

Women's Social Independence and Pregnancy Termination in Bangladesh: Evidence of Associations and Inequalities from BDHS 2022

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Abstract

Pregnancy termination—whether through miscarriage, stillbirth, or induced abortion—represents an important reproductive outcome, yet is often overlooked by researchers. This study investigated the determinants and distribution of pregnancy termination in Bangladesh utilizing the data from the Bangladesh Demographic and Health Survey 2022. A binary logistic regression model was employed to explore the association between pregnancy termination and women's social independence along with other covariates, and concentration curve assessed socioeconomic inequalities in the distribution of pregnancy termination. The findings indicate that pregnancy termination was more frequently reported among the socially independent women (odds ratio, OR, of *high* vs *low*: 1.19, 95% confidence interval, CI: 1.03–1.37; OR of *average* vs *low*: 1.14, 95% CI: 1.00–1.30). Marriage later than the perceived ideal marital age was associated with higher odds (OR of *later* vs *right time*: 1.21, 95% CI: 1.06–1.37) of pregnancy termination. This study underscores the need for policies that support reproductive autonomy, improve healthcare access, and reduce social stigma to ensure safer pregnancy outcomes.

Keywords: Pregnancy termination, Bangladesh Demographic and Health Survey, binary logistic regression, women's social independence, concentration curve

I. Introduction

Pregnancy termination, with its medical, psychological, and socio-cultural characteristics, is a profoundly significant but frequently stigmatized aspect of reproductive health throughout the world. It refers to the spontaneous or induced expulsion of a pregnancy by medical or surgical procedures before fetal viability¹, such as induced abortions, miscarriage, stillbirths, and medically indicated terminations for medical indications². The act of ending pregnancy is a multidimensional choice derived from the woman's reproductive autonomy³, her use of contraceptive methods, and on occasion, extreme health necessities⁴. Spontaneous abortion, also known as miscarriage, occurs in approximately 10–20% of clinically diagnosed pregnancies⁵. The stillbirth involves death after a fetus has developed for 20 weeks of gestation. Stillbirth occurs in approximately 2 million pregnancies annually, even more in poor resource settings⁶. In low- and middle-income countries, pregnancy termination—particularly unsafe abortion and preventable stillbirth—burdens people owing to inadequate health infrastructure, gender inequality, and socio-cultural taboos.

Bangladesh, as a developing country⁷, still faces a significant public health challenge, including reproductive health, despite the improvement in maternal health indicators. Approximately 20% of ever-married women from reproductive age group females have experienced some form of pregnancy termination, miscarriage, induced abortion, or stillbirth⁸. Pregnancy termination remains a significant yet understudied public health concern in Bangladesh. Although previous studies have explored

women's empowerment and reproductive outcomes, limited research in Bangladesh has examined the inequality in pregnancy termination specifically through the lens of women's social independence⁹. This study had addressed the gaps investigating the relation between pregnancy termination and social independence, and using concentration curve analysis to highlight how termination outcomes are disproportionately distributed among women with different levels of social autonomy.

II. Materials and Methods

Data Source and Study Participants

This research utilized data extracting from the Bangladesh Demographic and Health Survey (BDHS) 2022, the most recent national survey intended to measure important demographic and health indicators. The sampling frame for the BDHS 2022 was constructed using the household listing from the 2011 Population and Housing Census conducted by the Bangladesh Bureau of Statistics. The BDHS 2022 sample design utilized two-stage stratified cluster sampling. This led to a sample of 30,018 households from which the information on a final sample of total 7586 ever-married women aged 15–49 were extracted and analyzed in this study.

Outcome Variable

The outcome of interest of this study was pregnancy termination, which encompassed three pregnancy outcomes: miscarriage, abortion, and stillbirth.

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Miscarriage refers to the spontaneous loss of a pregnancy typically before 28 weeks of gestation¹⁰. Abortion is the intentional termination of a pregnancy before viability¹⁰⁻¹¹. Stillbirth refers to the delivery of a fetus with no signs of life at or after 28 weeks of pregnancy^{10,12}. For experiencing any of these three outcomes, the respondent was assigned to the “yes” category while “no” group encompassed their counterpart.

