ORIGINAL ARTICLE

Predictors of Modern Contraceptive Use among Married Women in Pakistan, India and Bangladesh

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ABSTRACT

Background: Pakistan, Bangladesh, and India are all facing challenges related to large, growing populations with low levels of contraception. While, Bangladesh has the highest CPR (62%), close to the world's CPR of 64%, India stands at 58%, followed by the lowest for Pakistan at 35%.

Objective: To analyze the differences in the socio-economic determinants of modern contraception use in Pakistan, India, and Bangladesh.

Methods: This study uses data from the latest rounds of Demographic and Health Surveys for Pakistan (2017-2018), Bangladesh (2017-2018), and India (2015-16) to examine the socioeconomic determinants of traditional, modern, and the most popular method of contraception among married women across the three countries by employing logistic regressions. The sample consists of currently married and fecund women only (Bangladesh=10,738; India=224,070; Pakistan=4,255).

Results: In Bangladesh, Oral contraception Pills (OCPs) are the most popular method of contraception (44%), followed by the use of other modern contraception(38%) and traditional contraception(18%). In India, 60% of women using contraception, reported using female sterilization, 27% uses other forms of modern contraception, and 13% reported using traditional methods. For Pakistan, 29% of the women reported using condoms as a source of contraception, 43% of women reporting using other modern methods, and 29% of women reported using traditional methods of contraception. Logistic regressions in Bangladesh and Pakistan show that female educational attainment level is positively associated with the use of modern methods and the country's most popular method of contraception but negatively associated with female sterilization, the most popular contraception method in India. Additionally, the socioeconomic status of the household is positively associated with the use of the most popular method of contraception in Pakistan but negatively associated with other modern methods. Contraception decision making if done by women in Bangladesh is positively associated with the use of both the most popular methods as well as modern methods of contraception. In India, the household's socioeconomic status and women's age are positively associated with the use of modern contraception.

Conclusion: For these countries to lower the population growth rate, achieve replacement-level fertility, and increase the use of modern contraception, they need to focus on relevant determinants that would help them achieve the desired results.

Keywords: *Contraception, demographic and health survey, Pakistan, India, Bangladesh.*

INTRODUCTION

India, Pakistan, and Bangladesh are the most populous countries in South Asia and are among the world's ten most populous countries. They account for over 1.7 billion people, comprising over 22% of the total global population [1]. They also share a similar history, cultural and traditional values, and norms. Before the partition of India in 1947, these countries were a single unified country that was colonized by the British Empire. After the partition of India in 1947, Pakistan and Bangladesh remained the same country, known by the name of Pakistan, with Bangladesh finally becoming an independent country in 1971.

Despite the common history and culture shared by these countries, the most popular method of contraception varies among all three countries. In India, female sterilization is the most popular, with 60% of women reporting sterilization [2] as the current method of contraception. In Pakistan, it is male condoms (29%), followed by withdrawal (24%) [3]. Lastly, in Bangladesh oral contraceptives (44%) [4] remain the most popular choice of contraception.

The popularity of female sterilization in India has a long history. In the 1970s, the Indian government began promoting female sterilization and in 1976, a national population policy made it mandatory for states to pass compulsory sterilization laws, and some central government funding was dependent upon the states meeting family planning targets [5]. While the official targets of family planning for states were removed in 1996, states are reportedly still carrying out efforts to meet those targets [6, 7]. In some cases, physicians report being pressured to meet targets while some states (*e.g.* Andhra Pradesh) offer incentives to government employees if they undergo

sterilization. In other cases, the lack of accessibility to other types of modern contraception leaves women without other choices but sterilization [8]. Apart from female sterilization, traditional methods like withdrawal, rhythm, breastfeeding, *etc.* remain a popular choice of contraception in India even though they have high failure rates [9]. Overall, the contraception prevalence rate for India has been reported as 54% by India National Family Health Survey 2015-16 [2].

Pakistan has the lowest contraceptive use prevalence in the South Asian region [10], and the highest proportion of discontinuation of use. This may be due to fears of the side effects of modern contraceptives, especially intrauterine devices (IUDs), condoms, and pills [11] as well as intra-family dynamics where husbands and mothers-in-law play a crucial role in contraception-related decision-making [10]. Side effects were cited as a major reason for discontinuation of contraceptive use in limiters (*i.e.* couples who no longer want to have any more children) and the second-largest reason for spacers (*i.e.* couples who would like to have more children but after a few year(s) [12]. One study [11] argued that to increase the uptake of modern contraception there is a need to train family planning providers regarding not only the use of contraception but also how to overcome concerns about side effects.

