

Inequalities in Reproductive Healthcare Utilization: Evidence from Bangladesh Demographic and Health Survey 2004

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Abstract

Utilization of reproductive healthcare services such as antenatal care (ANC), delivery place facilities and postnatal care (PNC) is essential and a basic need for mothers around the globe. However, in Bangladesh inequalities in many forms affect the use of these facilities. These inequalities include socio-economic status, age, education, household size, existence of living children, occupation and household location. Using the database from the Bangladesh Demographic and Health Survey (BDHS) 2004, this study investigated the inequalities and implications of receiving facility-based maternity care such as ANC, delivery place and PNC in Bangladesh. Based on our findings, it is assumed that with the current inequalities in wealth and education, less attention to mothers with bigger family size and to mothers those existing children, lack of facilities and awareness, in rural areas, increased use of reproductive healthcare is unlikely without a change in wealth inequalities and attention to more equity in the health sector. Bivariate and multivariate analyses were done for the study, including tests of significance. Overall, findings revealed significant socio-economic inequalities in the use of reproductive healthcare services. Use of services was much lower among the poor than the rich. These socio-economic inequalities may be reduced by expanding outreach health programs and bringing services closer to the disadvantaged (poor people). The study concluded that many of these inequalities are social constructs that can be reduced by prioritizing the needs of the poor and disadvantaged and adopting appropriate policy change options.

Introduction

Maternal mortality in Bangladesh is often depicted as among the highest in the world (Streatfield and Al-Sabir 2003). Although health in most countries has significantly improved over the past few decades, substantial inequalities in health outcomes among nations, socio-economic groups and individuals have remained (Leon and Walt 2001). Improving the health of the poor and reducing health inequalities have become the central goals of many development programs (Wagstaff 2002). Four dimensions in health – equal access to available care for equal need, equal utilization for equal need, equal quality of care for equal need and equity in outcome – are emphasized to promote health equity (Krasnik, 1996). Several studies have revealed that poverty and ill health are intertwined (Wagstaff 2002), and poverty and marginalization are the underlying causes of inequalities in health (Evans et al. 2001). The poor and women are expected to suffer a greater burden of ill health than the rest of the population, particularly during pregnancy and childbirth (Hadi and Gani 2005). The need to expand reproductive health services in developing countries is now recognized more than ever. Of more than 500,000 maternal deaths that occur every year, a quarter to a third are the result of complications of pregnancy (WHO, 2000). More than 99% of maternal deaths occur in developing countries. A woman living in Africa has a 200 times greater risk of dying from complications related to pregnancy than a woman living in an industrialized country (WHO, 2000).

Although the poor face the worst reproductive health outcomes, poverty is not an insurmountable barrier to health if appropriate investment in health is made. There are many discriminatory policies in place in most developing countries (Hadi and Gani 2005), and the distribution of public health services is unequal in many developing countries (Makinen et al. 2000).

Bangladesh is a poor country with nearly half (48%) of the population living on the wrong side of the poverty line (Hadi and Gani 2005). Although the healthcare network has expanded in rural areas of Bangladesh and the country has experienced significant health development over the past two decades, the overall situation of poor women has changed very little. The problems of the healthcare system are deeply rooted in the society, and their transformation requires major structural changes. Several attempts have been made to understand the equity issues in Bangladesh, but questions on many issues have remained unanswered (Bhuiya et al. 2001; Chowdhury and Bhuiya 1999). Reproductive health status has consistently been reported as varying widely and has never been uniform across the country (Mitra et al. 1997). This study attempted to improve our understanding about socio-economic inequality in the use of reproductive health services in Bangladesh by analysis of the BDHS 2004 database. Three domains of reproductive health services – antenatal care, safe delivery place and postnatal care – were considered in the study.

