

# Patterns and Differentials of Age at First Motherhood Among Married Adolescents in Bangladesh

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**Abstract:** *Background:* The focal point of this study is to investigate the current scenario of age at first motherhood among ever married adolescents in Bangladesh because early initiation into childbearing is generally the most important determinant of reproductive span, large family size, and population growth. *Methods:* The study uses the 2017-18 nationally representative Bangladesh Demographic and Health Survey (BDHS) data. In addition to the descriptive measures, Pearson's Chi-square test and binary logistic regression analysis are employed to determine the significant association and impact of explanatory variables on age at adolescent first motherhood, respectively. *Results:* The overall mean age at adolescents' first motherhood is 16.34±1.45 years, with marked variations by available explanatory variables. The bivariate analysis shows that the variables: current age, respondents' education, place of residence, access to mass media, wealth index, age at first cohabitation, continue studies after marriage, spousal age difference, education, and occupation of husbands are significantly associated with age at adolescents' motherhood. Multivariate binary logistic regression reveals that current age, respondents' education, wealth index, age at first cohabitation, spousal age gap, and husbands' occupation significantly impact the age at first motherhood among adolescents in Bangladesh. *Conclusions:* This study's results will be helpful for the policymakers to take necessary steps to increase the age at first cohabitation to raise the age of adolescent first motherhood by increasing the literacy rate, minimizing the spousal age difference, and improving the socio-economic conditions for good reproductive health, and further reducing fertility in Bangladesh.

**Keywords:** Teenage, Adolescent, Cohabitation, Body Mass Index, Binary Logistic Regression

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## 1. Introduction

Adolescents' age at first cohabitation and motherhood are important components of reproductive span and fertility where marriage is universal. Generally, the period of adolescence encompasses the changeover from childhood to adulthood during the second decade of life. Thus, adolescence is considered in this study as life between childhood and adulthood aged 10 and 19 years. This period is regarded as a critical time in the young person's life [1].

WHO (2020) reported that 10 million teenagers between 15-19 years become pregnant every year across the world [2, 3], and 95% of all teenage pregnancy occurs in low and middle-income countries [4]. Globally, 11% of the total birth is given

by adolescent mothers, and approximately 12 million teenage girls give birth every year [5], with an estimated 3.9 million having unsafe abortions [3]. The United Nations International Children Fund (UNICEF) reported that one in every fifth child is born by a teenage mother, and 80% of these adolescent pregnancies occur in third-world countries [6, 7]. Adolescent pregnancy could pose profuse unfavourable health problems to adolescent mothers, such as the risk of death, pregnancy-related illness, low birth weight babies, high infant mortality rate, and exposure to sexually transmitted diseases [7]. Almost 70% of the total adolescents of the world reside in developing countries [8]. There is evidence, for instance, that women who have early first births tend to be poorly educated and have lower income and fewer assets later in life [9]. Worldwide, adolescents suffer from an inconsistent share of early nuptial,

unsafe abortions, unwanted pregnancies, sexually transmitted infections, infertility, malnutrition and anaemia, and gender-based violence [10, 11].

Generally, the first visible outcome of the fertility process is the birth of the first child. Women's first birth may be assumed to be one of the significant events and the most remarkable happening because motherhood signals the beginning of her potential reproductive period and introduces an essential pledge of time and resources [12]. In many countries, postponement of first birth, reflecting in the age at first marriage, has contributed greatly to overall fertility decline [13]. But in traditional societies like Bangladesh, the early age of the first cohabitation and teenage motherhood are common phenomena. In Bangladesh, marriage is universal, and most females cherish the desire to become mothers as early as possible after marriage; less, they should be blamed for being sterile. As a result, a high proportion of females at the teenage stage become mothers in Bangladesh. Currently, Bangladesh is one of the densely populated and the 8<sup>th</sup> most populous countries in the world. The country has the highest juvenile fertility rate in South Asia. In Bangladesh, 28% of girls age 15-19 have begun childbearing; 22% have given birth, and another 6% are pregnant with the first child [14]. Although the proportion of women age 15-19 who begun childbearing decreased from 33% (2004) to 31% (2014) and 28% in 2017-18, a decline of 3 percentage points from 2014, but the prevalence of child marriage and teenage motherhood are still high in Bangladesh. The TFR in Bangladesh is 2.3 children per woman in 2017. The TFR declined from 3.4 (1993-94) to 2.3 (2011) and has since remained static up to 2017 [14]. Although the current fertility rate in Bangladesh is relatively lower than earlier, it is also considered high compared to its area and national resources.

