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Association between child marriage and institutional delivery care services use in Bangladesh: intersections between education and place of residence

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ABSTRACT

Objectives: To examine the association between child marriage and women's use of institutional delivery care services and whether education and place of residence moderate this association.

Study design: The study used de-identified data from four rounds (2004, 2007, 2011, and 2014) of the Bangladesh Demographic and Health Survey (BDHS). The BDHS is a cross-sectional survey conducted every three years. The analysis was based on 16,099 ever-married women aged 15–49 years with at least one live birth in the three years before the survey.

Methods: The study used multivariable logistic regression models with interaction terms between age at marriage, education, and place of residence. Adjusted predicted probabilities of outcome variables were computed from interaction models.

Results: Child marriage is significantly associated with decreased use of institutional delivery care services. Compared to women who married at adult ages (≥18 years), women who married between ages of 12–14 years were the most disadvantaged in having delivered at a health facility (odds ratio [OR]: 0.62; 95% confidence interval [CI]: 0.51–0.74) and having a skilled attendant present (OR: 0.63; 95% CI: 0.53–0.75) at the birth of their last child. The analysis suggests that the effect of education on the use of institutional delivery care is stronger among women married at age 18 or older compared to women who married younger than age 18 years. Further, the joint effect of age at marriage and education is stronger for women living in urban than rural place of residence.

Conclusions: Increasing the age at marriage and discouraging child marriage may be a fruitful way to improve mother and child health in Bangladesh. Encouraging girls to

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complete high school and pursue college education would also help decline the rate of child marriage and, in turn, benefit social mobility and health.

Introduction

Although there has been a steady decline in maternal mortality ratio, the use of institutional care for pregnancy and childbirth remains very low in Bangladesh. For example, only 35% of births are delivered at a health facility,[1] and home births (62%) are widespread, especially in rural areas. Unskilled birth attendants and relatives often assist home births with no professional training.[2,3] Studies report that relative to institutional delivery care, home births tend to be unsafe and unhygienic and provide inadequate coverage of essential newborn care.[4]

In the South Asian region, the highest rate of child marriage occurs in Bangladesh where about 59% of girls get married before the age of 18 years.[5] Child marriage profoundly shapes a girl's social mobility and life chances.[6] Early age at marriage and early childbearing are significant risk factors for increased malnutrition, morbidity, and mortality for both mothers and children.[7–9] Maternal age at marriage can shape both mother's and child's health outcomes through mechanisms of maternal educational attainment and access to healthcare services. Studies consistently report that girls who marry early are more likely to leave school prematurely and less likely to complete secondary education.[10,11] One recent study found that postponing early marriage by one year is associated with an increase in half a year of schooling.[12] Higher levels of educational attainment provide women with more income-earning opportunities and increase their health literacy and decision-making power, all of which, in turn, lead women to utilize modern healthcare services.[13,14]

Existing studies document a robust socio-economic gradient in the utilization of maternal care services in many developing countries, including Bangladesh.[15] A general conclusion of these studies is that women from higher social standing are better-off in using essential healthcare services for pregnancy and childbirth. For instance, studies continue to document that, poor women, relative to rich, are less likely to have births delivered at a health facility in Bangladesh.[14,16,17] Concerning education, studies report that less educated women, compared to women with higher levels of education, are less likely to utilize institutional delivery care services.[13] Further, a few studies documented that age at marriage is a significant predictor of utilization of maternal healthcare services. For example, young girls who enter into marriage at their adolescence, compared to women married at adult age, have inadequate use of maternal health services[18] and a host of adverse pregnancy and birth outcomes including low birth weight, preterm delivery, neonatal death, and maternal mortality.[19,20]

Extant studies on socio-economic inequalities in institutional delivery care services typically employ a unidimensional approach which implicitly assumes that social status and structural factors such as education and age at marriage are separate and additive axes of social inequality. These studies traditionally use an additive multivariable analysis which may mask the possibility that social status and stratification categories intersect and produce unique positions of (dis)advantage and opportunities. The unidimensional and additive approach cannot illuminate how social status and structural factors may constitute mutually reinforcing and interlocking processes of "multiple jeopardy".[21–23] In contrast to the additive approach, an intersectionality lens offers a promising approach to analyze how multifaceted statuses, social norms, and geographical context work in tandem to produce and sustain health inequality in the society.[24]