Methods

The BDHS 2004 is the fourth survey of this type conducted in Bangladesh. Fieldwork commenced on January 1, 2004 and was completed on May 25, 2004. The 2004 BDHS survey was conducted under the authority of the National Institute for Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare of the Government of Bangladesh. The survey was implemented by Mitra and Associates, a Bangladeshi research firm located in Dhaka. ORC Macro of Calverton, Maryland, provided technical assistance to the project as part of its international demographic and health surveys (DHS) program, and financial assistance was provided by the U.S. Agency for International Development (USAID)/Bangladesh.

The 2004 BDHS sample is a stratified, multistage cluster sample consisting of 361 primary sampling units, 122 in the urban area and 239 in the rural area.

Details of the methodology have been described elsewhere (BDHS 2004). After receiving permission, we took the BDHS 2004 data set from the Internet (www.measuredhs.com). The data file consists of 11,440 eligible women from 10,500 households. It includes information on background characteristics (age, education, religion, etc.); socio-economic status; reproductive history; family planning methods; antenatal, delivery and postnatal care; breastfeeding and weaning practices; vacci-

nation and health of children under the age of five; marriage; fertility preferences; causes of death of children under age five, etc. These households (10,500) had consistent data for assets, housing conditions, and water and sanitation variables, sufficient to create a household socio-economic status index.

The data were analyzed using SPSS (version 11.5) software. Household wealth status was measured by applying principal component analysis (PCA), which involves breaking down assets (e.g., radio, bicycle) or household service access (e.g., water, electricity) into categorical or interval variables in a manner similar to the approach proposed by Filmer and Pritchett (1998, 2000) and used by others (e.g., Wagstaff and Watanbe 1999). Cross-tabulations and multivariate analysis were used to expose associations between the dependent and independent variables. Lastly, trend tests (chi square) were used to determine the significance of any gradient in inequalities.

The variable of interest in the study is the wealth quintile, which is a proxy for socio-economic status. Five wealth quintiles were defined: 1st (poorest), 2nd, 3rd, 4th and 5th (richest). First, we examined the bivariate association between the independent variables and dependent variable. We also examined three-dimensional associations between the dependent variable and household characteristics by wealth quintiles. We then developed statistical models to examine the net association between the dependent variable and wealth quintiles in the presence of the effect of other independent variables. We used a logistic regression model for the associations.

The basic approach to model building was to include the wealth index in each model and to include, sequentially, age, education, household size, number of children, partner's occupation, residence location and discussion with partner regarding family planning (FP). This approach allows for an assessment of the extent to which wealth differences in ANC utilization, use of delivery places and PNC utilization are associated with other factors.

Variable Definitions

Dependent Variables

Utilization of antenatal care (ANC): A woman was defined as having used ANC if she used those services one or more times during pregnancy. She was defined as a non-ANC user if she had no ANC visits.

Use of delivery place: A woman was defined as having used a delivery place if, for her pregnancy delivery, she went to any of the following: Government hospital, Government health centre, any maternal and child welfare centre, private hospital/clinic or NGO hospital/clinic. She was defined as not having used a delivery place if she delivered at her own home or another's home.

Utilization of postnatal care (PNC): A woman was defined as having used PNC if, after the birth of her baby, a health professional had checked her health within 42 days of delivery. She was defined as a non-PNC user if she had had no PNC visits within 42 days of delivery.

Independent variables

The independent variables used for this study are wealth index (socio-economic status), age, education, household size, number of living children, partner's occupation, residence location and discussion about methods of family planning (FP) with her partner.

The wealth index was prepared based on household assets (electricity, radio, bicycle, motor cycle, television, wardrobe, table, chair/bench, watch or clock, cot or bed, sewing machine, owns any homestead, owns any land, hygienic latrine, floor-wall-roof material) and household service access (e.g., water, electricity, cooking fuel). Later, this wealth index was used as a proxy for socio-economic status and constituted the independent variable wealth index.

