Journal of Population and Development
Volume 1 December 2014, Pp.15-33

Impact of Female Education on Fertility in Bangladesh

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Abstract

This study aims to assess the extent to which female education affects cumulative fertility and progression to parity-specific fertility (up to fourth birth) in Bangladesh. It also aims to quantify the contribution of selected socio-demographic and cultural covariates to the fertility differentials between various categories of education. Fertility differentials across various categories of female education were examined using data from the 2011 Bangladesh Demographic and Health Survey. Poisson regression estimates, decomposition analysis (for cumulative fertility) and event history analysis (for parity-specific fertility) were done. The findings show that lower educated females are more likely to have higher cumulative fertility and higher progression to parity-specific fertility compared to their counterparts with higher education even after adjusting for selected socio-demographic and cultural characteristics. The findings suggest that the government should take necessary initiatives to ensure higher education for all women to reduce fertility rate in Bangladesh.

Keywords: Female Education; Cumulative Fertility; Parity-Specific Fertility; Bangladesh.

Introduction

The inverse relationship between education and fertility is well established both in developed and developing countries with few exceptions (Bagavos, 2010; Bongaarts, 2010; Kravdal, 2002; Lutz, 2010). Majority of these studies have measured fertility either in terms of cumulative fertility (i.e., number of children ever born) or progression of parity-specific fertility (e.g., progression to first birth from age 15 or from marriage, and progression to subsequent births from the preceding birth). Previous research on education and fertility suggest that higher educated women were more likely to have lower cumulative fertility (Caldwell *et al.*, 1999; Dreze and Murthi, 2001; Kravdal, 2002) and slower progression to parity-specific fertility (Van Bavel and Różańska-Putek, 2010; Derose and Kravdal, 2007; Kravdal, 2007) compared to

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those with lower education. Although examining the impact of female education on their fertility has received greater attention in other countries, it has received limited attention in Bangladesh (Caldwell et al., 1999; Chowdhury, 1994). This is particularly true in investigating the role of female education on progression to parity-specific fertility. It is important to examine the progression to parity-specific fertility because the cumulative fertility is determined to greater extent by the advancement or postponement of childbearing.

This study aims to assess the extent to which female education contributes to determine cumulative fertility and progression of parity-specific fertility (up to the fourth birth) in Bangladesh. It also aims to quantify the relative contribution of selected socio-demographic and cultural covariates to fertility differentials between various categories of education (e.g., no education versus higher education, primary versus higher, and secondary versus higher). The first two objectives have been achieved through the application of Poisson regression estimates and event history analysis, respectively. The third objective of quantifying the relative contribution of the socio-demographic and cultural covariates was assessed through application of decomposition analysis (also known as component analysis in demography). For all analyses, data from 2011 Bangladesh Demographic and Health Survey (BDHS) were used.

This study will contribute at least in four key ways. Firstly, examining the impact of female education on both cumulative fertility and parity-specific fertility will provide better insight about the extent to which respondents with higher education postpone their childbearing and thus end up with having a lower number of children as compared to those with lower education. Secondly, the application of decomposition analysis would facilitate assessing the relative contribution of the socio-demographic and cultural characteristics to the differential impact of female education on fertility. This will enable us to recommend better policy options for bringing desired change in fertility rates in Bangladesh. Thirdly, it will provide better understanding of the fertility mechanisms in Bangladesh which is the only exception among the least developed countries (LDCs) for achieving reduction in fertility rates despite being one of the poorest countries in the world. Finally, this study will generate further interest among researchers in examining the differential impact of female education on fertility in developing countries to generate effective strategies to reduce population growth.

How Does Female Education Affect Fertility?

Female education affects fertility through influencing its proximate determinants such as age of entry into marital unions, contraceptive use, and proportion of population married (Bongaarts, 1978; Bongaarts, 2010; Davis and Blake, 1956). Higher educated women tend to enter into marital union at older ages compared to lower educated women, because of their greater determination of completing education and getting established in the labour market. Higher age of entry into marital unions eventually leads to lower fertility for higher educated women compared to lower educated women (Dreze and Murhti, 2001; Hango and Bourdais, 2009; Hattori, Lance, and Angeles, 2011; Raymo, 2003; Skirbekk, *et al.,* 2004). Moreover, higher educated women are more likely to have greater birth spacing (Klesment and Puur, 2010; Kravdal, 2007; Neels and De Wachter, 2010).

