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Change in Demand for Long-acting Reversible and Permanent Contraceptive Methods among Women of Reproductive Age in Bangladesh: An Analysis of Demographic and Health Survey Data (2007-2022)

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ABSTRACT

Ensuring access to long-acting reversible and permanent contraceptive methods (LARCs & PMs) is essential to establishing universal coverage of contraception. We examined the trend and associated factors of long-acting reversible and permanent contraceptive methods (LARCs & PMs) use among women of reproductive age in Bangladesh. The study used data from the Bangladesh Demographic and Health Surveys (BDHS), conducted in 2007, 2011, 2014, 2017 and 2022, focused on Bangladeshi women aged 15–49. The BDHS surveys are nationally representative to produce specific indicators at the national and regional levels that use a two-stage stratified sampling method. A multilevel logistic regression analysis was carried out in this study. Using the five cross-sectional waves of the Bangladesh Demographic and Health Surveys (2007 and 2022) this study showed that utilization of LARCs and PMs increased in Bangladesh over the period of time however the rate of improvement is not satisfactory to attain the target of sustainable development goals. The adjusted logistic regression model of this study exhibited that in all four consecutive survey years, there were statistically significant associations between the use of LARCs &PMs and age, number of children, division, education, religion, and family planning service sources. Findings of the study indicates that it is crucial to enhance the government stor's ability to offer LARCs and PMs, especially by improving public-private partnerships. Current disparities may be addressed through targeted counseling for groups with lower utilization rates and the implementation of incentivization programs. Furthermore, including LARCs and PMs in wider maternal and child health programs could improve access to reproductive healthcare and its outcomes in Bangladesh.

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Introduction

Globally, more than half of all pregnancies are unwanted, and unmet need for contraceptive services is high, with significant disparities around the world. Contraception plays a crucial role in reducing maternal and child mortality. However, the use of long-acting reversible and permanent methods (LARCs & PMs) of contraception remains considerably low in low- and middle-income countries (LMICs) (Ahmed, Li, Liu, & Tsui, 2012; Aregay, Azale, Sisay, & Gonete, 2018). LARCs and PMs are the most effective and least expensive forms of contraception, reducing unplanned births and abortions, and facilitating women to space births and attain desired family size (Desalegn, Belachew, Gizaw, Kejela, & Gudeta, 2019; Gebremichael et al., 2014). Even though the need for contraception among women of reproductive age is not uniform, studies have identified adverse long-term effects of short-acting contraceptives such as oral pills to encompass blood clots, hypertension, dizziness, and increased cardiovascular risk (Bulto, Zewdie, & Beyen, 2014; Liao & Dollin, 2012). Despite the well-documented benefits of LARCs and PMs over condoms and pills with shorter duration of action, their uptake has not made a similar leap, especially in LMICs (Desalegn et al., 2019; Gebremichael et al., 2014).

Bangladesh, a country of over 160 million, is projected to have 251.45 million inhabitants by the year 2061 and be the eighth most populated country in the world (Bangladesh bureau of statistics, 2015; The World Bank, 2020). The country has made notable gains in family planning, reducing its total fertility rate from 3.4 children per woman in 1993 to 2.3 in 2018 (Bora, Saikia, Kebede, & Lutz, 2022; Rahman, Haider, Curtis, & Lance, 2016). Remaining challenges include the contraceptive prevalence rate remaining at 62%, while the desired fertility rate remains 1.7 children per woman. Besides, there remains a 12% unfulfilled family planning requirement and an average maternal death ratio of 194 per 100,000 live births—the challenges that place Bangladesh's achievement of Sustainable Development Goal (SDG) 3.7 at risk of being unfulfilled, targeting universal access to sexual and reproductive health services(National Institute of Population Research and Training and ICF International, 2020; National Institute of Population Research and Training; International Centre for Diarrhoeal Disease Research, 2017; United Nations Department for Economic Social Affairs, 2019b). In Bangladesh today, just 9% of married women of reproductive age use LARCs and PMs such as., implants, IUDs, and sterilization (male or female) well short of the proportion in most other countries of Central and South Asia(National Institute of Population Research and Training and ICF International, 2020; United Nations Department for Economic Social Affairs, 2019a).