Table 1. Reproductive healthcare utilization: ANC, delivery place and PNC by socio-economic and other household characteristics (weighted)

Indicators	Reproductive healthcare utilization (Percent of mothers)		
	ANC (n=5416)	Delivery place (n=5416)	PNC** (n=4838)
Wealth quintiles (Socioeconomic status)	p=0.000	p=0.000	p=0.000
1st (poorest)	33.7	2.2	13.0
2nd	45.9	3.5	16.8
3rd	58.4	6.2	16.5
4th	66.5	12.7	24.3
5th (richest)	84.1	33.7	30.1
Age	p=0.000	p=0.036	p=0.572
<20 years	59.3	10.8	20.3
20-34 years	56.9	11.3	18.3
35-49 years	42.7	6.4	19.6
Women's Education	p=0.000	p=0.000	p=0.000
No education	37.5	2.8	13.0
Primary	54.9	7.4	18.8
Secondary and higher	77.3	22.6	27.1
Household size	p=0.006	p=0.047	p=0.603
2-3	62.7	13.1	21.3
4+	54.0	10.8	16.7
Number of living children	p=0.000	p=0.000	p=0.007
No children	82.7	31.5	20.9
1 child	53.5	8.9	22.4
2 & above	51.9	7.3	17.0
Partner's occupation	p=0.000	p=0.000	p=0.000
Farmer	47.8	5.5	16.9
Agri & non-agri labourer	53.9	6.9	18.7
Semi-skilled labourer	66.1	16.9	21.5
Small businessman	58.3	12.7	19.4
Well-paid occupation*	77.0	32.1	29.6
Residence location	p=0.000	p=0.000	p=0.202
Urban	74.8	25.2	20.4
Rural	50.9	6.9	18.5
Discussed FP with partner	p=0.000	p=0.000	p=0.000
Never	51.1	8.7	16.9
Once or twice	58.5	12.2	20.5
More often	73.2	15.9	22.6

Note: * Well-paid occupation: Land owner, professional worker, big businessman.

** 578 (11%) women out of 5416 had delivered baby at a facility centre, were assumed to have received PNC and hence are not included in the PNC analysis.

Results

I. ANC for the Pregnant Mothers

Bivariate Associations

In the bivariate analysis, socio-economic status was strongly associated with utilization of ANC (Table 1). Besides this, the data revealed that more young (<20 years) pregnant women made ANC visits to healthcare providers (59%) than their counterparts aged 35–49 years (43%). ANC visits

were high among educated mothers (77%) compared with mothers with no education (38%). Also, ANC visits were highest among pregnant women without children, compared with those who already had children. Like wealth quintiles, ANC was higher among mothers with partners in a well-paid occupation. Table 1 also shows a significant difference between rural and urban households (51% versus 75%, respectively). Finally, women who discussed family planning (FP) with their partners most often used ANC more than their counterparts who seldom or never discussed it at all. Overall, ANC utilization revealed significant relationships with all variables, including socio-economic status, age of mother, maternal education, household size, number of living children, partner's occupation, residence location and discussion of FP with partners.

Association of ANC with Wealth Quintile and Household Characteristics

Table 2 presents ANC utilization by household characteristics and wealth quintile. On average, 56% of all women used ANC. The proportion of women using ANC increased with increasing wealth; more than twice as many women in the highest quintile used ANC (84%) compared to women in the lowest quintile (34%).

In all quintiles, the difference in ANC use between poorest (73%) and richest (89%) is less among women with no living children than with any other characteristic. Furthermore, women with no living children made the greatest use of ANC, with an average of 83%.

In terms of education, ANC use is significantly higher among educated women compared to those with less or no education. All the differences among quintiles are statistically significant. In addition, use of ANC shows an increasing trend from the poorest to the richest quintile in each category of educational achievement.

In terms of specific variables – age, partner's occupation and household size – while there is room for debate about variations within the quintiles, but for all variables – age, education, household size, number of living children, partner's occupation, residence location and discussion of FP with partners – the differences of variation between quintiles are statistically highly significant.

