Socioeconomic Differentials in the Use of Selected Reproductive Health Services from Different Sources in Bangladesh

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Abstract

This paper aims to investigate the association between provision of reproductive health services and its differentials. We used data from the Bangladesh Demographic and Health Surveys and the Utilization of Essential Service Delivery Surveys of Bangladesh. The analysis reveals that the public sector is still the major source of modern contraceptive methods among the rural, non-educated and poor women compared to their counterparts. Seeking of antenatal care (ANC) from trained personnel, the well-off people usually rely on the private sources for ANC and delivery services compared to the poor. The multivariate analysis shows that the socioeconomic status has significant impact on the likelihood of preferring sources for reproductive health services. The likelihood of using private sector for reproductive health services has been increasing over time. Despite expansion of the NGO (non-government organization) sector, no association has been found between socioeconomic status of women and choice of NGOs for reproductive health services. Thus, we conclude that more attention should be given to the determinants of reproductive health, associated with their interaction with service provision, to reduce maternal mortality and to achieve the millennium development goals for maternal mortality.

Keywords: Reproductive Health, Service Utilization, Multinomial Logistic Regression

Introduction

Bangladesh has made substantial advancement in health status of its population in recent decades. The contraceptive prevalence rate (CPR) has increased to 61.2 percent in 2011 from 45 percent in 1993-94 (GED, 2012; NIPORT *et al.,* 2013).The demand for family planning and reproductive health services has increased as population size and number of women at risk of

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unwanted pregnancy continued to rise. The benefit of family planning and maternal health for economic well-being remains limited to marginalized populations in developing countries. Globally, every year more than half a million of women die from preventable complications caused by childbirth or pregnancy-related issues. Almost all (99 percent) of these maternal deaths occur in low-income countries (Ronsmans and Graham, 2006; Campbell and Graham, 2006). In Bangladesh, with a large population among the poorest in the world, maternal mortality, as well as associated maternal morbidity, is a serious public health concern. The current estimated maternal mortality ratio is 194 per 100,000 live births (NIPORT *et al.,* 2012). Bangladesh has still one of the highest maternal mortality rate (MMR) in the world.

Health services in Bangladesh are provided through both public and private sectors. Although public sector is the main source of family planning and reproductive health services, the private sector also contributes significantly. Health service utilization is a complex phenomenon, which is affected by factors such as availability, distance, cost, quality of care, social structure and health beliefs. Approximately 60 percent women die from pregnancy-related complications at home without any professional assistance (NIPORT *et al.,* 2012). It is also estimated that for every maternal death, at least 31 women suffered haemorrhage, 20 percent suffered from eclampsia, and indirect obstetric cause of death accounted for about one-third (35 percent) of maternal deaths (NIPORT *et al.,* 2012). For pregnant women, aged 15–49 years, 55 percent received antenatal care (ANC) from skilled providers, while skilled attendance at birth remains low at 31 percent. The Bangladesh Demographic and Health Survey (BDHS) 2011 revealed that delivery in health facilities was 29 percent, while home deliveries were 71 percent (NIPORT *et al.,* 2013). The Demographic and Health Surveys (DHS) conducted in other countries suggest that the private sector provides 51 percent of health care in Sub Saharan Africa, 66 percent in South-East Asia and as high as 79 percent in South Asia (Agus and Horiuchi, 2012; Tey and Lai, 2013). Factors that prevent women from receiving or seeking healthcare during pregnancy and childbirth include inadequate services, poverty, distance, lack of information, and cultural practices (UNICEF, 2012). In Bangladesh, studies have found that education, household socioeconomic status, and urban-rural residence are consistently significant predictors of service utilization (Amin *et al.,* 2010; Rahman and Sarker, 2009).

The healthcare that a woman receives during pregnancy, delivery, and soon after delivery is important for the survival and well-being of both mother and child. This paper examines the existing demand among the users for the reproductive health services in Bangladesh. There are little researches

available that investigates the relationship between the expansion of the private and NGO sectors in the provision of services and socioeconomic disparities in reproductive health (RH). This paper also examines the association between sources of basic RH services (here referred to ANC, delivery care and contraceptive use) and its socioeconomic differentials such as women's residence, economic status, educational status, media exposure, and field workers' contact in Bangladesh. We also took the opportunity to revisit the question of whether the expansion of the role of private providers in Bangladesh has led to reduce disparities in modern RH services.

