

Women's empowerment and practice of maternal healthcare facilities in Bangladesh: a trend analysis

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Abstract

Purpose – This study aims to explore whether there is an association between women's empowerment and the utilization of maternal healthcare facilities.

Design/methodology/approach – This study considered four indices for measuring women's empowerment – labor force participation index (LFPI), decision-making power index (DMPI), attitude toward partner's violence index (ATPVI) and knowledge level index (KLI) – and three healthcare facilities – number of antenatal visits, delivery with healthcare facilities and postnatal checkup after delivery. Data extracted for this study were from the Bangladesh Demographic and Health Survey 2011 and 2014. A chi-square test was used for bivariate analysis, and a three-level logistic regression model was applied for multivariate analysis.

Findings – An increment was observed in the practice of all considered healthcare facilities, and the percentage of highly empowered women in DMPI decreased from 2011 to 2014. This study found that higher empowerment of women in DMPI, KLI and ATPVI significantly (p -value < 0.05) increases the utilization of healthcare facilities. High empowerment of mothers in LFPI was found negatively associated with facility delivery and positively associated with the postnatal checkup.

Originality/value – Women's empowerment was found significantly associated with the utilization of maternal healthcare facilities. This study is seeking the attention of corresponding authority to come up with a more effective intervention program to empower women to utilize maternal healthcare facilities.

Keywords Antenatal care, Bangladesh, Facility delivery, Multilevel modeling, Postnatal care, Women's empowerment

Paper type Research paper

Introduction

The utilization of maternal healthcare facilities plays a pivotal role in promoting maternal healthcare facilities, reducing maternal mortality and child mortality. Maternal mortality refers to the death of a mother due to pregnancy and childbirth-related complications. Although global maternal mortality has dropped noticeably in the past two decades, it remains the leading cause of death among women of reproductive age [1], and international communities are struggling to curb it. The Millennium Development Goal 5 (MDG5) was to reduce maternal mortality, and Bangladesh is one of the few developing countries that have achieved the MDG5 [2] targets. However, Bangladesh is still working toward achieving universal access to reproductive health and utilization of basic maternal healthcare services,



including antenatal care (ANC) by a qualified provider, delivery assistance by a skilled obstetrician and access to a medical facility for childbirth and postnatal care (PNC) from a qualified provider [3].

It has been found that a higher number of ANC visits during pregnancy, facility delivery and postnatal checkup of mothers within two days after delivery reduce maternal mortality to a certain extent [4]. The World Health Organization (WHO) has recommended at least four ANC visits during pregnancy as a part of the global agenda [5]. However, utilization of at least four ANC visits during pregnancy has not yet been realized in Bangladesh. The Bangladesh Demographic and Health Survey (BDHS) 2017 reported that only 47% of mothers had at least four ANC visits during pregnancy [6].

Also, the prevalence of delivery within a health facility is still halfway toward achieving universal practice. Only 49.6% of mothers had their deliveries within a health facility according to the report of the BDHS 2017 [6]. The prevalence of PNC of mothers after delivery had similar results with the prevalence of PNC visits for mothers at 52.7%, according to BDHS 2017 [6].

Female empowerment influences the attainment of maternal healthcare facilities [7, 8]. However, in literature, studies to find the association between female empowerment and utilization of healthcare facilities are scant regarding Bangladesh. Identifying the indices to calculate women's empowerment is a difficult task. There is no strict outline to calculate women's empowerment in literature. We found two studies on Asian and Southeast Asian countries that suggested four components of women's empowerment that we used in our study [7, 8]. This study aimed to find an association between women's empowerment and the utilization of maternal healthcare facilities. Previous studies identified several socio-economic and demographic factors associated with the utilization of maternal healthcare facilities [9, 10]. Studies showed maternal healthcare facilities varied with different administrative divisions and in the urban and rural areas. Most studies used a single-level logistic regression model for their analysis. But, the results obtained from the logistic regression model could be misleading because of its strict assumptions where data contained a hierarchical structure. Therefore, we used a multilevel modeling approach in our study as BDHS data contain a hierarchical structure.

Methodology

Data

This study used data sets obtained from the BDHSs 2011 and 2014, two nationally representative cross-sectional studies [11, 12]. BDHS used a two-stage stratified cluster sampling scheme to collect data. As a sampling frame, BDHS used a list of enumeration areas (EAs) of the preceding population and housing census. In the first stage, EAs are selected as primary sampling units (PSU), with probability proportional to the EA size. In the second stage, a systematic sample of households was selected from each PSU, and each eligible woman of reproductive age between 15 and 49 in the selected households was included in the sample. Further details on sampling and survey procedures were available in publicly available survey reports [11, 12]. The study sample included 7,095, and 4,345 currently married women with their last child from 17,842 and 17,863 women included in the BDHS 2011 and 2014, respectively. Therefore, information about 11,440 women concerning their last childbirth was used in this study.