Results of Logistic Regression

The models for ANC utilization are presented in Table 3. Model-I shows unadjusted odds ratios, that is, this model showed that mothers in the richest quintile were 10 times more likely to have used ANC compared to the poorest quintile (reference category). Though mothers in all quintiles were significantly more likely to have used ANC compared with women in the poorest quintile, the difference between 4th and 5th quintiles is just notable, that is, the magnitude of the difference is striking. Model-II shows that after controlling for age, mothers in the richest quintile were again 10 times more likely to have used ANC compared with the poorest quintile (reference category), that is, adjustment of age does not bring any significant changes over the odds ratios. Considering maternal age, ANC utilization varied significantly between age groups: older mothers were less likely to use ANC than younger (<20 years) mothers.

Model-III showed that education contributes significantly to ANC utilization. Including education in the model caused age group to become insignificant and lowered the impact of the wealth index. Hence, education is likely one of the most important factors influencing ANC utilization. The influence of household size, number of living children, partner's occupation, residence location and discussion of FP with partner were also significant. However, apart from the variables such as education and number of living children, other variables did not substantially change the logistic models.

II. Use of Delivery Facilities by the Pregnant Women

Bivariate Associations

On average, a small proportion (11%) of women used delivery facilities; the remaining (89%) women gave birth either at their own home or at another's home. The bivariate analysis in Table 1 shows that the highest percentage (34%) of women going to a facility for their delivery were in

Table 2. Reproductive health care utilization: ANC by wealth quintiles and by household characteristics

Indicators	Quintiles (figures are in percentage)					Average
	1st (Poorest)	2nd	3rd	4th	5th (Richest)	(Chi-square trend)
	n=1298	n=1123	n=1054	n=998	n=943	n=5416
ANC utilization	33.7	45.9	58.4	66.5	84.1	55.9 (p=0.000)
Age specific ANC						
<20 years	36.02	55.16	61.57	72.02	88.39	59.35 (p=0.000)
20-34 years	33.98	44.78	59.10	67.52	84.84	56.90 (p=0.000)
35-49 years	28.75	37.04	47.57	47.06	70.89	42.88 (p=0.000)
Education specific ANC						
No education	28.83	36.36	46.29	46.19	63.33	37.54 (p=0.000)
Primary	39.89	51.36	58.84	61.93	71.43	54.97 (p=0.000)
Secondary and higher	51.43	56.89	70.47	78.30	91.65	77.27 (p=0.000)
Household size specific ANC						
2-3	40.64	62.25	73.48	70.27	86.02	62.64 (p=0.000)
4+	31.79	48.39	57.69	71.76	85.06	53.85 (p=0.000)
Number of living children specific ANC						
No children	72.73	65.52	78.00	68.12	88.55	82.67 (p=0.000)
1 child	31.80	47.83	52.53	72.25	84.72	53.46 (p=0.000)
2 & above	30.70	44.10	59.77	67.70	76.00	51.90 (p=0.000)
Partner's occupation specific ANC						
Farmer	32.34	39.03	58.30	56.44	65.00	47.92 (p=0.000)
Agri & non-agri labourer	37.30	52.76	58.44	72.90	80.56	53.92 (p=0.000)
Semi-skilled labourer	34.51	47.52	59.78	75.31	86.43	66.24 (p=0.000)
Small businessman	31.65	41.24	60.78	61.95	85.71	58.34 (p=0.000)
Well-paid occupation	50.00	39.13	55.56	75.82	90.09	77.31 (p=0.000)
Residence location specific ANC						
Urban	40.18	58.97	66.44	71.82	88.01	74.80 (p=0.000)
Rural	33.05	44.39	57.16	65.44	78.19	50.92 (p=0.000)
Discussed FP with partner specific ANC						
Never	29.84	43.86	55.74	65.20	80.22	51.09 (p=0.000)
Once or twice	37.55	47.18	58.10	65.66	84.65	58.50 (p=0.000)
More often	49.33	55.07	75.53	78.95	93.22	73.15 (p=0.000)

Well-paid occupation: Land owner, professional worker and big businessman.