In Pakistan, according to the Pakistan Demographic and Health Survey (PDHS) 2017-18, overall contraception usage has been reported as low as 35% [3]. Condoms remain the most popular method of contraception due to strong and continuous social marketing campaigns [13]. Various studies have repeatedly reported dissatisfaction amongst contraceptive users due to the side effects of modern contraception [14-16], and condom use solves the problem of side effects as well as issues of affordability and accessibility. Condoms are relatively inexpensive and easier to use compared to other methods.

In Bangladesh, the contraceptive prevalence rate (CPR), according to the Bangladesh Demographic and Health Survey (BDHS) of 2017-18 is 62% [4]. Family planning in Bangladesh is seen as a case study of success, as the country saw a remarkable increase in the contraception prevalence rate from 8% in 1975 to 62% in 2014 [17]. Oral Contraception Pills (OCPs) are the most popular method of contraception used in Bangladesh. In 1975, a family planning program was initiated by Population Services International. The program aimed to increase contraception use in the country to reduce fertility and maternal mortality levels. Under this program, there was an emphasis on increasing the accessibility of OCPs by making them widely available at retail outlets, with the government providing free pills. Additionally, face-to-face and/or door-to-door campaigns played a crucial role in increasing the use of OCPs [18].

While the countries share a long history, each country's journey of fertility transition has been different and

distinct in terms of duration, the policies adopted by the government, and the effectiveness of those policies. This study aims to examine the three countries concurrently, and their similarities and differences today in terms of their contraceptive use. Prior studies [11, 19-23] have investigated contraception use separately for each of the three countries, but no other study has done a comparative analysis to analyze the determinants responsible for the differences in preferences for contraception use. This study establishes how similar levels of socio-economic determinants such as female literacy and socioeconomic status might result in different methods of contraception in countries sharing similar regions, history, and traditional and cultural practices. This study builds an understanding of how the socio-economic determinants of the contraception use vary between countries and within countries. This comparative analysis of contraception use between three neighboring South Asian countries can help serve as a guiding point for policymakers to develop effective policies for improving contraception usage in their own countries. Similarly, lessons can be learned from the experiences of neighboring countries.

MATERIALS AND METHODS

This study uses the latest rounds of Demographic and Health Surveys for each of the three countries; Bangladesh (2017-2018), India (2016-2017), and Pakistan (2017-2018). These data are publicly available and can be accessed after submitting the intended purpose of the study at dhsprogram.com. The Demographic and Health Survey is a nationally representative two-stage stratified cluster sample of ever-married women and men between the ages of 15-49 in all countries in which it is administered. To correct the non-proportional sample allocation in regions and between urban and rural areas, we use the sampling weights provided in the DHS data for all three countries [2-4].

For Pakistan and Bangladesh, the survey was conducted only with the ever-married women in the reproductive age group (15-49 years), whereas in India, the survey included married and never-married women. For the sake of consistency in all three countries, the sample was restricted to only currently married, fecund women aged 15-49 who reported using any method of contraception; removing from the sample women who were divorced, widowed, separated, and the women who were not at the risk of getting pregnant (*i.e.* those who were already pregnant, postpartum amenorrhoeic, infecund or had already reached menopause). Any other women who, after fulfilling all these sample restrictions, still reported as not currently having sex were also removed from the sample. The overall sample consists of 20,127, 15,040, and 724,115 women for Bangladesh, Pakistan, and India. After applying our inclusion criteria for the study and implementing listwise deletion for missing data, our sample for the study included 10,738, 4,255, and 224,070 women for Bangladesh, Pakistan, and India,

We created two binary dependent variables reflecting the choice/type of contraception method. The first dependent variable, "Type of contraception", consists of two categories:

1. Women using modern contraception (oral contraceptives, intrauterine devices, injections, male condoms, female and male sterilization, implants, and emergency contraception) and;
2. Women using traditional contraception (withdrawal, periodic abstinence, rhythm/standard days, and lactational amenorrhea).

The second dependent variable, "Popular contraception" is comprised of:

1. Women using the most popular method of contraception in the country (condoms in Pakistan, oral contraceptives in Bangladesh, and female sterilization in India)
2. Women using traditional contraception.

The primary independent variable of interest is female education, a categorical variable that consists of four categories ranging from no education to primary, secondary, and higher education. We also control for other variables such as wealth status (sorted into quintiles), women's age (three age groups, 15-24, 25-34, and 35-49), husband's education (categorical variable consisting of no education, primary, secondary or higher level of education), decision making regarding contraception (wife solely decides, husband solely decides or is it a joint decision), region (consisting of various provinces and/or cumulation of states as in the case of India) and area of residence (rural or urban).

