

Age at First Marriage and Determinants of Early Marriage Among Nepali Women

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ABSTRACT

Background: In Nepal, a substantial proportion of women marry before the age of 18, which is considered as early marriage (EM). The age at which women marry has a direct impact on fertility patterns, family size, and health outcomes of mothers and children. This study aims to assess the levels of age at first marriage (AFM) and significant determinants associated with EM among Nepali women.

Methods: This is a secondary data analysis for which data were obtained from Nepal Demographic and Health Survey 2022. The survey was based on a cross-sectional study design applying two-stage stratified cluster sampling. The AFM levels were analyzed using basic statistics, and a multiple logistic regression model was utilized to identify significant determinants associated with EM. The model's fit was evaluated using the H-L (χ^2) and Pearson's tests.

Results: Current age of women, women's education, region of residence, caste/ethnicity, husband's education, spouse age difference and age at first menstruation were identified as significant determinants associated with EM. Women with no education face a significantly higher risk of EM – Odds Ratio (OR): 21.67 compared to those with higher education, while from other Terai caste (OR:1.58), and Dalit communities (OR:1.51), and women in Madhesh (OR:2.38) and Karnali (OR:1.94) provinces also exhibited higher risks compared to their reference groups.

Conclusions: The risk of EM is higher among women with no or basic level education, those in Madhesh and Karnali provinces, and from Terai caste and Dalit communities. A large spousal age gap also contributes to this practice. Addressing these issues can help reduce EM among women in Nepal.

Keywords: Determinants; early marriage; Nepal; women.

INTRODUCTION

Marriage is a universal demographic event closely linked to fertility and overall population dynamics. A woman's age at first marriage (AFM) plays a significant role in shaping overall fertility patterns.¹ A meta-analysis of data including 15 developing countries identified that women who marry below the age of 18 (termed as early marriage - EM) are approximately 50% more likely to experience high fertility compared to those who marry at 18 or older.² Some other studies indicated that EM can also increase the likelihood of maternal mortality, complications during childbirth, and low birth weight.^{3,4} Nepal has a high incidence of EM,⁵ which varies depending on various factors including socio-economic, cultural background and the region of residence. Therefore, it is

important to conduct a study using the latest nationally representative data and appropriate statistical methods to identify levels of AFM, and significant determinants associated with EM among Nepali women.

METHODS

This study analyzed the Nepal Demographic and Health Survey (NDHS)-2022 dataset after getting approval from the Demographic and Health Survey (DHS) program. The NDHS-2022 is a nationwide, representative, retrospective survey that uses a stratified, two-stage cluster sampling method based on a cross-sectional study design. Altogether, 14,845 women aged 15 to 49 were interviewed in this survey. However, this study included only 11,082 married women aged 20 and above

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(5,905 urban and 5,177 rural). Women aged 15 to 19 were excluded to avoid bias, as the majority (78.4%) in this age group were neither married nor living with partners. The details about the sampling method, stratification and selection of enumeration areas are available in the NDHS-2022 report.⁵

Women's AFM and EM were the primary study variables. Descriptive statistics were used to assess the levels of AFM, while a multiple logistic regression (MLR) model was used to identify the significant determinants associated with EM, treating AFM as a dependent variable. The AFM was categorized as a binary variable with age below 18 as EM (coded by '1') and 18 & older classified as not EM (coded by '0').

With the review of previous studies,⁶⁻¹⁰ variables available from the NDHS-2022, and discussion with subject experts, fourteen different explanatory variables associated with EM were identified as possible influencing variables. Name of which are represented by; current age of women (continuous variable), region of residence (coded: 0 = Bagmati; 1 = Koshi; 2 = Madhesh; 3 = Gandaki; 4 = Lumbini; 5 = Karnali; 6 = Sudurpashchim), place of residence (coded: 0 = urban; 1 = rural), ecological region (coded: 0 = hill; 1 = mountain; 2 = terai), women's education level (coded: 0 = higher; 1 = secondary; 2 = basic; 3 = no

education), type of occupations of women (coded: 0 = professional work; 1 = sales & service; 2 = agriculture; 3 = others; 4 = not working), religion of women (coded: 0 = Non-Hindu; 1 = Hindu), caste/ethnicity of women (coded: 0 = Janajati; 1 = Brahmin/Chhetri; 2 = Dalit; 3 = Terai caste; 4 = Muslim), access to media (coded: 0 = yes; 1 = no), women's economic condition (coded: 0 = rich; 1 = middle; 2 = poor), husband's education level (coded:

0 = higher; 1 = secondary; 2 = basic; 3 = no education), types of occupation of husband (coded: 0 = professional work; 1 = sales & service; 2 = agriculture; 3 = others; 4 = not working), women's age at first menstruation (coded: 0 = greater than or equal to 14 years; 1 = less than 14 years), and spouse age difference between (coded: 0 = less than or equal to 2 years; 1 = greater than 2 years). Label '0' has been assigned for reference categories of all explanatory variables.

Based on theoretical consideration, empirical observation and the stepwise selection procedure, only six categorical covariates (women's level of education, caste/ethnicity, region of residence, husband's education level, age at first menstruation, spouse age difference) and one continuous variable - current age of women (at the time of survey) were selected as candidates explanatory variables to fit the final model.

The levels of AFM were assessed through descriptive analysis [$(\bar{x} \pm sd$, median, skewness (β_1) and kurtosis (β_2)], while MLR model was employed to identify significant determinants associated with EM. The MLR model is expressed in a mathematical equation,¹¹

The model yields Odds Ratio (OR) for each predictor indicating the likelihood of occurrence of the outcome variable for a specific category in comparison to a reference category.

The fitted model was evaluated using the H-L (χ^2) and Pearson's tests. The model diagnostics were attempted by plotting Pearson residual versus leverage and model estimated probability with size proportional to $d\beta$ ($\Delta\beta$). All statistical analysis was performed using Stata/SE 18.0.

RESULTS

The mean AFM for 40-49 age group was below 18 years, and the median AFM for the 30-39 and 40-49 age groups were also below the age of 18. The modal value (16 years) of AFM across all age groups indicated that EM was most commonly prevalent among Nepali women (Table 1).

Table 1. Women's age at first marriage in Nepal measured across the current age groups of women, at the period of survey.

Current age (in year)	Size (n)	Women age at first marriage (in year)			Skewness (β_1)	Kurtosis (β_2)
		Mean \pm Standard deviation ($\bar{x} \pm sd$)	Median (Md)	Mode (Mo)		
20 - 29	4091	18.0 \pm 2.8	18	16	0.28	3.44
30 - 39	4000	18.2 \pm 3.9	17	16	1.19	17.49
40 - 49	2991	17.8 \pm 3.8	17	16	2.15	7.31
All age: (20-49)	11082	18.0 \pm 3.5	17	16	1.32	5.78

The frequency distribution of the proportion of married women by single age, those who married at the age ≥ 10 years is constructed in Figure 1.