Child marriage and teenage pregnancy are widespread in Bangladesh.[25] Further, child marriage is not randomly distributed. Child marriage is geographically clustered and more pervasive in rural areas of Bangladesh.[26–28] In rural Bangladesh, girls who get married early tend to have low levels of education, have poorer household wealth, have early childbearing, and have less access to the health care system.[28,29] Consistent with the intersectionality perspective, we postulate that poorly-educated young pregnant girls living in rural areas essentially constitute a population group that, in many ways, has 'multiple jeopardy', compared to the higher-educated adult women living in urban areas. In other words, place of residence, age at marriage, and socio-economic status may intersect with one another in quite complex ways to shape the uptake of health services in low-income countries. Therefore, drawing on the intersectionality approach as briefly outlined above, this study examines the intersecting consequences of child marriage, educational attainment, and place of residence on institutional delivery care services.

Methods

Data and sample

This study used data from four most recent rounds (2004, 2007, 2011 and 2014) of the Bangladesh Demographic and Health Survey (BDHS). The BDHS is a nationally representative and cross-sectional household survey, which is a part of global Demographic and Health Survey (DHS) program. In the BDHS, a two-stage stratified sampling method has been applied to collect data on different indicators of maternal health care, mortality, fertility, family planning, and nutrition from ever-married women aged 15–49 years from the selected households. Details about the survey methodology and other information can be found elsewhere.[1] In this study, we

restricted the sample to women of reproductive age (15–49 years) who had at least one live birth in the three years before the survey. If a woman had more than one live birth, we used details concerning their most recent live birth. We pooled data from the four surveys which resulted in an analytic sample of 16,099 women with one live birth.

Outcome variables

We used two binary outcomes of delivery care services in this study: 1) whether or not a woman received delivery care at a health facility; and 2) whether or not a skilled birth assistant assisted the delivery. The delivery at a health facility was coded one (1) if the women received delivery care at a health facility (e.g., government or private hospital, government health center, government health post, maternal and child welfare center and non-governmental organization [NGO] static clinic or sub-district health complex) or zero (0) otherwise. Delivery assisted by a skilled birth assistant is coded as one (1) if a skilled birth attendant facilitated the delivery or zero (0) otherwise. The skilled birth assistants included a doctor, nurse/midwife, family welfare visitor (FWV), or a community skilled birth attendant (CSBA).

Explanatory variables

The primary independent variable of interest in this study is child marriage. The legal age of marriage for the majority of women is 18 years in Bangladesh. For this study, women who married before the age of 18 years are child brides. Additionally, we further categorized age at marriage into two groups following previous studies: age at marriage 12–14 and 15–17 years.[30] Education of the women was measured with four categories: no education, primary, secondary, or above.

We used several control variables following previous studies that examined the correlates of delivery care services in Bangladesh.[31–33] These controls include wealth index, region, place of residence (rural/urban), the current age of women (measured in years), a dummy variable measuring whether the woman had at least one antenatal care visit (ANC1+), the number of children ever born (parity), and exposure to mass media. Household wealth index consists of household's ownership of assets and dwelling characteristics such as televisions and bicycles; housing materials; and access to water and sanitation facilities. Using principal component analysis all assets were assigned a score, and finally, based on the continuous scale of assets score, all households were ranked into five wealth quintiles.[34]

We constructed an index of exposure to mass media using women's responses regarding the use of three forms of mass media (radio, television, and newspapers) in a typical week. For each medium, the frequency of media use was coded in the following ways: no use at all was coded 0, less than once a week was coded 1, and at least once a week was coded 2. We summed the scores for each medium and the score ranged from 0 to 6. Finally, the total score was divided into three groups as follows: 0 score = no exposure at all, 1–3 score- = irregular exposure, and 4–6 score = regular exposure. Previous studies also used the similar index of exposure to mass media.[35,14]