Table 3. Logistic regression

Indicators	Model-1	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII
	Un-adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR
Wealth index								
1st (poorest) ^a								
2nd	1.671***	1.663***	1.416***	1.435***	1.410***	1.461	1.453***	1.456***
3rd	2.774***	2.738***	2.093***	2.141***	2.061***	2.125	2.097***	2.081***
4th	3.922***	3.886***	2.541***	2.653***	2.484***	2.522	2.460***	2.472***
5th (richest)	10.401***	10.457***	5.887***	6.089***	4.664***	4.584	4.147***	4.076***
Age								
<20 years ^a								
20-34 years		.809**	1.002	1.059	1.054	1.055	1.056	1.066
35-49 years		.494***	.752*	.816	.810	.814	.815	.825
Education								
No education ^a								
Primary			1.637***	1.626***	1.666***	1.700	1.701***	1.675***
Second. & above			3.163***	3.089***	3.281***	3.272	3.326***	3.262***
Household size								
2-3 ^a								
4+				.737**	.759*	.759*	.769*	.775*
Living children								
No children ^a								
1 child					.461***	.484***	.643**	.650*
2 & above					.456***	.477***	.639**	.640**
Partner's Occupation								
Farmer								
Labourer						1.531***	1.500***	1.517***
Semi-skilled labourer						1.463***	1.402**	1.407**
Small businessman						1.241*	1.191	1.196
Well-paid occupation						1.531**	1.488**	1.463**
Residence location								
Urban ^a								
Rural							.684***	.693***
Discussed FP with partner								
Never ^a								
Once or twice								1.105
More often								1.966***

*** p<0.001, ** p<0.01, * p<0.05, ^a Reference Category

Well-paid occupation: Land owner, professional worker, and big businessman.

the richest quintile, whereas the figure was only 2% for the poorest. Similarly, the highest proportion of mothers who delivered at a facility were (23%) educated; the smallest percentage had no education (3%). Women without children formed the greatest percentage using delivery facilities at 32%, compared to mothers with one or more children at 9% or less. For the other characteristics, mothers whose partner had a well-paying occupation, mothers living in an urban environment and mothers who discussed FP with their partners more often had the highest rates of delivery facility use. Moreover, all these differences were statistically significant. On the other hand, maternal age and household size did not show strong significant differences in use of delivery facilities.

Overall, utilization of delivery facilities showed significant relationships with all variables (socio-economic status, maternal education, number of living children, partner's occupation, residence location and discussion of FP with partners) except maternal age and household size.

Association of Using Delivery Facilities by Wealth Quintiles and Household Characteristics

Table 4 presents use of delivery place facilities by household characteristics and wealth quintile. The richest–poorest ratio of using delivery place facilities is over 15. Throughout all breaking characteristics, the inequalities trend among quintiles in use of delivery facilities has constantly been observed as very wide.

Table 1 showed that age and household size were not significant factors in use of delivery place facilities for mothers. In terms of wealth inequalities, Table 4 shows, irrespective of age, education, household size, number of living children, partner's occupation, residence location and discussing FP with partner, differences in wealth are statistically significant across all characteristics. Use of delivery place facilities increases with wealth status.

Table 4. Reproductive health care utilization: Using of delivery place facilities by wealth quintiles and by household characteristics

