

## Research Article

### Effects of Socio-Economic and Demographic Variables on Age at First Marriage in Bangladesh

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**Abstract:** Age at first marriage is a most important factor in population dynamics as it affects fertility tremendously and mortality and migration to a lesser extent. Marriage is nearly universal everywhere in Bangladesh. Age at first marriage has a strong influence on a variety of demographic, social and economic factors. Early marriage is more common matter among the poorest women in Bangladesh than women from wealthy families. The purpose of this study is to identify the effects of socio-economic and demographic variables on age at first marriage in Bangladesh. For this, Bangladesh Demographic and Health Survey (BDHS) 2007 data is used in this study. Chi-square test and logistic regression analysis has been used to utilize the data. In logistics analysis, these results suggest that education, division, religion, occupation and partner occupation have highly significant effects on age at first marriage in Bangladesh. It is pointed out that education is one of the most viable means for enhancing the status of women as well as for rising age at first marriage in Bangladesh.

**Keywords:** Age at first marriage, Bangladesh, chi-square test, logistic regression analysis, socio-economic and demographic variables

#### INTRODUCTION

Age at first marriage is a fundamental aspect to develop marriage relationship. Actually, marriage is a universal social institution through an adult male and an adult female generally involves in marriage relationship and acquires new social status as a husband and wife (UN, 1988, 1990). The social status of the husband and wife goes through from institution to companionship to meet reciprocal material, sexual, emotional, psychological and spiritual needs for their survival (Burgess and Locke, 1945; Dyer, 1983). Marriage is an important religious duty as well as an important social institution. Islam, which is the predominant religion of Bangladesh, attaches great importance to the family by strengthening the ties bonding its members and safeguarding it against undermining influences (Islam and Ahmed, 1998). In general, Hindus communities marry later than Muslims because of higher education (Bruce and Caldwell, 2005).

Education is the important socio-economic factor that possesses strongest effect in increasing age at marriage and decreasing the chance of teenage first birth in Bangladesh (Nahar and Min, 2008). Education level of mothers and mothers-in-law are also found significantly associated with the age at first marriage of

daughters (Bates *et al.*, 2007). Husband's and wife's education and their work status are the strongest for explaining the variability in age at first marriage (Nurullah and Islam, 2010).

**Correct following:** Level of education should be intensified for both male and female and consequently level of occupation for both male and female would be improved age at first marriage. Therefore, the fertility, mortality (especially infant and child mortality), maternal mortality and poverty would be declined. Furthermore, female reproductive behaviors will be enhanced (Islam and Hossain, 2009). An increase in the age at first marriage would reduce high fertility (Haque and Sayem, 2009). Therefore, the aim of the presents study is to find the impacts of different socio-economic and demographic factors on age at first marriage.

Sources of data:

The total sample used in the current study consisted of 11,440 Bangladeshi female married populations. Age of the subjects at the time of collected data ranged from 10 to 49 years. The data is taken from Bangladesh Demographic and Health Survey (BDHS)-2007 collected from the various districts of Bangladesh using multistage cluster sampling technique.

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**METHODOLOGY**

**Logistic model:** Cox discovered the logistic regression model that can be used not only to identify risk factors but also to predict the probability of success (Cox, 1970). Furthermore, Lee and Fox developed this model (Lee, 1980; Fox, 1984). This model expresses a qualitative dependent variable as a function of several explanatory variables, both qualitative and quantitative. Logistic regression is a form of regression, which is used when the dependent is a dichotomy and the independents are of any type. In logistic analysis age at first marriage is treated as dependent variable.

The dependent variables chosen in the model was given in the following:

$$Y_i = \begin{cases} 0, & \text{Age at marriage less than 18} \\ 1, & \text{Age at marriage more than 18} \end{cases} \quad i = 1, 2, 3, \dots, n$$

Division, religion, education, occupation and partner occupation are considered as explanatory variables in this model.