The second pivotal factor that leads to lower fertility among higher educated women is their contraceptive use and effectiveness (Bean and Swicegood, 1982; Bongaarts, 2010; Davie and Mazuy, 2010). Bongaarts (2010) examined the educational differences in fertility using Demographic Health Survey (DHS) data from 30 Sub-Saharan African countries. The findings show that higher educated women had lower fertility due to their greater demand for and use of contraception and lower number of desired children. The inverse relationship between female education and fertility is because "better-educated women marry later and less often, use contraceptives more effectively, have more knowledge about and access to contraception, have greater autonomy in reproductive decision-making, and are more motivated to implement demand because of the higher opportunity costs of unintended childbearing" as reported (Bongaarts, 2010:31).

The third plausible explanation is that higher educated women are more likely to have lower number of children due to the "opportunity cost" of having children. Highly educated women are more likely to spend more time and money for producing quality children. As a result, they want to have fewer children to minimize the negative impact on their career in one hand and to ensure that they can spend enough for quality children (Bagavos, 2010; Becker, 1981; Schultz, 1976). Bagavos (2010:52) argues that "within the framework of traditional division of labour among partners, with one partner being in charge of household activities and the other participating in the labour market, these women tend to postpone parenthood and end up generally with a high proportion of childlessness and low fertility levels."

In addition, some other factors related to female education might exert negative influence on their fertility such as creating favourable attitudes and norms towards lower fertility, empowering women in household decision-making, increasing prospects of female employment, declining trend of infant mortality, and changing attitude towards desire for son (Barkat-e-Khuda and Hussain, 1996; Bongaarts, 2003; de Oliviera, 2009; Dreze and Murthi, 2001; Kravdal, 2002; Matin, 1985). For instance, Kravdal (2002: 234) states that "if a woman is well educated, she may, for example, be allowed by the family to work outside the house or may be heard more often in discussions with her husband or in-laws. These opportunities will add to the effect of her literacy and skills and may reduce fertility desires through factors such as opportunity costs, old-age security concerns, and child mortality."

Data and Methods

Data from the 2011 BDHS were used to assess the extent to which female education determined their cumulative fertility and progression to parity-specific fertility. The 2011 BDHS contain interviews of randomly selected 17,842 ever-married women aged 12-49 years. After excluding missing values, the final sample size was reduced to 17,833. Since missing values were <5 percent, list-wise delete procedure was followed to select the study population assuming that the missing values were completely at random (MCAR). The response rate of the survey was 98 percent (NIPORT et al., 2013).

Independent variable

The key exposure variable of interest in this study is female education. In the analysis, education is coded into four categories: (1) none, (2) primary, (3) secondary, and (4) higher. The fourth category of higher education was used as the reference category in the analysis.

Dependent variables

The dependent variable of fertility is measured in terms of two components: (1) cumulative fertility (i.e., number of children ever born), and (2) parity-specific fertility. In this study, the parity-specific fertility indicates time to first birth from age 12, time to second birth from the first, time to third birth from the second, and time to fourth birth from the third. It should be mentioned that due to several incidence of giving birth before age 15 in Bangladesh, progression to first birth was measured from age 12. Cumulative fertility is defined as the respondents' total number of children.

Concerning the parity-specific fertility, the respondents' time to first birth from age 12 was computed by subtracting 12 from their age at first birth. Those who did not have any child were also included in the analysis of first birth as censored cases. The time to first birth from age 12 for censored cases was computed by subtracting 12 from their current age (i.e., age in 2011). Regarding status of first birth, those who had first birth were coded as event (status=1), and those who did not have any child were coded as censored (status=0). Respondents' information on time to second birth from the first (in months) was used to estimate time to second birth from the first. Those who had first birth but did not have a second are included in the analysis of second birth as censored cases. The time to second birth from the first for the censored cases was computed by subtracting the respondents' age at first birth from their current age (i.e., age at the time of the survey). Regarding status of second birth, those who had second birth are coded as event (Status=1), and those who had first birth but did not have a second birth are coded as censored (status=0). Following the similar procedure, the time to third birth and time to fourth birth and censored cases for respective births are computed.