Indicators	Quintiles (figures are in percentage)					Average (Chi-square trend) N=5416
	1st (Poorest)	2nd	3rd	4th	5th (Richest)	
	n=1298	n=1123	n=1054	n=998	n=943	
Used delivery place	2.2	3.5	6.2	12.7	33.7	10.7 (p=0.000)
Age specific using of delivery place						
>20 years	5.69	3.59	8.80	15.48	31.25	10.75 (p=0.000)
20-34 years	1.73	3.52	5.84	13.02	34.44	11.26 (p=0.000)
35-49 years	0.00	2.96	2.91	5.88	30.38	6.41 (p=0.000)
Education specific using of delivery place						
No education	0.84	1.21	4.29	6.09	13.33	2.80 (p=0.000)
Primary	4.78	4.96	6.08	8.76	18.52	7.50 (p=0.000)
Secondary and higher	4.76	5.78	8.48	18.30	42.05	22.51 (p=0.000)
Household size specific using of delivery place						
2-3	5.35	3.97	10.61	21.62	40.86	13.19 (p=0.000)
4+	1.66	4.61	7.69	12.21	39.61	10.75 (p=0.000)
Living children specific using of delivery place						
No children	9.09	3.45	6.00	11.59	43.37	31.47 (p=0.000)
1 child	1.77	4.74	4.15	13.29	30.56	8.69 (p=0.000)
2 & above	2.25	4.51	6.77	10.51	20.00	7.29 (p=0.000)
Partner's occupation specific						
Farmer	1.49	4.09	4.26	7.92	18.75	5.57 (p=0.000)
Agri & non-agri labourer	1.85	1.51	7.14	13.55	24.07	6.84 (p=0.000)
Semi-skilled labourer	1.77	5.67	9.50	18.41	32.95	16.77 (p=0.000)
Small businessman	2.53	5.08	6.90	10.73	34.56	12.74 (p=0.000)
Well-paid occupation		3.04	4.17	18.68	49.14	32.18 (p=0.000)
Residence location specific						
Urban	3.57	5.13	10.27	11.05	41.80	25.11 (p=0.000)
Rural	2.11	3.28	5.51	13.11	21.54	6.89 (p=0.000)
Discussed FP with partner specific						
Never	1.70	3.76	6.67	12.24	29.27	8.69 (p=0.000)
Once or twice	2.84	2.93	5.48	14.04	35.53	12.27 (p=0.000)
More often	4.00	4.35	7.45	9.21	40.68	15.74 (p=0.000)

Well-paid occupation: Land owner, professional worker and big businessman.

Results of Logistic Regression

Table 5 presents results of the models for using delivery place facilities. Throughout all models, odds ratios do not differ significantly between the poorest and the 2nd quintile.

Table 5. Logistic regression

Indicators	Model-1	Model-I1	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII
	Un-adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR
Wealth Index								
1st (poorest) ^a	1.600	1.586	1.231	1.254	1.223	1.200	1.181	1.183
2nd	2.947***	2.894***	1.919**	2.014**	1.900**	1.646*	1.607*	1.605*
3rd	6.514***	6.428***	3.597***	3.959***	3.658***	3.089***	2.940***	2.941***
4th	22.639***	22.679***	10.935***	11.897***	8.856***	6.297***	5.245***	5.226***
5th (richest)								
Age								
<20 years ^a								
20-34 years		.812	.966	.982	.978	.912	.918	.921
35-49 years		.511***	.819	.888	.855	.751	.752	.753
Education								
No education ^a								
Primary			2.001***	1.980***	2.082***	1.974***	1.989***	1.980***
Second. & above			4.168***	4.062***	4.482***	3.764***	3.882***	3.869***
Household size								
2-3 ^a								
4+				.806	.831	.805	.826	.829
Living children								
No children ^a								
1 child					.519***	.515***	.736	.737
2 & above					.429***	.409***	.595**	.595**
Partner's occupation								
Farmer ^a								
Labourer						1.206	1.148	1.156
Semi-skilled labourer						1.781**	1.613**	1.617**
Small businessman						1.658**	1.501*	1.504*
Well paid						2.766***	2.528***	2.527***
Residence location								
Urban ^a								
Rural							.556***	.557***
Discussed FP with partner								
Never ^a								
Once or twice								1.008
More often								1.103

*** p<0.001, ** p<0.01, * p<0.05, ^a Reference Category

Well-paid occupation: Land owner, professional worker and big businessman.