Covariates

The covariates of these studies were selected from three domains: women's empowerment, socio-demographic transition, and household and demographic profile. The primary covariate of interest in this study, women's social independence, belonged to the aspect of women's empowerment. In this study, women's social independence is conceptualized as a multidimensional construct composed of three distinct dimensions: socio-economic condition, household decision-making autonomy, and asset ownership. The details of the dimensions, indicators, cut-offs, and weights are presented in **Table 1**. By distributing equal weight across dimensions (a weight of 0.33) and reallocating this weight equally within each dimension (based on the number of indicators), this method provides a balanced and interpretable composite

index of women's social independence. The construction approach follows the methodology proposed by *Alkire and Foster*¹³ and is supported by existing literature on women's empowerment in South Asia¹⁴⁻¹⁵. The social independence score was calculated using a weighted arithmetic mean. Mathematically, the social independence score for a woman is expressed as follows.

$$Z_i = \frac{1}{p} \sum_{j=1}^p \frac{1}{d_j} \sum_{k=1}^{d_j} u_{ijk}$$

Here, Z_i represents the social independence score for the i^{th} ($i = 1, 2, \dots, n$) woman, with n being the total number of women, d_j refers to the number of indicators in the j^{th} ($j = 1, 2, \dots, p$) dimension, p stands for the number of dimensions and u_{ijk} denotes the value of the k^{th} indicator in the j^{th} dimension for the i^{th} woman. Theoretically, the composite index ranges from 0 to 1, where a score of 0 implies no social independence and a score of 1 reflects full independence. As the score increases, so does the level of the respondent's social independence. To facilitate analysis, the social independence scores are categorized into three distinct groups: low ($Z_i \leq 0.3667$), average ($0.3667 < Z_i < 0.5$), and high ($Z_i \geq 0.5$)¹⁴.

Table 1. Dimensions, indicators, cut-offs, and weights of women's social independence index of ever-married women aged between 15–49 years.

Dimension	Indicator	Socially independent if woman (cut-off)	Weight (indicator)	Weight (dimension)
Socio-economic condition	Education	completes secondary or higher education	0.030	0.333
	Wealth	Belongs to middle to richest category	0.030	
	Employment status	Currently working	0.030	
	Age at first birth	Age at first birth is 19 or more	0.030	
	Mobile phone	Owens a mobile phone	0.030	
	Bank	Has an account in bank	0.030	
	Newspaper	Reads a newspaper at least once a week	0.030	
	Radio	Listens to the radio at least once a week	0.030	
	Television	Watches television at least once a week	0.030	
	Spousal education difference	Has equal or higher education than husband	0.030	
Decision making autonomy	Own healthcare	Takes decision alone or jointly with husband	0.083	0.333
	Household purchase	Takes decision alone or jointly with husband	0.083	
	Family Visits	Takes decision alone or jointly with husband	0.083	
	Management of husband's earnings	Takes decision alone or jointly with husband	0.083	
	Contraceptive use	Takes decision alone or jointly with husband	0.083	
Asset ownership	House ownership	Owens a house alone or jointly	0.167	0.333
	Land ownership	Owens a land alone or jointly	0.167	
Total			≈1	≈1

Other covariates selected from this domain were women's health access barriers (yes and no) and perception toward intimate partner violence (IPV) (positive and negative).

From the domain of socio-demographic transition, two variables (self-assessed marriage timing and migration status) were selected. The variable self-assessed marriage timing—with three categories: right time, earlier, and later—captures whether the respondent perceives the age at which she got married was appropriate. Another variable was migration status (non-migrants and migrants). The context of household and demographic profile encompassed four variables, which are number of living children (0–1, 2–3, and 3+), residing with partner (no and yes), place of residence (urban and rural), and region (eastern, central, and western).

Methodology

The data extracted from the BDHS 2022 were analyzed following several steps. Firstly, the univariate analysis displayed the frequency and percentage distribution of all the selected variables. Next, the bivariate analysis scrutinized the unadjusted association between the response variable and each covariate. It also checked the statistical significance of such association using the chi square test of independence¹⁶. The binary logistic model¹⁷ assessed the adjusted association between the response and all the selected covariates. Finally, concentration curve⁹ visualized the inequality of the distribution of pregnancy termination among Bangladeshi women according to their social independence.

Binary Logistic Regression Model

Let Y_i be the binary response with mean μ_i and $X_i = (x_{i0}, x_{i1}, x_{i2}, \dots, x_{ij}, x_{ip})^T$ be the $p \times 1$ vector of covariates (where $x_{i0} = 1$) for the i^{th} ($i = 1, 2, \dots, n$) individual. Also let $\beta = (\beta_0, \dots, \beta_j, \dots, \beta_p)^T$ be the $p \times 1$ vector of regression coefficients. The binary logistic regression model¹⁷ is expressed through the following equations.

$$\text{Log} \left(\frac{\mu_i}{1 - \mu_i} \right) = x_i^T \beta$$

Thus, μ_i , the mean of response is non-linearly related with the covariates. The parameters of this model are estimated by maximum likelihood estimation method. The estimated parameters are interpreted through odds ratio (OR), which is the exponent of the estimated coefficients. All the analyses stated above were accomplished using STATA of version 17.