Indices of women's empowerment

This study used a slightly modified framework of two previous studies for measuring female empowerment [7, 8]. Four indices – labor force participation index (LFPI), attitude towards

partner's violence index (ATPVI), decision-making power index (DMPI) and knowledge level index (KLI), were considered to measure female empowerment. The LFPI was constructed combining five variables – the respondent had to be working for the past 12 months (no = 0, yes = 1), who the respondent worked for (not working = 0, family = 1, others = 2, and self-employed = 3), type of payment received (not working/not paid = 0, 1 = in-kind, 2 = cash and in-kind, 3 = cash), type of work (0 = not working, 1 = occasional/seasonal, 2 = all year), who makes decisions about her earnings (0 = not working/not paid, 1 = husband/others, 2 = jointly/alone). Categories in a particular variable were ordered in ascending order, i.e. a higher value implied higher empowerment. Then, LFPI was calculated as a sum of the five variables mentioned.

ATPVI was obtained from five questions. Each of the respondents was asked if they would justify wife-beating in the following situations: (1) If she neglects children, (2) if she argues with her husband, (3) if she burns food, (4) if she goes out without her husband's permission, (5) if she refuses to have sex. Responses were “yes (0)” and “no (1)” for each question. Women who responded no in more questions were considered to have a greater sense of entitlement, self-esteem and status, and this reflected positively on her sense of empowerment. ATPVI was calculated as the sum of responses in the above-mentioned five questions.

Four questions were asked to calculate the DMPI: (1) who decides on the respondent's healthcare?, (2) who decides on large household purchases?, (3) who decides on respondent's visiting family or relatives? and (4) who takes the final decision on child healthcare? Each of the four questions had five categories: (1) respondent, (2) respondent and husband/partner jointly, (3) respondent and someone else, (4) husband/partner alone, (5) someone else in the family. For each of the questions, we marked Categories 1, 2 and 3 as 1, which implies women have empowerment in decision-making, and Categories 4 and 5 as 0, which implies no empowerment. The DMPI was then calculated as the sum of the four binary responses.

The KLI was calculated from two variables: education level and exposure to media. The education level had four categories: no education (0), primary (1), secondary (2) and higher (3). Exposure to media was coded as “yes (1)” if a respondent was exposed to at least one of the three main media forms: newspaper/magazine, television and radio, and “no (0)” if not. Then, the KLI was calculated as the sum of the two variables.

Each of the four indices was converted into a unit-free index between 0 and 1 following the construction method of the human development index as follows:

$$\text{Dimension Index} = (\text{Actual value} - \text{Minimum value}) / (\text{Maximum value} - \text{Minimum value})$$

After that, each of the four indices was recoded as tertiles with categories labeled as low, middle and high empowered. Confirmatory factor analysis was conducted for the selected 16 variables to see the reliability of the considered four indices. All the four factors showed eigenvalues greater than 1 and factor loadings greater than 0.40. The LFPI accounted for 29.12% of total variation (Cronbach's alpha = 0.956), ATPVI explained 16.83% of total variation (Cronbach's alpha = 0.774), decision-making index considered 16.70% of total variance (Cronbach's alpha = 0.833) and finally, women's knowledge level explained 8.55 % of total variation (Cronbach's alpha = 0.631).

Response variables

This study considered three response variables: number of antenatal visits during pregnancy, facility delivery and postnatal checkup of mothers within two days of delivery. The WHO suggested an agenda of at least four ANC visits for a pregnant mother. So, the number of antenatal visits during pregnancy was categorized as “1” if a mother had at least four ANC visits during pregnancy, and “0” otherwise. Place of delivery was considered as a

proxy variable of facility delivery. Facility delivery was considered as a binary response (Yes = 1, No = 0). “No” for the respondents who had a delivery at home, and “Yes” for the respondents who had a delivery in public/private hospitals or clinics or non-governmental organization (NGO) clinics. Postnatal checkup of mothers after delivery was considered as a dichotomous variable – “Yes (1)” for the mothers who had a postnatal checkup within 41 days after delivery, and “No (0)” for the rest.