Unadjusted odds ratios in model-I revealed that mothers in the richest quintile were 23 times more likely to have used delivery place facilities compared to the poorest quintile (reference category). Also striking is the difference in values of odds ratios between the 4th and 5th (richest) quintiles. Model-II shows that after controlling for age, mothers in the richest quintile were again 23 times

more likely to have used delivery place facilities compared to the poorest quintile: adjustment of age does not significantly change the odds ratios. However, adjustment of education brought the odds ratios from 23 times to 11 times compared with the poorest quintile. Including education in the model caused age to become insignificant and lowered the impact of the wealth index. Hence, education is likely one of the most important factors influencing mothers' use of delivery place facilities. Similarly, number of living children, partner's occupation and residence location are other significantly factors because adjustment of these variables in the model lowered the impact of the wealth index (Table 5). Overall, inclusion of age, household size and discussion of FP with partner did not substantially change the logistic models.

Table 6. Reproductive health care utilization: PNC by wealth quintiles and by household characteristics

Indicators	Quintiles (figures are in percentage)					Average (Chi-square trend) n=4838
	1st (Poorest) n=1270	2nd n=1085	3rd n=988	4th n=870	5th (Richest) n=625	
	PNC utilization	13.0	16.8	16.5	24.3	
Age specific PNC utilization						
>20 years	16.58	14.49	21.83	29.58	24.68	20.27 (p=0.000)
20-34 years	11.42	17.75	14.74	22.19	31.91	18.32 (p=0.000)
35-49 years	17.50	15.15	18.18	31.25	21.82	19.58 (p=0.000)
Education specific PNC utilization						
No education	10.84	14.34	9.85	20.65	20.19	12.98 (p=0.000)
Primary	15.93	19.53	15.88	19.47	27.92	18.75 (p=0.000)
Secondary and higher	20.00	16.98	24.28	30.03	34.06	27.05 (p=0.000)
Household size specific PNC utilization						
2-3	17.05	20.69	22.88	27.12	26.79	21.30 (p=0.000)
4+	12.84	17.39	12.50	29.82	19.35	16.74 (p=0.000)
Living children specific PNC utilization						
No children	15.00	10.71	17.39	18.03	25.53	21.28 (p=0.000)
1 child	15.83	20.42	15.87	32.67	43.43	22.36 (p=0.000)
2 & above	10.09	13.82	21.77	16.96	34.17	16.97 (p=0.000)
Partner's occupation specific PNC utilization						
Farmer	12.63	16.60	13.78	22.99	22.73	16.79 (p=0.000)
Agri & non-agri labourer	14.56	15.31	19.58	27.61	29.27	18.68 (p=0.000)
Semi-skilled labourer	12.61	16.54	18.52	25.77	28.90	21.47 (p=0.000)
Small businessman	12.34	19.05	13.43	24.04	29.37	19.21 (p=0.000)
Well-paid occupation	16.67	15.00	23.19	26.67	38.98	29.59 (p=0.000)
Residence location specific PNC utilization						
Urban	12.04	12.61	16.15	20.50%	27.58%	20.48 (p=0.000)
Rural	13.09	17.25	16.67	25.25%	33.22%	18.51 (p=0.000)
Discussed FP with partner specific PNC						
Never	11.97	16.13	13.27	24.02	27.97	16.96 (p=0.000)
Once or twice	14.38	16.71	19.40	24.20	32.99	20.58 (p=0.000)
More often	15.28	23.08	22.99	26.09	27.14	22.87 (p=0.000)

Well-paid occupation: Land owner, professional worker, and big businessman

III. PNC for the Mothers

Since 1998, 5416 (47%) of the 11,440 eligible women had given birth. Although many had more than one birth in this period, this analysis was limited to the most recent birth. Nevertheless, 578 (11%) women out of 5416 who had delivered their baby at a facility centre were assumed to have received PNC and hence these are not included in this PNC analysis.