Concentration Curve

A concentration curve is a graphical tool used to visualize the inequality in the distribution of a variable. It plots the cumulative percentage of the prevalence of the corresponding event (y-axis) against the cumulative percentage of the population, ranked by a socioeconomic variable (for example, income, wealth), from lowest to highest (x-axis). Thus, the curve illustrates how disproportionately the outcome is distributed across socioeconomic strata⁹.

III. Results and Discussion

Univariate and Bivariate Analyses

The results of univariate and bivariate analyses are presented in **Table 2**. This table shows that out of the total considerable cases, around 21.50% women faced pregnancy termination, which is the event of interest of this study. It further shows that the women with social independence of average level experienced the highest percentage (22.58%) of pregnancy termination, which is slightly higher than the highly socially independent women (with 22.53% of pregnancy termination). On the other hand, only 19.92% of the women who belonged to the low category had pregnancy termination, which is the lowest percentage compared to the remaining two categories of social independence.

Table 2. Percentage distribution of pregnancy termination among different categories of the covariates along with the *p*-values

Variables (<i>n</i>)	Ever had a terminated pregnancy		Chi-square (<i>p</i> -value)
	No (78.50%)	Yes (21.50%)	
Women’s Empowerment			
<i>Social Independence</i>			
Low (3047)	2,440(80.08%)	607(19.92%)	7.5238 (0.023)
Average (2484)	1,923(77.42%)	561(22.58%)	
High (2055)	1,592(77.47%)	463(22.53%)	
<i>Health Access Barrier</i>			
No (2558)	2,009(78.54%)	549(21.46%)	0.0033 (0.954)
Yes (5028)	3,946(78.48%)	1,082(21.52%)	
<i>Perception towards IPV</i>			
No (6676)	5,253(78.68%)	1,423(21.32%)	1.1282 (0.288)
Yes (910)	702(77.14%)	208(22.86%)	
Socio-Demographic Transition			
<i>Self-assessed Marriage Timing</i>			
Right Time (4615)	3,683(79.80%)	932(20.20%)	12.3219 (0.002)
Earlier (698)	540(77.36%)	158(22.64%)	
Later (2273)	1,732(76.20%)	541(23.80%)	
<i>Migration Status</i>			
Non-migrant (1102)	858(77.86%)	244(22.14%)	0.3143 (0.575)
Migrant (6484)	5,097(78.61%)	1,387(21.39%)	
Household and Demographic Profile			
<i>Number of Living Children</i>			
0–1 (2364)	1,992(84.26%)	372(15.74%)	70.8427 (<0.001)
2–3 (4506)	3,438(76.30%)	1,068(23.70%)	
3+ (716)	525(73.32%)	191(26.68%)	
<i>Residing with Partner</i>			
No (1167)	956(81.92%)	211(18.08%)	9.5555 (0.002)
Yes (6419)	4,999(77.88%)	1,420(22.12%)	
<i>Place of Residence</i>			
Urban (2507)	1,972(78.66%)	535(21.34%)	0.0567 (0.812)
Rural (5079)	3,983(78.42%)	1,096(21.58%)	
<i>Region</i>			
Eastern (2229)	1,762(79.05%)	467(20.95%)	2.7704 (0.250)
Central (2896)	2,289(79.04%)	607(20.96%)	
Western (2461)	1,904(77.37%)	557(22.63%)	

Binary Logistic Regression Model

Table 3 presents the results of the binary logistic regression model.

Table 3. Estimated regression coefficient ($\hat{\beta}$) along with p -values, standard error (SE), and odds ratio (OR) along with their 95% confidence intervals (CI) obtained from the regression model