Data and Methods

The datasets of BDHS (conducted in 1993-94, 1996-97, 1999-2000, 2004, 2007 and 2011) and Utilization of Essential Service Delivery (UESD) surveys (conducted in 2006, 2008 and 2010) of Bangladesh are used in this study (Mitra *et al*., 1994; Mitra *et al*., 1997; NIPORT *et al.,* 2001; NIPORT *et al.,* 2005; NIPORT *et al.,* 2009; NIPORT *et al.,* 2013; Al Sabir *et al.,* 2007; Al Sabir *et al.,* 2009; Shahin *et al.,* 2011). BDHS and UESD are two-stage nationally representative surveys that cover seven administrative divisions. At the first stage the primary sampling units were chosen from the available information provided by the Bangladesh Bureau of Statistics based on census data. Around 304 to 316 primary sampling units (PSU) were selected for all the BDHSs with probability proportional to size. Half of the PSUs of BDHSs were selected for all the UESD surveys with probability proportional to size. After the selection of the PSUs, all households in each of the selected areas were mapped and listed. A systematic sample of households was then selected from these lists for each of the surveys. In this analysis, women who were using modern methods of contraception, ANC and delivery care, and births occurred during the three years before the survey were included.

To assess different indicators over time, we used a number of statistical tools including bi-variate and multivariate analyses. Socioeconomic status was assessed by constructing a household 'wealth index' based on principal components analysis and household assets developed by Rutstein and others (Rutstein *et al.,* 2000). Bi-variate analysis was used to investigate the sources of RH services that the women used (e.g., public, private, NGO, etc.) in Bangladesh. We used multinomial logistic regression model. The dependent variables are place of delivery, source of ANC, and sources family planning services. Each of the variables recoded into nominal (*polychotomous)* variable into 3 categories. The sources of family planning were recoded as 1=Public, 2=Private, and 3=NGO. The place of delivery was recoded as 1=Public facility, 2=Private facility, and 3=Home; sources of ANC was recoded as 1=Public,

2=Private, and 3=NGO. The number of deliveries at NGO facilities is negligible. The NGOs are providing facility services in urban areas with government support. So, delivery facility of NGO facility included in public source. Moreover, the proportion of ANC at home and other places were low. To avoid the erroneous result in multivariate regression, ANC was included in private sources. The use of RH services is expected to be influenced by demographic (place of residence, geographical division), social (women's education), economic (wealth quintile) and programmatic (exposure to mass media and visit by fieldworkers) factors. To control the influence of these variables, multivariate analysis with the main effects of selection of service provider and other variables were used to examine the preference of women of Bangladesh for selecting private sector for their RH care services. In the case of ANC visit to home and other sources, we found insignificant results and thereby these two sources are included in private sources.

The model

A multinomial dependent variable requires us to make some notational adaptations. Let J represent the number of discrete categories of the dependent variable, where $J \geq 2$. Now, consider random variable Z that can take on one of J possible values. If each observation is independent, then each Z_i is a multinomial random variable. Once again, we aggregate the data into population each of which represents one unique combination of independent variable settings. Since each observation records one of J possible values for the dependent variable Z, let y be a matrix with N rows (one for each population) and J -1 column. For each population, y_{ij} represents the observed counts of the jth value of Z_i. Similarly, π is a matrix of the same dimension as y where each element π_{ij} is the probability of observing the jth value of the dependent variable for any given observation in the ith population.

The design matrix of independent variables, X, contains N rows and K +1 columns where K is the number of independent variable and the first element of each row, x_{i0}= 1, the intercept. Let β matrix with K + 1 rows and J - 1 column, such that each element β_{kj} contains the parameter estimate for the kth covariate and the jth value of the dependent variable.

For the multinomial logistic regression model, we equate the linear component to the log of the odds of a jth observation compared to the jth observation. That is, we will consider the jth category to be the omitted or baseline category, where logits of the first J - 1 categories are constructed with the baseline category in the denominator. The mathematical form of the model is given below.

$$\log\left(\frac{\pi_{ij}}{\pi_{iJ}}\right) = \log\left(\frac{\pi_{ij}}{1 - \sum_{j=1}^{J-1} \pi_{ij}}\right) = \sum_{k=0}^{K} x_{ik}\beta_{kj} \; ; i = 1,2,\dots.N \; and \; j$$
$$= 1,2,\dots,J-1$$

Solving for π_{ij}, we have

$$\pi_{ij} = \frac{e^{\sum_{k=0}^{K} x_{ik}\beta_{kj}}}{1 + \sum_{j=1}^{J-1} e^{\sum_{k=0}^{K} x_{ik}\beta_{kj}}} \; ; j < J$$

$$\pi_{iJ} = \frac{1}{1 + \sum_{j=1}^{J-1} e^{\sum_{k=0}^{K} x_{ik}\beta_{kj}}}$$

Results

Use and sources of family planning methods

In 2011, 52 percent of the currently married women in Bangladesh were using a modern contraceptive method. The same was 7.7 percent in 1975 indicating nearly eight-fold increase in less than four decades. Nearly a half of the currently married women (52.1 percent) collect modern contraceptive methods from the public sector, while the same is 42.8 percent for the private sector. Another 4.3 percent of women rely on the NGO sector for modern contraceptive methods (NIPORT *et al.* 2013).