The study on age at first birth among teenagers signifies fertility at the early stage of married life. It is the most welcome event for almost all families in traditional Bangladeshi societies. Moreover, there is little chance of memory lapse in reporting the date of cohabitation and first birth. Therefore, considering the potentially wide-ranging consequences of age at first birth, a detailed examination is made to estimate the age at first birth, its differentials and patterns, and identify the factors influencing the age at first birth among teenage girls in Bangladesh. Nonetheless, it is expected that this analysis will provide a comprehensive picture of age at first motherhood among ever married adolescents in Bangladesh.

## 2. Methods

### 2.1. Data

The data used for this research work is extracted from Bangladesh Demographic and Health Survey 2017-18 (BDHS 2017-18) dataset. The survey was conducted by the National Institute of Population Research and Training (NIPORT) authority, Health Education and Family Welfare Division of the Ministry of Health and Family Welfare under

the Training, Research and Development operational plan of 4<sup>th</sup> HPNSP. Mitra and Associates, located in Dhaka, Bangladesh, implemented the survey. The survey received financial support from the United States Agency for International Development (USAID). The sample for the 2017-18 BDHS is nationally representative, and this survey covers entire inhabitants residing in non-institutional residence units in the country. As part of the international Demographic and Health Surveys Program (MEASURE DHS), the technical support to the BDHS 2017-18 was obtained from the ICF International of Calverton, Maryland, USA.

The BDHS 2017-18 methodology protocols, assessment of biomarkers, and all other instruments connected to the survey were approved by institutional review boards (IRBs) at ICF and the Bangladesh Medical Research Council (BMRC). Before the beginning of data collection activities, the protocols were approved by both IRBs and BMRC. The data for the survey was collected from the respondents only who gave their verbal consent in response to reading out the informed consent declaration by the interviewer.

### 2.2. Study Design

The survey uses a two-stage stratified sampling technique to collect data on the households. In this survey, from 20,376 ever-married females age 15-49 years qualified for interviews, 20,127 were successfully interviewed, produced a response rate of 99%. Among the 20,127 selected females, 1951 were currently under age 20 years. First of all, this cohort was extracted from the large dataset for analysis. Since first birth makes a woman's transition into motherhood, only those women who have had at least one birth are considered to determine the age at first motherhood of the married adolescents in Bangladesh. Therefore, out of 1951 sampled women, 987 are considered in the analysis because they successfully produce at least one birth before three years preceding the survey. A detailed description of the methodology of data collection, including sample design for the survey, can be found elsewhere [14].

### 2.3. Statistical Techniques

At the analytical stage, descriptive measures of age at teenage motherhood have been computed to compare the mean age along with its variability and shape characteristics by available explanatory variables. For this research task, the dependent variable considered here is the age at adolescent first motherhood, and the explanatory variables include: Respondents current age, Religion, Respondents education, Administrative division, Types of place of residence, Ever had a terminated pregnancy, Working status, Access to mass media, Wealth index, BMI, Use of contraception, Age at first cohabitation, Continue study after marriage, Spousal age gap, Husbands education, and occupation. The dependent variable age at first motherhood is dichotomized as "< Median" and "≥ Median" for advance analysis. Moreover, contingency tables were constructed along with

corresponding Pearson's Chi-square statistics to examine the significant association between age at teenage motherhood and selected background characteristics. Thereafter, multivariate binary logistic regression analysis was employed considering the variables found significant in bivariate analysis to identify the significant factors affecting age at adolescents' motherhood. Finally, to understand the patterns of teenage motherhood at a glance, trend lines have been fitted for age at first cohabitation and birth cohorts with the mean age of motherhood at a different time of points from the nationally representative surveys. The statistical software SPSS (Statistical Package for the Social Science) version 25 is used to conduct the study.

### 3. Results

Early marriage and initiation into childbearing are generally the most important determinants of large family size and population growth. In Bangladesh, early age at first cohabitation and teenage motherhood are common scenarios across the regions. Thus, it is an urgent need to investigate the age at teenage motherhood comprehensively. Therefore, considering the potentiality of wide-ranging consequences of adolescent motherhood, the present study analyses this important demographic variable by selected background characteristics of the respondents. The descriptive statistics of the study variable concerning the selected explanatory variables are presented in Table 1.