Based upon the binary nature of our dependent variables, weighted logistic regression models were used to predict the relationship between socio-economic variables and the choice of contraception method. All the data analysis were conducted using the statistical software of STATA version 17. The statistical significance of independent variables in both the bivariate and the multivariable models was considered at p-value < 0.05. For ease of interpretation, our tables present adjusted odds ratios after controlling for the household's wealth status, women's age, husband's educational attainment, decision-making regarding contraception, region, and area of residence. For each country, two sets of regression models are shown. The first regression models use Modern Contraception as the dependent variable. While the second regression models use Popular Contraception as the dependent variable. [3].

RESULTS

Table **1** presents the socio-demographic characteristics of the analytic sample. India's sample consists of 224,070 observations, Bangladesh has 10,738 observations and Pakistan has 4,255 observations, all of the married women.

Table 1: Sample Characteristics.

Variables	Bangladesh n(%)	India n(%)	Pakistan n(%)
Wife's Education			
No education	1,500 (14.0)	76,326 (34.1)	1,725 (40.5)
Primary	3,422 (31.9)	34,679 (15.5)	663 (15.6)
Secondary	4,240 (39.4)	94,063 (42.0)	1,052 (24.7)
Higher	1,576 (14.7)	19,002 (8.5)	815 (19.2)
Wealth Status			
Poorest	2,093 (19.5)	36,163 (16.1)	437 (10.3)
Poorer	2,046 (19.1)	46,303 (20.7)	759 (17.8)
Middle	2,001 (18.6)	47,357 (21.1)	907 (21.3)
Richer	2,196 (20.5)	46,028 (20.5)	950 (22.3)
Richest	2,402 (22.4)	48,219 (21.5)	1,202 (28.2)
Age			
15-24	2,641 (24.6)	20,421 (9.1)	404 (9.5)
25-34	4,170 (38.8)	92,217 (41.2)	1,751 (41.2)
35-49	3,927 (36.6)	111,432 (49.7)	2,100 (49.4)
Husband Education			
No education	2,304 (21.5)	6,876 (17.2)	916 (21.5)
Primary	3,385 (31.5)	6,276 (15.7)	574 (13.5)
Secondary	3,026 (28.2)	21,578 (54.0)	1542 (36.2)
Higher	2,023 (18.8)	5,234 (13.1)	1223 (28.7)
Contraception Decision			
Wife only	1,621 (15.1)	18,046 (8.1)	256 (6.0)
Husband only	725 (6.8)	18,453 (8.2)	256 (6.0)
Joint decision	8,392 (78.2)	187,571 (83.7)	3743 (88.0)
Area of Residence			
Urban	4,165 (38.8)	67,256 (30.0)	2,425 (57.0)
Rural	6,573 (61.2)	156,814 (70.0)	1,830 (43.0)
Observations	10,738	224,070	4,255

Bangladesh Results

Table **2** presents the odds ratios from the logistic regression models predicting the type of contraception method being used in Bangladesh. Model 1 uses Modern Contraception as the dependent variable while Model 2 uses Popular Contraception as the dependent variable. 44% of Bangladeshi women reported using Oral Contraception Pills (OCPs), which is the most popular method of contraception, 38% of the women reported using other modern forms of contraception and 18% of the women reported using a traditional form of contraception.

The results show that women's education level has a positive relationship with modern contraception use. Model 1 shows that, as compared to females with no education, females with primary education are 18% more likely to use modern as compared to traditional contraception, those with secondary education are 41% more likely and those with higher education are 40% more likely. Age has a negative correlation with the use of modern contraception. As compared to younger women (age 15-24 years), women aged 25-34 years are 21% less likely, and women aged 35-49 years are 73% less likely to use modern contraception than traditional contraception. The husband's level of education only becomes significant when the husband

Table 2: Logistic regressions comparing modern and popular contraception to traditional methods in Bangladesh (2017-18).