Literature elsewhere identifies many explanations for there being low uptake of such approaches. These include fear and concern about side effects, misinformation and myths, limited awareness, family or marriage prohibition, process complexity, religion and culture, dependency on health providers, privacy, as well as worry

about provider bias (Alemayehu, Belachew, & Tilahun, 2012; Alemayehu et al., 2015; Bulto et al., 2014; Collier, Rosenthal, Harris, Lucas, & Stanwood, 2014; Desalegn et al., 2019; Gebremichael et al., 2014; Stonehill, Bishu, & Taddese, 2020). While they have numerous advantages, including enabling women to space and limit the number of children, LARCs and PMs are not used to their full potential. The growing global demand for these methods underscores the need for rigorous research. Few studies have explored the trends and determinants of LARCs and PMs use in Bangladesh to a satisfactory level (Desalegn, Belachew, Gizaw, Kejela, & Gudeta, 2019; Gebremichael et al., 2014, Dana et al., 2023). Therefore, this study aims to examine the pattern of demand for long-acting reversible and permanent contraceptive methods among reproductive-age Bangladeshi women and explore the factors behind observed patterns, using nationally representative data from the Bangladesh Demographic and Health Surveys (BDHS), 2007-2022

Theoretical Framework

A variety of theories from different fields are used in this study to explain the utilization of long-acting reversible and permanent contraceptive methods (LARCs & PMs) among women of reproductive age in Bangladesh. The framework is supported by empirical data from regional and international literature and is based on well-established behavioral and health systems theories. The theoretical underpinnings for investigating LARCs and PMs utilization are four major domains: sociodemographic characteristics, accessibility and service sources, cultural and behavioral norms, and policy/programmatic context. These domains are contextualized across five waves of the Bangladesh Demographic and Health Survey (BDHS) from 2007 to 2022.

Firstly, Andersen's Behavioral Model of Health Services Use, which categorizes individual-level factors like age, education, religion, geographic location, number of children, and household wealth as predisposing and enabling components that influence health behavior, serves as the foundation for the first domain, sociodemographic characteristics (Andersen, 1995). These factors have continuously been linked to access, understanding, and attitudes toward contraception, especially in low- and middle-income nations (Gebremichael et al., 2014; Haider et al., 2019). Secondly, the Health Belief Model (HBM) and Penchansky and Thomas's Access to Care Framework, which both highlight the significance of perceived barriers and structural availability in influencing health service utilization, are used to analyze accessibility and the source of services (Penchansky & Thomas, 1981). For LARCs and PMs, this involves being exposed to family planning messaging, interacting with family planning professionals, having access to medical facilities, and integrating family planning with services for mothers and children. Physical and informational accessibility are essential for making educated decisions about contraception, according to evidence from low- and middle-income nations (Desalegn et al., 2019; Bulto et al., 2014). Thirdly, both the Theory of Planned Behavior and Social Cognitive Theory,

which emphasize the impact of interpersonal relationships, perceived norms, and personal beliefs on behavioral outcomes, explain the third category, cultural and behavioral norms (Bandura, 1986; Ajzen, 1991). The acceptance of LARCs and PMs is frequently hampered in Bangladesh by elements such as spousal opposition, religious conservatism, fertility desires, and myths and misconceptions (Aregay et al., 2018; Alemayehu et al., 2012). Finally, drawing from the six-health system building blocks of the World Health Organization's Health Systems Strengthening (HSS) framework, the fourth domain concentrates on the policy and programmatic setting (WHO, 2010). This domain examines how service delivery and the uptake of LARCs and PMs are affected by national reproductive health policies, the caliber of public-private partnerships, the availability of incentives, and the efficacy of counseling and advocacy efforts (Rahman et al., 2020; Stonehill et al., 2020).

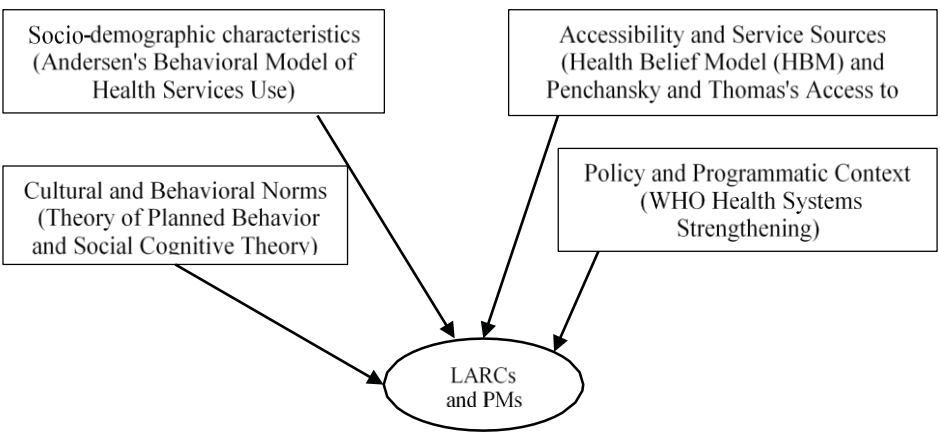


Figure 1: Conceptual Framework

The selection of variables for multivariable ss

Study Design and Measurement Variables

The data for this research were extracted from the women's files of BDHS for the years 2007, 2011, 2014, 2017 and 2022. The BDHS surveys are nationally representative to produce specific indicators at the national and regional levels. The surveys employed a two-stage stratified sampling method. The data collection was completed through a structured questionnaire. Detailed methodology of the surveys is available in all BDHS reports (National Institute of Population Research and Training, ICF International, & Mitra and Associates, 2008, 2009, 2012, 2015; National Institute of Population Research and Training and ICF International, 2020). In all surveys, determinants of change in long-acting reversible and permanent contraceptive methods use in Bangladeshi women aged 15–49. In order to address the objective of this study, women not living with husband (divorcees, separated or widowed) were not considered. The outcome variable for this research