Explanatory variables

As explanatory variables besides four indices of women's empowerment, some socioeconomic and demographic factors of mothers and children, namely, place of residence (urban, rural), wealth index (poorest, poorer, middle, rich, richest), sex of child (male, female), parity (1st, 2nd, 3rd, 3+), division (Dhaka, Barisal, Khulna, Chittagong, Rajshahi, Rangpur, Sylhet), wanted index child (yes, no), husband/partner's education level (no education, primary, secondary, higher) and mothers' age (≤ 20 , 21–30, > 30), were considered to see the adjusted effect on response variables. Survey years (1 for 2011, and 2 for 2014) were considered as a quantitative explanatory variable.

Statistical analysis

For trend analysis, the prevalence of at least four ANC visits, facility delivery and PNC visits were calculated. For bivariate analysis, a chi-square test was used to find the significant association between covariates, and ANC visit, facility delivery and postnatal checkup of respondents. Covariates that were found significant in bivariate analysis were considered in multivariate analysis. Since BDHS data are collected by using a hierarchical structure, it was essential to consider this data collection scheme in our analysis. Avoiding this hierarchical structure in the analysis could result in a misleading conclusion [13]. To consider this hierarchical structure in analysis, the mixed effect modeling approach was used. To see the adjusted effect of covariates on the ANC visit, facility delivery and postnatal checkup of respondents, a three-level logistic random intercept model was considered. The place of residence was considered as a second-level source of variation and division was considered as the third-level source of variation. For example, a three-level logistic random intercept model can be expressed as:

$$\text{Level 1 : } \log(p_{ijk}/1 - p_{ijk}) = \beta_{0jk} + \gamma_1 x_{1ijk} \quad (1)$$

$$\text{Level 2 : } \beta_{0jk} = \beta_{00k} + \alpha_{0j0} \quad (2)$$

$$\text{Level 3 : } \beta_{00k} = \alpha_{000} + \alpha_{00k} \quad (3)$$

where $p_{ijk} = \Pr(Y_{ijk} = 1)$ with response variable Y_{ijk} . Intra-class correlations (ICC) for the above model has the following formula:

$$\text{ICC}_k = \frac{\sigma_k^2}{\sigma_j^2 + \sigma_k^2 + (\pi^2/3)} \quad (4)$$

$$\text{ICC}_{J|k} = \frac{\sigma_j^2 + \sigma_k^2}{\sigma_j^2 + \sigma_k^2 + (\pi^2/3)} \quad (5)$$

where σ_j^2 and σ_k^2 are the variances of random effects α_{0j0} and α_{00k} at Levels 2 and 3, respectively. ICC always varies 0 to 1 inclusive. An ICC value greater than 0 implied the presence of hierarchical structure in the data; therefore, it should be considered in the analysis

Ethical approval

This study relied on the secondary data sets of the BDHS 2011 and 2014. BDHS was ethically approved by the National Institute of Population Research and Training of the Ministry of Health and Family Welfare, Bangladesh. The survey was conducted maintaining all international ethical standards. All other survey information is publicly available from the website: www.dhsprogram.com. For our study, an online proposal was submitted to the Demographic and Health Survey (DHS) Program, ICF International and a letter of data authorization was obtained. However, an ethical approval code was not provided on this occasion.

Results

A total of 11,440 mothers from the BDHS 2011 and 2014 were considered in this study. [Table 1](#) shows the percentage distribution of the response variables and covariates for two surveys separately as well as for pooled data. Prevalence of at least four ANC visits, facility delivery and PNC was found to increase from 2011 (26.6, 29 and 45.8 %) to 2014 (32.2, 40.2 and 66.1 %) ([Figure 1](#)). Percentages of highly empowered women increased for all indices of women empowerment, except the DMPI ([Figure 2](#)). In the DMPI, the percentage of highly empowered mothers decreased in 2014 (53.5%) compared to 2011 (56.7%). Most of the respondents were aged 21 to 30 years, and the ratio of male and female was close to one for both surveys. The percentages of respondents for different wealth index groups were approximately the same for both surveys. The number of rural respondents was greater compared to the number of urban respondents in each survey. An increase was observed in husband's/partner's education levels from 2011 to 2014. The number of mothers with three or more parity had decreased between the survey years. Most mothers reported that they wanted their child.

