

Socioeconomic Factors Affecting the Pattern of Using Contraceptives among Multiparous Women in Bangladesh

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ARTICLE INFO	ABSTRACT
Article Type: Original article	Background & aim: Despite population policy of Bangladesh, promoting a two-child norm, many families have more than two children. The government provides free domiciliary contraceptive services and counseling to address myths about birth control. Therefore, this study aimed to identify socio-demographic factors influencing the pattern of using contraceptive among multiparous women in Bangladesh.
Article History: Received: 17-May-2024 Accepted: 13-Oct-2025	Methods: This cross-sectional study used data (n=10004) extracted from the Bangladesh Demographic and Health Survey (BDHS) between 24 October 2017 and 15 March 2018/2017-2018. Ever-married women with two or more children were selected using stratified, multistage cluster sampling design. Data was collected through interviews using the structured BDHS Women's Questionnaire. Chi-square tests were used for bivariate analysis, followed by binary logistic regression to identify factors influencing contraceptive decisions. Data analysis was conducted using SPSS version 25.
Key words: Family Planning Contraceptive Unwanted Pregnancy Logistic Regression Socio Economic Status	Results: This study determined socio-demographic factors including son preference, limited decision-making power, and insufficient knowledge about the ovulatory cycle influencing contraceptive use among Bangladeshi women with two or more children. Findings also showed that higher education of husbands reduced contraceptive use ($P<0.0001$), while women's education had no significant impact ($P=0.246$). Contraceptive use by women were found to be increased with their age and the women from Chittagong, Dhaka and Sylhet divisions showed a greater likelihood to use contraceptives than the others.
	Conclusion: The contraceptive prevalence rate (CPR) was higher among women with two or more children, with multiple sociodemographic factors influencing their contraceptive decisions. Addressing multiparous women, this study proposes a special intervention to increase contraceptive use in Bangladesh.

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Introduction

According to the World Population Data Sheet 2022, Bangladesh is the 10th most populated country in the world; it contains 171.2 million people and is expected to reach 203.9 million by 2050. Worldwide, contraceptives have been playing a significant role in reducing the total fertility rate (TFR), particularly in achieving a replacement fertility level of 2.0 during the last

half of the previous century (1). The relative outcome of family planning programs including planned pregnancy, reduced fertility, and a decreased population growth rate are frequently elevated with higher levels of education and subsequently higher wages at work, which helps increase income and reduce poverty (2). Furthermore, one study on the costs and benefits

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of population control and demographic information showed that family planning programs are the second-best option for global development (3). As a result, by reducing expenditures due to unintended pregnancy, maternal and child health difficulties in additional childbearing, investment in family planning can play an essential role in curtailing the costs of individuals and countries (4).

Assuming that two children per family is the best practice for ensuring proper nourishment of health and education, Bangladesh has implemented various interventions to promote family planning. Therefore, the main objective of Bangladesh population policy (2011) was set to achieve Total Fertility Rate (TFR) 2 to make it a prosperous and happy place. On behalf of the government, the Directorate General of Family Planning (DGFP) have been implementing their work plans to ensure sound maternal and child health by limiting children to two. However, the 7th Bangladesh Demographic and Health Survey (2017-2018) revealed that 40.04% of mothers have more than two children, violating the existing Population Policy of Bangladesh. Research has shown that 80.9% of mothers with two or more children use contraceptives. Although this percentage is better than the national average (62%), 19.1% of women with two or more children are still at risk of becoming pregnant because they do not use birth control methods. Furthermore, with the reduction in the prevalence of using contraceptives, unwanted pregnancy has increased even faster (5). According to previous studies, after two additional pregnancies, either intended or unintended, might put a low-income family in a multidimensional problems (6). This may lead to abortion, which carries a high risk to maternal health and incurs additional costs or result in an extra newborn who requires extra care to grow up.

Using modern contraceptives is one of the best ways to plan for each birth and subsequently reduce unwanted pregnancies (7). Moreover, in order to achieve desired TFR (2.0) within 2021 by reducing the difference between wanted and actual fertility rates, the last population policy of 2012 also suggested identifying and emphasizing the parents of one or two children to bring them under family planning services on a priority

basis. Although, the Bangladesh Demographic and Health Survey (BDHS)-2018 showed that the actual fertility rate was 2.3, the desired fertility rate was only 1.7. Furthermore, despite a small increase in national contraceptive prevalence rate (CPR), there is a notable gap in CPR among people with different demographic and socioeconomic statuses(8), which has been considered a well-studied phenomenon in the social sciences.