**Table 1.** Descriptive measures of adolescents' age at first motherhood by background characteristics of the respondents.

Background Characteristics	Mean age at first motherhood	S. D.	$\gamma_1$	$\gamma_2$	95% CI		No. of respondents
					Min	Max	
Current age							
15-17	15.27	1.03	-0.51	-0.29	15.13	15.41	223
18-19	16.65	1.41	-0.14	-0.49	16.55	16.75	764
Religion							
Muslim	16.34	1.44	-0.50	-0.21	16.25	16.43	922
Others	16.37	1.57	-0.30	-0.52	15.99	16.75	65
Respondents Education							
Illiterate	16.32	1.74	-0.93	-0.28	15.74	16.90	34
Primary	16.05	1.53	-0.67	-0.05	15.88	16.22	310
Secondary and higher	16.48	1.38	-0.32	-0.28	16.37	16.59	643
Division							
Barisal	16.43	1.39	-0.64	-0.19	16.17	16.69	113
Chittagong	16.52	1.43	-0.41	-0.28	16.30	16.74	162
Dhaka	16.40	1.52	-0.70	-0.25	16.14	16.66	134
Khulna	16.31	1.48	-0.26	-0.26	16.05	16.57	128
Mymensingh	16.44	1.54	-0.15	-0.48	16.16	16.72	117
Rajshahi	16.08	1.33	-0.67	0.14	15.85	16.31	126
Rangpur	16.02	1.42	-0.52	-0.31	15.78	16.26	134
Sylhet	16.58	1.43	-0.36	-0.26	16.25	16.91	73
Type of place of residence							
Urban	16.47	1.39	-0.25	-0.18	16.32	16.62	308
Rural	16.28	1.48	-0.60	-0.24	16.17	16.39	679
Ever had a terminated pregnancy							
No	16.34	1.45	-0.51	-0.23	16.25	16.43	921
Yes	16.30	1.44	-0.04	-0.30	15.95	16.65	66
Respondent currently working							
No	16.44	1.46	-0.48	-0.26	16.33	16.55	700
Yes	16.08	1.40	-0.48	-0.21	15.92	16.24	287
Access to Mass Media							
No access	16.24	1.47	-0.64	-0.09	16.09	16.39	380
Have access	16.40	1.44	-0.35	-0.32	16.29	16.51	607
Wealth Index							
Poor	16.18	1.47	-0.66	-0.15	16.05	16.31	479
Middle	16.47	1.45	-0.39	-0.21	16.27	16.67	205
Rich	16.49	1.41	-0.16	-0.37	16.33	16.65	303
Body Mass Index							
Underweight	16.47	1.42	-0.54	-0.23	16.28	16.66	225
Normal	16.29	1.45	-0.47	-0.20	16.18	16.40	655
Overweight	16.36	1.54	-0.45	-0.37	16.07	16.65	107
Ever use of contraception							
No	16.62	1.39	-0.51	-0.13	16.37	16.87	122
Yes	16.30	1.46	-0.50	-0.24	16.20	16.40	865
Age at first cohabitation							
10-14	15.26	1.24	-0.17	0.22	15.14	15.38	412
15-18	17.11	1.05	-0.58	-0.03	17.02	17.20	575
Continue study after marriage							
No	16.19	1.40	-0.53	-0.10	16.06	16.32	458
Yes	16.47	1.48	-0.38	-0.36	16.34	16.60	529
Spousal age difference							
0-7	16.53	1.45	-0.35	-0.37	16.40	16.66	460
8-14	16.12	1.43	-0.49	-0.10	15.99	16.25	453
15-22	16.47	1.38	-0.50	-0.27	16.16	16.78	74

Background Characteristics	Mean age at first motherhood	S. D.	$\gamma_1$	$\gamma_2$	95% CI		No. of respondents
					Min	Max	
Husbands education level							
Illiterate	16.00	1.56	-0.49	-0.16	15.73	16.27	125
Primary	16.25	1.46	-0.52	-0.22	16.10	16.40	363
Secondary	16.38	1.39	-0.50	-0.12	16.24	16.52	366
Higher	16.79	1.38	-0.29	-0.51	16.56	17.02	133
Husbands Occupation							
Agriculture	16.01	1.43	-0.86	-0.06	15.80	16.22	170
Service	16.38	1.44	-0.49	-0.24	16.27	16.49	612
Business	16.56	1.44	-0.25	-0.32	16.34	16.78	170
Others	16.00	1.66	0.18	-0.37	15.45	16.55	35
Bangladesh	16.34	1.45	-0.23	-0.49	16.25	16.43	987
Coefficient of Variation (%)			8.57				