was Long-Acting Reversible Contraceptives (LARCs) and Permanent Methods (PMs) use. This variable was recoded as use of LARCs and PMs (implant, IUD, vasectomy and tubal ligation) which was a dichotomous variable with value 1 for "Yes" and 0 for "No" for logistic regression analysis. All the independent variables were age, division, place of residence, religion, education, employment status, wealth quintile, age at first cohabitation, number of living children, exposer to FP messages, and received FP services. Exposure to FP messages variable was created consider women's exposure to family planning messages through mass media (TV, radio or newspaper or magazines) or from FP worker.

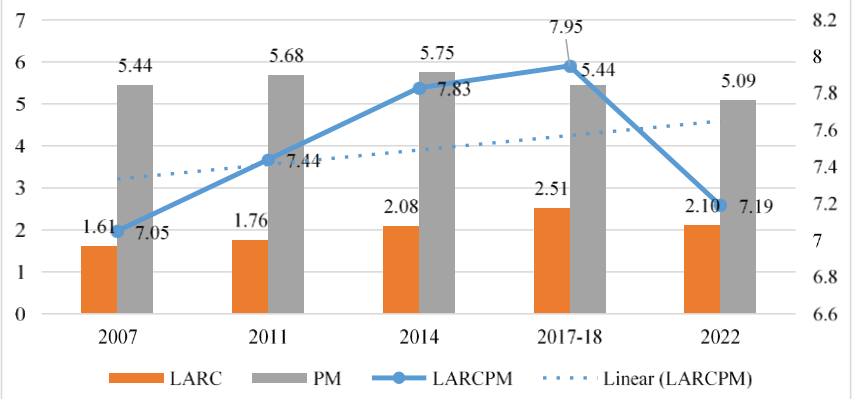
Data Analysis

At the next stage, bivariate test was executed to observe the strength of association between LARCs and PMs use and all the selected covariant characteristics. The chi-square test at bivariate level was done to confirm the presence of statistically significant difference all the survey years. Later, at multivariate level multiple logistic regression was carried out. In the logistic regression model, the LARCs and PMs use was outcome variable after adjusting all the independent variables. The associations were reported in terms of Odds Ratio (OR) with their p-values after controlling for potential confounders. All the analysis for this research was executed using STATA 18.

Results

Figure 2 indicates a fluctuating trend in the use of LARCs and PMs in Bangladesh over time. The utilization of LARCs started at 1.6% in 2007 and has shown variation, with a prominent decline to 2.1% in 2022. While use of PMs was 5.4% in 2007 and saw an increase to 6.7% in 2011, then slightly declined to 5.1% by 2022. The combined use of LARCs and PMs reached at peak in 2011 (7.95%), followed by a steady decline through 2022 (7.05%). Overall, the pattern indicates a slight downward tendency in the utilization of LARCs and PMs in Bangladesh.

Figure 2: Trends of use of LARCPM in Bangladesh



Source: BDHS 2007 to BDHS 2022

The table presents key findings from bivariate analysis examining the association between using Long-Acting Reversible Contraceptions (LARCs) and Permanent Methods (PMs) and all independent variables in Bangladesh. Table 1 reveals that usage of LARCs and PMs increased with age, women aged 35-49 constantly showed the highest percentage of utilization across all survey years (2007, 2011, 2014, 2017-18, and 2022). Yet, the overall usage steady since 2007-2022 (13.2%). The utilization levels did not vary across different divisions. For example, Rajshahi continued to have constant higher usage rates. Education plays a significant role in the use of LARCs and PMs, with women who had no education or only primary education reliably using such methods at higher rates compared to women with secondary or higher levels of education. This pattern remained stable throughout all survey years, showing a higher likelihood of women with lower education levels to utilize LARCs and PMs. Concerning, religious affiliation, non-Muslim women consistently show higher usage rates than Muslim women. For instance, in 2022, 8.3 % of Muslim women used LARCs and PMs, compared to 10.1% of non-Muslim women. This difference remained the same in previous survey periods. Urban women constantly exhibited higher utilization of LARCs and PMs than rural women. For instance, in 2007 and 2022, only 7.5% of urban women used these methods, while the utilization rate of such services remained high for rural women in both survey years, 8.1% and 8.9% respectively. Poorer women primarily had a high percentage of LARCs and PMs utilization (10.9% in 2011), but this abruptly fell to 9.8% by 2022. Whereas, richer women's usage ranged from 6.9% in 2007 to 7.5% in 2022, reflecting a slight change over time. Unemployed women significantly showed a higher usage rate of LARCs and PMs than employed women. The rates peaked at 11.4% in 2011 and persisted at about 10.1% in 2022. Women who started cohabitation before the age of 20 consistently showed higher use of LARCs and PMs than their other counterparts (8.9% vs 4.9%) in 2022. Women with 3 or more children are reliably exposed to much higher usage rates of such services, expanding from 11.9% in 2007 to 16.9% in 2022. Women who received family services from government facilities had fluctuating usage rates, from 26.8% in 2007, peaking at 49.4% in 2011, and snowballing again to 44.5% in 2022. Although those receiving services from private facilities had a significantly high usage rate (89.4%) in 2017, it drastically declined to 0.1% in 2022. Women using NGO services demonstrated a moderate increase over the years, from 15.6% in 2007 to 23.1% in 2022. Interestingly, women who were exposed to family planning (FP) messages were less likely to use LARCs and PMs than those who had no exposure. This finding was consistent in all survey years from 2007 to 2017 (Table 1).