Control variables

The respondents' age in years from 12 to 49 has been included in the analysis as control variable. Moreover, age is also included in the analysis as a quadratic term (age squared) to capture the curvilinear effect of age on fertility. In addition, age at first cohabitation has been used as the control variable. In Bangladesh, it is common to wait several months or even years before women start to live with their husbands after formal marriage. Therefore, it is more relevant to include age at first cohabitation in the analysis instead of age at first marriage. The respondents' employment status is coded into two categories: employed and unemployed both during the survey. The category of 'not employed' is used as the reference category in the analysis.

The respondents' wealth index is reported into five categories: poorest, poorer, middle, richer, and richest (coded as 0, 1, 2, 3 and 4, respectively). This variable is included in the analysis as a continuous variable. An advantage of using this variable in the analysis is that it will also capture the effect of income on fertility since the variable is consistent with measures related to expenditure and income. Partners' education was coded into four categories: none, primary, secondary, and higher. This variable is coded as continuous variable ranging from 0 to 3 for inclusion into the analysis. The respondents' religion is coded into two categories: (1) Islam and (2) else (comprised of Hinduism, Buddhism, and Christianity). The category of 'else' is used as the reference in the multivariate analysis. The respondents' attitude towards family size is coded into two categories: small family (≤ 2 children) and large family (> 2 children). The small family is used as the reference category.

Analytical approach

The first dependent variable of interest in this study, cumulative fertility, is a count variable. For this reason, Poisson regression estimates have been used to examine the differential impact of education on cumulative fertility. The Poisson regression estimates show the effect of education on cumulative fertility. Thus, we can establish whether there is a significant difference in cumulative fertility across various categories of education. But using only the Poisson regression estimates it is not possible to quantify the relative contribution of each covariate in the model to the observed differences in cumulative fertility. For this reason, decomposition analysis of the fertility differentials has been conducted to quantify the observed differences in cumulative fertility across various categories of education. The procedure of conducting decomposition analysis of non-linear models including Poisson regression is explained in greater detail by Bauer and Sinning (2008). This is particularly important for policy recommendations. Based on the relative contribution of each covariate to fertility differentials it is possible to recommend the initiatives that the government should be given higher priority to reduce fertility in Bangladesh. Finally, the parity-specific fertility is analyzed through the application of Kaplan-Meier (KM) survival estimates and Cox regression estimates (Mills, 2011).

Results

Sample characteristics

Table 1 presents the sample characteristics of the respondents disaggregated by education. The total sample size for this study is 17,833. One-fourth of the respondents do not have any education and 8.21 percent have higher than secondary education. The respondents with lower education have higher number of children than those with higher education. Concerning the transition to parity-specific fertility, the respondents with lower education takes lower time to each birth compared to those with higher education. Similarly, they also have greater percentages of higher order births than those with higher education. Majority of the respondents with lower education are unemployed. About 90 percent of the respondents in all categories of education are Muslim. Concerning the attitude towards family size, a vast majority of the respondents with higher education prefer small family.

Table-1: Sample characteristics of the respondents (N=17,833) by educational attainment in Bangladesh in 2011

Variables	Educational attainment of the respondents			
	None	Primary	Secondary	Higher
	Mean / (%)	Mean / (%)	Mean / (%)	Mean / (%)
Number of children	3.663	2.832	1.823	1.414
Time to first birth (years)	5.418	5.173	6.041	10.222
Time to second birth (years)	4.157	4.317	4.605	4.971
Time to third birth (years)	3.298	3.274	3.465	3.833
Time to fourth birth (years)	2.912	2.775	2.899	3.342
Age (years)	36.210	30.941	26.985	29.614
Age at first cohabitation	14.781	15.054	16.053	19.786
Wealth index	1.407	1.828	2.625	3.570
Status of first birth				
Event	(95.84)	(92.44)	(85.65)	(79.37)
Censored	(4.16)	(7.56)	(14.35)	(20.63)
Status of second birth				
Event	(89.42)	(82.09)	(64.03)	(54.13)
Censored	(10.58)	(17.91)	(35.97)	(45.87)
Status of third birth				
Event	(80.40)	(67.18)	(44.85)	(30.05)
Censored	(19.60)	(32.82)	(55.15)	(69.95)
Status of fourth birth				
Event	(68.17)	(57.81)	(37.78)	(20.63)
Censored	(31.83)	(42.19)	(62.22)	(79.37)
Employment status				
Employed	(16.63)	(11.90)	(9.78)	(23.22)
Not employed	(83.37)	(88.10)	(90.22)	(76.78)
Religion				
Islam	(89.26)	(90.33)	(87.93)	(85.72)
Else	(10.74)	(9.67)	(12.07)	(14.28)
Attitude towards family size				
Small family	(70.33)	(77.33)	(88.59)	(92.42)
Large family	(29.67)	(22.67)	(11.41)	(7.58)
Husband's education				
None	(62.65)	(31.70)	(9.35)	(0.27)
Primary	(25.51)	(39.49)	(23.74)	(1.84)
Secondary	(11.08)	(25.77)	(47.02)	(18.92)
Higher	(0.75)	(3.04)	(19.89)	(78.96)
N	4637	5328	6404	1464

