Examining the Role of Women's Empowerment in Contraceptive Use among Reproductive-Age Women in Bangladesh

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Abstract

This research investigates the interplay between women's empowerment and current contraceptive practices among Bangladeshi women, taking into account various socio-economic and demographic factors. The study analyzes data of 18,987 women aged 15-49 from the Bangladesh Demographic and Health Survey (BDHS), 2022. Women's empowerment is assessed through latent variables related to household decision-making and attitudes toward wife beating using principal component analysis. Chi-square tests and mixed-effect binary logistic regression are employed to scrutinize the unadjusted and adjusted associations. The findings reveal a positive association between women's empowerment and contraceptive use, highlighting the role of gender equality in fostering communication on reproductive health decisions and improving access to family planning services. Women in the 25–35 and 35+ age groups, urban residents, educated, employed, and media exposed women exhibit higher odds of contraceptive use. The unexpected discovery that wealthier women are less likely to use contraceptives challenges prevailing norms, prompting further exploration. These findings suggest that empowering women can play a crucial role in enhancing reproductive autonomy and access to family planning services. To that end, policy interventions such as education and awareness campaigns, community-based family planning initiatives, mobile health (mHealth) tools, and legal reforms aimed at strengthening women's rights are essential. Such interventions can bridge socio-economic disparities, foster informed decision-making, and improve reproductive health outcomes across Bangladesh.

Keywords: Contraceptive use, Women's empowerment, BDHS 2022, Logistic regression, Gender equality, Family planning interventions

I. Introduction

Women's empowerment has become a prominent subject on the worldwide development agenda in recent decades[1]. According to the International Conference on Population and Development in 1994, it is a fundamental human right to be able to freely determine the number, spacing, and timing of one's children[2]. Women have access to contraceptives through family planning programs, which boost their chances of having the number of children they want. However, in spite of having the well-established advantages of family planning, it is estimated that 40% of the pregnancies are unplanned[3], and despite the improved accessibility of techniques, there is still a significant unmet need for contraception[4]. Consistent obstacles to using contraception and engaging in related behaviors emphasize the need to increase the awareness of the structural factors that influence women's empowerment and contraceptive use.

Although there is a great deal of diversity in the findings, prior research related to empowerment of women shows its crucial role in affecting the reproductive health behaviors[5-7]. An analysis of the relationship between empowerment and fertility reveals that women's empowerment is linked to decreased fertility, longer time intervals between births, and decreased rates of unwanted pregnancy[8]. It is reasonably hypothesized that empowerment of women would be related to different family planning actions, the conceptualization, and prevailing beliefs about gender dynamics and reproductive health[6,9]. Given that using family planning methods would enable women to delay, space out, or limit their pregnancies and free up their time for other pursuits, it makes sense that as women become more capable of making strategic life decisions, and take on more responsibilities outside of the roles of wife and mother. Before continuing to develop interventions and programs, it is necessary to review the evidence surrounding such widely held beliefs and to clarify the underlying phenomena regarding reproductive health. Despite these findings, very few researches have looked at both the usage of contemporary contraceptives and how women's empowerment influences this use in Bangladesh. That is why, this study intends to focus on the association of women's empowerment with current contraceptive use of the women of reproductive age in Bangladesh.

Despite growing recognition of the critical role women's empowerment plays in shaping reproductive behavior, limited research in the Bangladeshi context has examined this relationship using recent post-pandemic, nationally representative data. While earlier studies have provided valuable insights, they often rely on narrow or single-dimensional indicators of empowerment. Many also fall short of employing composite indices derived through principal component analysis (PCA), or of

adjusting for a comprehensive range of socio-economic and demographic factors that influence contraceptive use. This study addresses these gaps by utilizing the most recent BDHS 2022 dataset, constructing a multidimensional empowerment index through PCA, and applying robust multivariate models to analyze the association between empowerment and current contraceptive use. In doing so, it offers updated evidence to take initiatives to promote women's reproductive autonomy and improve family planning outcomes in Bangladesh.