Differentials in selecting sources of modern contraceptive methods

The choice of sources of modern contraceptive methods varies by socioeconomic characteristics of the currently married women (Table 1). The market share of contraceptive methods varies by place of residence. The currently married women in urban area relies more on the private sector, while women in rural areas relies mainly on public sources. There are increasing trends in choosing private source in both urban and rural areas. For example, 42 percent of urban women prefer private facility for modern contraception in 1993-94, but in 2011 it increased to 60.4 percent.

Source of modern contraceptive methods also vary by women's educational qualification. In 2011, 38.5 percent of the currently married women with secondary or higher education reported to select public sector for modern contraceptive methods, which was 57.2 percent in 1993-94. In contrast, 57 percent of the currently married women with secondary and higher education relied on private sector in 2011; the same was 42.8 percent in 1993-94. The choice of public sector still remains as the major source of modern contraceptive methods among the poor women (71 percent)

compared to the women from richest quintile (25 percent) in 2011. In contrast, private sources seem to be more popular among the well-off. Use of NGO services does not vary by women's residence, education or wealth quintile.

Table-1: Distribution (percent) of women using modern contraceptives by sources of method by background characteristics 1993-2011

Background characteristics		93-94 (4,002)	96-97 (4,160)	99-00 (5,226)	2004 (6,144)	2006 (4,695)	2007 (5,686)	2008 (4,769)	2010 (5,954)	2011 (5,954)
Place of residence										
Urban	Public sector	58.2	47.4	37.1	37.0	34.1	33.8	30.7	35.4	32.0
	Private sector	41.8	50.0	53.4	50.5	54.0	57.4	60.2	58.7	60.5
	NGO sector	-	2.6	9.5	12.5	11.9	8.9	9.0	5.9	7.5
Rural	Public sector	83.7	79.0	72.6	63.5	58.5	55.2	57.5	53.3	59.7
	Private sector	16.3	20.3	23.3	32.2	35.3	40.8	36.8	42.4	37.2
	NGO sector	-	0.7	4.1	4.3	6.3	4.0	5.8	4.3	3.1
Level of education										
No	Public sector	88.6	83.0	79.2	71.6	63.6	65.4	63.5	59.2	66.8
education	Private sector	11.4	16.2	14.7	21.9	27.4	28.6	30.3	34.8	28.8
	NGO sector	-	0.9	6.1	6.5	8.9	6.0	6.2	6.0	4.4
Secondary	Public sector	57.2	51.0	42.3	36.1	36.6	33.5	33.8	36.9	38.5
	Private sector	42.8	47.8	52.8	58.2	57.3	62.1	61.5	59.8	57.0
	NGO sector	-	1.1	4.9	5.7	6.0	4.5	4.6	3.3	4.5
Wealth quintile										
Poorest	Public sector	89.7	89.4	84.8	76.3	63.9	65.1	63.2	66.6	70.9
	Private sector	10.3	10.0	9.9	18.7	26.6	28.5	28.8	28.3	25.3
	NGO sector	-	0.7	5.3	5.1	9.5	6.4	7.9	5.1	3.8
Richest	Public sector	60.8	49.0	38.8	30.7	26.9	25.3	21.5	26.8	25.0
	Private sector	39.2	49.5	54.1	60.1	64.8	67.9	73.1	69.1	69.0
	NGO sector	-	1.6	7.1	9.2	8.3	6.8	5.4	4.1	6.0
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: *'-' means there was no information for NGOs in the 1993-4 BDHS and figures in bracket reflect the sample size (n)*

Table 2 shows that percentage of users who use services from private sources has increased to 50 percent in 2011, whereas it was almost half (27 percent) in 1993-94. Two-thirds (65 percent) of the currently married women selected public sources that have no mass media access. It is observed that there is no significant impact of mass media for choosing NGO on accepting modern contraceptive methods. The trend analysis expresses that women prefer public sources for receiving modern contraceptive methods who visited by field workers in last six months. Almost 73 percent currently married women

were selected from public source who visited by field workers; whereas 50 percent of the currently married women are selected from private source who were not visited by the field workers.

Antenatal care (ANC)

In 2011, 67.7 percent of the women who had a live birth in three years preceding the survey received ANC from any providers. However, more than a half (54.6 percent) of the women received ANC from medically trained providers. The proportion of women receiving ANC from any provider has increased from 27.4 percent in 1993-94 to 67.7 percent in 2011, representing 2.5-fold increase over the period. But only a quarter (25.9 percent) of the women received ANC from medically trained providers in 1993-94, which has increased to 54.6 percent in 2011 (NIPORT *et al.* 2013).

Nearly 43 percent of the women in 2011 received ANC from public sector, while 34 percent of the women received ANC from private sources and 10 percent received from home (Table 3). The proportion of women receiving ANC services from public sector was 48.9 percent in 2006, which has decreased to 37.4 percent in 2008 and 45.4 percent in 2011.