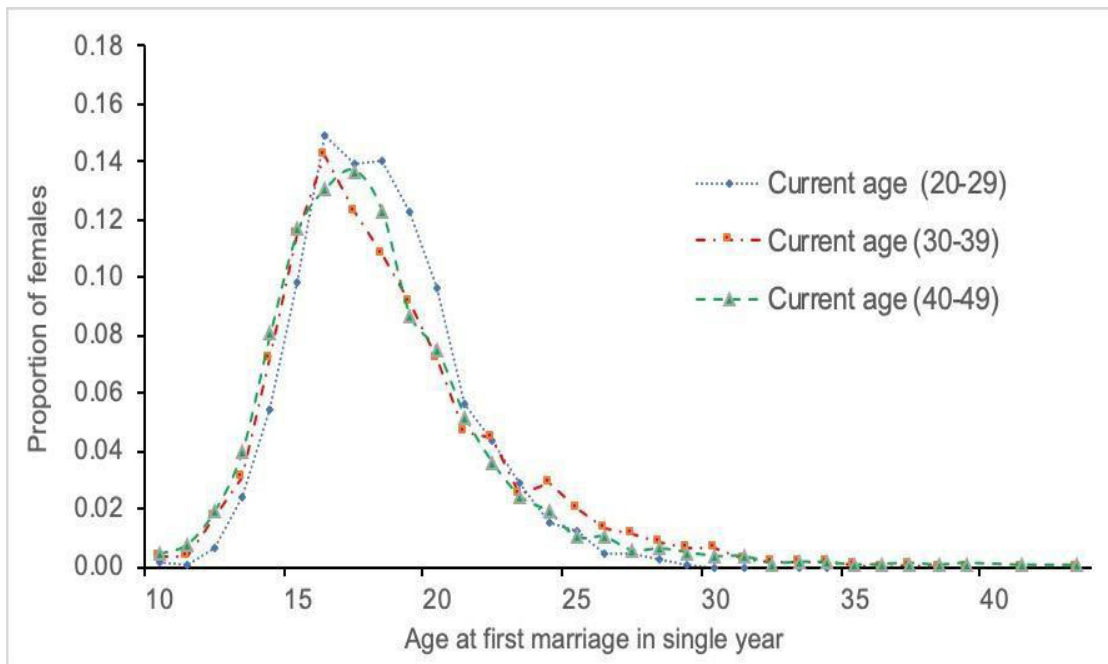


Figure 1. Women's age at first marriage of the current age (20 - 49) computed from NDHS-2022 data.

The values of skewness (β_1) are positive since the third central moment (μ_3) for all current age groups: 20-29, 30-39 and 40-49 are positive (Table 1). Also, the distributions of AFM for all age groups are positively skewed (Figure 1). Likewise, β_2 values exceeding 3 across all age groups indicate that the distributions are leptokurtic. It means the frequency distribution for the 20-29 age group is less skewed and less leptokurtic than those of the older age groups (30-39 and 40-49). It signifies that EM is less frequent among younger women compared to older ones.

The results of the MLR model in terms of odds ratio (OR) with 95% confidence interval and percentage of EM are presented in Table 2. The percentage of early marriage (50.3%) remains high among women in Nepal, with Madhesh Province reporting the highest rate (71%) of women marrying before the age of 18. Likewise, early marriage is highly prevalent among women with no education (65.5%), those belonging to the Terai caste (66.9%), and the Muslim community (69.9%), with the majority marrying below the age of 18. The study shows that women with no education face a significantly higher risk of EM (OR: 21.67) compared to those with higher education, while Terai (OR: 1.58) and Dalit (OR: 1.51) women and those in Madhesh (OR: 2.38) and Karnali (OR: 1.94) provinces also show higher risks. The husband's education level also had a significant impact on the risk of EM. Women married to husbands with no or only a basic level education faced a higher risk of EM compared to those whose husbands with higher education. Age at first menstruation and larger age gap between spouses also possessed significant impact on the likelihood of EM among women (Table 2).

The Variance Inflation Factor (VIF) indicates the extent to which multicollinearity inflates the variance of the coefficient estimate.¹² In MLR with categorical predictors, a VIF exceeding 2.5 may indicate potential multicollinearity.¹³ In this study, no multicollinearity issues were detected, as all of the VIF values obtained were ≤ 1.80 .