**Measuring the worth of the model:** There are various statistical that have been proposed for assessing the worth of a logistic regression model, analogous to those that are used in linear regression. The proposed statistics as follows:

**R<sup>2</sup> in logistic regression:** The worth of the linear regression model can be determined by using R<sup>2</sup> but R<sup>2</sup> computed as in linear regression should not be used in logistic regression at least not when the possible values of Y are zero and one. It is evident that R<sup>2</sup> can be dropped considerably for every miss fitted point, so can be less than 0.9 even for near perfect fitting. Cox and Wermuth also conclude that R<sup>2</sup> should not be used when Y has only two possible values and show that frequently R<sup>2</sup> = 0.1 when good models are used. Various alternative forms of R<sup>2</sup> have been proposed for the binomial logit model (Cox and Wermuth, 1992). Maddala and Magee proposed using (Maddala, 1983; Magee, 1990)

$$R^2 = 1 - \left\{ \frac{L(0)}{L(\hat{\beta})} \right\}^{\frac{2}{n}} \tag{1}$$

With L(0) denoting the likelihood for the null model (i.e., with no regressors) and L(β) representing the likelihood function that would result when replaces in the following equation

$$g(Y_1 Y_2 \dots Y_n) = \prod_{i=1}^n P_i^{Y_i} (1 - P_i)^{1 - Y_i} \tag{2}$$

Essentially the same expression expects that 2/n was misprinted as 1/n, was given by Cox and Snell (1989).

[Equation (1) is motivated by the form of the likelihood ratio test for testing the fitted model against the null model. It can be shown that R<sup>2</sup> as defined in linear regression is equivalent to the right hand side of Eq. (1). Hence, this is a natural form for R<sup>2</sup> in logistic regression]. Since the likelihood function L(β̂) is a product of probabilities it follows that the value of the function must be less than 1. Thus, the maximum possible value for R<sup>2</sup> defined by Eq. (1) is max R<sup>2</sup> = 1 -

$$\frac{2}{\{L(0)\}^n}. \text{ In linear regression } \hat{Y} - \bar{Y} \text{ is used for the null model. Similarly, in logistic regression we would have } \hat{p} - \gamma \text{ for the null model with } \gamma_1 \text{ denoting the percentage of 1's in the data set. It follows that } \max R^2 = 1 - \left\{ \gamma_1^{\gamma_1 n} (1 - \gamma_1)^{1 - \gamma_1 n} \right\}^{\frac{2}{n}}. \text{ For example if } \gamma_1 = 0.5 \text{ then } \max R^2 = 0.75. \text{ This is the largest possible value of } R^2 \text{ defined by Eq. (1). When the data are quite sparse, the maximum possible value will be close to zero. Therefore, Nagelkerke suggests that } \bar{R}^2 \text{ be used with } \frac{\bar{R}^2 - R^2}{\max R^2} \text{ (Nagelkerke, 1991).}$$

For the above fitted model the Cox and Snell R<sup>2</sup> = 0.544 and Nagelkerke  $\bar{R}^2 = 0.726$ . It is observed that when the value of  $\bar{R}^2$  exceeds 0.5 the data fit the binary logistic regression model well. Therefore, the model can be used for the significance prediction about the age at first marriage in Bangladesh.

**RESULTS AND DISCUSSION**

To see the association between age at first marriage and various selected background characteristics in Bangladesh, a well-known statistical tool namely-Pearson Chi-square test procedure was used and the results are presented in Table 1. The results revealed that there were significant variations in age at first marriage among the socio-economic and demographic characteristics. Among the selected background characteristics-geographic region, religion, respondent's education, and their partner occupation were significantly associated with the age at first marriage in Bangladesh.

The results of logistic regression analysis are presented in Table 2 in the form of logistic regression coefficients, p-value, and relative odds ratio corresponding to the selected explanatory variables. Dhaka division was considered as the combination and interactions of all other divisions, therefore, considering Dhaka as reference category. The odds ratio corresponding to Chittagong, Rajshahi, Barisal, Sylhet, Khulna divisions were found 0.236, 0.139, 0.205, 0.450 and 0.136 respectively. This clearly indicated that the Dhaka divisions had 1.00 times more probability in

Table 1: Chi-square ( $\chi^2$ ) test of age at first marriage among various socio-economic and demographic variables

Variables	Age at first marriage		$\chi^2$ values	
	<18	18+		
Division	Dhaka	3360	126	218.73*
	Chittagong	1586	185	
	Rajshahi	2147	144	
	Barisal	1240	120	
	Sylhet	882	165	
Religion	Muslim	9536	649	109.63*
	Non-muslim	1073	182	
Respondents education	No-education	4775	174	582.49*
	Primary	3457	158	
	Secondary and higher	2377	499	
Respondents Occupation	Manual	8268	656	0.449
Partner occupation	Non-manual	2340	175	125.85*
	Manual	7580	440	
	Non-manual	3029	391	

\*: p<0.001

Table 2: Results of logistics analysis of age at first marriage among various socio-economic and demographic variables