Table-2: Percent distribution of market share of modern contraceptive method use by programme characteristics, 1993-2011

	Variable	1993-4 (n=4,002)	1996-7 (n=4,160)	1999-00 (n-5,226)	2004 (n=6,144)	2007 (n=5,686)	2011 (n=10,183)
Mass media access							
Yes	Public sector	73.0	66.6	52.8	51.2	44.6	45.8
	Private sector	27.0	32.4	41.2	42.0	49.8	49.7
	NGO sector	-	1.0	6.0	6.8	5.6	4.5
No	Public sector	87.6	83.8	78.5	72.5	60.8	65.2
	Private sector	12.4	15.2	17.0	22.7	34.7	30.8
	NGO sector	-	0.9	4.5	4.8	4.5	4.0
Visited by field workers in the last 6 months							
Yes	Public sector	85.8	84.4	70.3	62.7	77.6	73.2
	Private sector	14.2	14.9	25.5	31.8	20.9	21.8
	NGO sector	-	0.7	4.1	5.5	1.5	5.0
No	Public sector	72.0	64.1	63.7	56.4	41.7	47.0
	Private sector	28.0	34.6	30.8	37.3	52.0	48.9
	NGO sector	-	1.3	5.5	6.4	6.3	4.1
Total		100.0	100.0	100.0	100.0	100.0	100.0

Note: *'-' means there was no information for NGOs in the 1993-4 BDHS.*

Table-3: Source of antenatal care service (in percent) according to place of residence

Sources	UESD 2006			BDHS 2007			UESD 2008			UESD 2010			BDHS 2011		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Public	37.4	53.2	48.9	35.2	38.2	37.4	38.8	46.4	44.5	43.7	46.1	45.4	35.0	45.3	42.6
Private	32.4	26	27.8	39.5	29.7	32.2	35.5	26.8	28.8	44.8	34.8	37.4	41.2	31.1	33.7
NGO	22.9	13.5	16.1	17.3	11.1	12.8	19.9	8.9	11.4	1.6	0.9	1.1	18.2	11.0	12.9
Home	3.5	7.0	6.0	7.7	21	17.5	5.4	17	14.4	9.5	18	15.8	4.2	12.3	10.1
Others	3.8	0.3	1.2	0.2	0.1	0.1	0.5	0.9	0.9	0.4	0.2	0.2	1.4	0.4	0.7
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Differentials in ANC services

In 2011, nearly 35 percent of the urban women received ANC from public sector, followed by private (41.2 percent), NGO facilities (18.2 percent), home (4.2 percent), and other places (1.4 percent). On the other hand, nearly 45.3 percent of the rural women received ANC from public sources, followed by private sources (31.1 percent), NGOs (11.0 percent), home (12.3 percent), and other places (0.4 percent) (Table 3).

The analysis reveals that the source of ANC service also varies by women's educational qualification. The selection of private sector increased among women with secondary and higher education. In 2011, 45 percent of the women with secondary or higher education selected public sector for ANC service, which was 47 percent in 2006. In contrast, 44 percent of the women with secondary and higher education relied on private sector in 2011 whereas this proportion was 33 percent in 2006 (Table 4).

Table-4: Source of antenatal care (in percent) according to education level

Sources	UESD 2006		BDHS 2007		UESD 2008		UESD 2010		BDHS 2011	
	No education	Secondary and above	No education	Secondary and above	No education	Secondary and above	No education	Secondary and above	No education	Secondary and above
Public	51.0	46.6	39.3	35.7	46.6	42.1	46.3	45.2	45.1	41.3
Private	19.7	32.8	20.5	41.3	15.7	38.1	24.8	43.9	25.7	39.5
NGO	18.5	14.2	17.1	11.6	16.4	8.9	1.9	0.9	12.9	11.8
Home	8.3	5.5	23.1	11.3	20.9	9.7	26.7	9.8	15.7	6.9
Others	2.6	0.9	0.0	0.1	0.4	1.2	0.4	0.2	0.6	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The well-off people usually rely on the private sources for ANC services compared to the poor (Table 5). There is a significant increased choice of ANC service from private sources among the richest women. It is important to note that more than half (57.9 percent) of the women from richest quintile sought ANC from private providers in 2011, while the same was only 17.5 percent for the poorest quintile.