II. Data and Methodology

Data

This study relies on secondary analysis of data extracted from BDHS 2022, employing a two-stage cluster sampling method. The dataset, derived from 675 enumeration areas (237 urban, 438 rural), includes 18,987 women aged 15-49, with missing observations excluded.

Outcome Variable

This study considers women's current contraceptive use as its outcome variable. The original variable, encompassing multiple categories, is simplified to a binary outcome: 'no' for non-use and 'yes' for remaining categories.

Independent Variable

Women's empowerment is the main independent variable in the study, which was measured using two latent variables: women's participation in household decision-making and their attitudes toward wife beating. These dimensions were selected because they are among the most consistently used and validated indicators of women's agency in Demographic and Health Surveys and related literature[11].Household decision-making captures a woman's direct influence over personal and family matters, while attitudes toward domestic violence reflect internalized gender norms and tolerance of unequal power structures. In this study, participation in decision-making was assessed through four questions about who decides on women's healthcare, major purchases, visits to relatives, and how to spend the husband's earnings. Responses were recorded as binary (yes (1)/no (0)), where "yes" meant the woman had a role in the decision (either alone or with others). After that, women's attitudes toward wife beating were measured using five indicators, where she was asked whether her husband is justified in hitting her for going out without permission, neglecting children, arguing, refusing to have sex, or burning the food. If a woman disagreed with the justifications, it was coded as 1 (no), and if she agreed, it was coded as 0 (yes). All nine indicators were combined through Principal Component Analysis (PCA)

to create a women's empowerment index. Women were then categorized into two groups based on the median score: "low" empowerment for those with lower scores, and "high" empowerment for those with higher scores.

Control Variables

Several variables are considered in this study based on literature review that influence the association between women's empowerment and current contraceptive use. The selected control variables include Women's current age (<25, 25-35, >35), Husband's current age (<30, 30-40, >40), Women's education (No education, Primary, Secondary, Higher), Number of living children (1-2, >2), Place of residence (Rural, Urban), Working status (Yes, No), Media exposure (Yes, No), Religion (Islam, Other), Wealth index (Poor, Middle, Rich).

Statistical Analysis

For the composite measure of women's empowerment, PCA is used to create an index score from multiple indicators[12]. PCA is appropriate in this context as it allows for data-driven weighting of multiple correlated indicators into a single composite score, minimizing subjectivity, and multicollinearity[12].

The principal components (PC_k) are calculated as:

$$PC_k = \sum_{j=1}^{p} w_{kj} X_j$$

where w_{kj} are the weights of the j-th variable in the k-th principal component, and X_j are the original variables.

Chi-square tests examine the bivariate associations between current contraceptive use and other covariates. It is used to test how expected values are compared to actual observed data[13]. The formula for chi-square test is

$$\chi^2{}_c = \sum \frac{(O_i - E_i)^2}{E_i}$$

where c stands for the degrees of freedom, O for the observed value, and E for the expected value.

Binary logistic regression is employed in this study as a statistical technique to estimate the effect of independent variables on a binary outcome— current contraceptive use. Initially, a standard logistic regression model (Model I) was fitted without accounting for clustering. However, given the hierarchical structure of the BDHS data, where individuals are nested within clusters (enumeration areas), a mixed-effects logistic regression model (Model II) was also estimated. This model incorporates random intercepts at the cluster level to adjust for intra-cluster correlation and unobserved heterogeneity.

Table 1. Chi-square Test of Association between Contraceptive Use and Several Socio-economic Characteristics*

Variable	Contraceptive use		p-value
	No	Yes	
Women's empowerment			<0.001
Low	37.6	62.4	
High	34.1	65.9	
Women's current age			<0.001
<25	42.4	57.6	
25-35	31.7	68.3	
>35	34.9	65.1	
Husband's current age			<0.001
<30	42.2	57.8	
30-40	33.8	66.2	
>40	34.3	65.7	
Women's education			<0.001
No education	38.2	61.8	
Primary	31.2	68.8	
Secondary	36.1	63.9	
Higher	38.9	61.1	
Number of living children			<0.001
1-2	39.0	61.0	
>2	27.6	72.4	
Place of residence			<0.001
Rural	37.0	63.0	
Urban	32.8	67.2	
Working status			<0.001
No	38.6	61.4	
Yes	28.4	71.6	
Media exposure			<0.001
No	39.0	61.0	
Yes	33.0	67.0	
Religion			<0.001
Islam	36.4	63.6	
Other	27.7	72.3	
Wealth index			<0.001
Poor	33.3	66.7	
Middle	35.1	64.9	
Rich	37.7	62.3	

*Note that values in the second and third column represent row percentages.