Statistical analysis

Our analysis is based on a pooled sample of four rounds of Bangladesh Demographic and Health Survey (2004, 2007, 2011, 2014). We modeled two outcomes of the use of institutional delivery care services following a three-stage analytic process. First, we ran an adjusted logistic regression model for each outcome. This adjusted model regressed the outcome variables on the age at marriage categories controlling for the covariates listed above. Second, we modeled two-way interaction terms between age at marriage categories and education in the full sample controlling for current age, parity, receipt of any ANC, exposure to mass media, wealth quintile, region, place of residence, and year. Finally, we modeled three-way interaction terms between age at marriage, education, and place of residence in the full sample controlling for the same sociodemographic variables. For ease of interpretation, we produced adjusted predicted probabilities of delivery at a health facility and delivery assisted by a skilled birth attendant from these interaction models. We used the margins (atmeans) command in Stata to calculate the predicted probabilities and their confidence intervals. We used Stata version 15.1 (StataCorp LP, College Station, TX) for all data analyses. We used the Stata command *svyset* to account for the multistage survey design of the BDHS which includes survey weights, clusters, and strata. To adjust for population difference in each survey, we denormalized sampling weights following the DHS Sampling and Household Listing Manual.[36]

Results

Table 1 shows the distribution of women by age at marriage over 2004–2014 in Bangladesh. The proportion of women married at the age of 18 years and older increased from 14.7% in 2004 to 28.4% in 2014. Overall, the proportion of child marriage (married <18 years) decreased by about 14% between 2004 and 2014. The percent of women married between 15 and 17 years increased from 33.7% in 2004 to 44.8% in 2014. The percent of women married between 12 and 14 years decreased from 51.7% in 2004 to 26.8% in 2014.

Table 2 reports the weighted proportion of sample characteristics by age at marriage. It demonstrates that women who married at older ages were more likely to have delivered at a health facility. We found that about 14% of women who married between the ages of 12–14 years delivered at a health facility center, compared to 24% of women married between the ages of 15–17 years and 43% of women who married at age 18 years or older. Similarly, only 16% of the women who married between the ages of 12–14 years received skilled birth assistance while this percentage was almost triple (47%) among the women who married at age 18 years or older. Examining education, we found that women who married at younger ages had lower levels of education compared to women who married at older ages. Of those who married between 12 and 14 years, 32.5% of women had no education compared to 12.7% of women who married at age 18 years or older. About 58% of women who married between the ages of 12–14 years had at least one ANC visit compared to 79% of women who married at

Table 1 – Distribution of women by age at marriage over 2004–2014.

Year	Age at marriage							
	12–14 years		15–17 years		<18 years		≥18 years	
	N	%	N	%	N	%	N	%
2004	1924	51.70	1252	33.64	3176	85.34	545	14.66
2007	1381	41.07	1326	39.42	2707	80.49	656	19.51
2011	1536	33.48	1980	43.17	3516	76.65	1071	23.35
2014	1187	26.82	1983	44.79	3170	71.61	1257	28.39

age 18 years or older. Women who married younger were less likely to come from the wealthiest quintile. For example, only 11% women who married between the age of 12–14 years were from the wealthiest quintile compared to 34% of women who married at age 18 years or older.

The patterns of child marriage are also unequally distributed by region. For example, of those who married in between the ages of 12–14 years, 33% of them were from Dhaka, 10% of them were from Khulna, and 6% of them were from Barisal region. About 81% of women who got married between the ages of 12–14 years were from the rural area.

Fig. 1 presents the relationship between child marriage and our outcome variables over time. Overall, the uptake of delivery at a health facility and having delivery assisted by a skilled birth attendant increased across all the categories of age at marriage during this period. For example, among the women who married between the ages of 12–14 years, the proportion of delivery at a health facility increased from about 6% in 2004 to almost 30% in 2014 (Panel a). Panel b shows that delivery assisted by a skilled birth attendant increased by about four times among these women between 2004 and 2014.

Table 2 – Weighted mean and proportion of sample characteristics by age at marriage.