Table 1. Percentage distribution of women using LARCs & PMs in Bangladesh by socio-demographic characteristics.

	2007	2011	2014	2017-18	2022
Age	***	***	***	***	***
15-24	1.8	2.6	3.4	3.0	2.2
25-34	8.1	9.0	9.8	9.6	7.3
35-49	13.9	13.9	12.8	13.7	13.2
Divisions	***	***	***	***	***
Barisal	7.6	7.0	6.7	6.5	5.9
Chittagong	6.8	8.6	7.7	7.8	7.5
Dhaka	7.0	7.7	8.1	9.1	7.7
Khulna	9.5	9.4	10.0	9.3	9.6
Rajshani	9.9	9.8	10.0	11.1	11.0
Sylhet	4.5	7.4	9.8	8.6	9.8
Rangpur	NA	11.1	12.1	13.5	9.3
Mymensingh	NA	NA	NA	7.7	6.9
Place of Residence				***	***
Urban	7.5	6.9	8.7	8.1	7.5
Rural	8.1	9.4	9.1	10.1	8.9
Education	***	***	***	***	***
No education	13.0	13.8	13.3	15.6	15.0
Primary	8.0	9.4	10.1	11.8	11.4
Secondary and above	3.1	4.8	5.9	5.9	5.6
Religion	*		***	***	**
Muslim	7.8	8.6	8.7	9.1	8.3
Non-Muslim	10.0	10.5	11.7	12.8	10.1
Wealth	***		***	***	
Poorer	8.9	10.9	10.5	11.5	9.8
Middle	8.1	8.9	9.4	9.9	8.1
Richer	6.9	6.7	7.4	7.3	7.5
Employment Status	***	***	***	***	***
Employed	7.0	8.4	7.9	7.9	7.8
Unemployed	10.1	11.4	11.1	11.1	10.1

Age at First Cohabitation	***		***	***	
Less than 20	8.2	9.1	9.2	9.8	8.9
More than 20	3.3	3.6	5.3	4.6	4.9
Desire for Child	***	***	***	***	***
Yes	0.9	1.1	2.0	1.9	1.2
No	11.5	12.0	11.9	12.8	11.8
Number of Living Children	***	***	***	***	***
Less than 3	4.9	5.3	5.4	5.5	4.6
3 or more	11.9	13.7	14.8	16.0	16.9
Received Family Service	***	***	***	***	***
Government	26.8	49.1	26.8	29.6	44.5
Private	67.1	8.2	82.7	89.4	0.1
NGO	15.6	19.9	14.8	34.9	23.1
Other	0.3	0.2	0.2	2.0	3.9
Media Exposer	***	***	***		**
No	9.5	10.0	9.5	10.2	9.0
Yes	6.8	7.6	7.9	8.3	7.9

Source: BDHS 2007 to BDHS 2022 (*p < .050; **p < .010; ***p < .001)

The percentage of LARCs and PMs used and changes over the survey years are presented in Table 2. Use of LARCs increased till 2017-18, which increased almost 20.67%, then decreased to 16.33% in 2022. Whereas over the last 14 years percentage of PMs used did not increase rather, it always had a decreasing trend. Over all LARCPM users were high in 2011 and 2014, then the percentage started to decrease.