Cumulative fertility

Poisson regression estimates of cumulative fertility are presented in the form of incident rate ratios (IRR). The IRR is interpreted as the effect of a one-unit change in the independent variable on the incident rate of fertility of respondents with different educational background compared to the reference category. Table 2 shows four models of IRR of cumulative fertility. Model 1 is the basic model that includes education as the predictor of cumulative fertility of the respondents. The respondents' age and age at first cohabitation are included in Model 2. Model 3 includes the respondents' employment status, wealth index, and husband's education in addition to all variables in model 2. The full model (model 4) also takes religion and attitude towards family size into account along with the demographic and socioeconomic characteristics. The full model confirms that the respondents with no education have 23.2 percent higher cumulative fertility than the reference category of higher education. This is also true for respondents with primary education. In addition, those who have secondary education have 14.4 percent higher cumulative fertility compared to the reference category of higher education. Inclusion of additional control variables in successive models has reduced the impact of education on number of children suggesting that other socio-demographic variables are also important predictor of fertility.

Table-2: Incident Rate Ratios (IRR) of number of children ever born in Bangladesh in 2011

Variables	Model 1	Model 2	Model 3	Model 4
	IRR	IRR	IRR	IRR
Education				
None	2.575**	1.514**	1.265**	1.232**
Primary	1.985**	1.483**	1.285**	1.258**
Secondary	1.252**	1.241**	1.145**	1.144**
Higher (ref)				
Age		1.217**	1.222**	1.219**
Age squared		0.997**	0.997**	0.997**
Age at first cohabitation		0.950**	0.951**	0.953**
Employment status				
Employed			0.845**	0.872**
Not employed (ref)				
Wealth index			0.960**	0.961**
Husband's education			0.970**	0.974**
Religion				
Islam				1.107**
Else (ref)				
Attitude towards family size				
Large family				1.260**
Small family (ref)				
Constant	1.424**	0.087**	0.100	0.091**
F (df)	1143.68**	2436.59**	1704.18**	1536.49**
	(3 & 17830)	(6 & 17827)	(9 & 17824)	(11 & 17822)
N	17833	17833	17833	17833

Note: *p<0.05, * *p<0.01

Decomposition analysis

The decomposition analysis of the observed differences in cumulative fertility shows that the mean difference in cumulative fertility between respondents with no education and respondents with higher education is 2.2488 (Table 3).This difference is decomposed into two categories: (A) differences due to characteristics, and (B) differences due to coefficients. Table 3 also shows that 72.10 percent of this difference (1.623) is due to their differences in characteristics (age, age at first marriage, employment status, wealth, religion, attitude towards family size, and husband's education). The relative contribution to the observed difference in cumulative fertility is strongest for age followed by age at first cohabitation, wealth index, attitude towards family size, and husbands' education. The remaining 29.0 percent of the difference (0.628) is due to their differences in coefficients.

Table-3: Decomposition analysis of the differences in number of children across various contrasts of education

Cumulative fertility	**None vs. Higher**	**Primary vs. Higher**	**Secondary vs. Higher**
A. Differences in characteristics			
Age	2.5285	0.6274	-1.5582
Age squared	-1.8299	-0.5511	1.0163
Age at first cohabitation	0.4178	0.5398	0.5281
Employment status	0.0277	0.0273	0.0403
Wealth index	0.1757	0.1612	0.0765
Husband's education	0.1283	0.1093	0.1362
Religion	0.0148	0.0118	0.0031
Attitude towards family size	0.1583	0.0837	0.0202
Total difference in characteristics (%)	*1.6213*	*1.0094*	*0.2625*
	(72.10%)	*(71.16%)*	*(64.24%)*
B. Differences in coefficients			
Age	-6.7010	-4.3664	-1.7324
Age squared	2.7492	1.7975	0.6287
Age at first cohabitation	0.7921	0.3612	0.0391
Employment status	-0.0145	0.0019	-0.0043
Wealth index	0.0434	0.0068	0.0159
Husband's education	0.0343	0.0171	-0.0655
Religion	0.1739	0.1107	0.0485
Attitude towards family size	0.0028	-0.0007	-0.0008
Constant	*3.5473*	*2.4810*	*1.2170*
Total difference in coefficients (%)	*0.6275*	*0.4091*	*0.1462*
	(27.90%)	*(28.84%)*	*(35.77%)*
Total difference (A + B)	*2.2488*	*1.4185*	*0.4087*
	(100.00%)	*(100.00%)*	*(100.00%)*