The binary logistic regression model takes the form[14]

$$ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k$$

where $p_i = P(Y_i = 1)$ and $1 - p_i = P(Y_i = 0)$; Y_i be the binary dependent variable, x_i be the independent variable such as women's socio-economic or demographic characteristics, β_i be the regression coefficient corresponding to the i th independent variable.

The mixed-effects logistic regression model (Model II) extends this formulation by including a random intercept for each cluster[15]:

$$ln\left(\frac{p_{ij}}{1-p_{ij}}\right) = \beta_0 + \beta_1 x_{1ij} + \beta_2 x_{2ij} + \cdots + \beta_k x_{kij} + u_j$$

where p_{ij} is the probability that woman i in cluster j uses contraceptives, x_{kij} are the observed covariates, β_k are

the fixed-effect coefficients, and u_j is the random effect for cluster j, assumed to be normally distributed:

$$u_j \sim N(0, \sigma_u^2).$$

The SPSS (version 26) and R (version 4.3.2) have been used in this study for data analysis purpose.

III. Results

Chi-square tests were executed to scrutinize the unadjusted association between contraceptive usage and various selected variables. The results are presented in Table 1, which shows a significant association between contraceptive use and women's empowerment, denoted by an impressive p-value of less than 0.001. Notably, all

the selected control variables were emerged as highly significant contributors to contraceptive use.

The variables found significant in the bivariate analysis were included in both a standard binary logistic regression model (Model I) and a mixed-effects logistic regression model (Model II). The results are summarized in Table 2, which presents both sets of estimates side by side. Controlling for all covariates, women's empowerment remained a significant predictor of contraceptive use in both models. In Model II, highly empowered women had a 7.8% higher likelihood of using contraceptive methods compared to their less empowered counterparts (OR = 1.078, p = 0.019), which reinforces the importance of empowerment even after adjusting for cluster effects.

Table 2. Binary Logistic Regression Model Estimates of the Selected Variables for Contraceptive Use in Bangladesh from BDHS 2022 Data along with Standard Error (SE), p-value and Odds Ratio (OR)

Variable	Model I				Model II			
	Estimate	SE	p-value	OR	Estimate	SE	p-value	OR
Women's empowerment								
Low	-	-	-	-	-	-	-	-
High	0.078	0.032	0.014	1.081	0.075	0.033	0.019	1.078
Women's current age								
<25	-	-	-	-	-	-	-	-
25-35	0.314	0.050	<0.001	1.369	0.200	0.052	<0.001	1.222
>35	0.215	0.068	0.002	1.240	-0.066	0.071	0.356	0.936
Husband's current age								
<30	-	-	-	-	-	-	-	-
30-40	0.092	0.053	0.084	1.096	0.117	0.054	0.031	1.125
>40	0.141	0.069	0.042	1.151	0.069	0.072	0.333	1.072
Women's education								
No education	-	-	-	-	-	-	-	-
Primary	0.326	0.054	<0.001	1.385	0.419	0.056	<0.001	1.520
Secondary	0.171	0.054	0.001	1.186	0.370	0.057	<0.001	1.447
Higher	0.219	0.066	0.001	1.245	0.260	0.070	<0.001	1.296
Number of living children								
≤2	-	-	-	-	-	-	-	-
>2	0.622	0.041	<0.001	1.862	0.698	0.043	<0.001	2.010
Place of residence								
Rural	-	-	-	-	-	-	-	-
Urban	0.271	0.036	<0.001	1.311	0.310	0.050	<0.001	1.364
Working status								
No	-	-	-	-	-	-	-	-
Yes	0.384	0.036	<0.001	1.467	0.350	0.038	<0.001	1.418
Media exposure								
No	-	-	-	-	-	-	-	-
Yes	0.277	0.034	<0.001	1.319	0.292	0.036	<0.001	1.340