Table 2: Use of LARCPM rates and changes in Bangladesh, 2007-2022

BDHS Survey Years	Period	Number of users LARCPM	Percentage of change across the years		
			LARCs	PMs	LARCPM
2007	2004-2006	2325	-	-	-
2011	2006-2010	1328	9.32	4.41	5.53
2014	2010-2014	1399	18.18	1.23	5.24
2017-18	2014-2016	1600	20.67	-5.39	1.53
2022	2017-2021	1437	-16.33	-6.43	-9.56

Source: BDHS 2007 to BDHS 2022

Table 3 outlines the adjusted logistic regression models measuring the probability of women using LARCs and PMs from 2007 to 2022. After controlling for all the variables, age was significantly associated with the use of LARCs and PMs in all five years. Women in older age groups 25-34 and 35-49 were more likely to use LARCs and PMs compared to younger women. Women aged 35-49 consistently showed a higher likelihood of using LARCs and PMs in all survey years, with a highly significant effect in 2007 (OR = 4.27, $p < 0.001$), which decreased over time but persisted substantially in 2022 (OR = 1.60, $p = 0.002$). Barisal, Chittagong, and Sylhet divisions generally indicated lower odds of LARCs and PMs use than Dhaka. Rajshahi reliably had higher odds of LARCs and PMs use than Dhaka, with a highly significant effect in 2022 (OR = 1.53, $p = 0.001$). Rural women constantly presented lower odds of LARCs and PMs utilization rates throughout most survey years, but by 2022, this difference was no longer statistically significant (OR = 0.99, $p = 0.883$). Women with secondary education or higher consistently had lower odds of using LARCs and PMs compared to those with no education, with a highly significant effect in 2014 (OR = 0.56, $p < 0.001$), though it to some extent increased by 2022 (OR = 0.81, $p = 0.037$). Non-Muslim women had consistently higher odds of the utilization of LARCs and PMs than Muslim women and it remained statistically significant in all survey years. Women who were employed showed no significant differences in most years except for 2014, where employed women were slightly more likely to use LARCs and PMs (OR = 1.16, $p = 0.046$). Women who started cohabitation at more than 20 years had significantly lower odds of using LARCs and PMs in 2007 (OR = 0.61, $p = 0.006$), but this effect was not statistically significant in later years. Women who desired more children were less likely to use LARCs and PMs compared to those who did not desire more children, with a peak in 2022 (OR = 4.31, $p < 0.001$). Women with 3 or more children consistently had higher odds of LARCs and PMs use across all survey years, predominantly in 2017-18 (OR = 186.00, $p < 0.001$), suggesting the strong association between the number of children and the use of LARCs and PMs. The likelihood of LARCs and PMs use from the private sector significantly increased in all survey years, especially in 2017-18 (OR = 22.46, $p < 0.001$). Women with media exposure usually had lower odds of using LARCs and PMs compared to other counterparts, with significant association observed in most survey years excluding the year 2022. Overall, table 3 identifies key predictors of LARCs and PMs use in Bangladesh from the demand side perspective. The significant factors include age, number of children, division, education, religion, and family planning service sources. Remarkably, women's desire for more children and receiving services from the private sector were significant determinants of LARCs and PMs use in Bangladesh.

Table 3. Logistic regression showing the effect of socio-demographic characteristics on the use of LARC &PMs

	2007		2011		2014		2017-18		2022	
	OR	p-value	OR	p-value	OR	p-value	OR	p-value	OR	p-value
Age										
15-24	1		1		1		1		1	
25-34	1.87	0.000	1.40	0.011	0.89	0.343	1.02	0.891	1.29	0.086
35-49	4.27	0.000	2.80	0.000	1.36	0.026	1.06	0.644	1.60	0.002
Divisions										
Barisal	0.98	0.839	0.60	0.001	0.78	0.95	0.66	0.004	0.64	0.004
Chittagong	1.41	0.001	1.07	0.635	0.99	0.939	0.71	0.009	0.68	0.005
Dhaka	1		1		1		1		1	
Khulna	1.13	0.164	1.07	0.606	1.05	0.704	0.89	0.363	1.38	0.012
Rajshani	1.43	0.000	1.13	0.364	1.13	0.340	1.19	0.162	1.53	0.001
Sylhet	1.33	0.100	0.93	0.644	1.24	0.115	0.73	0.022	0.88	0.337
Rangpur	NA	NA	0.95	0.760	1.22	0.111	1.10	0.429	1.02	0.866
Mymensingh	NA	NA	NA	NA	NA	NA	0.73	0.022	0.60	0.001
Place of Residence										
Urban	1		1		1		1		1	
Rural	0.84	0.007	0.76	0.003	0.82	0.016	0.83	0.014	0.99	0.883
Education										
No education	1		1		1		1		1	
Primary	0.97	0.87	0.14	0.304	0.85	0.067	0.82	0.017	0.90	0.274
Secondary and above	0.61	0.750	0.10	0.120	0.56	0.000	0.46	0.000	0.81	0.037
Religion										
Muslim	1		1		1		1		1	
Non-Muslim	1.4	0	1.27	0.43	1.64	0.000	1.31	0.005	1.16	0.007
Wealth										
Poorer	1		1		1		1		1	
Middle	0.95	0.538	0.84	0.090	1.03	0.745	1.02	0.785	0.86	0.118
Richer	0.77	0.001	1.04	0.709	1.1	0.325	1.09	0.385	1.16	0.101
Employment Status										
Unemployed	1		1		1		1		1	
Employed	0.98	0.756	1.20	0.116	1.16	0.046	0.92	0.199	1.02	0.828