Variables	Co-efficient ( $\beta$ )	Odds ratio	
Division	Dhaka (RC)	....	1.00
	Chittagong	-1.444	0.236*
	Rajshahi	-1.970	0.139*
	Barisal	-1.586	0.205*
	Sylhet	-0.798	0.450*
	Khulna	-1.995	0.136*
Religion	Muslim (RC)	....	1.00
	Non-muslim	0.428	1.534*
Respondents education	No-education (RC)	....	1.00
	Primary	-1.152	0.316*
	Secondary and higher	0.587	1.799*
	Manual (RC)	....	1.00
Respondents occupation	Non-manual	-0.229	0.796*
	Manual (RC)	....	1.00
Partner occupation	Non-manual	-0.856	0.425*

-2 Log

likelihood:

6864.419

Model Chi-square test:

8993.402

Degree of freedom: 13

R<sup>2</sup> = 0.7261

\*\*\*: p<0.001; \*\*: p<0.05; RC: Reference category

Table 3: Predicted classification table<sup>a</sup>

Age at first marriage	Predicted		Percentage correct	
	<18	18+		
Observed	<18	10172	436	95.9
	18+	810	21	
Overall percentage				89.1

a: The cut value of 0.500

getting their married after the legal age at first marriage (18+ years) than the others division. It is apparent from the results that there are significant regional variations in age at first marriage among the population of Bangladesh. Religion is another important and highly

significant factor influencing age at marriage of the respondents. The logistic co-efficient indicated that the highest occurrence of married after the age of 18 years was among non-Muslim women. It appears that the non-Muslim women are 1.534 times more likely to go for getting married after the age of 18 years than the Muslim women (Table 2).

Education is the key determinant of the life style and status in a society. For this reason, the regression coefficients corresponding to different levels of respondent's education were calculated. It was seen that the results had statistically significant effects on age at first marriage. It was evident that the respondents with secondary and higher secondary level education had large age at first marriage (married after the age of 18 years) than that of no education. In order to identify the impact of respondent's occupation on age at first marriage of the respondents, the respondents were categorized into manual (housewife, servants and street workers) and not manual (jobs holder & services). The regression coefficients demonstrated that occupation of respondents had significant effect on age at first marriage. The odds ratio corresponding to non-manual group of was 0.796. It means that the respondents of have 0.796 time less probability in getting married after the age of 18 years than the manual groups of respondents (reference category). In the contrary, the manual group husbands had an effect on age at first marriage, with non-manual groups and services) having 0.425 times less likely to go for married after the age of 18 years, but it was statistically significant (Table 2).

**Correct Classification Rate (CCR):** We may criticize any statistic that is a function of the  $\hat{p}_i$  when Y is binary. Each  $\hat{p}_i$  and its closeness to  $Y_i$  depends on more than the worth of the model. If our objective is to predict whether a subject will or will not have the attribute of interest a more meaningful measure of the worth of the model would be the percentage of subjects in the data set that are classified correctly. Accordingly, we will use the Correct Classification Rate (CCR) as a measure of the fit of the model. In order to find the CCR we have the Table 3.

If we use 0.5 as the threshold or cut value we have from Table CCR = 89.1. Since a model that affords better classification should be judged superior by a goodness of fit test that indirectly assesses the classification performance of the model. Through classification performance we conclude that our fitted model may be used for prediction.

## CONCLUSION AND RECOMMENDATIONS

Marriage is a universal institution to enter into marriage relationship intended to meet sexual and reproductive needs, to control sexual drive and to adapt

to environment in Bangladesh, as are in many other cultures around the world. In particular, prefer more early age at first marriage for male and female and more age differences in marital relationship compared to urban community and affluent class who support delayed age at first marriage for male and female. Finally, the study findings lead to the following policy implications:

Education is one of the most viable means for enhancing the status of women rising the age at first marriage. Therefore, even more vigorous attempts should be made to keep the girls in school for an extended period. Along with formal education, women must have access to informal education. One dimension of informal education is that women should be made aware of the risks and consequences of early marriage.

An important challenge is to reduce the regional (geographic) differentials to increase the age at marriage in Bangladesh. In order to overcome such differentials, awareness must be created through the public and private mass media as well as through the community leaders so that marriages do not occur before the fixed minimum age.

Moreover, marriage should be entered into with the full consent of the intending couples. Special efforts should be made to provide paid employment for women in suitable places. In respect to the education of children, efforts should be made at multiple levels to ensure that there is no discrimination according to sex in terms of employment status.

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