Table 2. Factors associated with women's age at first marriage using a multiple logistic regression model.			
Determinants	% of EM	OR [95% CI]	VIF
Women's current age	50.25	0.98*** [0.97, 0.98]	1.25
Women's education			
Higher	07.48	1.0	1.8
Secondary	26.85	4.01*** [2.61, 6.16]	
Basic	59.28	17.20*** [11.15, 26.55]	
No education	65.53	21.67*** [13.92, 33.74]	
Women's caste/ethnicity			
Janajati	41.65	1.0	1.07
Brahmin/Chhetri	43.87	1.29*** [1.15, 1.44]	
Dalit	64.76	1.51*** [1.32, 1.73]	
Terai caste	66.95	1.58*** [1.31, 1.89]	
Muslim	69.92	1.28 [0.97, 1.69]	
Region of residence			
Bagmati	37.76	1.0	1.04
Koshi	36.26	0.85 [0.72, 1.00]	
Madhesh	71.24	2.38*** [1.96, 2.90]	
Gandaki	44.77	1.36** [1.14, 1.61]	
Lumbini	49.08	1.36*** [1.16, 1.60]	
Karnali	57.11	1.94*** [1.63, 2.30]	
Sudurpashchim	51.32	1.47*** [1.25, 1.74]	
Husband's education			
Higher	24.29	1.0	1.49
Secondary	40.97	1.32* [1.06, 1.64]	
Basic	65.21	1.45** [1.16, 1.81]	
No education	66.27	1.43** [1.12, 1.84]	
Women's age at first menstruation			
Age >= 14 years	47.22	1.0	1.02
Age < 14 years	53.17	1.49*** [1.36, 1.63]	
Spouse age difference			
Age <= 2 years	41.96	1.0	1.02
Age > 2 years	54.89	1.73*** [1.58, 1.89]	
Constant	-	0.05*** [0.03, 0.08]	
Number of observation (n) = 10145			
Log - likelihood = -5964.9187			
LR Chi-square with (19) degree of freedom = 2131.87			
Pseudo R-square = 0.1516			
*p < 0.05; **p < 0.01; ***p < 0.001			

The goodness of-fit-test of multiple logistic regression model was tested, where the overall model was significant as indicated by the omnibus Chi-square test [$X^2(19) = 2131.87$, $p < 0.001$]. Likewise, each of the odds ratio is significant across all levels of predictors when compared to their reference category, with an exception of one level (Muslim) of the caste/ethnicity variable. Additionally, the model fits well as indicated by the H-L test [$X^2(8) = 10.65$, $X^2(8) = 10.65$, p -value = 0.2225] and Pearson's Chi-square test [$X^2(6726) = 6808.24$, $p = 0.2382$]. It was observed that 15.16% of the

total variation in the EM is explained by the independent explanatory variables, as measured by Pseudo R-square.

Most of the covariate patterns (CPs) in the model exhibit similar characteristics. Considering a few exceptions of residual points, there are no strong influential observations on the model, hence the model fits reasonably well.

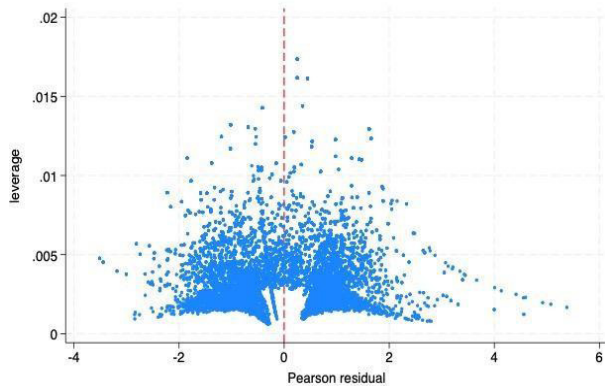


Figure 2. A diagnostic plot of Pearson residuals (r_j) versus leverage (h_j) of CPs of the fitted model, $J = 6746$ (CPs).

Points clustered around the x-axis in the middle region indicate reasonably good fit, while points on the left (negative) and right (positive) edges beyond the vertical lines denote large residuals (Figure 2). Points at the top of the graph denote high leverage patterns.

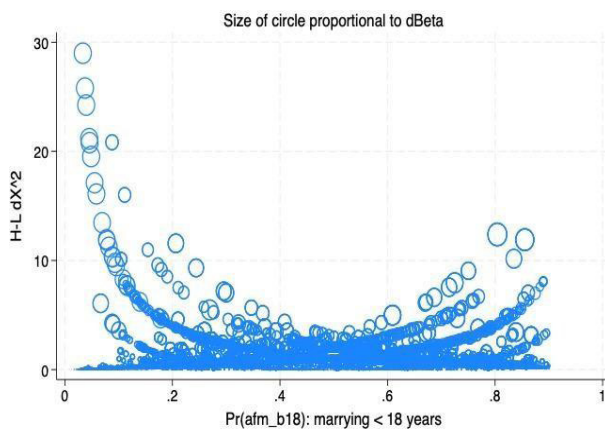


Figure 3. Plot of $\Delta\chi^2$ (dx^2) versus estimated probability ($\hat{\pi}_j$) for the fitted model's covariate patterns ($J = 6746$), with circles size proportional to $\Delta\beta$.