The observed difference in cumulative fertility between respondents with primary education and the reference category of higher education is 1.4185. Majority of this difference (71.16 percent) is due to their differences in the characteristics. Age at first marriage has the strongest contribution to the difference in cumulative fertility followed by wealth index, husbands' education, and attitude towards family size. The remaining 28.84 percent of the difference is due to their differences in coefficients (Table 3).

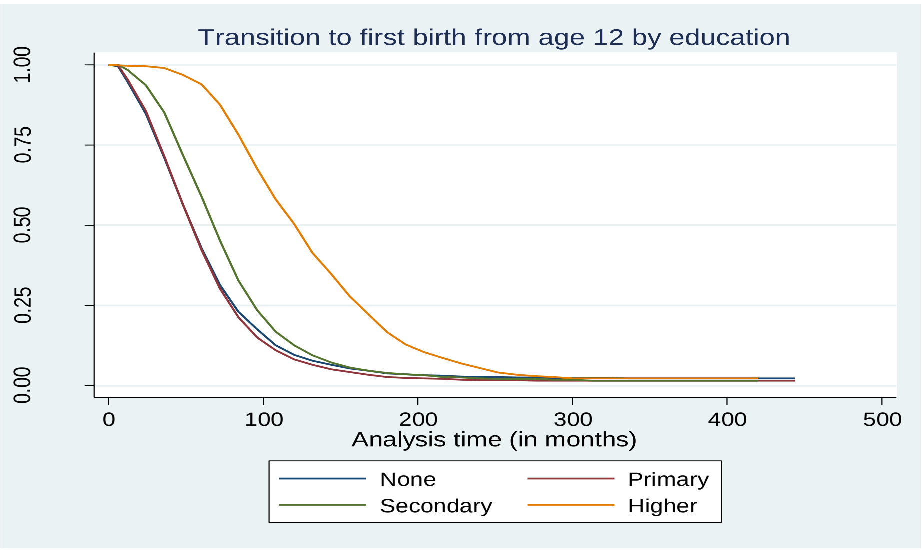
The mean difference in cumulative fertility between respondents with secondary education and respondents with higher education is 0.409. Differences in the characteristics explain 64.2 percent of the total difference. The relative contribution to this difference is highest for age followed by age at first cohabitation, husband's education, wealth index, and employment status. The remaining 35.77 percent of the difference is explained by differences in slopes.

The decomposition analysis also reveals that the differences in cumulative fertility due to intercepts for three categories of education (none, primary, secondary) from that of reference category (higher education) are positive (Table 3). The positive difference indicates the group effect of lower education on higher cumulative fertility. This can be explained by the fact that some factors other than the variables included in the model lead to higher cumulative fertility for respondents with lower education. Possible factors might include desire for son, unmet need of family planning, lack of contraceptive knowledge, and greater gender inequality.