Variables	$\hat{\beta}$	SE($\hat{\beta}$)	OR	95%CI
Intercept	-2.02(***)	0.14	.13	[0.10, 0.17]
Women's Empowerment				
<i>Social Independence</i>				
Low (RC)	-	-	-	-
Average	0.13 (*)	0.07	1.14	[1.00, 1.30]
High	0.17 (*)	0.07	1.19	[1.03, 1.37]
<i>Health Access Barrier</i>				
No (RC)	-	-	-	-
Yes	0.01	0.06	1.01	[0.89, 1.13]
<i>Perception towards IPV</i>				
No (RC)	-	-	-	-
Yes	0.07	0.09	1.07	[0.91, 1.27]
Socio-Demographic Transition				
<i>Self-assessed Marriage Timing</i>				
Right Time (RC)	-	-	-	-
Earlier	0.13	0.10	1.14	[0.94, 1.38]
Later	0.19(**)	0.06	1.21	[1.06, 1.37]
<i>Migration Status</i>				
Non-migrant (RC)	-	-	-	-
Migrant	-0.04	0.08	0.96	[0.82, 1.12]
Household and Demographic Profile				
<i>Number of Living Children</i>				
0–1 (RC)	-	-	-	-
2–3	0.49 (***)	0.07	1.64	[1.44, 1.87]
3+	0.64 (***)	0.10	1.89	[1.54, 2.31]
<i>Residing with Partner</i>				
No (RC)	-	-	-	-
Yes	0.23(**)	0.08	1.26	[1.07, 1.48]
<i>Place of Residence</i>				
Urban (RC)	-	-	-	-
Rural	0.005	0.06	1.01	[0.89, 1.13]
<i>Region</i>				
Eastern (RC)	-	-	-	-
Central	-0.02	0.07	0.98	[0.86, 1.13]
Western	0.07	0.07	1.07	[0.93, 1.24]

RC: Reference Category; ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$

Table 3 shows the significant association between the target covariate, that is, women's social independence, and pregnancy termination after controlling for all the selected covariates. The estimated regression coefficients are interpreted assuming that all other covariates are kept at a specific level. The women with an average level of social independence have an OR of 1.14, which implies $(1.14 - 1) \times 100\% = 14\%$ higher odds of pregnancy termination than those of the less independent group. The highly socially independent women had 19% significantly (with $p < 0.05$) higher

odds of experiencing pregnancy termination compared to those who belonged to the low. This finding is supported by previous study¹⁸, which observed some aspects of women's social independence to be significantly associated with pregnancy termination. More autonomously oriented women have more specific reproductive goals and are more likely to respond if pregnancy is not desired or mistimed.

Among the selected control variables, the self-assessed marriage timing, number of living children,

and residing with a partner were also determined to be significantly related to the outcome variable. Marrying later than the perceived ideal age of marriage age corresponded to higher odds of pregnancy termination. Later marriage results in pregnancy at advanced maternal ages, which is associated with other augmented health hazards such

as miscarriage, stillbirth, and pregnancy complications, leading to higher rates of pregnancy termination¹⁹⁻²⁰. Additionally, mothers of 2 or more children and those residing with their husband were more prone to pregnancy termination. These results align with the previous findings²¹⁻²².

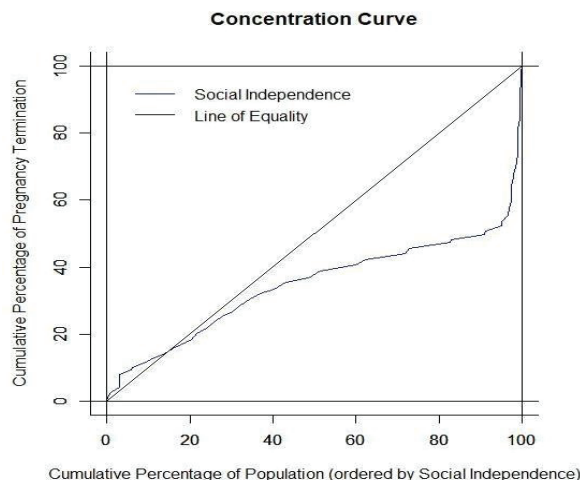


Fig. 1. Concentration curve of pregnancy termination of Bangladeshi women according to social independence

Concentration Curve

Figure 1 depicts the concentration curve of pregnancy termination within the social independence of women in Bangladesh. The concentration curve initially lies above the line of equality, which falls below it soon after and finally rises sharply toward the end. Such a concentration curve indicates that pregnancy termination is more common among socially independent women in Bangladesh.

The empowered women are more suited to recognize unwanted pregnancy at an early stage and access safe abortion²². On the other hand, working through pregnancy could expose women to pregnancy complications and pregnancy termination²³.

IV. Conclusion

The findings of this study suggest some extensive and advantageous implications for policymakers and public health experts. For example, the empowered women might be offered private, rights-based family planning counseling based on the extent to which they are engaged in decision-making. Policymakers should de-stigmatize menstrual regulation, expand safe procedure access, and eliminate informal health system barriers. Finally, programs must integrate long-term family planning and spacing counseling with other empowerment initiatives.

Future Scopes

To contribute to the existing evidence, further studies can be planned to specify more accurately different typologies of female reproductive behavior and autonomy, applying

latent class models or cluster-based multivariate segmentation.

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