Table-5: Source of antenatal care (in percent) according to wealth quintiles

Sources	UESD 2006		BDHS 2007		UESD 2008		UESD 2010		BDHS 2011	
	Poorest	Richest	Poorest	Richest	Poorest	Richest	Poorest	Richest	Poorest	Richest
Public	60.1	35.3	42.0	32.8	54.1	30.8	51.1	36.1	52.5	29.8
Private	16.3	43.9	15.7	55.9	9.9	54.6	17.5	57.9	17.5	50.6
NGO	16.3	15.7	11.5	9.2	8.9	11.5	0.7	0.8	13.2	15.7
Home	6.7	2.4	30.8	1.8	26.8	2.0	30.5	5.1	16.5	3.1
Others	0.5	2.7	0.0	0.3	0.3	1.0	0.2	0.2	0.3	0.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Delivery care

Twenty-nine percent of the births were delivered in a facility of which 11.8 percent were delivered at public facilities, 15.1 percent at private facilities, and 1.9 percent at the NGO facilities (NIPORT *et al.* 2013) while 71.0 percent of the births were delivered at home. The proportion of births delivered at public facilities has increased steadily from 2.0 percent in 1993-94 to 11.8 percent in 2011. On the other hand, the proportion of births delivered at private facilities was 1.5 percent in 1993-94, which has increased to 15.1 percent in 2011, representing a ten-fold increase during the period.

Differentials in delivery care at facility

The proportion of births delivered at a health facility is notably higher in urban areas compared to rural areas. Further, the facility delivery has increased significantly in the urban areas compared to the rural areas (NIPORT *et al.* 2013). In urban areas preference of public facility for giving birth has not been increased, but the preference of private facility has increased significantly in the last two decades. For example, in 1993-94 the place of delivery at private facilities was 9 percent, but it has increased almost 3 times (25 percent) in 2011 (Table 6). In rural area the facility delivery (both public and private) among women has increased, but no significant difference was found between public and private facility delivery.

The socioeconomic status of women has positive impact on the likelihood of delivering at a health facility. Women's education is one of the most influential determinants of knowledge, attitudes, and behaviour. The educational attainment of a population is an important indicator of level of

socioeconomic development as well as status in the society. Women with no education have no significant difference in choosing health facility for child birth. Women who have secondary and higher education, the preference of facility delivery has been increasing. Table 6 shows that in 1993-94, 8 percent of the women received delivery service from public facility whereas it was almost double in 2011. The proportion of selecting private facility was higher than public facility for giving birth among women who have secondary and higher education.

The proportion of births delivered at private facilities has increased sharply among the well-off women from 6.6 percent in 1993-94 to 35.8 percent in 2011. In contrast, home delivery has decreased significantly among the well-off group from 85.2 percent in 1993-94 to 40 percent in 2011. Almost 36 percent of the women from the richest quintile delivered in a private facility in 2011, while the same was 2.8 percent among the poor quintile. However, it can be concluded that the poor still prefer to give birth at home. The private sector plays an important role in providing delivery care to the well-off. With respect to HPNSDP 2016 target on achieving equity in facility delivery, i.e. a proportion less than 1:4 between the lowest and the highest quintiles, Bangladesh has made some progress in reducing the wide gap between the poorest and the richest in the use of facilities for delivery (MOHFW 2011). In 2011 it was observed that a level of 9.9 percent among the lowest and 59.8 percent among the highest wealth quintiles gave births in health facilities – this translates to a ratio of 1:6.

Twenty percent of those women who had access to mass media chose private facility, and 15 percent of them chose public facility for delivery in 2011, while it was 3.2 percent and 3.9 percent in 1993-4. Moreover, women who have no mass media access are relied on only home delivery for their childbirth.

Table-6: Distribution of place of delivery by different sectors by respondent's background characteristics 1993-2011

Background characteristics		1993-4	1996-7	1999-00	2004	2007	2011
Place of residence							
Urban	Public facility	10.7	11.9	16.4	15	13	17.8
	Private facility	9.1	13.7	1.3	10.6	17	25.2
	NGO facility	-	0.0	9.0	1.6	3.7	6.3
	Home	79.2	72.6	72.9	72.8	66.1	50.5
Rural	Public facility	1.0	1.8	3.5	5.2	6.5	10.1
	Private facility	0.6	0.8	0.3	2.2	5.5	12.2
	NGO facility	-	0.0	1.3	0.5	0.8	0.6
	Home	98.2	96.8	94.7	91.8	86.9	77

(continued)