	Age at marriage			
	12–14 years	15–17 years	≥18 years	Total
Health facility delivery	0.14	0.24	0.43	0.24
Skilled birth assistance	0.16	0.28	0.47	0.28
Education (years)	3.61	5.47	7.61	5.21
Current age of women in years				
15-19	0.29	0.24	0.02	0.21
20-24	0.29	0.38	0.42	0.35
25-34	0.35	0.34	0.48	0.37
35-49	0.08	0.05	0.08	0.07
Parity (no. of living children)	1.97	2.26	2.93	2.45
Have any ANC visit	0.58	0.68	0.79	0.67
Mass media exposure				
Not all	0.42	0.35	0.27	0.36
Irregular	0.11	0.11	0.11	0.11
Regular	0.47	0.54	0.63	0.53
Household wealth quintile				
Poorest	0.29	0.22	0.13	0.23
Poorer	0.24	0.20	0.14	0.20
Middle	0.20	0.20	0.18	0.20
Richer	0.16	0.21	0.22	0.19
Richest	0.11	0.17	0.34	0.18
Region				
Barisal	0.06	0.06	0.05	0.06
Chittagong	0.17	0.24	0.28	0.22
Dhaka	0.33	0.32	0.32	0.32
Khulna	0.10	0.10	0.08	0.10
Rajshahi	0.28	0.21	0.15	0.22
Sylhet	0.06	0.09	0.12	0.08
Place of residence (Rural)	0.81	0.79	0.68	0.77
N	3795	6525	5779	16099

ANC, antenatal care.

Table 3 presents the adjusted odds ratio (OR) with 95% confidence interval (CI) from the multivariable logistic regression models. Controlling for sociodemographic variables, we found that age at marriage was significantly associated with delivery at a health facility. Compared to women who married at age 18 years or older, women who married between the ages of 12–14 years were 38% less likely to have their children delivered at a health facility (OR = 0.62, 95% CI: 0.51–0.74, $P < 0.01$). Compared to women who married at age 18 years or older, women who married between the ages of 15–17 years were 25% less likely to have their children delivered at a health facility (OR = 0.75, 95% CI: 0.66–0.86, $P < 0.01$). The analysis found almost similar patterns concerning the association between age at marriage and delivery assisted by a skilled birth attendant. Compared to women who married at age 18 years or older, women who married between the ages of 12–14 years were 37% less likely to have childbirth assisted by a skilled birth attendant (OR = 0.63, 95% CI: 0.53–0.75, $P < 0.01$), controlling for sociodemographic variables. Likewise, compared to women who married at age 18 years or older, women who married between the ages of 15–17 years were 22% less likely to have childbirth assisted by a skilled birth attendant (OR = 0.78, 95% CI: 0.69–0.87, $P < 0.01$).

The regression results show that women's education was significantly associated with both outcomes. One year of schooling was associated with an increase in delivery at a health facility and delivery assisted by a skilled birth attendant by a factor of 1.07 (OR = 1.07; 95% CI: 1.03–1.11). The probability of delivery at a health facility was 3.6 times greater for women who had at least one ANC visit compared to those who had no ANC visit (OR = 3.6, 95% CI: 3.07–4.21, $P < 0.001$). Women who had regular exposure to mass media were more likely to have delivery at a health facility compared to those who had no exposure at all (OR = 1.21, 95% CI: 1.02–1.44, $P < 0.01$). Compared to women from the poorest wealth quintile, women from the wealthiest quintile were 4 times more likely to have a delivery at a health facility (OR = 4.16, 95% CI: 3.19–5.44, $P < 0.01$). Women from rural areas were less likely to have delivery at a health facility compared to their urban counterparts (OR = 0.67, 95% CI: 0.59–0.77, $P < 0.01$). The probability of delivery at a health facility was higher in 2014 than in 2004. We found similar patterns and magnitudes of