Different aspects of socioeconomic status, such as the education of the husband (9-10) and wife (11), wealth level (12-13), place of residents (14), exposure to media and family planning workers, religion (15), age of respondent (15), number of living children (16), expectation of male child (17-18) or a combination of children (boy and girl) (19) and employment status (20) have been identified as significant factors influencing contraceptive use among eligible married couples in Bangladesh (21). However, studies on this topic are lacking. One of the latest studies revealed that Bangladeshi women lack knowledge about the ovulatory cycle due to socioeconomic inequality, which can cause unintended pregnancy and increase the prevalence of unhealthy menstrual regulation (22).

In Bangladesh, a plethora of related research has been conducted to determine the effects of socioeconomic factors on contraceptive use, focusing on the reproductive age of 15-49 women. According to the population policy 2012, parents of one or two children should be prioritized to bring them under a family planning program. Despite this, no one has shown interest either in examining the family planning program participation patterns of families with two or more children or the factors affecting their contraception decisions. For this reason, it is important to know the pattern of using contraceptives by couples with more than two children. It is noteworthy that research can be conducted to mitigate this knowledge gap that will help policy leaders to have proper intervention to bring mothers of two or children under family planning program. Therefore, this study aimed to identify socio-demographic factors influencing the pattern of using contraceptive among multiparous women in Bangladesh.

Materials and Methods

The data were extracted from the Women's Questionnaire of the Bangladesh Demographic and Health Survey (BDHS) 2017–2018. The survey was conducted between 24 October 2017 and 15 March 2018 after a successful pre-test of August, 2017). The dataset that was published in 2020 and is available at www.dhsprogram.com. It is a nationally representative dataset designed to provide data on women's and children's demographic and health status that organized and carried out under the authority of the National Institute of Population Research and Training (NIPORT), Bangladesh. The survey focused on assisting policymakers and program managers by providing information to ease the monitoring and evaluation process of the 4th HPNSP (2017–2022). A total of 1311 questions were asked where 470 were women's questionnaires related to demographic, reproduction, contraception, pregnancy and childcare.

Bangladesh has eight administrative divisions, where each division is subdivided into districts and districts are composed of upazilas (Sub-districts). These upazilas are divided into urban and rural areas, with urban areas divided into 'wards' and 'mahallas', and rural areas into 'Union Parishad (UP)' and 'mauzas'. The sample households were selected by two-stage stratification. In the first stage, 675 EAs (Enumeration area) (250 from urban areas and 425 from rural areas) were selected with a probability proportional to the size of the EAs. In the second sampling stage, an average of 30 households were selected from each EA through a systematic sampling technique to ensure the inclusion of statistically reliable estimates of key demographic and health variables for the country. With this process, 20250 residential households were selected for the survey, and interviews were expected to be conducted with 20100 married women aged 15–49 years. A total of 210 field staff were recruited and trained for the main survey, while 62 staff were trained for household listing and mapping. Training covered questionnaire administration, biomarker procedures, and verbal autopsy, using lectures, mock interviews, and field practice. Training was supported by Mitra and Associates, ICF, NIPORT, DGHS, and icddr,b.

A total of 19,584 of the 20,160 households chosen were found to be occupied. Interviews were successfully conducted in 19,457 households with the response rate of 99%. All ever-married women between the ages of 15 and 49 who were regular members and who spent the night before the survey in the selected households were eligible to be questioned. A total of 20,127 ever-married women aged 15–49 were interviewed, yielding a response rate of 99%. Then, 10004 women with at least two children who were found currently fecund or non-pregnant and who were conjugating with their husbands were extracted from the dataset of BDHS: 2017–2018 which is the final dataset for this study. There were 27 missing values in different columns, and they were replaced by mode. Data selection process is shown in Figure 1.

The process of selecting reproductive women with two or more children was as follows (BDHS: 2017–2018): Multiple logistic regression analysis was performed, considering each woman as a unit of analysis. The dependent variable (contraceptive use) was examined against various socioeconomic and demographic factors, including administrative division, respondent's age, wealth index, religion, number of living children, education level, husband's education, knowledge of the ovulatory cycle, source of contraceptives, place of residence, occupation, and women's autonomy. Descriptive statistics were used to summarize participants' characteristics, and the Chi-square test was applied to assess bivariate associations between categorical variables. Variables that were statistically significant ($p < 0.05$) in the Chi-square -test were included in the multiple logistic regression model. The strength of association was measured using odds ratios (OR) with 95% confidence intervals (CI). Model reliability was evaluated using Pearson's and Hosmer–Lemeshow goodness-of-fit tests, as well as multicollinearity diagnostics (standard errors and variance inflation factor (VIF)). A VIF greater than 10 or a standard error above 2.0 was considered indicative of multicollinearity. Data analysis was conducted using SPSS (Statistical Package for the Social Sciences) version 25.