Religion								
Other	-	-	-	-	-	-	-	-
Islam	-0.277	0.054	<0.001	0.758	-0.389	0.064	<0.001	0.677
Wealth index								
Poor	-	-	-	-	-	-	-	-
Middle	-0.172	0.044	<0.001	0.842	-0.154	0.047	<0.001	0.857
Rich	-0.374	0.041	<0.001	0.688	-0.362	0.045	<0.001	0.696

Women's current age exhibited a somewhat attenuated pattern in Model II compared to Model I. While women aged 25–35 still showed significantly higher odds of contraceptive use (OR = 1.222, p <0.001), the association for women aged over 35 was no longer statistically significant (OR = 0.936, p = 0.356), suggesting that age-related variation in contraceptive use may be partially explained by community-level differences. In contrast, husband's age between 30–40 became statistically significant in Model II (OR = 1.125, p = 0.031), indicating that women with slightly older husbands may be more empowered or more likely to plan family size. However, the association for husbands aged above 40 lost significance in the mixed model.

A strong and consistent relationship was found between women's education and contraceptive use in both models, with even stronger effects in Model II. In particular, women with primary, secondary, and higher education were 52.0%, 44.7%, and 29.6% more likely, respectively, to use contraceptives compared to those with no formal education, all with p-values < 0.001. Women with more than two living children were significantly more likely to use contraceptives in both models, with Model II estimating a 2.01 times odds (p < 0.001). Urban residence was associated with greater contraceptive use in both models, with urban women showing a 36.4% higher likelihood of use compared to rural women in Model II (OR = 1.364, p < 0.001). Employment status remained a significant factor, with employed women being 41.8% more likely to use contraceptives than their unemployed counterparts (p < 0.001) in the mixed model.

Furthermore, media exposure consistently demonstrated a positive influence on contraceptive use, with media-exposed women showing a 34.0% increase in odds of use in Model II (OR = 1.340, p < 0.001). On the other hand, religion emerged as a strong predictor: Muslim women were 32.3% less likely to use contraceptives compared to women of other religions in Model II (OR = 0.677, p < 0.001). Lastly, the wealth index displayed an inverse relationship. Women from middle-class and rich households were 14.3% and 30.4% less likely, respectively, to use contraceptives compared to women from poor households in Model II.

Figure 1 illustrates the distribution of the selected variables across low and high empowerment categories. It is clear that there is an upswing in the percentage of high women empowerment as individuals reach the age of 25. Conversely, the prevalence of low empowerment is most pronounced among women in the age group below 25. A parallel pattern is observed in relation to the husband's age, where the highest incidence of low empowerment is observed in unions where the husband's age is below 30. Conversely, a peak in high empowerment is noted for husbands aged over 40.

Education also plays a significant role. While the percentages of low and high empowerment are relatively similar among women with no education, primary education, and secondary education, women with higher levels of education overwhelmingly report high empowerment. Additionally, women with more than two children are more likely to exhibit high empowerment compared to those with fewer children.

Furthermore, the figure reveals that geographical and social factors significantly influence empowerment dynamics. Women living in urban areas, those who are employed, and those exposed to media demonstrate significantly higher levels of empowerment. Religious affiliation also appears to influence empowerment as non-Muslim women reported higher empowerment levels. In addition, the proportion of women with high empowerment steadily increases across the poor, middle, and rich categories. These findings collectively offer valuable insights into the interplay of demographic factors in shaping women's empowerment, which in terms impacts contraceptive use.