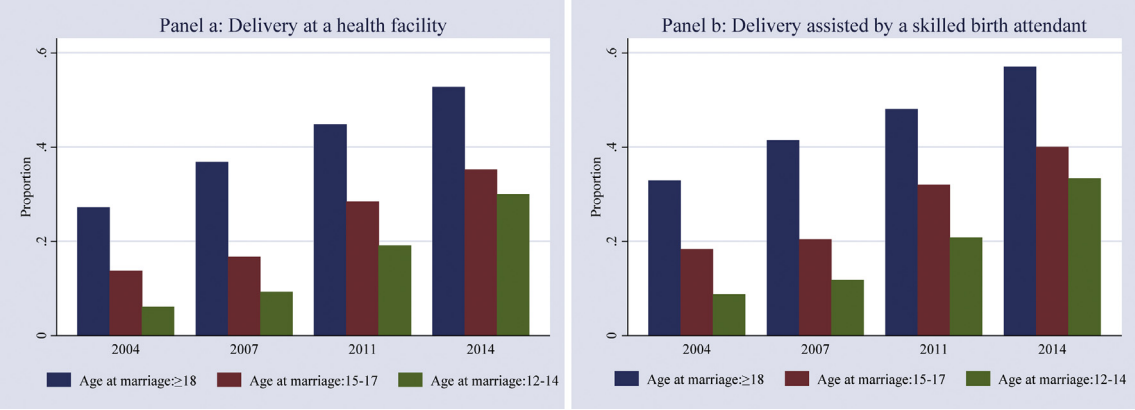

Fig. 1 – Weighted proportion of institutional delivery by marital age over 2004–2014.

Table 3 – Odds ratios with 95% confidence intervals for adjusted logistic regression models for institutional delivery care indicators (n = 16,099).

	Delivery at a health facility		Delivery assisted by a skilled birth attendant	
	OR	95% CI	OR	95% CI
Age at marriage (Ref: ≥18 years)				
15–17 years	0.75***	(0.66–0.86)	0.78***	(0.69–0.89)
12–14 years	0.62***	(0.51–0.74)	0.63***	(0.53–0.75)
Education (years)	1.07***	(1.03–1.11)	1.07***	(1.03–1.11)
Current age (Ref. = 15–19)				
20–24 years	1.09	(0.94–1.26)	1.08	(0.94–1.24)
25–34 years	1.68***	(1.38–2.04)	1.59***	(1.33–1.91)
35–49 years	3.47***	(2.45–4.90)	2.89***	(2.08–4.00)
Parity (no. of living children)	0.68***	(0.63–0.74)	0.71***	(0.66–0.76)
Receipt of any ANC (Ref. No)	3.60***	(3.08–4.21)	3.25***	(2.81–3.75)
Exposure to mass media (Ref. No)				
Irregular	1.14	(0.93–1.39)	1.05	(0.87–1.27)
Regular	1.21**	(1.03–1.44)	1.22**	(1.05–1.43)
Wealth quintile (Ref. Poorest)				
Poorer	1.10	(0.90–1.35)	1.12	(0.93–1.36)
Middle	1.39***	(1.09–1.78)	1.51***	(1.20–1.91)
Richer	2.14***	(1.71–2.68)	2.21***	(1.78–2.73)
Richest	4.16***	(3.19–5.44)	4.21***	(3.28–5.40)
Region (Ref. Barisal)				
Chittagong	0.99	(0.80–1.23)	0.88	(0.71–1.10)
Dhaka	1.32**	(1.07–1.62)	0.95	(0.77–1.18)
Khulna	2.28***	(1.84–2.84)	1.68***	(1.35–2.09)
Rajshahi	1.46***	(1.19–1.81)	1.01	(0.82–1.25)
Sylhet	0.93	(0.73–1.18)	0.78*	(0.61–1.00)
Rural Residence (Ref. Urban)	0.67***	(0.59–0.77)	0.66***	(0.58–0.75)
Survey Year (Ref. 2004)				
2007	1.35***	(1.11–1.63)	1.19**	(1.01–1.41)
2011	2.87***	(2.39–3.44)	2.27***	(1.94–2.67)
2014	3.96***	(3.27–4.79)	3.33***	(2.81–3.94)
Constant	0.04***	(0.03–0.06)	0.08***	(0.05–0.11)

***P < 0.01, **P < 0.05, *P < 0.1.
ANC, antenatal care; CI, confidence interval; OR, odds ratio.

probabilities concerning the association between control variables and delivery assisted by a skilled birth attendant.

Figs. 2–4 present the adjusted predicted probabilities derived from the interaction terms between age at marriage, education, and place of residence. Fig. 2 presents adjusted predicted probabilities of using institutional delivery care services by years of education (detail results available from authors), with the other sociodemographic variables in Table 2 held at their mean values. Fig. 2 suggests that with the increasing years of education, the predicted probability of having childbirth at a health facility is significantly higher among women who married at age 18 years or older compared to other two child marriage categories. In other words, the effect of educational attainment on the use of a health center for delivery care is steeper for women married at their adult ages.