The finding in Table 1 shows that the overall mean age at first motherhood is  $16.34 \pm 1.45$  years, which is even one and a half years less than the existing legal age of female marriage (18 years) in Bangladesh. Findings illustrate that the age at first motherhood is heterogeneous, and the shape characteristics of the distribution are negatively skewed ( $\gamma_1 = -0.23$ ) and platykurtic ( $\gamma_2 = -0.49$ ). Differentials of teenage motherhood elucidate that the lowest mean age at adolescent motherhood ( $15.26 \pm 1.24$ ) is found among the respondents whose age at first cohabitation is between 12-14 years, followed by respondents whose current age is 15-17 years ( $15.27 \pm 1.03$ ). On the contrary, the higher mean age at adolescent motherhood is found among the respondents whose age at the first cohabitation is between 15-18 years ( $17.11 \pm 1.05$ ), followed by those whose husbands are highly educated ( $16.79 \pm 1.38$ ). It may be mentioned here that the mean age at first cohabitation is found only  $15.44 \pm 1.60$  years, which indicates that age at first cohabitation is less than two and half years than the legal age of female marriage of 18 years in Bangladesh. As expected, the mean age at motherhood is greater for urban adolescents ( $16.47 \pm 1.39$ ) compared to their vast majority of rural counterparts ( $16.28 \pm 1.48$ ). Regional differentials reveal that the mean age

at teenage motherhood is the highest in Sylhet division ( $16.58 \pm 1.43$ ) and lowest in Rangpur ( $16.02 \pm 1.42$ ). Teenage girls who have access to mass media have a relatively higher mean age at motherhood ( $16.40 \pm 1.44$ ) than those who do not have access to mass media. The respondents who belong to the rich wealth index stratum have a greater mean age at motherhood ( $16.49 \pm 1.41$ ) than those who belong to other wealth index categories. The underweighted adolescents have maximum mean age at motherhood ( $16.47 \pm 1.42$ ) in comparison to other BMI groups, probably because of adolescent subfecundity due to malnutrition. Among the variables, the spousal age difference of the adolescent girls is an important variable for the variations of age at first motherhood. Surprisingly, the mean spousal age difference of this study is found  $8.40 \pm 3.90$  years. Adolescents with a spousal age difference between 0-7 years take a longer time for their first birth ( $16.53 \pm 1.45$ ) than adolescents with other categories of spousal age gaps. Besides the descriptive statistics, bivariate analysis is also performed to examine the significant association between teenage motherhood and available background characteristics of the respondents, and the findings are presented in Table 2.

**Table 2.** Test of association between age at first motherhood and background characteristics of the adolescents, Bangladesh.

Background Characteristics	Categories	Age at first motherhood		Chi-square	p-value
		12-15 n (%)	16-18 n (%)		
Current age	15-17	122 (12.36)	101 (10.23)	99.33	0.000
	18-19	157 (15.91)	607 (61.50)		
Religion	Muslim	263 (26.65)	659 (66.77)	0.458	0.499
	Others	16 (1.62)	49 (4.96)		
Respondents Education	Illiterate	12 (1.22)	22 (2.23)		
	Primary	113 (11.45)	197 (19.6)	16.98	0.000
	Secondary and higher	154 (15.60)	489 (49.54)		
Division	Barisal	32 (3.24)	81 (8.21)	8.19	0.316
	Chittagong	38 (3.85)	124 (12.56)		
	Dhaka	40 (4.05)	94 (9.52)		
	Khulna	36 (3.65)	92 (9.32)	8.19	0.316
	Mymensingh	29 (2.94)	88 (8.92)		
	Rajshahi	42 (4.26)	84 (8.51)		
	Rangpur	46 (4.66)	88 (8.92)		
	Sylhet	16 (1.62)	57 (5.78)		
Type of place of residence	Urban	76 (7.70)	232 (23.51)	2.85	0.091
	Rural	203 (20.57)	476 (48.23)		
Ever had a terminated pregnancy	No	262 (26.55)	659 (66.77)	0.22	0.639
	Yes	17 (1.72)	49 (4.96)		
Respondent currently working	No	188 (19.05)	512 (51.87)	2.36	0.124
	Yes	91 (9.22)	196 (19.86)		
Access to Mass Media	No	120 (12.16)	260 (26.34)	3.34	0.068
	Yes	159 (16.11)	448 (45.39)		