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Table-6: **(continued)**

Background characteristics		1993-4	1996-7	1999-00	2004	2007	2011
Level of education							
No education	Public facility	0.5	1.2	3.1	1.8	1.8	4.9
	Private facility	0.1	0.1	0.2	0.8	1.9	4.7
	NGO facility	-	0.0	0.3	0.2	0.4	1.6
	Home	99.3	98.2	96.5	97.3	95.9	88.8
Secondary and above	Public facility	8.6	8.9	12.6	14.1	13.3	16.0
	Private facility	7.4	9.9	1.0	8.8	15.2	22.7
	NGO facility	-	0.0	8.2	1.2	2.7	2.4
	Home	83.7	80.2	77.8	75.7	68.3	58.7
Wealth quintiles							
Poorest	Public facility	0.2	0.8	2.2	2.1	3.6	6.9
	Private facility	0.0	0.0	0.4	0.2	2.2	2.7
	NGO facility	-	0.0	0.1	0.2	0.5	0.3
	Home	99.7	98.8	96.9	97.3	93.7	90.1
Richest	Public facility	7.3	8.4	18.1	20.2	17.5	19.1
	Private facility	6.6	9.9	1.4	15.4	26.6	35.5
	NGO facility	-	0.0	12.5	2	4.4	5.1
	Home	85.2	79.9	67.6	62.4	51	40.1
Mass media access							
Yes	Public facility	3.9	4.6	9.5	9.2	9.8	14.4
	Private facility	3.2	4.0	1.0	5.4	11.3	20.4
	NGO facility	-	0.0	5.4	1.0	2.1	2.5
	Home	92.4	90.4	83.8	84.3	76.4	62.4
No	Public facility	0.6	1.2	2.7	2.8	4.7	7.3
	Private facility	0.3	0.2	0.1	0.7	2.4	6
	NGO facility	-	0.0	0.5	0.1	0.2	0.8
	Home	99.0	98.0	96.6	96.0	92.5	85.8
Total		100.0	100.0	100.0	100.0	100.0	100

Note: *'-' means there was no information for NGOs in the 1993-4 BDHS.*

Multivariate analysis

Choice of modern family planning method: private facility to public facility

The regression analysis shows that the likelihood of preferring private sector than public in terms of receiving modern methods would be expected to 1.54 times higher in 2011 than 1996 given the other variables in the model are held constant. In other words, in 2011 women were more likely to prefer private sectors than public in receiving modern family planning methods compared to 1996. The women of richest quintile were 3.1 times more likely to prefer private sources than the poorest quintile. The women with secondary and above education were 3 times more likely to receive modern methods from

private source relative to public source than women with no education. Similarly, those who had mass media access had 1.2 times higher chance to receive modern contraceptives from private sources than women who have no mass media access. The women who were visited by field workers were less likely to prefer private source compared to public source than their counterpart for modern contraceptives. Women in rural areas are 35 percent less likely to receive private service compared to public than women in urban areas (Table 7).

Table-7: Multinomial logistic regression for predicting market share of family planning facility (Public facility is the most frequently preferred facility is the reference group)

Variables		Private to Public (OR and 95% CI)	NGO to Public (OR and 95% CI)
Survey year	1996-7 (RC)	1.00	1.00
	1999-2000	1.02 (0.91-1.15)	5.58 (3.85-8.10)
	2004	1.41 (1.27-1.57)	7.40 (5.13-10.67)
	2007	2.05 (1.84-2.29)	7.25 (5.01-10.50)
	2011	1.54 (1.39-1.71)	5.39 (3.74-7.77)
Place of residence	Urban (RC)	1.00	1.00
	Rural	0.65 (0.60-0.70)	0.28 (0.25-0.33)
Division	Barisal (RC)	1.00	1.00
	Chittagong	1.28 (1.12-1.45)	0.83 (0.62-1.11)
	Dhaka	1.25 (1.11-1.41)	0.90 (0.69-1.18)
	Khulna	1.07 (0.94-1.22)	1.08 (0.81-1.44)
	Rajshahi	1.14 (1.01-1.29)	0.89 (0.68-1.17)
	Sylhet	1.12 (0.92-1.36)	1.25 (0.85-1.84)
Level of education	No education (RC)	1.00	1.00
	Primary	1.58 (1.47-1.69)	0.93 (0.80-1.08)
	Secondary	3.02 (2.80-3.25)	1.13 (0.96-1.33)
Wealth index	Poorest (RC)	1.00	1.00
	Poorer	1.27 (1.16-1.40)	0.87 (0.70-1.07)
	Middle	1.53 (1.39-1.68)	0.91 (0.73-1.12)
	Richer	1.78 (1.61-1.97)	1.09 (0.88-1.35)
	Richest	3.13 (2.80-3.50)	1.56 (1.24-1.96)
Mass media access	No (RC)	1.00	1.00
	Yes	1.20 (1.11-1.27)	1.10 (0.95-1.29)
Visited by Field worker	No (RC)	1.00	1.00
	Yes	0.31 (0.29-0.33)	0.83 (0.73-0.95)

RC=Reference Category; OR=Odd Ratio; CI=Confidence Interval

Choice of modern family planning method: NGO facility to public facility

The analysis shows that in 2011 women were 5.4 times more likely to receive modern method than in 1995 preferring NGO source than public source. The women in richest quintile were 1.56 times more likely to prefer NGO service compared to public services than women in poorest quintile. Women in rural areas were less likely to receive NGO service compared to public than women in urban areas. Moreover, women visited by field workers are less likely to receive NGO service relative to public than women visited by field workers (Table 7).