Age at First Cohabitation									
Less than 20	1		1		1		1		1	
More than 20	0.61	0.006	0.64	0.067	1.13	0.61	0.96	0.83	0.86	0.273
Desire for more children										
Yes	1		1		1		1		1	
No	4.01	0.000	3.39	0.000	2.84	0.000	3.83	0.000	4.31	0.000
Number of Living Children										
Less than 3	1		1		1		1		1	
3 or more	0.90	0.960	1.39	0.000	1.13	0.000	186.00	0.000	2.64	0.000
Received Family Service										
Government	1		1		1		1		1	
Private	9.22	0.000	0.11	0.000	11.1	0.000	22.46	0.000	0.00	0.000
NGO	0.50	0.000	0.24	0.000	0.61	0.004	1.11	0.450	0.29	0.000
Other	0.01	0.000	0.00	0.000	0.01	0.00	0.51	0.000	0.05	0.000
Media Exposer										
No	1		1		1		1		1	
Yes	1.09	0.145	1.15	0.150	0.66	0.000	0.66	0.000	0.96	0.525

Source: BDHS 2007 to BDHS 2007-2022 (*p < .050; **p < .010; ***p < .001)

Discussion

This paper examines Bangladesh's LARCs and PMs utilization trend and identifies the contributing factors for such a pattern. To our knowledge, this study uniquely uses the five consecutive BDHS datasets (2007 to 2022) in analyzing trends and associated factors of LARCs and PMs utilization in Bangladesh. Since this trend reveals enduring disparities and inequities that need to be addressed through focused policy and programmatic interventions, such observed pattern of utilization should be a primary concern in the pursuit of universal coverage of sexual and reproductive health care services, including family planning. The trend analysis showed the changing dynamics of LARCs and PMs use in Bangladesh. Consistent with other studies, the adjusted logistic regression model of this study exhibited that in all five consecutive survey years, there were statistically significant associations between the use of LARCs and PMs and age, education, religion, number of living children, and source of family planning services (Alemayehu et al., 2012; Alemayehu et al.,

2015; Bulto et al., 2014; Collier et al., 2014; Gayatri, 2022).

In this study, the overall utilization of LARCs and PMs showed an increasing trend with the growing age of women. Women of late reproductive age were more likely to utilize LARCs and PMs compared to other age groups which is in line with previous studies (Alemayehu et al., 2015; Gebremichael et al., 2014; M. Moinuddin Haider, Sharad Barkataki, Ali Ahmed, Quamrun Nahar, & Rahman, 2019). This study explained that the likelihood of using LARCs and PMs among poor women was higher compared to rich women (Stonehill et al., 2020). Like a previous study conducted in North West Ethiopia this study also found that religion restriction is associated with lower utilization of LARCs and PMs. In this study, Muslims were less likely to utilize these methods compared to non-Muslim women (Aregay et al., 2018). This study showed an increasing trend of utilization of LARC & PMs among women of reproductive age with more living children (Alemayehu et al., 2012; M. Moinuddin Haider et al., 2019).

Unlike the higher percentage use rate of LARCs and PMs in urban areas conducted in other countries like United States this study in line with Northern Ethiopia showed lower rate of utilization of such services in urban areas compared to rural areas (Alemayehu et al., 2015; Vaaler, Kalanges, Fonseca, & Castrucci, 2012). In connection to this highly educated woman in this study were less likely to utilize LARCs and PMs than non-educated women. This might be due to the fact that Bangladesh Government's target-specific initiatives mostly focus on rural uneducated women (Mizanur Rahman, M. Moinuddin Haider, & Curtis, 2020). Moreover, unlike other studies study showed that exposure to Family planning message was not associated with the likelihood of LARC & PMs utilization. Similar pattern was also notable by receiving of family planning services (M. Moinuddin Haider et al., 2019; Mizanur Rahman, Moinuddin Haider, Ali Ahmed, & Barkataki, 2020). Consistent with previous studies conducted in Bangladesh this study also revealed that over the period of time private facilities are in the stronger position to provide LARCs and PMs services in Bangladesh (M. Moinuddin Haider et al., 2019; Mizanur Rahman, M. Moinuddin Haider, et al., 2020; Mizanur Rahman, Moinuddin Haider, et al., 2020; National Institute of Population Research and Training and ICF International, 2020).The present study has certain limitations. Notably, only respondents who received LARCs and PMs from medical facilities were included in the research. This may limit the findings' applicability to women who did not receive these treatments or who only received them in institutional settings. The study's main strength, however, is its trend analysis, which makes use of four rounds of nationally representative BDHS datasets. The study also highlights a number of relevant factors that affect Bangladesh's use of PMs and LARCs. These observations can help policymakers create focused interventions, like providing non-users with incentive programs, strengthening public-private partnerships, boosting government sector participation in the delivery of contraceptives, and increasing access by incorporating PMs and LARCs into more

comprehensive women's healthcare services.