Background Characteristics	Categories	Age at first motherhood		Chi-square	p-value
		12-15 n (%)	16-18 n (%)		
Wealth Index	Poor	156 (15.81)	323 (32.73)	8.60	0.014
	Middle	48 (4.86)	157 (15.91)		
	Rich	75 (7.60)	228 (23.10)		
Body Mass Index	Underweight	61 (6.18)	164 (16.62)	0.30	0.863
	Normal	186 (18.84)	469 (47.52)		
	Overweight	32 (3.24)	75 (7.60)		
Ever use of contraception	No	28 (2.84)	94 (9.52)	1.94	0.164
	Yes	251 (25.43)	614 (62.21)		
Age at first cohabitation	10-14	245 (24.82)	167 (16.92)	339.48	0.000
	15-18	34 (3.44)	541 (54.81)		
Continue study after marriage	No	145 (14.69)	313 (31.71)	4.85	0.028
	Yes	134 (13.58)	395 (40.02)		
Spousal age difference	0-7	110 (11.14)	350 (35.46)	9.14	0.010
	8-14	149 (15.10)	304 (30.80)		
	15-22	20 (2.03)	54 (5.47)		
Husbands' education	Illiterate	46 (4.66)	79 (8.00)	10.927a	0.012
	Primary	108 (10.94)	255 (25.84)		
	Secondary	100 (10.13)	266 (26.95)		
	Higher	25 (2.53)	108 (10.94)		
Husbands' occupation	Agriculture	63 (6.38)	107 (10.84)	12.18	0.007
	Service	169 (17.12)	443 (44.88)		
	Business	35 (3.55)	135 (13.68)		
	Others	12 (1.22)	23 (2.33)		

The results in Table 2 show that the respondents' current age is highly significantly associated with the age at adolescents' first motherhood ( $p < 0.05$ ) and a maximum of the adolescents ( $n = 607$ , 61.50%) aged 18-19 who give birth at age 16-18 years. The respondents' education is one of the most significant factors ( $p < 0.05$ ) associated with the age of adolescent motherhood. The highest number of the adolescents with secondary and higher education ( $n = 489$ , 49.54%) became mother at age 16-18 years compared to other categories of the educational status. Like education, wealth index ( $p < 0.05$ ) and access to mass media ( $p < 0.10$ ) are also significantly associated with the age at adolescent motherhood. Age at first cohabitation ( $p < 0.05$ ) and spousal age difference ( $p < 0.05$ ) found to have a highly significant association with the age at motherhood of the adolescents. The respondents who continue study after marriage ( $n = 395$ ,

40.02%) become a mother at age 16-18 years, and the variable is also associated with the age of adolescent motherhood ( $p < 0.05$ ). Husbands' education and occupation also play a vital role in varying teenage motherhood. The results in Table 2 also depict that husband education ( $p < 0.05$ ) and occupation ( $p < 0.05$ ) show a significant association with the age at adolescent motherhood.

In addition to univariate and bivariate analyses, multivariate binary logistic regression analysis is also used in this study to identify the risk factors of adolescent motherhood. For this purpose, the age at first adolescent motherhood has dichotomized as the value zero for age at first motherhood less than 16 years (median) and 1 for age 16 years and above. Table 3 present the estimates of logistic regression of the different covariates of age at first motherhood.

**Table 3.** Logistic regression coefficients and odds ratios of the selected factors associated with age at first motherhood, Bangladesh.

Background Characteristics	B	S. E.	p-value	Odds Ratio	95% CI Odds	
					Lower	Upper
Current age				1		
15-17*						
18-19	1.10	0.21	0.000	3.02	2.021	4.506
Res. education						
Illiterate*			0.011	1		
Primary	0.20	0.51	0.701	1.22	0.447	3.306
Secondary and higher	0.85	0.52	0.105	2.33	0.838	6.488
Place of residence						
Urban*				1		
Rural	-0.22	0.22	0.313	0.80	0.517	1.235
Access to Mass Media						
No*				1		
Yes	0.28	0.21	0.177	1.33	0.88	2.004
Wealth Index						
Poor*			0.095	1		
Middle	0.31	0.26	0.220	1.37	0.829	2.261
Rich	-0.30	0.26	0.253	0.74	0.445	1.238
Age at first cohabitation						