Choice of antenatal care service: private facility to public facility

The result shows that the likelihood of preferring private sector than public for receiving ANC was 1.6 times higher in 2011 than 2006 keeping other variables constant. The analysis shows that women in rural areas are 1.2 times more likely to receive ANC from private service than public service compared to women in urban areas. The women of richest quintile are 2.5 times more likely to prefer private source relative to public source for ANC than the poorest quintile. The results reveal that there is no educational differential in preferring private services relative to public ANC among women. The women in Chittagong, Sylhet and Rajshahi divisions were less likely to receive ANC from private service to public than Barisal division (Table 8).

Choice of antenatal care service: NGO facility to public facility

The analysis shows that women in rural areas are 50 percent less likely to receive ANC from NGO service relative to public than women in urban areas. The women in richest quintile are 40 percent more likely to prefer ANC service from NGO relative to public services than women in poorest quintile. Moreover, women who have secondary and higher education are 30 percent less likely to receive NGO service relative to public than women who have no formal education (Table 8).

Table-8: Multinomial logistic regression for predicting market share of ANC facility (Public facility is the most frequently preferred facility is the reference group)

Variables		Private to Public (OR and 95% CI)	NGO to Public (OR and 95% CI)
Survey period	2006(RC)	1.00	1.00
	2007	1.4 (1.2-1.6)	0.9 (0.7-1.2)
	2008	2.0 (1.7-2.3)	1.1 (0.9-1.3)
	2010	1.4 (1.2-1.6)	0.8 (0.6-1.0)
	2011	1.6 (1.4-1.9)	0.9 (0.6-1.1)
Place of residence	Urban (RC)	1.00	1.00
	Rural	1.2 (1.1-1.3)	0.5 (0.4-0.6)
Level of education	No education (RC)	1.00	1.00
	Primary	1.0 (0.9-1.2)	0.8 (0.7-1.1)
	Secondary	1.0 (0.9-1.1)	0.7 (0.5-0.8)

(continued)

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Table-8: (continued)

Variables		Private to Public (OR and 95% CI)	NGO to Public (OR and 95% CI)
Division	Barisal (RC)	1.00	1.00
	Chittagong	1.5 (1.2-1.8)	0.7 (0.5-1.0)
	Dhaka	1.4 (1.1-1.7)	1.0 (0.7-1.4)
	Khulna	0.9 (0.7-1.1)	0.7 (0.5-1.0)
	Rajshahi	1.1 (0.9-1.4)	1.5 (1.1-2.1)
	Sylhet	1.5 (1.2-1.9)	1.1 (0.7-1.6)
Wealth index	Poorest (RC)	1.00	1.00
	Poorer	1.2 (1.1-1.4)	1.4 (1.1-1.7)
	Middle	1.2 (1.1-1.2)	1.2 (0.9-1.6)
	Richer	1.5 (1.3-1.7)	1.3 (1.0-1.7)
	Richest	2.5 (2.1-2.9)	1.4 (1.1-1.9)

Table-9: Multinomial logistic regression for predicting market share of delivery facility (Home is the most frequently preferred place is the reference group)

Variables		Public facility to home (OR and 95% CI)	Private facility to home (OR and 95% CI)
Survey year	1996-7 (RC)	1.00	1.00
	1999-2000	2.61 (2.15-3.16)	0.20 (0.13-0.29)
	2004	2.07 (1.70-2.52)	1.20 (0.96-1.50)
	2007	2.50 (2.06-3.04)	2.42 (1.96-2.99)
	2011	4.38 (3.64-5.27)	5.69 (4.68-6.92)
Place of residence	Urban (RC)	1.00	1.00
	Rural	0.42 (0.38-0.47)	0.53 (0.47-0.60)
Division	Barisal (RC)	1.00	1.00
	Chittagong	0.92 (0.74-1.15)	0.81 (0.62-1.05)
	Dhaka	1.27 (1.03-1.57)	1.27 (0.98-1.63)
	Khulna	2.07 (1.65-2.60)	2.03 (1.55-2.66)
	Rajshahi	1.58 (1.27-1.97)	1.44 (1.11-1.87)
	Sylhet	1.14 (0.87-1.48)	0.84 (0.60-1.16)
Level of education	No education (RC)	1.00	1.00
	Primary	1.79 (1.55-2.06)	1.68 (1.36-2.07)
	Secondary	4.03 (3.51-4.63)	5.14 (4.23-6.25)
Wealth index	Poorest (RC)	1.00	1.00
	Poorer	0.95 (0.79-1.14)	1.60 (1.22-2.09)
	Middle	1.20 (1.01-1.42)	2.03 (1.56-2.63)
	Richer	1.83 (1.55-2.17)	3.41 (2.65-4.40)
	Richest	3.48 (2.92-4.15)	9.99 (7.73-12.91)
Mass media access	No (RC)	1.00	1.00
	Yes	1.39 (1.24-1.55)	1.49 (1.28-1.74)

Choice of delivery care service: public facility to home

In 2011, the likelihood of preferring child delivery at public facility than home delivery would be expected to 4.4 times higher than 1996 keeping all other variables constant. In other words, in 2011 women were more likely to prefer public facility relative to home delivery than 1996 (Table 9).