Conclusion

This study provides a comprehensive analysis of the trends and determinants of long-acting reversible and permanent contraceptive methods (LARCs & PMs) use among women of reproductive age in Bangladesh from 2007 to 2022, utilizing five rounds of nationally representative BDHS data. Although there has been a slow increase in the overall uptake of LARCs & PMs over the past 15 years, the rate is still too slow to reach the targets set by Sustainable Development Goal 3.7, which calls for universal access to sexual and reproductive health services. The results highlight enduring differences in family planning services based on age, education, number of children, religion, area, and source. Notably, uptake was much lower among urban and better-educated women, indicating gaps in outreach and counseling tactics. At the same time, LARCs and PMs use was higher among older, less educated, rural women with more children.

Therefore, this study's suggestions include the necessity of expanding community-based counseling, creating focused interventions for disadvantaged groups, and bolstering the public sector's capabilities through improved public-private partnerships. More equitable and long-lasting gains in the use of contraceptives can be achieved by incorporating LARC & PMs into larger maternal and child health programs and removing sociocultural barriers through education and awareness campaigns. Prioritizing the acceptability, cost, and accessibility of LARC & PMs is essential to maintaining reproductive autonomy and lowering mother and infant mortality as Bangladesh moves closer to attaining universal health coverage.

Availability of data and material

BDHS data sets are available in the Demographics and Health Surveys programme website (https://www.dhsprogram.com/). Access to the data is temporarily paused.

References

Ahmed, S., Li, Q., Liu, L., & Tsui, A. O. (2012). Maternal deaths averted by contraceptive use: an analysis of 172 countries. *The Lancet, 380*(9837), 111-125.

Alemayehu, M., Belachew, T., & Tilahun, T. (2012). Factors associated with utilization of long acting and permanent contraceptive methods among married women of reproductive age in Mekelle town, Tigray region, north Ethiopia. *BMC pregnancy and childbirth, 12*(1), 1-9.

Alemayehu, M., Kalayu, A., Desta, A., Gebremichael, H., Hagos, T., & Yebyo, H. (2015). Rural women are more likely to use long acting contraceptive in Tigray region, Northern Ethiopia: a comparative community-based cross sectional study. *BMC women's health, 15*(1), 1-8.

Aregay, W., Azale, T., Sisay, M., & Gonete, K. A. (2018). Utilization of long acting reversible contraceptive methods and associated factors among female college students in

Gondar town, northwest Ethiopia, 2018: institutional based cross-sectional study. *BMC research notes, 11*(1), 1-6.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, *36*(1), 1–10. https://doi.org/10.2307/2137284

Bangladesh bureau of statistics. (2015). *Population projection of bangladesh dynamics and trends 2011-2061* Bangladesh bureau of statistics, Statistics and informatics division, Ministry of planning, Government of the people's republic of bangladesh

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice Hall.

Bora, J. K., Saikia, N., Kebede, E. B., & Lutz, W. (2022). Revisiting the causes of fertility decline in Bangladesh: the relative importance of female education and family planning programs. *Asian Population Studies*, 1-24.

Bulto, G. A., Zewdie, T. A., & Beyen, T. K. (2014). Demand for long acting and permanent contraceptive methods and associated factors among married women of reproductive age group in Debre Markos Town, North West Ethiopia. *BMC women's health, 14*(1), 1-12.

Collier, C. H., Rosenthal, M., Harris, K., Lucas, G., & Stanwood, N. L. (2014). Contraceptive implant knowledge and practices of providers serving an urban, low-income community. *Journal of health care for the poor and underserved, 25*(3), 1308-1316.

Dana, G. P. T., Sutopa, T. S., & Afroz, S. (2023). Disparities in readiness of health facilities to provide long-acting reversible contraceptives (LARCs) and permanent methods (PMs) in Bangladesh. *Heliyon*, *9*(4).

Desalegn, M., Belachew, A., Gizaw, M., Kejela, G., & Gudeta, R. (2019). Utilization of long-acting and permanent contraceptive methods and associated factors among married women in Adama town, Central Ethiopia: community based cross-sectional study. *Contraception and reproductive medicine, 4*(1), 1-9.

Gayatri, M. (2022). The use of long-acting and permanent contraceptive methods (LAPMs) among women who have completed childbearing in Indonesia: does informed choice matter? *The European Journal of Contraception & Reproductive Health Care, 27*(1), 28-33. doi:10.1080/13625187.2021.2008347

Gebremichael, H., Haile, F., Dessie, A., Birhane, A., Alemayehu, M., & Yebyo, H. (2014). Acceptance of long acting contraceptive methods and associated factors among women in Mekelle city, Northern Ethiopia. *Sci J Public Health, 2*(4), 239-245.