The results of the bivariate analysis are reported in [Table 2](#). Chi-square test of association was applied on pooled data to find the factors associated with ANC visits, facility delivery and PNC visit. It was found that the DMPI, KLI and ATPVI were significantly (p -value < 0.01) associated with utilization of ANC visits, and highly empowered women were found to have a higher prevalence of having at least four ANC visits. Other covariates, except for the sex of children, were also found significantly associated with ANC visits (p -value < 0.01). All the four indices of women's empowerment were significantly associated (p -value < 0.05) with facility delivery, and a higher prevalence of facility delivery was found for highly empowered mothers, except in the case of LFPI. All other considered covariates were also significantly associated (p -value < 0.01) with the utilization of facility delivery. All the four indices and other considered covariates, except the sex of the child, were found significantly associated (p -value < 0.01) with PNC visit within two days of delivery. The prevalence of PNC visits was found higher for highly empowered mothers. Surprisingly, this study found mothers of higher age groups had significantly lower prevalence in all three considered healthcare facilities. Mothers living in urban areas, in wealthier families, mothers whose husbands had higher education and mothers with less parity were found to have a higher percentage of utilization of all considered three healthcare facilities.

Covariates that were significant in the bivariate analysis were considered in the multivariate analysis stage. To consider the hierarchical structure of data, a three-level logistic regression was applied for multivariate analysis using the place of residence and division as Level 2 and Level 3 sources of variation. The results obtained from regression analysis are reported in [Table 3](#). Random effects parameters and ICC values reported in

Variables		Survey 2011 (N = 7,095)	Survey 2014 (N = 4,345)	Pooled (N = 11,440)
ANC	<4	73.4	67.8	71.3
	At least 4	26.6	32.2	28.7
Facility delivery	No	71.0	59.8	66.8
	Yes	29.0	40.2	33.2
PNC	No	54.2	33.9	46.5
	Yes	45.8	66.1	53.5
Age (years)	≤20	20.9	27.9	23.6
	21–30	58.8	56.6	58
	>30	20.3	15.5	18.5
Division	Dhaka	16.8	17.7	17.2
	Khulna	12.0	11.7	11.9
	Rajshahi	13.0	12.2	12.7
	Rangpur	13.2	12.4	12.9
	Sylhet	14.4	14.9	14.6
Place of residence	Urban	31.6	32.2	31.9
	Rural	68.4	67.8	68.1
Wealth index	Poorest	20.7	20.6	20.7
	Poorer	19.2	18.9	19.1
	Middle	19.2	19.1	19.2
	Richer	20.0	21.2	20.5
	Richest	20.8	20.1	20.5
Sex of child	Male	51.8	51.6	51.7
	Female	48.2	48.4	48.3
Wanted index child	No	29.1	25.1	27.6
	Yes	70.9	74.9	72.4
Husband/partner's education level	No education	26.6	22.6	25.1
	Primary	29.1	30.1	29.5
	Secondary	30.1	31.8	30.7
	Higher	14.3	15.5	14.7
	3+	18.6	13.8	16.8
Parity	1st	33.7	40.7	36.3
	2nd	30.0	29.9	30.0
	3rd	17.7	15.6	16.9
	3+	18.6	13.8	16.8
LFPI	Low	89.1	77.4	84.6
	Medium	0.6	2.6	1.4
	High	10.3	20.0	14.0
KLI	Low	31.1	27.3	29.6
	Medium	26.5	26.2	26.4
	High	42.5	46.4	44.0
ATPVI	Low	4.9	4.2	4.7
	Medium	14.9	12.5	14.0
	High	80.1	83.4	81.4
DMPI	Low	30.6	33.2	31.6
	Medium	12.7	13.3	12.9
	High	56.7	53.5	55.5

Table 1.
Percentage
distribution of
response variables and
covariates by survey
year and for
pooled data

Table 3 suggested a three-level model was appropriate for analyzing these data as all the random effect parameters were significantly greater than zero and all ICC values were greater than zero. The regression results showed the practice of all three considered healthcare facilities significantly increased in 2014 compared to 2011. Mothers with high and medium KLI were 2.14 and 1.56 times more likely to have at least four ANC visits compared to mothers with low KLI. Mothers with high ATPVI and DMPI also had a higher chance of having at