Study Variables	Modern Contraception (1)			Popular-Oral Contraception Pills (2)		
	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Wife's Education						
No education	Reference category			Reference category		
Primary	1.18	1.01 -1.37	*0.041	1.28	1.07 - 1.52	**0.007
Secondary	1.41	1.18 - 1.69	**<0.001	1.62	1.32 - 1.97	**<0.001
Higher	1.40	1.08 - 1.81	**0.010	1.34	1.02 - 1.77	*0.037
Wealth Status						
Poorest	Reference category			Reference category		
Poorer	0.83	0.70 - 0.98	0.027	0.87	0.72 - 1.05	0.143
Middle	0.96	0.80 - 1.15	0.632	1.06	0.87 - 1.29	0.557
Richer	0.87	0.73 - 1.04	0.129	1.00	0.82 - 1.22	0.998
Richest	0.86	0.70 - 1.06	0.148	0.81	0.64 - 1.01	0.058
Age						
15-24 years	Reference category			Reference category		
25-34 years	0.79	0.68 - 0.945	**0.006	0.70	0.59 - 0.83	**<0.001
35-49 years	0.27	0.23 - 0.31	**<0.001	0.20	0.17 - 0.24	**<0.001
Husband Education						
No education	Reference category			Reference category		
Primary	0.97	0.84 - 1.13	0.705	1.10	0.93 - 1.30	0.267
Secondary	0.91	0.77 - 1.08	0.270	1.08	0.89 - 1.30	0.426
Higher	0.62	0.50 to 0.78	**<0.001	0.68	0.53 to 0.86	**0.002
Contraception Decision						
Wife Only	Reference category			Reference category		
Husband only	0.70	0.56 - 0.90	**0.004	0.33	0.25 - 0.44	**<0.001
Joint decision	0.78	0.68 - 0.91	**0.001	0.63	0.53 - 0.74	**<0.001
Type of Residence						
Urban	Reference category			Reference category		
Rural	0.97	0.86 - 1.09	0.583	1.09	0.95 - 1.25	0.215
Constant	11.89	9.12 - 15.51	**<0.001	6.67	4.94 - 8.99	**<0.001
Observations	10,738			6,613		

Source: Bangladeshi Demographic Health Survey (2017-2018). Weighted Results.
*Statistically significant at p<0.05, **Statistically significant at p<0.01

Table 3: Logistic regressions comparing modern and popular contraception to traditional methods, excluding husband's education, in India (2015-2016).

Study Variables	Modern Contraception (1)			Popular- Female Sterilization (2)		
	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Wife's Education						
No education	Reference category			Reference category		
Primary	1.04	1.00 - 1.09	*0.033	1.02	0.98 - 1.07	0.268
Secondary	0.79	0.76 - 0.82	**<0.001	0.67	0.64 - 0.69	**<0.001
Higher	0.56	0.53 - 0.59	**<0.001	0.3	0.28 - 0.31	**<0.001
Wealth Status						
Poorest	Reference category			Reference category		
Poorer	1.12	1.07 - 1.16	**<0.001	1.05	1.01 - 1.1	*0.021
Middle	1.36	1.30 - 1.42	**<0.001	1.33	1.28 - 1.39	**<0.001
Richer	1.52	1.46 - 1.59	**<0.001	1.46	1.39 - 1.53	**<0.001
Richest	1.67	1.59 - 1.76	**<0.001	1.38	1.31 - 1.45	**<0.001
Age						
15-24 years	Reference category			Reference category		
25-34 years	1.9	1.83 - 1.97	**<0.001	4.12	3.93 - 4.31	**<0.001
35-49 years	2.24	2.16 - 2.33	**<0.001	6.4	6.11 - 6.71	**<0.001
Contraception Decision						
Wife only	Reference category			Reference category		
Husband only	1.04	0.98 - 1.11	0.232	0.96	0.90 - 1.03	0.274
Joint decision	0.95	0.90 - 0.99	*0.018	0.92	0.88 - 0.96	**0.001

Study Variables	Modern Contraception (1)			Popular- Female Sterilization (2)		
	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Type of Residence						
Urban	Reference category			Reference category		
Rural	1.06	1.03 - 1.10	**<0.001	1.11	1.08 - 1.15	**<0.001
Constant	3.01	2.81 - 3.22	**<0.001	1.02	0.94 - 1.10	0.631
Observations	224,070			164,877		

Data Source: Indian Demographic Health Survey (2015-16). Weighted Results.
*Statistically significant at p<0.05, **Statistically significant at p<0.01

has obtained higher education. Table **2** demonstrates that, as compared to women whose husbands had no education, husbands having higher education are 38% less likely to use modern contraception as compared to traditional contraception, controlling for other variables.

Model 2, in Table **2**, illustrates a positive relationship between females' education attainment level and the use of Oral Contraception Pills (OCPs) which are the most popular method of contraception in Bangladesh. Higher levels of women's education correlate with higher use of OCPs over traditional methods., assuming ceteris paribus. Age is negatively associated with the use of OCPs. Moreover, as compared to a woman whose husband does not have any education, a woman with a highly educated husband is 32% less likely to use OCPs as compared to traditional contraception, controlling for other variables. Who decides the contraception use is a significant determinant of the choice of contraception method. The wife making the decision alone regarding the use of contraception maximizes the use of both modern contraception and OCPs. As compared to women deciding on contraception use, when the contraception use decision is solely made by the husband, modern contraception is 30% less likely to be used as compared to traditional contraception. In the case of joint decision-

making, the use of modern contraception is 22% less likely to happen as compared to when women make the decision alone. Concerning contraception decision-making, Model 2 demonstrates that as compared to a woman deciding on contraception, the use of OCPs is 77% less likely to happen in case of the husband-only decision-making and 37% less likely to occur in the case of joint decision-making as opposed to the use of traditional contraception. Area of residence (urban/ rural), and household wealth do not play a significant role in deciding the choice of contraception method.