Figs. 3 and 4 display the differential effect of age at marriage categories by years of education and place of residence, with other sociodemographic variables held at their mean values. In both graphs (Figs. 3 and 4), we see that the predicted probability of the use of institutional delivery care services increases with years of education, but the benefit of education was lower among women married at younger than age 18 years as compared with those married at age 18 years or older. Further, the joint effect of age at marriage and education significantly varies by place of residence. In general, examining both graphs (Figs. 3 and 4) it is commonly apparent that, with increasing education, rural women married at early ages are way less likely than their urban counterparts to utilize institutional delivery care services. It appears that living in urban areas has a positive effect on using professional delivery care services. In other words, the joint effect of age at marriage and education is stronger for women from urban than rural areas.

Discussion

This study found that age at marriage is an important predictor of utilizing maternity healthcare services. Findings demonstrated that women who married younger were less

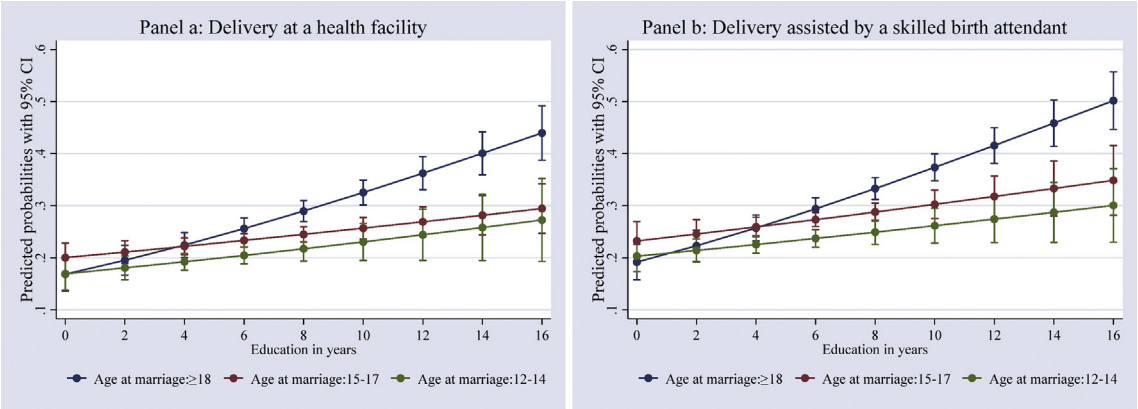

Fig. 2 – Adjusted predictions for institutional delivery by age at marriage by education. CI, confidence interval.

likely to have had their last childbirth at a health facility or childbirth attended by a skilled attendee. The relationship between age at marriage and use of delivery care services is robust and remained significant even after controlling for women's current age, number of living children, exposure to mass media, wealth quintile, region, place of residence, and survey years.

Previous studies in South Asia and other low-income regions have shown that women who marry early are less likely to utilize adequate maternal care, family planning services, and have poor birth outcomes.[20,30,37] Some mechanisms can explain the lower likelihood of using maternity care such as having delivery care at a health facility, among adolescent mothers. Young brides and adolescent mothers tend to have less control over reproductive choices, be least educated and have fewer economic resources. Studies demonstrate that economic resources often turn out to be a salient determinant of utilizing professional delivery care services for childbirth.[17]

Our findings suggested that women's age at marriage emerges as a strong predictor of delivery care utilization in Bangladesh. Women's early entry into marriage is a salient barrier to their access to a range of resources including education, earning, and labor market opportunities in Bangladesh, a Muslim-majority country, where patriarchal family structure and traditional religious values often constrain women's life chances and reproductive choices. For instance, the Muslim institution of *purdah* (seclusion of women) enforces a strict separation between men and