Background Characteristics	B	S. E.	p-value	Odds Ratio	95% CI Odds	
					Lower	Upper
10-14*				1		
15-18	3.02	0.21	0.000	20.56	13.497	31.306
Continue study after marriage						
No*				1		
Yes	0.21	0.21	0.316	1.23	0.821	1.839
Spousal age difference						
<8*			0.157	1		
8-14	-0.38	0.20	0.055	0.686	0.467	1.007
>14	-0.26	0.37	0.484	0.772	0.374	1.593
Husbands' education						
Illiterate*			0.68			
Primary	0.22	0.32	0.49	1.245	0.669	2.314
Secondary	0.31	0.33	0.338	1.369	0.72	2.602
Higher	0.5	0.42	0.238	1.648	0.719	3.779
Husbands' occupation						
Agriculture*			0.227			
Service	0.15	0.25	0.543	1.162	0.717	1.883
Business	0.64	0.33	0.05	1.891	1.001	3.573
Others	0.22	0.54	0.683	1.246	0.433	3.584
Constant	-2.07	0.67	0.002	0.126		

\* Reference Category

The findings in Table 3 reveal that respondents' current age has a significant impact on the age at first motherhood ( $p < 0.05$ ). The respondents' age group 18-19 years has a higher (OR: 3.02, 95% CI: 2.02-4.51) probability of giving birth at median age and above than the respondents aged less than the median (16 years). The educational levels of the adolescents also significantly influence the age at motherhood ( $p < 0.05$ ). The result in Table 3 illustrates that the respondents who are secondary and higher educated have 2.33 times (95% CI: 0.84-6.49) higher likelihood of taking a long time to be a mother compared to their illiterate counterparts. The wealth index has a significant impact on the age at adolescents motherhood ( $p < 0.1$ ). The respondents who belong to the middle class have more probability of becoming late motherhood (OR: 1.37, 95% CI: 0.83-2.26) than other wealth index categories. As expected, age at first cohabitation significantly impacts the age at adolescents' motherhood ( $p < 0.05$ ). The adolescents whose age at first cohabitation are in the age group 15-18 years are 20.56 times (95% CI: 13.50-31.31) higher odds of late motherhood than the respondents whose age at first cohabitation is 12-14 years.

Biological maturity may be the leading cause of late motherhood in the age group 15-18 years. The spousal age difference is an important factor in the variation of demographic events because the difference between brides and grooms is noticeably higher among adolescents in Bangladesh. It can be seen from Table 3 that the spousal age difference is also considered to be a significant determinant that affects adolescents' motherhood ( $p < 0.1$ ). The lower spousal age difference (<8 years) has higher odds of giving late birth than other groups of the spousal age differences. Husbands occupations of the respondents significantly influence the age at adolescents motherhood ( $p < 0.05$ ). Adolescents whose husbands' occupation is business are more likely to give birth later than other occupational groups (OR: 1.89, 95% CI: 1.00-3.57). The Hosmer and Lemeshow test of goodness of fit illustrates that the binary logistic regression model fits the data well (Chi-square: 2.423,  $p$ -value: 0.965). In addition to multidimensional numerical findings of age at first adolescent motherhood, Figure 1 displays the same to understand the trends at a momentary look based on age at first cohabitation and birth cohorts.

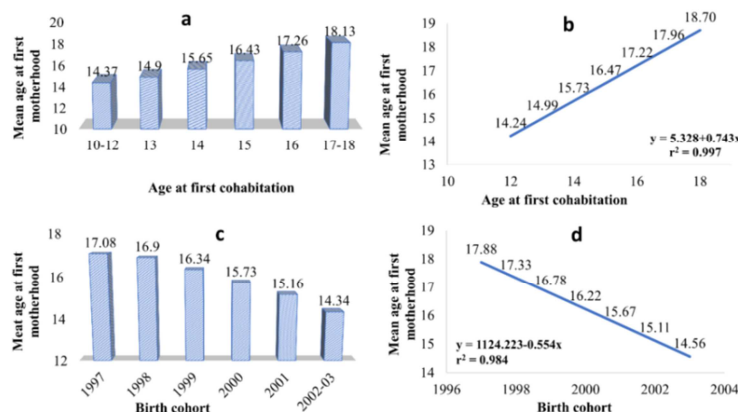


Figure 1. Trends of age at first adolescent motherhood with respect to age at first cohabitation and birth cohorts.