India Results

In India, out of the total women using any form of contraception, 60% reported using female sterilization – the most popular method of contraception – 27% reported using other forms of modern contraception, while 13% reported using traditional methods. For India, two sets of regressions were run since the question regarding the husband's education was only answered by a small number of respondents. Therefore, to maintain the sample size, Table **3** does not include the husband's education variable. However, for the sake of consistency, Table **4** includes all variables including the husband's education but with a relatively smaller sample size.

Table 4: Logistic regressions comparing modern and popular contraception to traditional methods, including husband's education, India (2015-2016).

Study Variables	Modern Contraception (1)			Popular-Female Sterilization (2)		
	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Wife's Education						
No education	Reference category			Reference category		
Primary	1.17	1.06 - 1.29	**0.002	1.15	1.04 - 1.28	**0.007
Secondary	0.84	0.78 - 0.91	**<0.001	0.72	0.66 - 0.78	**<0.001
Higher	0.72	0.63 - 0.83	**<0.001	0.4	0.35 - 0.46	**<0.001
Wealth Status						
Poorest	Reference category			Reference category		
Poorer	1.18	1.08 - 1.30	**0.001	1.11	1.00 - 1.23	*0.049
Middle	1.47	1.33 - 1.63	**<0.001	1.42	1.28 - 1.58	**<0.001
Richer	1.65	1.48 - 1.83	**<0.001	1.59	1.42 - 1.78	**<0.001
Richest	1.92	1.70 - 2.17	**<0.001	1.59	1.39 - 1.81	**<0.001
Age						
15-24 years	Reference category			Reference category		
25-34 years	1.77	1.62 - 1.94	**<0.001	3.82	3.42 - 4.25	**<0.001
35-49 years	2.04	1.86 - 2.24	**<0.001	5.84	5.23 - 6.52	**<0.001

Study Variables	Modern Contraception (1)			Popular-Female Sterilization (2)		
	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Husband Education						
No education	Reference category			Reference category		
Primary	1.03	0.92 - 1.15	0.582	1.04	0.93 - 1.17	0.470
Secondary	0.81	0.74 - 0.89	**<0.001	0.81	0.73 - 0.89	**<0.001
Higher	0.63	0.55 - 0.71	**<0.001	0.58	0.51 - 0.66	**<0.001
Contraception Decision						
Wife only	Reference category			Reference category		
Husband only	1.1	0.95 - 1.28	0.197	1	0.85 - 1.17	0.987
Joint decision	0.92	0.83 - 1.03	0.159	0.87	0.78 - 0.98	*0.019
Type of Residence						
Urban	Reference category			Reference category		
Rural	1.07	0.99 - 1.15	0.076	1.11	1.03 - 1.20	**0.007
Constant	3.25	2.74 - 3.86	**<0.001	1.13	0.94 - 1.37	0.188
Observations	39,955			29,200		

Data Source: Indian Demographic Health Survey (2015-16). Weighted Results.

*Statistically significant at p<0.05, **Statistically significant at p<0.01

The results are mostly similar for both sets of models, with and without the husband's education. Model 1 in Table **4** shows that as compared to women with no education, women with primary education are 17% more likely to use other modern contraception (excluding female sterilization) as opposed to traditional contraception, controlling for other variables. However, women with secondary education are 16% and women with higher education are 28% less likely to use other modern contraception (excluding female sterilization) as opposed to traditional contraception, controlling for other variables. Higher wealth status is positively associated with the use of modern contraception, as compared to traditional contraception. There is a positive association between women's age and the use of modern contraception. As compared to the younger women (age 15-24 years), women in ages 25-34 years have 77% higher odds, and women in ages 35-49 years are twice as likely to use modern contraception as compared to traditional contraception. Husband's education at secondary and higher levels becomes significant but has a negative association with the use of modern contraception.

Model 2 in Table **4** shows that there is a negative relationship between a woman's educational attainment level and female sterilization. Female sterilization is less popular than traditional contraception in women with secondary and higher education as compared to women with no education. Higher wealth status is associated with increases in the use of female sterilization, as compared to traditional contraception. Women of older ages prefer female sterilization over traditional contraception. It makes intuitive sense; since once a woman has reached the desired number of children, it is easier to opt for permanent contraception. As seen in the case of modern contraception, the husband's education at secondary and higher levels is significant and negatively associated with female sterilization.