IV. Discussion

This study examined the association between women's empowerment and current contraceptive use among reproductive-aged women in Bangladesh, using the most recent, nationally representative BDHS 2022 dataset. While previous studies have explored similar themes, our study contributes to the existing body of literature by employing a multidimensional empowerment index constructed through PCA, and by incorporating a mixed-effects logistic regression model to account for the hierarchical nature of the data. As anticipated, our findings underscore a positive association between

women's empowerment and contraceptive use, which aligns with numerous prior studies[16,17]. Gender-based equality promotes communication between partners on reproductive health decisions and enhances women's access to reproductive health services. This, in turn, contributes to improved health outcomes and facilitates the adoption of contraceptive methods.
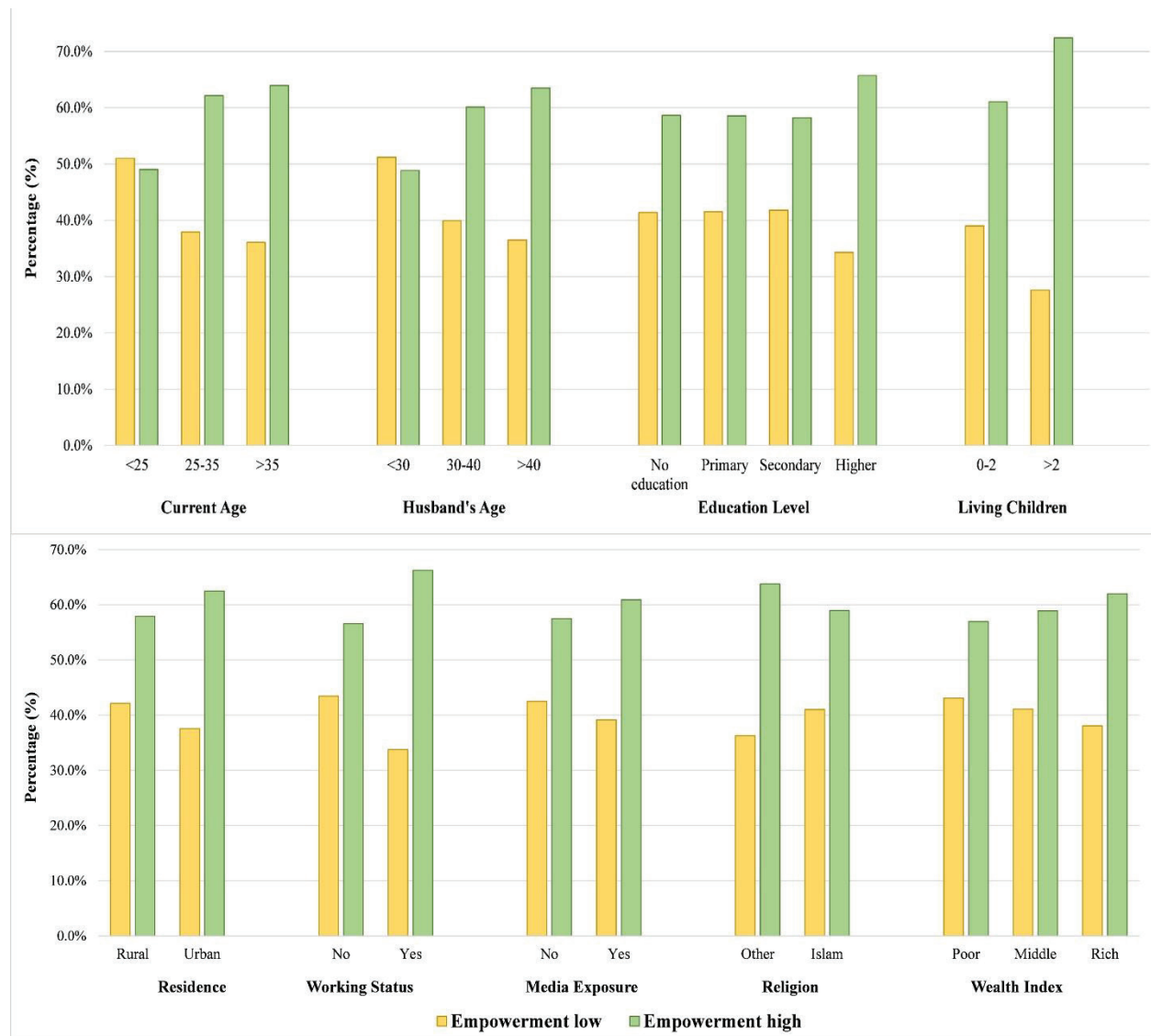

Fig. 1. Distribution of some selected variables across women empowerment.