Figure 1.
Prevalences of
healthcare facilities by
survey years

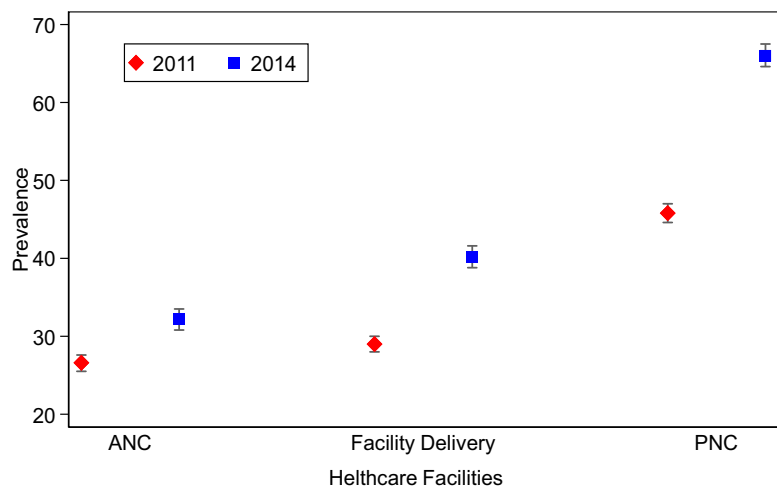
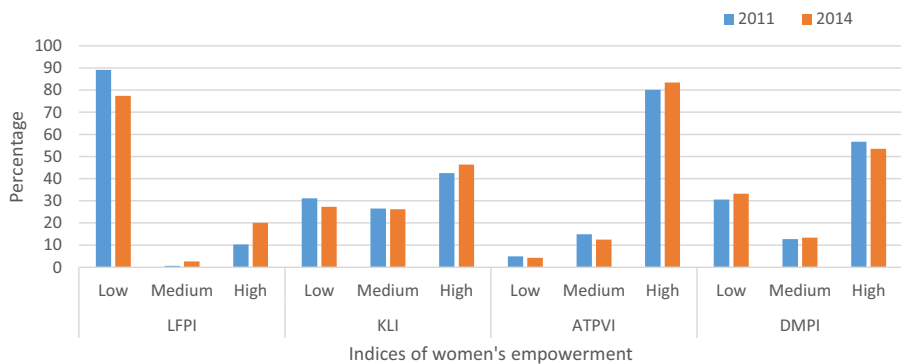


Figure 2.
Indices of women's
empowerment by
survey years



least four ANC visits. Mothers with high values of KLI, ATPVI and DMPI were found more likely to have facility delivery compared to their opposite counterparts. Surprisingly, this study found mothers who were more empowered in the LFPI had a lower chance of facility delivery. However, in the case of a PNC visit, mothers with high empowerment in all four indices were found to have a higher probability of having a PNC visit after delivery. Except for the sex of the child, in the case of the PNC visit, all other covariates that were considered in the regression models were found significantly associated with all three considered healthcare facilities, and the results were similar to the results obtained from the bivariate analysis.

Discussion

This study found the prevalence of having at least four ANC visits, delivery in healthcare facilities and PNC visits after delivery increased from 2011 to 2014. The increase in the prevalence of PNC visits was higher compared to ANC visits and facility delivery. This increase might be because of the higher prevalence of deliveries at home. The rise in home

Covariates	Categories	Survey 2011			Survey 2014			Pooled Facility delivery	ANC	PNC	<i>p</i> -value Facility delivery	ANC	PNC
		ANC	Facility delivery	PNC	ANC	Facility delivery	PNC						
Survey year	2011	26.6	29	45.8				28.7	33.2	53.5	<0.01	<0.01	<0.01
	2014				32.2	40.2	66.1						
Age (years)	≤20	29.20	30.50	47.70	31.20	39.30	66.60	30.10	34.50	56.20	<0.01	<0.01	<0.01
	21-30	27.00	29.60	46.10	33.80	41.70	66.30	29.50	34.10	53.60			
Divisions	>30	22.70	25.60	43.20	27.90	36.50	64.20	24.40	29.00	49.90			
	Barisal	27.60	24.10	38.70	26.00	31.70	61.90	27.00	27.00	47.60	<0.01	<0.01	<0.01
	Chittagong	21.80	24.70	44.50	28.80	37.20	67.20	24.50	29.50	53.20			
	Dhaka	26.70	29.60	43.20	35.90	45.50	71.30	30.30	35.80	54.20			
	Khulna	33.00	43.00	58.50	41.30	57.90	71.90	36.10	48.50	63.50			
	Rajshahi	25.10	31.30	45.80	30.60	45.50	73.00	27.10	36.50	55.70			
	Rangpur	36.40	28.00	49.60	43.60	39.30	64.60	39.10	32.10	55.10			
	Sylhet	19.00	24.90	42.30	21.70	27.20	52.80	20.00	25.80	46.40			
	Urban	43.40	46.40	61.00	46.10	57.70	79.10	44.40	50.70	68.00	<0.01	<0.01	<0.01
	Rural	18.80	20.90	38.80	25.50	31.90	59.90	21.40	25.10	46.80		<0.01	<0.01
Wealth index	Poorest	10.90	10.30	26.20	16.30	15.90	46.00	12.90	12.40	33.70	<0.01	<0.01	<0.01
	Poorer	14.70	14.30	31.80	20.90	24.80	55.00	17.00	18.30	40.60			
	Middle	21.50	22.70	40.10	25.90	36.50	65.50	23.20	27.90	49.70			
	Richer	28.90	35.20	55.10	39.20	50.10	74.70	32.90	41.10	62.80			
	Richest	55.80	60.80	74.70	57.70	72.90	88.40	56.50	65.30	79.80			
Sex of child	Male	27.20	29.60	46.60	32.40	41.60	66.10	29.10	34.10	54.00	0.299	0.036	0.293
	Female	26.00	28.30	45.00	32.00	38.80	66.10	28.30	32.30	53.00		<0.01	<0.01
Husband's education	No	11.80	12.70	28.80	18.90	20.30	53.00	14.30	15.30	37.10	<0.01	<0.01	<0.01
	education												
	Primary	20.00	20.40	37.80	24.00	30.80	59.30	21.60	24.50	46.10			
	Secondary	31.80	35.00	53.30	37.40	47.90	72.60	34.00	40.00	60.90			
	Higher	56.60	64.00	78.10	56.60	71.80	85.00	56.60	67.10	80.80			