Pakistan Results

For Pakistan, among all contraception users, 29% of the women reported using condoms as contraception, making it the most popular method in the country. 43% of the women reported using other modern methods, and 29% reported using traditional. Table **5** shows the predictors of using modern contraception in Pakistan. In Model 1, female education has a positive relationship with the use of modern contraception but is not significant. For modern contraception, there is a negative relationship with higher levels of household wealth, where women belonging to households with higher wealth status are less likely to use modern contraception than traditional contraception. A husband's educational attainment does not seem to have a strong role in predicting the use of modern contraception in Pakistan. Model 1 shows, that as compared to wife-only deciding about contraception use, husband-only or even joint decision-making is likely to result in lower use of other modern contraception than traditional methods.

In Table **5** Model 2, there is a positive and significant relationship between female education and the use of condoms. As compared to females with no education, those with primary education had 37% higher odds, those with secondary education had 56% higher odds and those with higher education were almost twice more likely to use condoms as compared to traditional contraception. There is a positive relationship between wealth and the use of condoms. In Table **5**, a woman's age only becomes significant in model 2. As compared to women aged 15-24 years, older women (35-49 years) are 42% less likely to use condoms than traditional contraception. Lastly, who decides on contraception use does not have a great deal of influence in determining the use of condoms.

DISCUSSION

In the case of Pakistan and Bangladesh, it appears that women's education is crucial in increasing the use of modern contraception. For Bangladesh, both the use of

Table 5: Logistic regressions comparing modern and popular contraception to traditional methods in Pakistan (2017-2018).

Study Variables	Modern Contraception (1)			Popular-Condoms (2)		
	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Wife's Education						
No education	Reference category			Reference category		
Primary	1.09	0.88 - 1.36	0.410	1.37	1.05 to 1.77	*0.019
Secondary	1.17	0.96 - 1.43	0.122	1.56	1.22 to 2.00	**<0.001
Higher	1.24	0.98 - 1.57	0.076	2	1.51 to 2.66	**<0.001
Wealth Status						
Poorest	Reference category			Reference category		
Poorer	0.71	0.53 - 0.96	*0.025	1.33	0.86 to 2.06	0.206
Middle	0.65	0.48 - 0.88	**0.006	1.61	1.04 to 2.48	*0.032
Richer	0.63	0.46 - 0.86	**0.004	1.51	0.97 to 2.37	0.070
Richest	0.58	0.42 - 0.81	**0.001	1.53	0.96 to 2.43	0.075
Age						
15-24 years	Reference category			Reference category		
25-34 years	1.06	0.83 - 1.35	0.662	0.82	0.63 to 1.07	0.151
35-49 years	1.04	0.82 - 1.32	0.756	0.58	0.45 to 0.76	**<0.001
Husband Education						
No education	Reference category			Reference category		
Primary	1.2	0.93 - 1.55	0.152	1.35	0.98 to 1.86	0.062
Secondary	0.91	0.75 - 1.12	0.392	1.15	0.88 to 1.49	0.31
Higher	0.9	0.71 - 1.14	0.386	1.08	0.80 to 1.45	0.627
Contraception Decision						
Wife only	Reference category			Reference category		
Husband only	0.22	0.14 - 0.36	**<0.001	0.73	0.40 to 1.34	0.309
Joint decision	0.3	0.20 - 0.45	**<0.001	0.72	0.43 to 1.22	0.228
Type of Residence						
Urban	Reference category			Reference category		
Rural	1.28	1.09 - 1.49	**0.002	1.09	0.90 to 1.32	0.370
Constant	10.1	5.95 - 17.12	**<0.001	0.79	0.40 to 1.59	0.516
Observations	4,255			2,450		

Data Source: Pakistani Demographic Health Survey (2017-18). Weighted Results.

*Statistically significant at p<0.05, **Statistically significant at p<0.01

modern contraception as well as the most popular method of contraception *i.e.* oral contraceptives, use increase with higher levels of women's education. This is not surprising as more educated women are likely to have a greater role in decision-making regarding contraception use and probably would tend to opt for modern methods as compared to traditional contraception which is neither sufficient nor adequate to meet fertility goals due to their higher failure rate.

In the case of Pakistan, women's education has a strong and positive relationship with the use of condoms (the most popular method of contraception). Overall, with modern methods of contraception, women's education only becomes significant at higher levels of education. Preference for the use of condoms for educated women is understandable as educated women realize that family planning is a shared responsibility of both men and women; thus, men need to be equally involved as women. Overall, the Contraception Prevalence Rate (CPR) in Pakistan is still very low *i.e.* 35% [3] where withdrawal, a traditional method of contraception, is the second most popular method of contraception after

condoms. Therefore, only after attaining a certain level of education (higher education), women prefer modern contraception over traditional contraception. Cultural, traditional, and at times, conservative religious views toward the use of modern contraception may act as primary deterrents.