The diagnostic plots of H-L (χ^2) versus estimated probability with size proportional to $d\beta$ ($\Delta\beta$), presented in Figure 3 clearly illustrates how residual (r_j) and leverage (h_j) contribute to change in the estimated coefficients $\Delta\beta$. Large circles in the top-left corner correspond to moderately large $\Delta\chi^2$ values, while three circles on the top-right represent covariate patterns with similarly large $\Delta\chi^2$ values. In spite of having these, overall assessment of the model indicates that the size of the circles is proportional to $\Delta\beta$, and the $\Delta\chi^2$ values corresponding to CPs are within the acceptable range. It indicates that the model fit is reasonably satisfactory.

DISCUSSION

The marriage behavior of Nepali women reflects their demographic, socio-economic and cultural practices, with many marrying at early age. This study found that the levels of AFM varied across age groups, with an overall mean AFM was found to be 18 years, with younger women more likely to delay marriage compared to their older counterparts. The EM is more common among women with lower levels of education, consistent with studies in Nepal,^{5,6,14} South Asia,¹⁵⁻¹⁷ and Sub-Saharan Africa,⁹ and among rural women, aligning with findings from developing countries.^{18,19} EM often leads to early pregnancy and early childbirth, which often increases health risks for both mothers and children.^{3, 20}

Education, caste/ethnicity and region of residence are significant determinants and the risk associated with EM, while family economic condition, religion and exposure to media show a minimal impact. Higher education of women and their husbands significantly delays marriage, a finding consistent with the study in Pakistan.⁷ Socio-cultural practices drive EM, particularly among Dalit and Terai castes and in Madhesh, Sudurpashchim and Karnali provinces, where poverty and traditional norms exist.^{21, 22} In contrast, women in Gandaki and Koshi provinces appear to be more aware of legal marriage age likely due to better socio-economic conditions.²³

This study shows a positive relationship between the onset of menarche and the AFM, with earlier puberty linked to earlier marriage, consistent with prior studies.²⁴⁻²⁶ Greater spousal age differences, common among uneducated women, Dalit and Terai castes and Madhesh residents, also increase EM likelihood, often driven by perceptions of daughters as a burden.^{27, 28} Better family socio-economic conditions reduce spousal age gaps and delay AFM.²⁹

Overall, this study highlights the prevalence of EM,

and its significant factors among Nepali women. The EM is an important demographic indicator in shaping women's reproductive health behavior, as it is inversely proportional to total fertility rate.³⁰ Addressing education, socio-cultural norms, and regional disparities is crucial for policies to delay marriage and improve health outcomes of young women in Nepal.

CONCLUSIONS

While there is steady progress in the median AFM of women in Nepal, early marriage remains a significant concern as more than half of married women continue to marry before the age of 18. The risk of EM is less frequent among younger cohort women compared to their older counterparts. The AFM among women in Nepal is strongly linked to poor socio-economic conditions, traditional cultural practices, and regional disparities. The occurrence of EM is most common among women those having low educational attainment, belong to Terai caste, Dalit and Muslim caste, and women residing in Madhesh, Karnali and Sudurpashchim provinces. Among these, education emerged as one of the strong determinants demonstrating a positive association between higher educational attainment and delayed marriage, highlighting the transformative potential in reshaping levels of AFM and reducing the rate of EM.

Addressing the issue of EM requires targeted and strategic interventions, with a particular effort on ensuring girls attainment of secondary level education. Program interventions should also specifically target Dalit, Muslim communities and Terai castes, ensuring they receive relevant information about the adverse health consequences of marrying early. Additionally, authorities in Nepal should consider the minimum marriage age of 18 for women.

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