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Women's
empowerment
and healthcare
facilities

Table 2.
Prevalence of at least
four ANC visits,
delivery in a healthcare
facility and PNC by
survey year and their
associated factors with
p-values obtained from
chi-square test using
pooled data

Table 2.

Covariates	Categories	Survey 2011			Survey 2014			Pooled			<i>p</i> -value Facility delivery	PNC
		ANC	Facility delivery	PNC	ANC	Facility delivery	PNC	ANC	Facility delivery	PNC		
Parity	1st	35.90	40.40	55.80	37.70	49.90	72.30	36.70	44.40	62.80	<0.01	<0.01
	2nd	29.10	30.30	46.70	35.10	40.80	66.50	31.40	34.30	54.20		54.20
	3rd	22.10	23.70	41.60	25.80	31.90	60.10	23.40	26.60	48.10		48.10
	3+	10.10	11.10	30.50	16.60	19.80	53.70	12.10	13.80	37.80		37.80
Wanted index child LFPI	No	22.20	23.00	40.30	24.10	33.60	63.00	22.80	26.70	48.10	<0.01	<0.01
	Yes	28.40	31.40	48.10	34.90	42.50	67.10	31.00	35.70	55.60		55.60
	Low	26.30	29.10	45.40	32.70	42.20	65.10	28.50	33.60	52.20	0.044	<0.01
	Medium	22.20	22.20	57.80	27.00	27.80	59.10	25.60	26.20	58.80		58.80
DMPI	High	29.30	28.30	48.60	31.00	34.30	70.90	30.20	31.60	60.70		60.70
	Low	21.40	25.10	40.60	27.80	37.20	63.10	24.00	29.90	49.60	<0.01	<0.01
	Medium	27.20	30.50	48.60	32.40	41.20	65.90	29.20	34.70	55.30		55.30
	High	29.30	30.70	48.00	34.90	41.90	68.00	31.30	34.80	55.30		55.30
KLI	Low	10.20	11.20	27.60	13.40	18.40	48.90	11.30	13.70	35.10	<0.01	<0.01
	Medium	20.30	20.90	39.20	27.70	31.80	61.70	23.10	25.00	47.70		47.70
	High	42.50	47.00	63.20	45.70	57.90	78.60	43.80	51.30	69.40		69.40
	Low	13.10	15.40	32.30	18.10	23.10	52.70	14.80	18.00	39.30	<0.01	<0.01
ATPVI	Medium	17.60	20.60	40.40	26.20	27.20	51.60	20.50	22.80	44.20		44.20
	High	29.10	31.40	47.70	33.80	43.00	68.90	30.90	35.90	55.90		55.90