Figure 1a illustrates that the mean age at first motherhood and age at first cohabitation are highly positively correlated, indicating that with the increase in age at first cohabitation, the mean age of adolescent motherhood also increases. The trend line (Figure 1b.) shows a sharp rise in the age of motherhood with the increase of age at first cohabitation. The estimate of the trend line ( $b=0.743$ ) indicates that for a one-year increase in the age of the first cohabitation, the age at adolescent motherhood also increases by, on average, about nine months. Similarly, Figure 1 (c, d) portray the inverse relationship between mean age at first motherhood and birth cohorts of teenage girls. In Figure 1d, the coefficient ( $b=-0.554$ ) reflects a sharp decrease in age at adolescents' first

motherhood from old birth cohort to recent birth cohort. The mean age at first motherhood among the recent birth cohorts is relatively lower because the more fertile teenage girls are included in this cohort. In addition to trends of mean age at adolescent motherhood based on age at first cohabitation and birth cohorts of the respondents, Figure 2a also depicts the trend of mean age at first motherhood during the period 1993-2018 to understand the patterns at a glance. Since age at first cohabitation is highly positively correlated with the age at first motherhood, therefore Figure 2b presents the trend of mean age at first cohabitation during the same period to observe the comparative patterns of mean age at adolescent first motherhood.

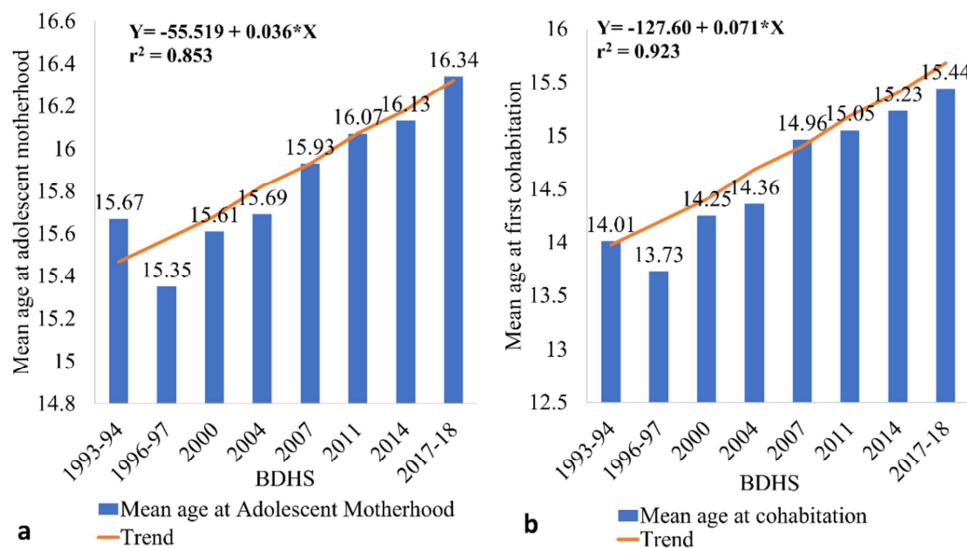


Figure 2. Trends of mean age at adolescent motherhood and cohabitation during the period 1993-2018.

Figure 2 (a, b) shows that both mean age adolescent motherhood and mean age at first cohabitation have an increasing trend during the periods mentioned above. Figure 2a shows that adolescents' motherhood mean age increment rate is 0.03 years for every four years. The value of the estimate in Figure 2a ( $b=0.036$ ) reflects that the mean age at motherhood increases by about three months for every four years. Similarly, Figure 2b indicates the increasing trend of age at first cohabitation during the same periods. The estimate ( $b=0.071$ ) shows that the mean age at first cohabitation among teenagers also increases to about six months for every four years in Bangladesh.