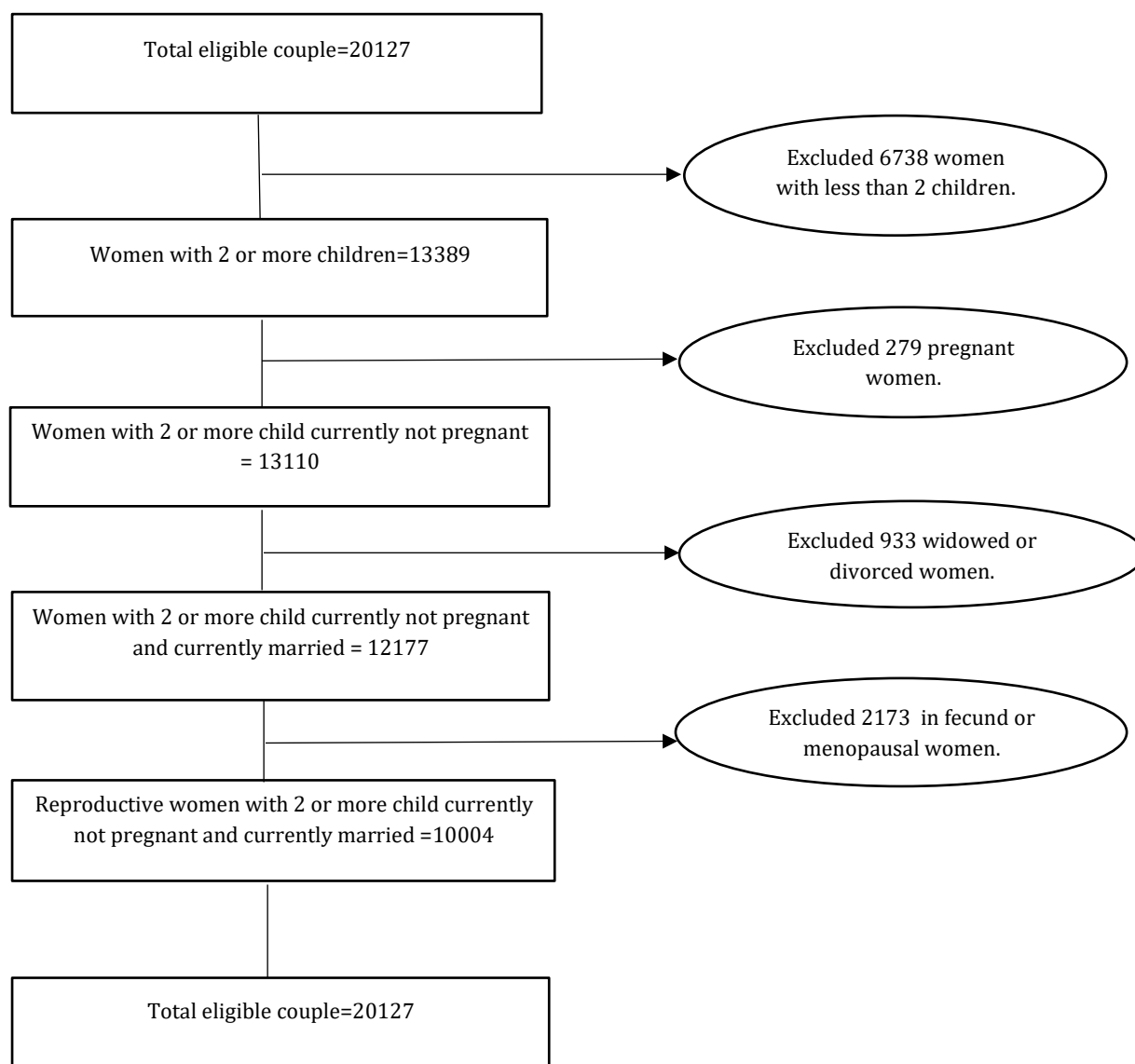


Figure 1. Process of sample selection flow chart

Results

Descriptive Statistics

The Bangladesh Demographic and Health Survey (2017–18) collected data from 20,127 eligible couples. Among these, 12,067 couples (59.96%) had 0–2 children, while 8,060 couples (40.04%) had more than two children (Table-1). The result suggests that beyond family size and education, knowledge and information regarding reproductive health and contraception play a vital role. Moreover, analysis revealed that the

contraceptive prevalence rate (CPR) for women with two or more children was 80.9%. (Table 2).