The women of the richest quintile are 3.5 times more likely to prefer delivery at public facility than at home than the poorest quintile. The women with secondary and above education are 4 times more likely to deliver their child birth at public facility compared to home. Similarly, those who have mass media access are 1.4 times higher likelihood to prefer public facility delivery relative home than who have no access. Women in rural areas are 58 percent less likely to public facility delivery relative to home than women in urban areas.

Choice of delivery care service: private facility to home

Like public facility it is also found that the likelihood of preferring delivery at private facility among relative to home delivery would be expected to 5.7 times higher in 2011 than 1996. There is significantly increasing trends of private facility in the last two surveys. Women in rural areas are 45 percent less likely to private facility delivery relative to home than women in urban areas. The women with secondary and above education are 5.9 times more likely to deliver their child birth at private facility than at home. The women of the richest quintile are 10 times more likely to prefer delivery at private facility relative to home than the poorest quintile. Similarly, those who have mass media access are 1.5 times more likely to prefer private facility for delivery relative to home than those who have no access. The women in Khulna and Rajshahi divisions are also more likely to prefer private facility to home than Barisal division.

Discussion and Conclusion

This study aimed at identifying the factors affecting the choice of family planning and maternal services in Bangladesh. The findings show consistently strong relationship between the choice of healthcare service and the education of the respondent, their place of residence, and economic status of the family. There is a lack of studies exploring the association between women's socioeconomic and programme factors and the selection of reproductive health services. We have quantitatively documented the choice

of facility for family planning services, ANC and place of delivery in Bangladesh.

The findings imply that the public sector had an important role to play in modern contraceptive use for the poor. It suggests that the public sector had an important role in building modern contraceptive markets for the private sector to exploit. This study revealed that the private sector contraceptive provision was associated with the richest socioeconomic groups. Similar study also found the association of private sector and the use of modern contraceptive method with urban residence, women education, and employment is positive and it is similar across the countries (Berman and Rose, 1996). The results indicate that the private sector meeting the significant portion of the needs for modern contraception of family planning. The findings of this study have important implications for better targeting of public sector interventions. The results suggest that the private sector's receptiveness to changing consumer preferences was enabling rural women in the lowest quintiles to switch to the private sector. The results also disclosed that choice of private facility was associated with women with at least secondary education and mass media access. But women who were not visited by field workers had less likely to prefer private than public. As long as the public sector remains an important source of contraceptives for the poorest women, an expansion in private sector supply is unlikely to lead to greater inequality in contraceptive use (Agha and Do, 2008). As the private sector expands, the public sector must increasingly target low-income women living in rural areas.

The facility where a woman receives ANC influences the quality of care received. Information on the ANC source also assists policy-makers with decisions on how to allocate resources. The results revealed that women in urban areas and women in the highest wealth quintile are more likely to receive ANC from the private sector. There is sparse evidence on socioeconomic differentials in the quality of ANC in developing countries (Navaneetham and Dharmalingam, 2002; Ahmed *et al.,* 2000). Education is significantly associated with utilization of maternal health services. Our study implied that a significant portion of women with secondary and above education preferred private facility for ANC. It is likely that more educated women seek higher quality services and have greater ability to use healthcare inputs to produce better health. The choice of NGO service relative to public

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facility is significant among educated women rather than uneducated women compared to private service. The reason of choosing NGOs might be due to the availability, accessibility and affordability of the women.

We have also shown that mother's education, residence, mass media access and socioeconomic status were important independent factors in determining the choice of delivery place. A study also found maternal education among women was the important independent factor in determining the place of delivery in Nepal (Bolam *et al.,* 1998). Yanagisawa *et al*. (2006) also documented that woman who had at least 7 years of schooling being six times more likely to deliver babies at a health facility than those who did not attend. Wealth quintiles and socio-cultural factors play a major role in the choice of place of delivery. Limited access in rural areas, mainly caused by lack of money and long distance to healthcare facilities, is a problem. Moreover, midwife-assisted home births could possibly improve the safety of the mother and the newborn.

Despite expansion of the private and NGO sectors, the public sector remains an important source of supply for poor women, who may lack the physical and financial accessibility to private outlets that sell modern contraceptives. Our results also suggest that the private sector and NGO sector can also be important sources of supply to poor women without leading to increased inequity. Social marketing programmes are likely to have played an important role in expanding the use of private suppliers among poor women. It is accepted that attaining millennium development goal 5 depends on widespread improvements in the level and quality of antenatal and obstetric facilities in developing countries. More attention should be given to the wider social determinants of reproductive health, including education, and to the factors associated with their interaction with health provision, when devising strategies to reduce maternal mortality and to achieve the MDG for maternal mortality. Finally, promoting female education, especially primary and higher education, as well as continued heath education, will lead to select health facility.

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