## 4. Discussion

Adolescent motherhood is a global health concern due to its high prevalence in low-and middle-income countries. Adolescent motherhood jeopardizes an ultimate and efficacious changeover to adulthood [6]. Moreover, teenage mothers are more at risk of significant malformation compared to adult mothers [15]. From earlier studies, there is ample evidence that several socio-economic and demographic factors contribute to teenage motherhood

between 15-19 years, and this study aims to determine such features affecting it. This study gives clear information that entrances into the childbearing of Bangladeshi adolescents are too early. This study found a significant relationship between the current age of the respondents and age at first adolescents motherhood and the adolescents belong to comparatively higher age group give late birth than their low age counterparts. A study conducted in Ethiopia also found a significant association between teenage motherhood and the age of the respondents [16, 17] and higher teenage childbearing is observed among the adolescent age group 18-19 years [18, 19]. As expected, adolescents' education plays a significant role to avert child motherhood in a great magnitude. The illiterate respondents have a greater risk of early motherhood than adolescents with secondary and higher education. Teenage motherhood is highly significantly influenced by the educational status of the respondents [17, 19-21], and illiterate adolescents are more susceptible to give early birth [22-24]. The graduate students have a lower probability of getting early motherhood than secondary and illiterate respondents [25-28]. The wealth index, a proxy of income, is a significant determinant of adolescent motherhood, and middle-class adolescents have higher mean

age at motherhood than other wealth indices of the respondents. A similar result was found in a study that a lower wealth index is a risk factor that significantly affects teenage pregnancy [29]. Moreover, the richest wealth index adolescents are less likely to be early pregnant compared to the poorest wealth quantile [22]. This study found a significant impact of age at first cohabitation on the age at adolescent motherhood. The respondents whose age at first cohabitation is between 10-14 years are at risk of early motherhood than the cohabitation age group 15-18 years. A previous study in Bangladesh found a significant influence of early marriage on age at first adolescents motherhood, and they are more likely to be early motherhood than the adolescent with late marriage [25]. The spousal age gap is a significant predictor that influences teenage motherhood. The spousal age gap of fewer than eight years has a higher likelihood of late motherhood, while the spousal age difference greater than eight years are more at risk of early motherhood. A significant impact is identified between spousal age difference and adolescent motherhood, and a lower spousal age gap is associated with a lower chance of early adolescent motherhood [22]. Husbands occupation of the respondents has a substantial impact on adolescent motherhood, and the respondents whose husbands occupation is business are more susceptible to be late motherhood than other husbands occupational status in Bangladesh.

## 5. Conclusion

Generally, childbearing at early age entails substantial death risks for both mother and the child. Pregnancy at the teenage stage includes anemia, low birth weight babies, stillbirth, high infant mortality, high maternal mortality, malnutrition, large population size, and population growth. Moreover, to be the extent that early first birth is associated with poor educational and employment opportunities and more rapid childbearing. In addition, reproductive span is lengthened due to early access into childbearing, which accelerates fertility. The finding of this research study confirms that the mean age at adolescents motherhood in Bangladesh is extremely lower, although its fertility rate is still so far above replacement level. The results of this study reflect that the secondary and higher educated adolescents take more time to give their first birth than other educational status groups. Similarly, higher age at first cohabitation and lower spousal age difference also significantly impact the age of teenage motherhood. Moreover, the husbands' occupation of the respondents has a remarkable impact on the age at first motherhood of the adolescents. Therefore, it can be concluded that the study's results help the policymakers initiate appropriate policies to reduce the frequency of teenage motherhood by properly addressing the above-mentioned issues in Bangladesh.

## Abbreviations

BMI: Body Mass Index.

BDHS: Bangladesh Demographic and Health Survey

<: Less than

≥: Greater than equal

UNICEF: The United Nations International Children Fund

NIPORT: National Institute of Population Research and Training

USAID: United States Agency for International Development

HPNSP: The Health Sector and Fourth Health Population and Nutrition Sector Programmes

## Declarations

### *Ethics Statements and Consent for Publication*

As part of the international Demographic and Health Surveys Program (MEASURE DHS), the technical support to the BDHS 2017-18 was obtained from the ICF International of Calverton, Maryland, USA. The respondents give their verbal consent to read out the informed consent statement by the interrogator. The user instructions were firmly followed, and permission of the BDHS dataset was accessible from <https://dhsprogram.com/data>. The ethical approval for the BDHS 2017-18 was taken by NIPORT from the BMRC (Bangladesh Medical Research Council).

### *Declaration of Competing Interest*

The authors declare that there is no competing interest in this research.

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## Appendix

Supplementary data Supplementary data to this article can be found at <https://data.mendeley.com/datasets/tn9pvppxx2/draft?a=03d215aa-6d19-4643-8c12-f6d4d7241600>.

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