For India, the predictors of modern contraception are different when compared to Pakistan and Bangladesh. Women's education has a negative relationship with the use of modern methods of contraception. This result, though surprising, has been discussed in prior literature [24-26]. More educated women with college degrees have better knowledge of the traditional methods of contraception than uneducated or less educated women. Hence, they have higher rates of using traditional contraception as they can effectively and efficiently use them despite higher failure rates [27]. Additionally, educated and wealthier women have been attracted to traditional contraception due to the overall side effects associated with temporary modern contraception [28].

Moreover, women's education is also negatively associated with female sterilization, the most popular

method of contraception in India. Female sterilization is more popular in uneducated, rural, and poorer women [29] mainly due to its free provision at health centers and the compensation provided to the acceptors to cover transportation costs, wage loss, food reimbursement, and other hospital-related expenses (such as child care and laboratory bills) [19, 20].

Our results show that an increase in a husband's education cannot be equated with a rise in the use of modern contraception. In Pakistan, the husband's education variable is not significantly associated with modern contraceptive use, while in Bangladesh and India, higher levels of husband's education are associated with increased odds of using traditional contraception. This shows that to transition women from using traditional contraception to modern methods, efforts should focus primarily on increasing women's education because it appears to have a positive and significant effect on improving the usage of modern contraception. To increase the acceptance of modern contraception among men, there is a need for awareness campaigns as well as social marketing as done in the case of Pakistan for condoms[13, 30].

Unlike Pakistan and Bangladesh, wealth status is related to the use of modern contraception in India. Indian women are more likely to opt for modern contraception than traditional contraception as the wealth of the household they belong to increases. The relationship is the inverse of what is seen in Pakistan and Bangladesh which warrants the need for detailed research that aims at identifying the reasons why women from affluent backgrounds continue to opt for traditional contraception, with a higher rate of failure than modern contraception. Possible reasons could include noncooperation from the husband and fear of side effects associated with modern contraception.

LIMITATIONS

The DHS data for all three countries were not collected at the same time but within the span of 5 years. While this study describes how socio-economic determinants are associated with the choice of contraception methods differently in the three large south Asian countries, we cannot identify the reasons for these differences in detail. Future research can examine each of these socio-economic determinants to analyze the difference in the usage of the contraception method.

CONCLUSION

Increases in women's education in all three countries are likely to increase the use of contraceptive methods. However, emphasis on female education alone may not be sufficient to achieve greater use of modern contraception. This may need to be complemented by social change associated with women's empowerment

by providing women an increased role in decision-making regarding their health, especially in the areas of reproductive health and contraception. Additionally, knowledge and awareness campaigns to address the side effects of modern contraception may also be needed to shift the focus from traditional to modern contraception, especially in the case of India.

ETHICS APPROVAL

This study uses secondary data. A proper IRB approval is obtained by DHS.

CONSENT FOR PUBLICATION

No primary participants were involved in this research.

AVAILABILITY OF DATA

Data is publicly available and can be requested *via* dhsprogram.com .

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CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

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AUTHORS' CONTRIBUTION

All authors conceived the idea for the study and developed the analysis plan. FR conducted the data analysis with the help of BC, DW, and JM, and wrote the first draft. BC, DW, and JM finalized the manuscript. All authors approved the final version of the manuscript.

REFERENCES

1. Worldometers. (2022). Countries in the world by population. Worldometers/ Population.

2. International Institute for Population Sciences - IIPS/India and ICF. National Family Health Survey NFHS-4, 2015-16: India. Mumbai: IIPS 2017.

3. National Institute of Population Studies (NIPS) [Pakistan] and ICF. Pakistan Demographic and Health Survey 2017-18. Islamabad, Pakistan, and Rockville, Maryland, USA: NIPS and ICF 2019.

4. National Institute of Population Research and Training - NIPORT, Ministry of Health and Family Welfare, and ICF. 2020. Bangladesh Demographic and Health Survey 2017-18. Dhaka, Bangladesh: NIPORT/ICF.

5. Gwatkin DR. Political will and family planning: the implications of India's emergency experience. Population Develop Rev 1979; 5(1): 29-59. https://doi.org/10.2307/1972317

6. Pulla P. Why are women dying in India's sterilisation camps? BMJ 2014; 349. DOI: https://doi.org/10.1136/bmj.g7509

7. India HR. India: target-driven sterilisation harming women. Human Rights Watch 2012.

8. Percher J. Too much of a good thing? Female sterilization in India: a literature review; 2016. DOI: https://doi.org/10.17615/3sgt-8c73

9. Shoupe D, Kjos SL. The handbook of contraception. Humana Press Incorporated; 2006.

10. Shah NZ, Ali TS, Jehan I, Gul X. Struggling with long-time low uptake of modern contraceptives in Pakistan. East Mediterr Health J 2020; 26(3): 297-303. DOI: https://doi.org/10.26719/emhj.19.043