Table 1. Frequency of women according to their number of children (BDHS 2017-2018)

Number of children	Frequency of couples (%)
0-2	4912 (49.10)
3 and above	5092 (50.90)
Total	10004 (100.0)

Table 2. Frequency distribution of contraception used by families with two or more children: BDHS-2017-2018

Contraceptive Use	Frequency (%)
Not using	1910 (19.1)
Using	8094 (80.9)
Modern methods	6552 (65.5)
Short-term method	5387 (53.8)
Pill	3323 (33.2)
Male condom	875 (8.8)
Injectables	1183 (11.9)
Long acting	282 (2.8)
IUD	84 (0.8)
Implants/Norplant	198 (2)
Permanent	883 (8.8)
Male sterilization	168 (1.7)
Female sterilization	715 (7.1)
Traditional method	1542 (15.4)
Periodic abstinence	1147 (11.5)
Withdrawal	352 (3.5)
Other traditional	43 (0.4)
Total	10004 (100)

Table: Author

After cleaning the dataset, among the eight administrative divisions, women from the Chittagong division were found to be less likely to use contraceptives (71.1%), while women from the Rangpur division were more likely to use contraceptives (87%) during the survey. A greater incidence of contraception was found among women older than 30 years and women those belong to middle income levels. Although a significant number of respondents (47.8%) and

their husbands (42.5%) attended secondary school, only 36.09% of the participants had accurate knowledge of the ovulatory cycle. Surprisingly, over 75% women did not meet with family planning field workers for the last six months, and 34.6% did not know the sources of modern contraceptives. Respondents were distributed almost equally across all wealth levels. Similarly, Muslim (80%), rural (65.1%) and unemployed (48.2%) women and non-Muslim (88.4%), urban (34.9%) and employed (51.8%) women made the dataset comprehensive. In this study, how women contribute to decision making and its influence on using contraceptives were also included (Table-3).

The bivariate analysis revealed that all the selected independent variables were significantly related to the dependent variable, except for respondent's education ($P = 0.246$).

As background characteristics of the respondent, the model included sixteen independent variables (division, age, location, wealth level, education, number of living children, religion and knowledge of the ovulatory cycle, contraceptive sources, visited by FP workers, respondent occupation, decision about healthcare, and decision about visiting relatives). The complete model containing all predictor variables was statistically significant [χ^2 (29, $N=10004$) = 9.321, $P=0.316$], indicating that the model can distinguish between respondents who use and not use contraceptives.

Table 3. Bivariate analysis between socioeconomic and demographic characteristics of women having two or more children and contraceptives use (BDHS 2017-2018)

Characteristics	No. of Respondents N (%)	Current use of contraceptives N (%)	
		Not using	Using
Division ($P<0.0001$)			
Barisal	1070(10.7%)	206 (19.3%)	864 (80.7%)
Chittagong	1532(15.3%)	442 (28.9%)	1090 (71.1%)
Dhaka	1445(14.4%)	272 (18.8%)	1173 (81.2%)
Khulna	1220(12.2%)	188 (15.4%)	1032 (84.6%)
Mymensingh	1126(11.3%)	202 (17.9%)	924 (82.1%)
Rajshahi	1221(12.2%)	194 (15.9%)	1027 (84.1%)
Rangpur	1295(12.9%)	168 (13.0%)	1127 (87.0%)
Sylhet	1095(10.9%)	238 (21.7%)	857 (78.3%)
Age ($P=0.0001$)			
15-19	67 (0.67%)	20 (29.9%)	47 (70.1%)
20-24	953 (9.53%)	273 (28.6%)	680 (71.4%)
25-29	2052 (20.5%)	489 (23.8%)	1563 (76.2%)
30-34	2495 (24.9%)	481 (19.3%)	2014 (80.7%)
35-39	2146 (21.5%)	318 (14.8%)	1828 (85.2%)