Parity-specific fertility

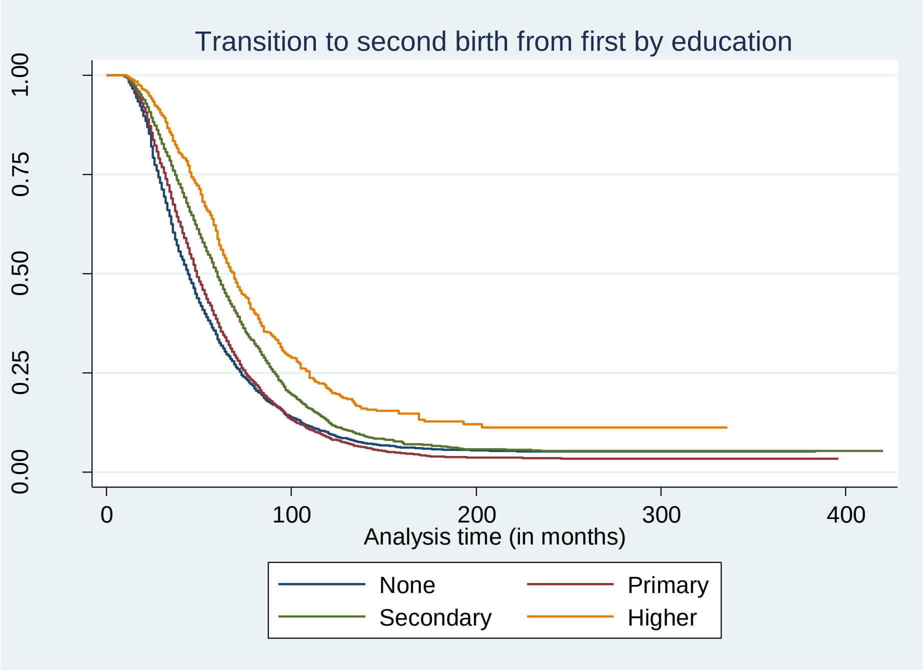
Figures 1 to 4 presents results related to KM survival estimates. Figure 1 shows that respondents with lower education (none, primary, or secondary) take significantly lower time to have their first birth from age 12 as compared to those with higher education. This is also true for transition to second birth from the first (Fig. 2). The significant differences in progression to parity-specific fertility among respondents across various categories of education are more pronounced in higher order births (third and fourth) (Fig. 3 and 4). These findings raise the question of whether the differences in progression to parity-specific fertility remain statistically significant even after controlling for the socio-demographic and cultural characteristics.

Figure-1: Kaplan-Meir survival estimates of transition to first birth from age 12



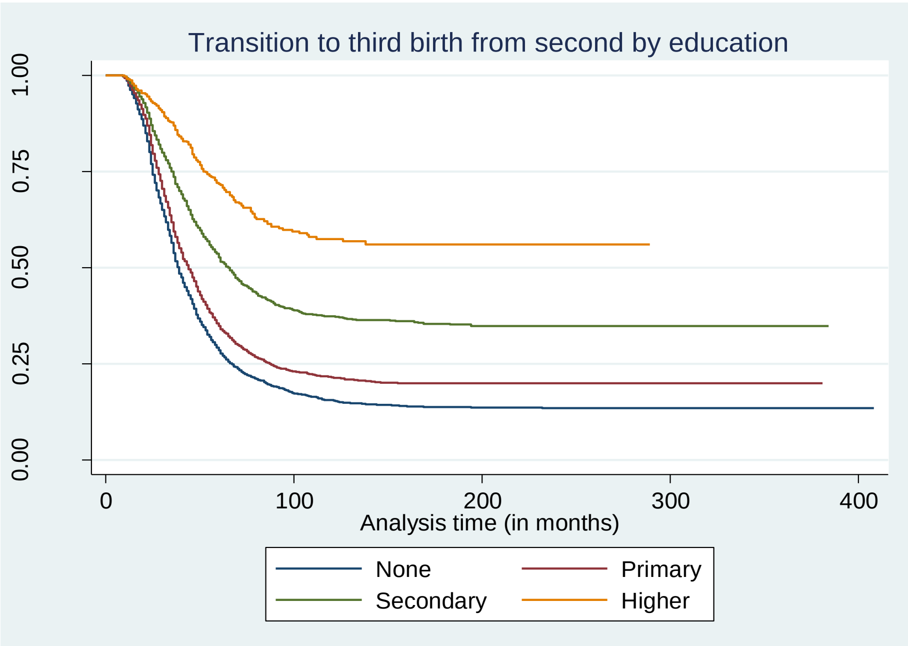
Log rank test: Ch-square (3) =1458.61; P-value= Pr>chi2 = 0.000

Figure-2: Kaplan-Meir survival estimates of transition to second birth from first