Several socio-economic and demographic variables play significant role in the association between women's empowerment and contraceptive use. Notably, women aged 25–35 are much more likely to decide to use contraceptives compared to those under 25. This aligns with previous findings showing that age correlates with increased decision-making power regarding contraception[18-21]. Similarly, our study reflects findings from Pakistan, showing that women married to husbands age 30-40 are significantly more likely to use contraceptives compared to those with younger husbands[22].

Our findings indicate that educated women are more likely to use contraceptives compared to uneducated women. This supports existing literature that emphasizes the positive influence of education on family planning decisions[15]. Educated women tend to have better access to health services, improved communication with partners, and greater knowledge about reproductive health, which empowers them to make informed choices

regarding contraception. Our study supports existing literature indicating that women with a higher number of living children are more likely to use contraceptives[14]. This may be driven by a greater desire to control family size after having reached a certain number of children.

Residence emerges as a pivotal factor, echoing previous research, with urban women exhibiting a higher propensity for contraceptive use compared to their rural counterparts[22,23]. This urban-rural gap is largely due to greater access to education and media exposure in urban areas, which increases awareness of family planning among urban women. In contrast, rural environments face challenges in this respect, such as, limited family planning worker visits. Consistent with existing literature, occupational status is found to be a positive factor influencing contraceptive use[24,25]. Women with jobs tend to have more power and resources, and this reduces their reliance on spouses for decision-making and purchasing contraceptives[26,27]. Additionally, aligning with previous studies, this study finds media exposure to be emerged as a potential factor influencing women's decision-making power, that emphasize the role of mass media in augmenting women's autonomy in contraceptive choices[28,29].

According to our study, Muslim women exhibit a lower likelihood of contraceptive use compared to women of different religions. This aligns with a parallel study in Bangladesh, suggesting that religious conservatism may influence contraceptive practices within Muslim families[30,31]. In a departure from existing research, our study finds that middle-class and affluent women are less likely to use contraceptives compared to their economically disadvantaged counterparts[32]. This unexpected finding invites further investigation into how wealth, women's empowerment, and family planning are interconnected.

V. Conclusion

This study sheds light on the positive relationship between women's empowerment and contraceptive practices among Bangladeshi women of reproductive age. The findings confirm that gender-based equality facilitates communication between partners on reproductive health decisions and enhances women's access to reproductive health services. Several socio-economic and demographic variables play significant roles in shaping this association. This study suggests policy makers to focus on empowering women to ensure their active participation in decision-making processes related to reproductive health. In addition, awareness campaigns addressing contraceptive methods, family planning, and reproductive health should be designed considering the demographic and socio-economic characteristics of different groups. These campaigns can

be particularly effective in rural areas where access to information may be limited. Addressing cultural and religious beliefs through community engagement can help overcome barriers to contraceptive use. By addressing the identified challenges and building on the strengths highlighted in this study, Bangladesh can continue to progress towards ensuring the reproductive health and autonomy of its women.

Limitations

While this study provides important insights into the relationship between women's empowerment and contraceptive use in Bangladesh, several limitations must be acknowledged. First, the use of cross-sectional data from the BDHS 2022 precludes the establishment of causal relationships between variables. Second, the analysis relies on self-reported data, which may be subject to recall bias or social desirability effects, particularly for sensitive topics such as contraceptive use and attitudes toward domestic violence. Third, although we used PCA to construct a composite empowerment index, this technique is influenced by the choice and scaling of input variables, and may not capture the full multidimensionality of empowerment. Lastly, unmeasured factors such as partner influence, local service availability, and cultural norms could have affected the observed relationships but were not available in the dataset.

Acknowledgement

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