Characteristics	No. of Respondents N (%)	Current use of contraceptives N (%)	
		Not using	Using
40-44	1450 (14.5%)	199 (13.7%)	1251 (86.3%)
45-49	841 (8.4%)	130 (15.5%)	711 (84.5%)
Place of residence (P<0.0001)			
Rural	6509 (65.1%)	1368 (21%)	5141 (79%)
Urban	3495 (34.9%)	542 (15.5%)	2953 (84.5%)
Wealth level (P=0.0001)			
Poorest	2055 (20.5%)	369 (18.0%)	1686 (82.0%)
Poorer	1981 (19.8%)	357 (18.0%)	1624 (82.0%)
Middle	1906 (19.1%)	304 (15.9%)	1602 (84.1%)
Richer	1979 (19.8%)	374 (18.9%)	1605 (81.1%)
Richest	2083 (20.8%)	506 (24.3%)	1577 (75.7%)
Number of sons (P=0.003)			
No son	2023 (20.2%)	436 (21.6%)	1587 (78.4%)
Having one son	4609 (46.1%)	875 (19.0%)	3734 (81.0%)
Having two sons	2644 (26.4%)	463 (17.5%)	2181 (82.5%)
Having three sons	575 (5.75%)	111 (19.3%)	464 (80.7%)
Having four sons and above	153 (1.3%)	25 (19.0%)	128 (81%)
Number of daughters (P=0.010)			
No daughter	2868 (28.7%)	514 (17.9%)	2354 (82.1%)
Having one daughter	4377 (43.8%)	818 (18.7%)	3559 (81.3%)
Having two daughters	2152 (21.5%)	441 (20.5%)	1710 (79.5%)
Having three daughters	490 (4.9%)	110 (22.4%)	380 (77.6%)
Having four daughters and above	107 (0.89%)	27 (21.4%)	80 (78.6%)
No of Living children (P=0.001)			
Having 2 children	4912 (49.10%)	1029 (20.9%)	3883 (79.1%)
Having 3 or more children	5092 (50.90%)	881 (17.35%)	4211 (82.55%)
Respondent education (P=0.246) (Insignificant)			
No education	1624 (16.2%)	318 (19.6%)	1306 (80.4%)
Primary	3598 (36.0%)	656 (18.2%)	2942 (81.8%)
Secondary	3813 (38.1%)	738 (19.4%)	3075 (80.6%)
Higher	969 (9.7%)	198 (20.4%)	771 (79.6%)
Husband's education (P<0.0001)			
No education	2459 (24.6%)	371 (15.1%)	2088 (84.9%)
Primary	3298 (33%)	629 (19.1%)	2669 (80.9%)
Secondary	2748 (27.5%)	646 (23.5%)	2102 (76.5%)
Higher	1499 (15%)	264 (17.6%)	1235 (82.4%)
Religion (P<0.0001)			
Muslim	9010 (90.1%)	1795 (19.9%)	7215 (80.1%)
Non-Muslim	994 (9.9%)	115 (11.6%)	879 (88.4%)
Knowledge of the ovulatory cycle (P<0.0001)			
Correct knowledge	3610 (36.09%)	614 (17%)	2996 (83%)
Incorrect knowledge	6394 (63.91%)	1296 (20.3%)	5098 (79.7%)
Knowledge about the source of contraceptives (P<0.0001)			
Don't know	3470 (34.57%)	701 (20.2%)	2769 (79.8%)
Government source	3081 (30.8%)	546 (17.7%)	2535 (82.3%)
Private source	3453 (34.5%)	663 (19.2%)	2790 (80.8%)
Exposure to Family planning workers (P<0.0001)			
No	7579 (75.8%)	1622 (21.3%)	5957 (78.7%)
Yes	2425 (24.2%)	307 (12.3%)	2118 (87.7%)
Respondent's employment status (P<0.0001)			
Not employed	4819 (48.2%)	1013 (21%)	3806 (79%)
Employed	5185 (51.8%)	897 (17.3%)	4288 (82.7%)
The decision about respondent healthcare (P<0.0001)			

Characteristics	No. of Respondents N (%)	Current use of contraceptives N (%)	
		Not using	Using
Wife and husband both	6971 (69.7%)	1194 (17.1%)	5777 (82.9%)
Wife alone	1057 (10.6%)	367 (34.7%)	690 (65.3%)
Husband alone	1759 (17.6%)	269 (15.3%)	1490 (84.7%)
Someone else	192 (01.9%)	70 (36.5%)	122 (63.5%)
Other	25 (0.2%)	10 (40.0%)	15 (60.0%)
The decision about the visit to relatives (P<0.0001)			
Wife and husband both	7127 (71.2%)	1192 (16.7%)	5935 (83.3%)
Wife alone	906 (09.1%)	308 (34.1%)	598 (65.9%)
Husband alone	1688 (16.90%)	299 (17.7%)	1389 (82.3%)
Someone else	254 (2.55%)	100 (39.4%)	154 (60.6%)
Other	29 (0.29%)	11 (37.9%)	18 (62.1%)

A stepwise binary logistic regression (backwards) was performed then to assess the impact of socioeconomic and demographic factors on the likelihood of women with two or

more children using contraceptives in Bangladesh and 10 independent variables were found significant to form regression model (Table 4).