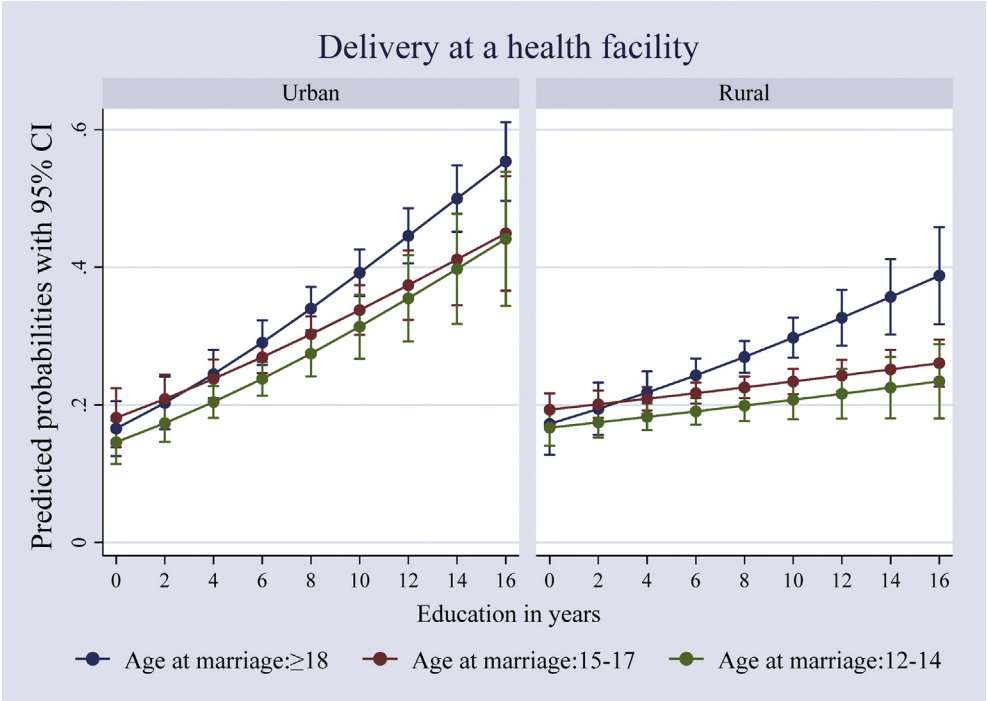

Fig. 3 – Adjusted predictions for delivery at a facility delivery by age at marriage by education and by area of residence. CI, confidence interval.

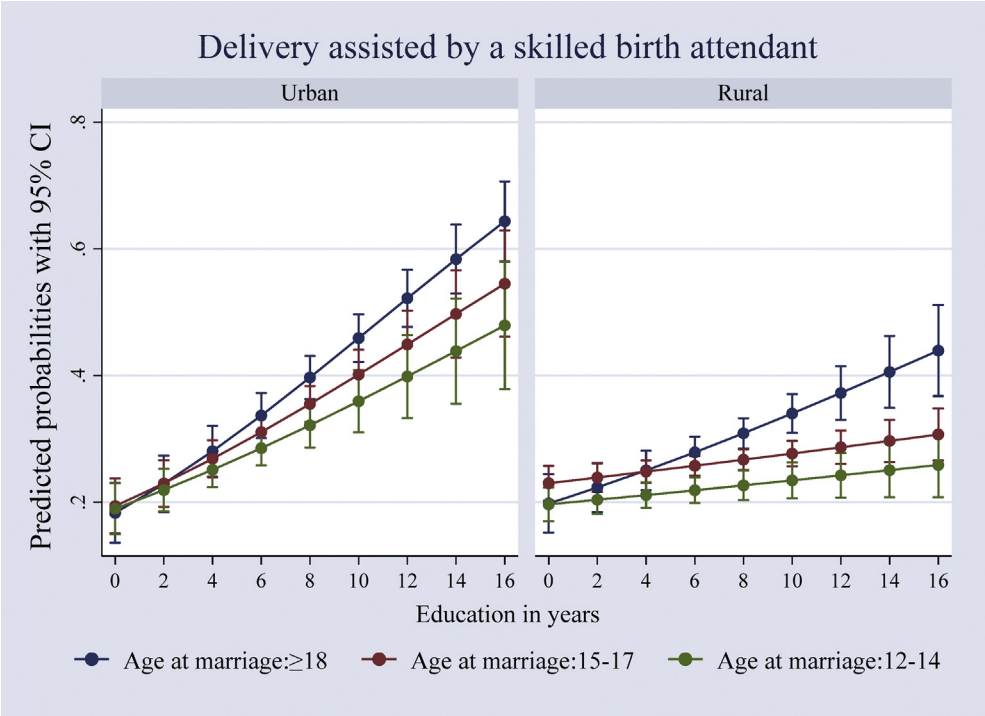

Fig. 4 – Adjusted predictions for delivery assisted by a skilled birth attendant by age at marriage by education and by area of residence. CI, confidence interval.