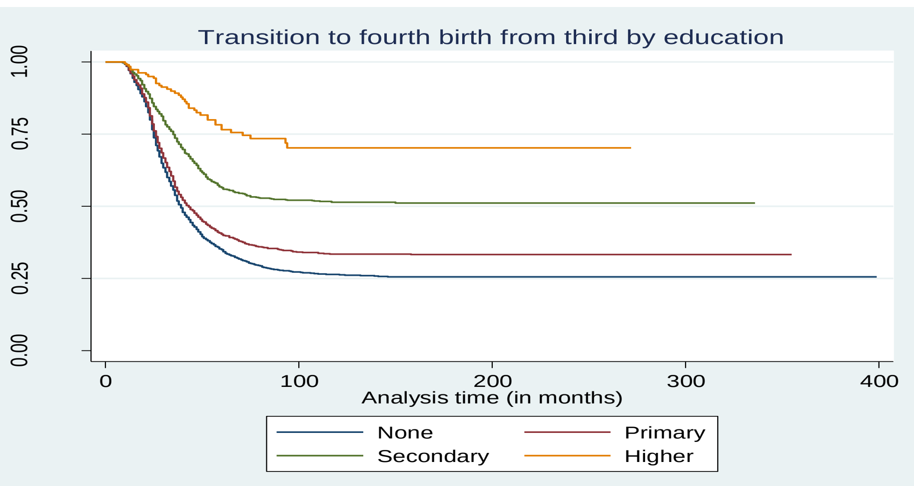
Log rank test: Chi-square (3) = 339.98; P-value = Pr > Chi2= 0.000

Figure-3: Kaplan-Meir survival estimates of transition to third birth from second



Log rank test: Chi-square (3) = 697.13; P-value= Pr>Chi2=0.000

Figure-4: Kaplan-Meir survival estimates of transition to fourth birth from third



Log rank test: Chi-square (3) = 288.62; P-value= Pr>Chi2=0.000

Table 4 presents the Cox regression estimates (hazard ratios) of parity-specific fertility (up to the fourth). All models in Table 4 includes control variables of age, age at first cohabitation, employment status, wealth index, husband's education, religion, and attitude towards family size. All three categories of education (none, primary, and secondary) have higher progression to first birth from age 12 compared to the reference category of higher education (11.3 percent, 29.4 percent, and 14.1 percent, respectively) after controlling for the socio-demographic and cultural characteristics.

Table-4: Cox regression estimates of the effect of education on parity-specific fertility in Bangladesh in 2011

Variables	First birth	Second birth	Third birth	Fourth birth
	Hazard Ratio	Hazard Ratio	Hazard Ratio	Hazard Ratio
Education				
None	1.103*	1.218**	2.206**	2.312**
Primary	1.294**	1.246**	2.092**	2.216**
Secondary	1.141**	1.092*	1.555**	1.527**
Higher (ref)				
Age	1.081**	0.985	1.056**	0.975
Age squared	0.998**	1.001	0.997*	1.001
Age at first cohabitation	0.808**	0.941*	0.975**	0.982*
Employment status				
Employed	0.902**	0.814**	0.778**	0.803**
Not employed (ref)				
Wealth index	1.013	0.950**	0.940**	0.923**
Husband's education	0.985	0.947**	0.996	0.971
Religion				
Islam	1.019	0.925*	1.199**	1.527**
Else (ref)				
Attitude towards family size				
Large family	1.167**	1.367**	1.627**	1.275**
Small family (ref)				
Subjects	17833	16016	12158	7675
Failures	16016	12158	7675	4382
F (df)	256.78**	48.96**	116.89**	44.63**
	(11 & 17822)	(11 & 16005)	(11 & 12147)	(11 & 7664)

Note: The dependent variable is the number of months to a birth from either the previous birth or age 12 (in the case of the first birth)

*$p<0.05$, * *$p<0.01$

The findings of higher progression among lower educated women are also similar for progression to second birth from the first. Moreover, the differences in progression of parity-specific fertility across various categories of education are more pronounced in third and fourth births. For example, respondents with no education had 2.21 times higher progression to third birth than respondents with higher education. This is also identical for respondents with primary education in relation to the reference category (2.09 times). Concerning the fourth birth, respondents with no education had 2.31 times higher progression than that of the reference category. The rate of higher progression to fourth birth is 2.22 times for respondents with primary education in relation to the reference category of higher education after adjusting for the socio-demographic and cultural characteristics.

