 (0.237)***	-0.443 (0.254)*	-0.424 (0.068)***
Muslim		-0.504 (0.105)***	-0.581 (0.097)***
Wealth index		1.506 (0.040)***	1.527 (0.041)***
Extended family		0.490 (0.067)***	0.503 (0.070)***
Observations	24329	24329	24329
R-squared	0.086	0.317	0.344
Age FE	No	No	Yes
Year FE	No	No	Yes
Division FE	No	No	Yes

Note: Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Placebo Tests

	(1) Women's education	(2) Women's education	(3) Women's education
		Panel A: Placebo Test I	
Cohort 1 × Rural	1.385 (0.268)***	1.241 (0.255)***	1.248 (0.117)***
Cohort 2 × Rural	0.306 (0.255)	0.602 (0.246)**	0.612 (0.105)***
Cohort 3_1 × Rural	-0.133 (0.293)	-0.095 (0.289)	-0.062 (0.124)
Observations	23343	23343	23343
R-squared	0.112	0.309	0.341
		Panel B: Placebo Test II	
Pseudo Cohort 1 × Rural	0.045 (0.278)	0.010 (0.266)	0.012 (0.129)
Pseudo Cohort 2 × Rural	-0.089 (0.225)	-0.028 (0.221)	-0.026 (0.133)
Observations	15404	15404	15404
R-squared	0.093	0.303	0.326
Age FE	No	No	Yes
Year FE	No	No	Yes
Division FE	No	No	Yes

Note: Rural, religion, wealth index and family type are controlled like in Table 3. Panel A (Placebo Test I) divides Cohort 3 into two groups: those who were born between 1975 and 1979 (Cohort 3_1) and between 1971 and 1974 (Cohort 3_2). Panel B (Placebo Test II) uses the sample of those who were born between 1961 and 1978: Pseudo Cohort 1 was born in, or after, 1973; Pseudo Cohort2 was born between 1970 and 1972; Pseudo Cohort 3 was born in 1969 or before. Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Effect of Wife's Education on Husband's Education and Their Age Gap

	(1) OLS	(2) IV	(3) OLS	(4) IV
	Husband's education		Age gap	
Women's Education	0.694	0.717	-0.153	-0.396
	(0.014)***	(0.073)***	(0.010)***	(0.126)***
Cohort 1	-0.768	0.023	1.042	-0.477
	(0.161)***	(0.119)	(0.272)***	(0.318)
Cohort 2	-0.527	0.060	0.977	-0.016
	(0.082)***	(0.084)	(0.254)***	(0.201)
Rural	-0.082	-0.086	0.092	0.126
	(0.036)**	(0.047)*	(0.073)	(0.096)
Islam	-0.268	-0.254	-0.191	-0.334
	(0.067)***	(0.072)***	(0.135)	(0.160)**
Wealth Index	0.768	0.732	0.125	0.497
	(0.024)***	(0.116)***	(0.048)**	(0.202)**
Joint family	0.173	0.162	-0.220	-0.094
	(0.049)***	(0.057)***	(0.080)***	(0.110)
Observations	24,329	24,329	24,329	24,329

Note: First-stage F-statistics is 104.80. Women's age, year and division fixed effects are controlled. Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Effect of Wife's Education on Husband's Occupation

	(1) Work in agriculture	(2) Work in informal sector	(3) Work in formal sector
		Panel A: OLS	
Women's education	-0.006***	0.019***	-0.014***
	(0.001)	(0.001)	(0.002)
Observations	24,329	24,329	24,329
		Panel B: IV	
Women's education	-0.051***	-0.013	0.060***
	(0.007)	(0.009)	(0.009)
Observations	24,329	24,329	24,329

Note: Women's age, year and division fixed effects are controlled. Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Effect of Women's Education on Contraceptive Use and Autonomy

	(1) Contraceptive use	(2) Observable contraceptive use	(3) Health care	(4) Large Purchasing	(5) Visiting Family
			Panel A: OLS		
Women's education	0.005 (0.001)***	0.013 (0.001)***	0.001 (0.001)	-0.002 (0.001)***	-0.001 (0.001)
Observations	24329	24329	23794	23794	23794
			Panel B: IV		
Women's education	-0.006 (0.009)	0.021 (0.007)***	0.020 (0.006)***	0.004 (0.007)	0.008 (0.007)
Observations	24329	24329	23794	23794	23794

Note: Women's age, year and division fixed effects are controlled. Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. Outcome variable for column (3) indicates whether a woman usually decides on own health care, column (4) indicates whether a woman usually decides on large household purchases and column (5) indicates whether a woman usually decides on visits to family or relatives. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Effect of Women's Education on Child Health Outcomes

	(1) Number of children	(2) Height-for-age (z-score)	(3) Weight-for-age (z-score)	(4) Hemoglobin	(5) Anemia
			Panel A: OLS		
Women's education	-0.083 (0.003)***	0.050 (0.005)***	0.047 (0.005)***	0.206 (0.101)**	-0.006 (0.004)
Observations	24329	11951	11951	1257	1257
			Panel B: IV		
Women's education	-0.238 (0.028)***	0.108 (0.020)***	0.080 (0.028)***	0.855 (0.420)**	-0.008 (0.023)
Observations	24329	11951	11951	1257	1257

Note: Sample size is lower than the main sample of married women because not all women reported their child's health information. Women's age, year and division fixed effects are controlled. Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Heterogeneous Effects of Women's Education (IV Estimates)

	(1) Number of children	(2) Height-for-age (z-score)	(3) Weight-for-age (z-score)	(4) Hemoglobin	(5) Anemia
	Panel A: When women live in an extended family				
Women's education	-0.272	0.070	0.040	-0.174	0.042
	(0.043)***	(0.032)**	(0.035)	(0.734)	(0.028)
Observations	11958	6132	6132	606	606
	Panel B: When women do not live in an extended family				
Women's education	-0.186	0.178	0.160	1.646	-0.053
	(0.026)***	(0.052)***	(0.046)***	(0.627)***	(0.022)**
Observations	12371	5819	5819	651	651

Note: Women's age, year and division fixed effects are controlled. Standard errors are clustered by birth year×rural/urban level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.