Table 4. Logistic regression model for contraceptive use

	Not using N (%)	Using N (%)	P-Value	Exp(B)	95% CI for Exp(B)	
					Lower	Upper
Division			<.0001			
Barisal*	206 (19.3%)	864 (80.7%)	1			
Chittagong	442 (28.9%)	1090 (71.1%)	<.0001	0.567	0.465	0.691
Dhaka	272 (18.8%)	1173 (81.2%)	0.553	0.938	0.758	1.160
Khulna	188 (15.4%)	1032 (84.6%)	0.131	1.191	0.950	1.493
Mymensingh	202 (17.9%)	924 (82.1%)	0.972	1.004	0.802	1.257
Rajshahi	194 (15.9%)	1027 (84.1%)	0.075	1.229	0.980	1.541
Rangpur	168 (13%)	1127 (87%)	0.003	1.423	1.129	1.794
Sylhet	238 (21.7%)	857 (78.3%)	0.012	0.752	0.603	.938
Place of residence			<.0001			
Rural*	1368 (21%)	5141 (79%)	1			
Urban	542 (15.5%)	2953 (84.5%)	<.0001	1.492	1.326	1.679
Religion			<.0001			
Muslim*	1795 (19.9%)	7215 (80.1%)	1			
Non-Muslim	115 (11.6%)	879 (88.4%)	<.0001	1.810	1.469	2.232
Wealth level			<.0001			
Poorest*	369 (18%)	1686 (82%)	1			
Poorer	357 (18%)	1624 (82%)	0.524	0.947	0.800	1.120
Middle	304 (15.9%)	1602 (84.1%)	0.110	1.153	0.968	1.373
Richer	374 (18.9%)	1605 (81.1%)	0.716	0.969	0.819	1.147
Richest	506 (24.3%)	1577 (75.7%)	0.001	0.747	0.633	.881
No of sons			0.002	1.103	1.038	1.172
Knowledge of ovulatory cycle			<.0001			
Don't know*	1296 (20.3%)	5098 (79.7%)	1			
Know	614 (17%)	2996 (83%)	<.0001	1.240	1.108	1.387
Husband educational level			<.0001			
No education*	318 (19.6%)	1306 (80.4)	1			
Primary	656 (18.2%)	2942 (81.8%)	0.007	0.815	0.703	.944
Secondary	738 (19.4%)	3075 (80.6%)	<.0001	0.616	0.530	.716
Higher	198 (20.4%)	771 (79.6%)	0.004	0.761	0.633	.915
Decision about healthcare			<.0001			
Respondent and husband jointly*	1194 (17.1%)	5777 (82.9%)	1			

	Not using N (%)	Using N (%)	P-Value	Exp(B)	95% CI for Exp(B)	
					Lower	Upper
Respondent alone	367 (34.7%)	690 (65.3%)	<.0001	0.511	0.433	.605
Husband alone	269 (15.3%)	1490 (84.7%)	0.000	1.340	1.141	1.574
Someone else	70 (36.5%)	122 (63.5%)	0.087	0.716	0.489	1.050
Others	10 (40%)	15 (60%)	0.509	0.703	0.247	2.001
The decision on visit to the relatives			<.0001			
Respondent and husband jointly*	1192 (16.7%)	5935 (83.3%)	1			
Respondent alone	308 (34.1%)	598 (65.9%)	<.0001	0.524	0.437	.627
Husband alone	299 (17.7%)	1389 (82.3%)	0.380	0.932	0.797	1.090
Someone else	100 (39.4%)	154 (60.6%)	<.0001	0.531	0.381	.740
Others	11 (37.9%)	18 (62.1%)	0.235	0.562	0.217	1.456
Age (Years)			<.0001			
15-19*	20 (29.9%)	47 (70.1%)	1			
20-24	273 (28.6%)	680 (71.4%)	0.874	0.955	0.538	1.694
25-29	489 (23.8%)	1563 (76.2%)	0.719	1.109	0.630	1.954
30-34	481 (19.3%)	2014 (80.7%)	0.236	1.409	0.799	2.484
35-39	318 (14.8%)	1828 (85.2%)	0.035	1.851	1.045	3.278
40-44	199 (13.7%)	1251 (86.3%)	0.021	1.980	1.110	3.533
45-49	130 (15.5%)	711 (84.5%)	0.058	1.770	0.981	3.195
Occupation						
Not employed*	1013 (21%)	3806 (79%)	1			
Employed	897 (17.3%)	4288 (82.7%)	<.0001	1.216	1.090	1.357
Constant			<.0001	3.143		

*Reference category

The women in Chittagong, Dhaka and Sylhet were 0.567, 0.938 and 0.752 times respectively less likely to use contraceptives than those were in the Barisal division while the women in Khulna, Mymensingh, Rangpur and Rajshahi were 1.191, 1.004 and 1.229 times more likely to use contraceptives respectively than women in the Barisal division were.