Gebremichael, M. W., Fenta, S. M., Zeleke, L. B., & Muluneh, A. G. (2014). Utilization of long acting and permanent contraceptive methods and associated factors among women of reproductive age in East Gojjam zone, Northwest Ethiopia. *Science Journal of Public Health*, *2*(5), 349–355. https://doi.org/10.11648/j.sjph.20140205.17

Haider, M. M., Barkataki, S., Ahmed, A., Nahar, Q., & Rahman, M. (2019). Access and equity in family planning in Bangladesh: Current situation and future strategies. *Population Council Research Report*.

Liao, P. V., & Dollin, J. (2012). Half a century of the oral contraceptive pill: historical review and view to the future. *Canadian Family Physician, 58*(12), e757-e760.

M. Moinuddin Haider, Sharad Barkataki, Ali Ahmed, Quamrun Nahar, & Rahman, M. (2019). *Effective Access to Long-Acting Reversible Contraceptives and Permanent Methods in Bangladesh: An Analysis of Health Facility Survey Data*.Retrieved from USAID, Data for Impact, University of North Carolina at Chapel Hill & icddr,b.

Mizanur Rahman, M. Moinuddin Haider, & Curtis, S. (2020). *Potential interventions to improve the use of long-acting reversible contraceptives and permanent methods in Bangladesh*.

Mizanur Rahman, Moinuddin Haider, Ali Ahmed, & Barkataki, S. (2020). *The availability of and readiness for providing long-acting contraceptives and permanent methods in Bangladesh*.

National Institute of Population Research and Training, ICF International, & Mitra and Associates. (2008). *Bangladesh Demographic and Health Survey 2007*. Retrieved from Dhaka, Bangladesh, and Rockville, Maryland, USA.:

National Institute of Population Research and Training, ICF International, & Mitra and Associates. (2009). *Bangladesh Demographic and Health Survey 2007-2008*. Retrieved from Dhaka, Bangladesh, and Rockville, Maryland, USA.

National Institute of Population Research and Training, ICF International, & Mitra and Associates. (2012). *Bangladesh Demographic and Health Survey 2011*. Retrieved from Dhaka, Bangladesh, and Rockville, Maryland, USA.

National Institute of Population Research and Training, ICF International, & Mitra and Associates. (2015). *Bangladesh Demographic and Health Survey 2014*. Retrieved from Dhaka, Bangladesh, and Rockville, Maryland, USA.

National Institute of Population Research and Training and ICF International. (2020). *Bangladesh Demographic and Health Survey, 2017-2018*. Retrieved from Dhaka, Bangladesh, and Rockville, Maryland, USA:

National Institute of Population Research and Training; International Centre for Diarrhoeal Disease Research, B. a. M. E. (2017). *Bangladesh Maternal Mortality and Health Care Survey 2016: Preliminary Report*. Retrieved from

Penchansky, R., & Thomas, J. W. (1981). The concept of access: Definition and relationship to consumer satisfaction. *Medical Care*, *19*(2), 127–140. https://doi.org/10.1097/00005650-198102000-00001

Rahman, M., Haider, M. M., Curtis, S. L., & Lance, P. M. (2016). The Mayer Hashi large-scale program to increase use of long-acting reversible contraceptives and permanent methods in Bangladesh: explaining the disappointing results. An outcome and process evaluation. *Global Health: Science and Practice, 4*(Supplement 2), S122-S139.

Rahman, M., Haider, M. M., Ahmed, A., & Barkataki, S. (2020). Strengthening the public sector in family planning service delivery in Bangladesh. *Population Council Bangladesh Policy Brief*.

Stonehill, A., Bishu, S. G., & Taddese, H. B. (2020). Factors associated with long-acting and short-acting reversible contraceptive use in Ethiopia: an analysis of the 2016 Demographic and Health Survey. *The European Journal of Contraception & Reproductive Health Care, 25*(5), 350-358.

Stonehill, A., Bishu, S., & Taddese, H. B. (2020). Family planning utilization and influencing factors in LMICs: A systematic review. *Reproductive Health*, *17*(1), 150. https://doi.org/10.1186/s12978-020-00973-6

The World Bank. (2020). Population of Bangladesh Retrieved from https://data.worldbank.org/indicator/SP.POP.TOTL?locations=BD

United Nations Department for Economic Social Affairs. (2019a). Contraceptive Use by Method 2019: Data Booklet United Nations, Department of Economic and Social Affairs, Population Division.

United Nations Department for Economic Social Affairs. (2019b). *Family Planning and the 2030 Agenda for Sustainable Development (data Booklet)*: UN.

Vaaler, M. L., Kalanges, L. K., Fonseca, V. P., & Castrucci, B. C. (2012). Urban–rural differences in attitudes and practices toward long-acting reversible contraceptives among family planning providers in Texas. *Women's Health Issues, 22*(2), e157-e162.

World Health Organization. (2010). *Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies*. Geneva: WHO.