women and restricts women's mobility, especially in the public spheres.[33] The *purdah* system has also been shown to limit women's access to educational and labor market opportunities.[31]

In addition to the above disempowering structural contexts, early entry into marriage further exacerbates women's status and position in the household. Early marriage increases adolescent girl's economic dependency on the husband's family by limiting their education and participation in the labor market. Thus, a lack of their income reduces young brides' decision-making capacity and the ability to pay for their and children's healthcare. Under such a disadvantaged position of young brides in the household, studies demonstrated that husbands and mothers-in-law often control newly-wed adolescent girl's healthcare decisions in India.[38] Similarly, a large body of studies has consistently shown that women with less autonomy and limited power in the household are less likely to utilize maternal health care services in South Asia.[32,39,40] In sum, women's empowerment emerges as a possible mediator in the observed association between age at marriage and healthcare utilization. Future studies may test these mediating relationships in a comprehensive way.

Our analysis has demonstrated that the effect of women's increased education on the use of institutional delivery care appears to be weaker for women married younger than age 18 years and stronger for women married at age 18 years or older. Again, the joint effect of education and age at marriage is weaker for women living in rural than that of urban areas. These findings demonstrated that the exposure of child marriage might jeopardize young women in receiving education's beneficial effects. We note that, as mentioned earlier, early marriage may disempower young women by curtailing their education, status attainment in the family, and labor market opportunities. It is well documented that early marriage leads young girls to leave school prematurely[10,11] and scholars continue to argue that enabling girls to continue schooling would much contribute to postponing their early marriage.[41] Scholarship in women's education and empowerment emphasizes that education not only helps to delay marriage but also increases women's health literacy, a sense of personal control, knowledge about reproductive health issues, and access to healthcare facilities.[42,43] In line with these studies, we continue to underscore the importance of education in delivery care utilization.

Though this study demonstrates the importance of women's age at marriage as a strong predictor of delivery care utilization, it is not without its limitations. Though we attempted to control for some confounders, we are not able to control for all possible factors. Measures of father's involvement, social networks, or even literacy may prove to be important controls for the relationship between age at marriage and delivery care utilization. Additionally, the data on delivery care use and age at marriage were self-reported and particularly, the responses concerning age at marriage can be subject to social desirability bias and long-recall periods. We believe that such bias, especially concerning delivery care use, should be minimum as the healthcare use information are based on the most recent live births. Despite these limitations, key strengths of this study lie in the use of nationally representative samples and an intersectionality approach.

Conclusions

Delivery at a health facility and having a skilled attendee present at one's birth are important predictors of child and maternal health including mortality. The analysis provides strong evidence that child marriage has adverse consequences for mother's use of delivery care services in Bangladesh. Findings indicate that discouraging child marriage will likely increase the uptake of essential maternity services for safe delivery. Overall, discouraging child marriage will likely benefit both maternal and child health through increases in women's education. The analysis suggests that a substantial increase in the use of institutional delivery care services is possible through improving access to education and promoting girl's education, especially in rural areas. This study provides an empirical basis for interventions targeting rural areas and young girls in Bangladesh where neonatal healthcare utilization is reduced, and child marriage is common.

Author statements

Ethical approval

The Bangladesh Demographic and Health Survey received ethical approval from ICF Macro Institutional Review Board, Maryland, USA and National Research Ethics Committee of Bangladesh Medical Research Council (BMRC), Dhaka, Bangladesh. The data used in this study was collected through a collaborative effort of the National Institute of Population Research and Training (NIPORT), ICF International (USA) and Mitra & Associates. Verbal informed consent was sought by the interviewer by reading a prescribed statement to the respondent and recording in the questionnaire whether or not the respondent consented (or that consent was provided on behalf of minors). We obtained permission from MEASURE DHS to download the data from the DHS on-line archive. In this study, we used de-identified data obtained from MEASURE DHS. Ethical approval was not necessary as the study was conducted on anonymous public use data, which had no identifiable information on the survey respondents.

Funding sources

No funding was received for this study.

Conflict of interest

None declared.

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