The respondent's age was found to influence the use of contraceptives, and the use of contraceptives was more likely to increase with the age of the woman. Compared to women older than 30 years, mothers with two or more children younger than 30 years of age used fewer contraceptives. Urban women were found to be 1.492 times more likely to use contraceptives than their rural counterparts were. In terms of wealth, women in the middle wealth category were found to be 1.153 times more likely to use contraceptives than women in the poorest category were. Women in the poorer, richer, and richest categories were 0.947, 0.969 and 0.747 times respectively less likely to use contraceptives than women in the poorest category were.

The education of the respondent's husband was negatively associated with the use of

contraception, whereas the number of male children, knowledge of the ovulatory cycle, and employment status were positively related to the use of contraceptives. The likelihood of using contraceptives increased among women who were dependent on their husbands for their health care decisions, but those couples whose wives visited their relative's house were more likely to use contraceptives than were those whose husbands or wives were deciding on contraceptives alone. Non-Muslim women were found significantly 1.810 times more inclined to use contraceptives than Muslim women.

Discussion

The aim of this study was to identify the socioeconomic factors affecting the use of contraceptives among multiparous women of reproductive ages. Study reveals a significant number of mothers are not using modern contraceptives which put them in a danger of unintended pregnancy. Previously, lack of knowledge about ovulatory cycle, side effects of modern methods, infertility fears, and disapproval from partners were identified as the most crucial factors in adopting traditional practices of contraceptives (23). Among the traditional techniques, women were more likely

to use periodic abstinence (11.5%) followed by withdrawal (3.5%). Furthermore, the use of traditional contraceptive methods such as periodic abstinence was significantly related to the knowledge of ovulatory cycle (24). Unfortunately, this study revealed that the respondents' knowledge of the ovulatory cycle was very poor; only 36.1% of the respondents had appropriate knowledge of the ovulatory cycle, and they were found to be less likely to use modern contraceptives. So those women who are unaware of their infertile days in a regular cycle and do not use birth control methods face a high risk of unintended pregnancy.

On the other hand, among the modern methods, oral contraceptive use was the most widely used method, followed by the injectable contraceptives. Only 11.6% of women were identified as using long-acting (implant or IUD, 2.8%) or permanent methods (male or female sterilization, 8.8%) whereas these methods are more suitable for women with two or more children especially those are not aware of menstrual cycle. A study in another Muslim country, Indonesia, showed that women with two or more children were more likely to use long-acting and permanent methods (25), which emphasizes the significance and suitability of these methods.

From the bivariate analysis, respondent's education was found insignificant. Moreover, this study found there are five independent variables—exposure to family planning workers, husband employment, source of contraceptives, number of living children and number of daughters but were found insignificant in the regression model. This might be because these variables are less likely to influence contraceptive use by the women with two or more children. In contrast, other studies found these variables have influence on contraception decision for all the women of reproductive age (15-49) years regardless of their number of children (9), (11), (17-18).

With the increase in total number of children living above two, this study found the trend of using contraceptive increased. These findings are consistent with those of various studies showing that women with (3-4) children are more likely to use contraceptives than women without children (16). According to this study, women

under thirty years of age with at least two children are less likely to use birth control methods, which supports the findings of a previous study that young women are less likely to use contraception (15). This indicates that women who become mothers of at least two children at a young age are at risk of another pregnancy that might be either intentional or unintentional, which would be the deviation of population policy.

In this study, employed women were also found to use more contraceptive than their unemployed counterparts did which is similar and consistent with the findings (20). Husband-only decision-making about women's health care increased the likelihood of using contraceptives whereas joint decisions of both husbands and wives regarding women's visits to their relative's house increased the possibility of using contraceptives. Another study suggested that gender equality may improve women's autonomy and uptake of contraceptives through increased participation in decision-making (26). It reveals that women are either reluctant to take care of their own health or they have no such autonomy to make their decisions regarding contraception.

Furthermore, this study revealed that women with educated husbands had a lower likelihood of using birth control method and women's education was found to be less effective in making decisions regarding family planning for mothers with two or more children. Therefore, several factors affect reproductive behaviors in certain settings, but their relative importance is unknown. This finding contradict with other study where authors found education boosts women's access to new information or their willingness to use modern birth control methods (27).

In addition, this study demonstrated that women with at least two children inhabiting to Khulna, Rajshahi and Rangpur divisions were more likely to use contraceptives than their counterparts in the Barisal, Chittagong, Dhaka, Mymensingh, and Sylhet divisions. These findings also aligned with others, explaining that due to the geographical location, availability of health facilities and contraceptives, education level of respondents (28), transport facilities and physical structure of the area (29), sociocultural

beliefs and traditional family practices(30), the use of contraceptives has been found to change. Another finding of using more contraceptives by urban women is similar to that of previous studies, which reported that women from rural areas are less likely to use contraceptives than their urban counterparts (31), possibly due to the availability of health facilities as well as contraceptives in urban areas.