Covariates	ANC	<i>p</i> - value	Facility delivery		PNC	
	AOR (95% CI)		AOR (95% CI)	<i>p</i> - value	AOR (95% CI)	<i>p</i> - value
<i>Year</i>						
2014	1.31 (1.19–1.44)	0.000	1.85 (1.68–2.03)	0.000	2.47 (2.27–2.70)	0.000
2011 ^R	1.00		1.00		1.00	
<i>Age (years)</i>						
21–30	1.07 (0.94–1.12)	0.286	1.32 (1.16–1.50)	0.000	1.07 (0.95–1.21)	0.249
>30	1.23 (1.01–1.49)	0.036	1.82 (1.49–2.21)	0.000	1.27 (1.06–1.51)	0.008
≤20 ^R	1.00		1.00		1.00	
<i>Wealth index</i>						
Poorer	1.09 (0.92–1.30)	0.299	1.27 (1.07–1.51)	0.006	1.15 (1.01–1.31)	0.029
Middle	1.31 (1.10–1.56)	0.002	1.69 (1.42–2.01)	0.000	1.40 (1.22–1.61)	0.000
Richer	1.77 (1.48–2.11)	0.000	2.43 (2.04–2.89)	0.000	2.08 (1.79–2.40)	0.000
Richest	3.46 (2.84–4.20)	0.000	4.61 (3.79–5.62)	0.000	3.80 (3.17–4.56)	0.000
Poorest ^R	1.00		1.00		1.00	
<i>Husband's education</i>						
Primary	1.05 (0.90–1.21)	0.488	1.14 (0.98–1.31)	0.069	1.04 (0.92–1.16)	0.488
Secondary	1.24 (1.07–1.44)	0.004	1.40 (1.21–1.63)	0.000	1.29 (1.13–1.46)	0.000
Higher	1.89 (1.58–2.27)	0.000	2.60 (2.18–3.11)	0.000	2.23 (1.87–2.65)	0.000
No education ^R	1.00		1.00		1.00	
<i>Wanted index child</i>						
Yes	1.13 (1.01–1.26)	0.031	1.05 (0.93–1.17)	0.410	1.03 (0.93–1.13)	0.501
No ^R	1.00		1.00		1.00	
<i>Parity</i>						
2nd	0.81 (0.72–0.92)	0.001	0.58 (0.52–0.66)	0.000	0.71 (0.629–0.75)	0.000
3rd	0.68 (0.58–0.80)	0.000	0.49 (0.42–0.58)	0.000	0.67 (0.58–0.78)	0.000
3+	0.47 (0.38–0.59)	0.000	0.31 (0.25–0.38)	0.000	0.61 (0.51–0.72)	0.000
1st ^R	1.00		1.00		1.00	
<i>Sex of child</i>						
Female			0.91 (0.83–1.00)	0.057		
Male ^R			1.00			
<i>KLI</i>						
Medium	1.56 (1.34–1.81)	0.000	1.19 (1.03–1.38)	0.014	1.16 (1.03–1.31)	0.009
High	2.14 (1.83–2.51)	0.000	1.71 (1.47–1.99)	0.000	1.56 (1.37–1.77)	0.000
Low ^R	1.00		1.00		1.00	
<i>ATPVI</i>						
Medium	1.28 (0.96–1.70)	0.089	1.08 (0.82–1.42)	0.570	1.05 (0.83–1.31)	0.664
High	1.47 (1.14–1.91)	0.003	1.36 (1.06–1.74)	0.014	1.21 (1.00–1.49)	0.050
Low ^R	1.00		1.00		1.00	
<i>DMPI</i>						
Medium	1.19 (1.02–1.38)	0.022	1.14 (0.98–1.32)	0.080	1.18 (1.03–1.35)	0.017
High	1.25 (1.13–1.39)	0.000	1.12 (1.01–1.24)	0.029	1.16 (1.05–1.27)	0.002
Low ^R	1.00		1.00		1.00	
<i>LFPI</i>						
Medium			0.89 (0.60–1.33)	0.583	1.36 (0.96–1.92)	0.074
High			0.76 (0.67–0.88)	0.000	1.25 (1.11–1.92)	0.000
Low ^R			1.00		1.00	

(continued)

Table 3.
Three-level logistic
regression model for
finding potential
factors associated with
ANC, facility delivery
and PNC

Covariates	ANC		Facility delivery		PNC	
	AOR (95% CI)	p-value	AOR (95% CI)	p-value	AOR (95% CI)	p-value
Constant	0.08 (0.05–0.11)	0.000	0.10 (0.06–0.14)	0.000	0.29 (0.21–0.41)	0.000
<i>Random effects</i>						
Division	0.23 (0.056–0.923)		0.16 (0.01–2.34)		0.11 (0.009–1.30)	
Place of resid	0.35 (0.202–0.652)		0.38 (0.21–0.66)		0.22 (0.11–0.42)	
<i>ICC</i>						
Division	0.014		0.007		0.004	
Place of resident division	0.051		0.05		0.02	

Table 3.