Discussion and Conclusion

The objective of this study was to assess the differential impact of female education on cumulative fertility and parity-specific fertility in Bangladesh. Consistent with previous research conducted elsewhere, the findings of this research indicate that female education is inversely related with cumulative fertility. Higher educated women are more likely to have lower number of children than their counterparts with lower education. This finding is consistent with earlier research conducted by Bagavos (2010), Bailey (1989), Bollen *et al.,* (2007), Chowdhury (1994) and Tanfer (1984). Part of the reason behind lower number of children is that higher educated women have higher age at first cohabitation, higher participation in the labour market, and positive attitude towards small family. In addition, they have higher wealth index and have partners with higher education which essentially contributes to the lower level of cumulative fertility. In connection with this, Tanfer (1984:135) shows that "the negative effects of education on fertility operate through the direct associations between education and age at first marriage, contraceptive knowledge and contraceptive use, and through the inverse relationship between education and desired family size."

The decomposition analysis of cumulative fertility shows that the differences in intercepts between the three categories of respondents (no education, primary education, or secondary education) and the reference category of higher education are positive suggesting that when all the socio-demographic and cultural characteristics are set to zero the three categories of respondents would have higher cumulative fertility as compared to the reference category. Moreover, the differences are larger for respondents with lower education. This can be explained by the group effect of education on cumulative fertility. More specifically, some other factors might exert positive influence on cumulative fertility for respondents with lower education. For instance, negative attitude towards abortion, lower prevalence of contraception, unmet need of family planning, desire for son, and lower levels of gender equality could be most probable factors in this case (Derose and Kravdal, 2007; Gerster *et al.*, 2007; Grindstaff, 1989).

One of the strengths of this study is that a host of socio-demographic and cultural characteristics were taken into account in the analysis. This helps to overcome the limitations due to confounding and effect modification. However, one limitation of this study is that regional variations (e.g., rural-urban or divisional variation) in fertility were not taken into account in the analysis due to its main focus on examining differentials in fertility between various categories of education. Thus, based on the findings of this study, it is not possible to predict whether the impact of education on fertility is identical across respondents' region of residence. Earlier research shows that there were substantial variations in fertility by region of residence (Barkat-e-Khuda and Hussain, 1996; Kabir *et al*., 2008).

Another limitation of this study is the use of cross-sectional data in this analysis. The disadvantage of using cross-sectional data is that respondents' employment status and wealth index do not truly reflect their employment situation at the time of each birth. As a result, the employment status and wealth index used in this study are not the exact representative of their employment status and wealth index at the time of each parity. Using longitudinal data in the analysis would enable us to use employment status and wealth index that are related to respective parity.

Despite these limitations, this study provides important contributions to the literature through incorporating parity-specific analysis along with cumulative fertility in general and for Bangladesh in particular. One possible extension of this study could be to examine the impact of education on fertility in Bangladesh disaggregated by income attainment. This is particularly important because the effect of education on fertility may not be identical across various categories of income groups. Conducting separate analysis for each income group in investigating the impact of education on fertility would facilitate selecting the target group for policy interventions.

Moreover, analysing the impact of education on fertility of only those who have completed their childbearing (aged >49 years) would provide better estimates of the differential impact of education on fertility. Thus, excluding those women who are still in their reproductive age (15-49 years) will reduce the chance of distorting the findings due to further possibility of having children. Therefore, future research should focus on this aspect as well.

It is evident from this study that even after adjusting for the selected socio-demographic and cultural characteristics lower educated women have higher cumulative fertility and higher progression to parity-specific fertility. This suggests that there are some unobserved factors (not included in the analysis) that might lead to higher fertility for lower educated women. Therefore, in future research, it is worthwhile to take unobserved heterogeneity into account in the analysis in order to avoid the risk of either underestimating or overestimating the effect of female education on fertility. Lee (2010) and Muresan and Hoem (2010) noticed significant effect of unobserved heterogeneity in examining the relationship between education and fertility.

The findings of this study suggest that government should take necessary initiatives to ensure higher education for all women with a view to reduce fertility rate in Bangladesh. Findings based on decomposition analysis suggest that among the socio-demographic factors age at first cohabitation has the strongest impact on the total number of children. Therefore, strict implementation of legal age at marriage should be ensured by the government which will also facilitate career development of millions of young females in Bangladesh. In addition, effective social awareness programme should be launched to motivate women to finish their education and to concentrate more on establishing themselves in the labour market. To fulfill these objectives, both the government and non-government sectors should come forward to create greater employment opportunities for women. Finally, the social awareness programme should also focus on motivating couples for having smaller family so that they can invest enough time and money for producing quality children. Thus, an integrated approach is needed to bring desired change in the levels of fertility in Bangladesh.

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