The role of religion in this study is very similar to that of other research. Compared to women of other religions, Muslim women are less knowledgeable about contraception and have less intent to use contraceptives, which leads them to have more children (32-33). This difference may be due to Muslim women having less access to education, although they belong to more well-off families than low-income families with other religions (32). Male domination or male dependency were found significant on the use of contraceptives for the women with more than two children. The respondents those who have two daughters were found less inclined to use contraceptives and those women depends on their husband to make their household decisions were found reluctant to use birth control methods which is the social and cultural phenomenon in the south-Asian countries (15).

This research also revealed that women with two or more children and belong to middle wealth level were more likely to use contraceptives than women with lower and higher wealth levels. On the other hand, a study conducted in Bangladesh revealed that women from the lower wealth quintile and illiterate individuals had greater fertility than did those from the higher wealth quintile with higher education (34). Although women from higher wealth levels used fewer contraceptives, their families were not found to be larger. In contrast, women from the lower wealth quintile were found to use fewer contraceptives, simultaneously with larger families. This can be explained by a study conducted by a group of researchers (7), which showed that the number of abortions in the highest wealth quintile was three times greater than that in the lowest wealth quintile and that abortion history was positively correlated with wealth. The standard errors for the regression coefficient and VIF for the independent variables in this research were

below 1 and 10 and the highest values of standard error and VIF were 0.849 and 1.285 respectively, indicating the 'no multicollinearity' problem.

This study identifies critical factors influencing contraceptive use among women with multiple children, where lack of knowledge about the ovulatory cycle, lack of household decision making ability, and son preference were found unique than other studies. Another surprising finding of this study was that education had no effect on contraceptive use among the target group. This study's internal validity may be compromised by the exclusion of mothers under two, pregnant, widowed, or infected, potentially due to selection bias. Socioeconomic variables were chosen based on previous literature, potentially causing confounding bias. Although this study used nationally representative data, the findings cannot be generalized to all women of reproductive age in Bangladesh. The study suggests future research to include variables like media exposure, intention of last pregnancy, and desire for more children in program participation patterns for women with multiple children. The study revealed that traditional methods involve a large number of participants, while long acting and permanent methods have a smaller number. Further research is needed to understand these factors.

This research recommended implementing a targeted motivational program to encourage the use of long-acting contraceptive methods over short-acting ones immediately after having two or more desired children. Information regarding ovulatory cycles should be widely disseminated through behavior change communication (BCC) at the community level, without considering the couple's education level. In this regard, health care providers can play a great role. This research also suggested that couples should be segregated based on their socioeconomic status or number of living children to emphasize those with lower socioeconomic status. For this reason, this study recommends a national survey to classify eligible couples based on their socioeconomic status.

Conclusion

This study concludes that the family planning program participation pattern of women with

two or more children varies with socioeconomic status. This study revealed that the use of contraceptives may vary due to administrative division, age, place of residence, wealth level, number of living children, husband's education, religion, lack of knowledge about the source of contraceptives and ovulation cycle, employment status and household decision-making ability. Consequently, a sizable portion of women who have had two or more children are more likely to become pregnant again, which could increase the family's risk of both financial hardship and poor mother and child health. Therefore, to increase the uptake of contraceptives among multiparous women, intervention should be taken based on the factors revealed through this study. Further study should be conducted in qualitative approach to explore individual level factors of not using contraceptives among multiparous women.

Declarations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

DHS authority received an ethical certificate from the government before collecting data and they took consent from the participant along with their legal guardians. The survey followed international ethical principles governing confidentiality, anonymity, and informed consent.

It is notable that BDHS 2017–2018 dataset is freely available online with all identifier information removed. Every independent researcher is permitted to use this dataset for their study; therefore, no ethical approval is

required. Because this study relied on secondary analysis of publicly available data collected retrospectively, no additional ethical review was necessary.

Code of ethics

The BDHS 2017–2018 received ethical clearance from ICF's International Institutional Review Board (FWA00000845) and Bangladesh's Medical Research Council (BMRC/NREC/2016-2019/324).

Use of artificial intelligence (AI)

The authors did not use any AI tool in this study.

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Authors' contribution

MSU, KCh, MD and NU contributed substantially to the conception and design of the study. KCh downloaded datasets from the DHS website, extracted initial datasets and developed a conceptual framework for this study. Data cleaning, pre-processing, analysis and interpretation of data were done by Mohammad Safi Uddin. Md. NU made the literature review and reviewed the manuscript critically for important intellectual content. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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