Note(s): ^RReference category, AOR = adjusted odds ratio, CI = confidence interval

deliveries with unskilled obstetricians often leads to complications and results in mothers needing emergency medical support. However, the prevalence of the practice of at least four ANC visits and facility delivery was still below 50%, and the practice of PNC visits was developing towards universal practice. Although this study found an increase in the percentage of highly empowered women in KLI, ATPVI and LFPI, the percentage of highly empowered women decreased in the case of DMPI. This decrease is a matter of concern and requires urgent action.

Women with higher knowledge levels were found to be significantly associated with the utilization of at least four ANC visits, facility delivery and PNC visit. This result is obvious as mothers with higher knowledge know more about maternal and child health and are, therefore, more conscious about the utilization of maternal healthcare facilities. A similar result was reported in previous studies [15–17].

Women who possess high autonomy regarding decision-making are expected to have more access to healthcare facilities. Previous studies also suggested women’s decision-making autonomy increased the utilization of maternal healthcare facilities [18, 19]. A study in India found women’s access to family resources (ability to save money) influenced the use of maternal healthcare facilities [20]. Women who had high levels of empowerment in the DMPI were also found to have higher levels of access to utilization of at least four ANC visits, facility delivery and PNC visits within two days of delivery.

Consistent with a previous study, our study also revealed that women who strongly disagreed with wife-beating justification (i.e. high value for ATPVI) were more likely to have at least four ANC visits and facility delivery [21]. This study also found a higher prevalence of PNC visits for mothers with high ATPVI values. Mothers who disagreed with wife-beating justification had a sense of self-esteem, had a greater sense of entitlement and had more access to healthcare facilities.

Surprisingly, this study found women with high empowerment in labor force participation were less likely to have a facility delivery. Other studies also found unemployed mothers had a higher chance of receiving professional delivery care services compared to the employed mothers [21, 22]. We tried to find a plausible explanation for this finding. The level of education of mothers may be the reason for this finding as we found employed mothers had a lower level of education compared to the unemployed mothers (result not reported). In the case of PNC visits, we found that highly empowered mothers in the LFPI were more prone to have PNC visits compared to the low empowered mothers. The explanation of this finding lies in the prevalence of facility delivery. Mothers with high values of LFPI gave birth without a delivery facility and faced more complications immediately after the delivery, making it necessary to visit a doctor or physician.

The legalized age of marriage for Bangladeshi girls is at least 18 years old. Several studies stated the negative consequences of early marriage [23–25]. For instance, early married women have less autonomy in decision-making and face higher levels of partner violence and are, therefore, expected to have lower access to healthcare facilities. On the other hand, older women become more prominent as a mother and achieve a status in the family and community that may increase the utilization of healthcare facilities [26, 27]. Consistent with previous studies, our study also revealed that older mothers were more likely to utilize healthcare facilities than younger mothers [15, 21].

Similar to previous studies, this study also found women from wealthier families and whose partners were more educated had a higher chance of utilizing healthcare facilities [15, 21, 28, 29]. High educated husbands are more aware of their wives' health and child health and influence their wives to get healthcare facilities. Also, wealthy families have an additional amount of money to spend on healthcare, which may explain why mothers from wealthier backgrounds may have a higher chance of access to healthcare facilities. Additionally, having more children creates resource constraints in the family with the result that the mothers' accessibility to healthcare facilities reduced [30]. This study also found a similar result that mothers with more parity had a lower rate of utilization of healthcare facilities.

Limitation and strength of study

Since the data sets were obtained from cross-sectional studies, we were unable to demonstrate a cause–effect relationship. Being a retrospective study, there was a chance of recall bias. We were not able to use the more recent BDHS 2017 data set as this data set was not publicly available at the time of our research. Using this data set could give us a more recent scenario of the considering issues. The strength of this study is that it used BDHS 2011 and 2014 data sets that are nationally representative.

Conclusion

Although the practice of healthcare facilities was found to be increasing, they remain far behind the universal practice. Women's empowerment was found to significantly increase the utilization of healthcare facilities along with other socio-economic and demographic factors. Special attention must be given to women's decision-making autonomy as it was found to decrease from 2011 to 2014. This study would be of relevance to governmental and NGOs in the effort to develop more effective intervention programs to empower women to utilize maternal healthcare facilities.

Conflict of Interest: None

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