11. Fizza R. Causes and policy recommendations for low contraceptive use in Pakistan. Hum Soc Sci Rev 2017; 7(1): 219-36. http://universitypublications.net/hssr/0701/pdf/H7V749.pdf

12. Mahmood A, Naz SS. Contraceptive use dynamics in Pakistan 2008-09. 10.31899/rh1.1003

13. Agha S, Meekers D. Impact of an advertising campaign on condom use in urban Pakistan. Stud Fam Plann 2010; 41(4): 277-90. DOI: https://doi.org/10.1111/j.1728-4465.2010.00253.x

14. Ataullahjan A, Vallianatos H, Mumtaz Z. Needles don't agree with me, pills don't agree with me: experiences of contraceptive use among pakhtun women in Pakistan. Stud Fam Plann 2020; 51(4): 361-75. DOI: https://doi.org/10.1111/sifp.12137

15. Hameed W, Azmat SK, Ishaque M, Hussain W, Munroe E, Mustafa G, et al. Continuation rates and reasons for discontinuation of intra-uterine device in three provinces of Pakistan: results of a 24-month prospective client follow-up. Health Res Policy Syst 2015; 13(Suppl 1): 53. DOI: https://doi.org/10.1186%2Fs12961-015-0040-9

16. Marvi K, Howard N. Objects of temporary contraception: an exploratory study of women's perspectives in Karachi, Pakistan. BMJ open 2013; 3(8): e003279. http://dx.doi.org/10.1136/bmjopen-2013-003279

17. Huda FA, Robertson Y, Chowdhuri S, Sarker BK, Reichenbach L, Somrongthong R. Contraceptive practices among married women of reproductive age in Bangladesh: a review of the evidence. Reprod Health 2017; 14(1): 69. https://doi.org/10.1186/s12978-017-0333-2

18. Zafar Ullah AN, Humble ME. Determinants of oral contraceptive pill use and its discontinuation among rural women in Bangladesh. Reproductive medicine and biology 2006; 5(2): 111-21. DOI: https://doi.org/10.1111%2Fj.1447-0578.2006.00132.x

19. Mohanty SK, Mishra S, Chatterjee S, Saggurti N. Pattern and correlates of out-of-pocket payment (OOP) on female sterilization in India, 1990–2014. BMC Women's Health 2020; 20(1): 1-3. DOI: https://doi.org/10.1186/s12905-020-0884-1

20. Dwivedi LK, Ram F, Reshmi RS. An approach to understanding change in contraceptive behaviour in India. Genus 2007; 64(3-4): 19-54. https://www.jstor.org/stable/29789352

21. Khalil B, Sarfraz M, Khan R. Socio-economic and demographic determinants of contraceptive uptake in Pakistan. Pak J Med Res 2015; 54(2): 40-4.

22. Mohsena M, Kamal N. Determinants of contraceptive use in Bangladesh. Ibrahim Medical College Journal 2014; 8(2): 34-40. DOI: https://doi.org/10.3329/imcj.v8i2.26676

23. Thyagarajan S, Reji B, Viswan SP. Determinants of contraceptive usage in India. Int J Interdiscip Multidiscip Stud 2014; 1(10): 88-97.

24. Shahidullah M. Determinants of contraceptive use in Bangladesh. The Florida State University; 1985.

25. Thulaseedharan JV. Contraceptive use and preferences of young married women in Kerala, India. Open Access J Contracept 2018; 9: 1-10. DOI: https://doi.org/10.2147/oajc.s152178

26. Singh P, Singh KK, Singh P. Factors explaining the dominion status of female sterilization in India over the past two decades (1992-2016): A multilevel study. PLoS One 2021; 16(3): e0246530. DOI: https://doi.org/10.1371/journal.pone.0246530

27. Basu AM. Ultramodern contraception: Social class and family planning in India. Asian Population Studies 2005; 1(3): 303-23. DOI: https://doi.org/10.1080/17441730500441178

28. de Oliveira IT, Dias JG, Padmadas SS. Dominance of sterilization and alternative choices of contraception in India: an appraisal of the socioeconomic impact. PLoS One 2014; 9(1): e86654. DOI: https://doi.org/10.1371/journal.pone.0086654

29. Ram F, Shekhar C, Chowdhury B. Use of traditional contraceptive methods in India & its socio-demographic determinants. Indian J Med Res 2014; 140(Suppl 1): S17-S28.

30. Agha S, Tollefson D, Paul S, Green D, Babigumira JB. Use of the Fogg behavior model to assess the impact of a social marketing campaign on condom use in Pakistan. J Health Commun 2019; 24(3): 284-92. DOI: https://doi.org/10.1080/10810730.2019.1597952