Bivariate Associations

Bivariate analysis in Table 1 revealed that socio-economic status was strongly associated with utilization of PNC. In addition, education, number of living child, partner's occupation and discussion of FP with partner are other significant factors that influenced women's PNC utilization. PNC use is highest among the women in the richest quintile; age, household size and residence location did not make a significant difference in PNC use.

Comparing all background characteristics, women with partners in well-paid occupations showed the highest rate of PNC use (30%), followed by women with the highest education (27%) and women who discussed FP with their partner more often (23%).

Association of PNC with Wealth Quintile and by Household Characteristics

Utilization of PNC by household characteristics and wealth quintile is presented in Table 6. On average, 19% (909 out of 4838) of women used PNC. The proportion increased with increasing wealth: more than twice as many women in the richest quintile used PNC (30%) compared with women in the poorest quintile (13%).

Overall, Table 6 shows that irrespective of age, education, household size, number of living children, partner's occupation, residence location and discussing FP with partner, differences in wealth across all specific characteristics are statistically significant. Use of delivery place facilities increases with wealth status.

Results of Logistic Regression

The logistic models for PNC utilization are presented in Table 7. Model-I shows unadjusted odds ratios: this model revealed that mothers in the richest quintile were three times more likely to have used PNC than those in the poorest quintile (reference category). Unadjusted odds ratios in model-I also showed that ratios differ significantly between the poorest quintile (reference category) and 2nd and 3rd quintiles ($p < 0.05$) and with other quintiles (4th and richest; $p < 0.001$).

Though adjusting the model for age did not bring any significant change (model-II), adjusting for education reduced the differences between the poorest and 2nd and 3rd quintiles to insignificance and lowered the impact of the wealth index (model-III). Moreover, the odds ratios of education differed significantly compared to no education. Hence, other than wealth, education is likely one of the most important influences on PNC utilization.

In general, other than wealth and education, the logistic models in Table 7 revealed that partner's well-paid occupation and no living children influenced women's use of PNC positively.

Discussion and Conclusions

ANC Utilization

Older, poor, and less educated women are less likely to seek ANC (Thomas et al. 1997). Tables 1, 2 and 3 show a consistently wide variation in ANC across wealth quintiles. In Bangladesh, poorer mothers generally use ANC less than their richer counterparts. The general perception is that the wealthy are able to use ANC more than the poor (Hadi and Gani, 2005). Findings were similar for partner's occupation: women whose partner was well paid used ANC more than women whose partner was not.

In terms of age, the study revealed that young pregnant women (<20 years) had the highest use of ANC (59%); women aged 35 to 49 used it least (43%, Table 1). A study by Hadi and Gani (2005)

had similar findings: use by women aged 30 years or less was 40.8%, versus 28.9% for women over thirty. One possible reason for this could be that younger women know less about complications of pregnancy. Moreover, most women under 20 are first-time mothers and fearful about pregnancy complications. Irrespective of wealth, they tend to visit healthcare providers for ANC more than any other age group. However, the overall rate is far below expectations. Results were similar for women with no living children: their ANC utilization was higher than that of women with children.

The ANC analysis (Tables 1, 2 and 3) established that education is another positive factor for ANC use: educated mothers utilized ANC more than uneducated mothers. A study by Ahmed and colleagues (2003) also found that educated mothers were much more aware regarding ANC.

As per planning and management of the health sector in Bangladesh, though the rural health program comparatively seems to be more systematic (only by structure) than urban areas (Source:

Table 7. Logistic regression

Indicators	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII
	Un-adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR	Adj. OR
Wealth Index								
1st (poorest) ^a								
2nd	1.351*	1.342*	1.197	1.198	1.199	1.222	1.225	1.223
3rd	1.326*	1.321*	1.084	1.089	1.098	1.106	1.112	1.107
4th	2.149***	2.160***	1.626***	1.649***	1.696***	1.696***	1.718***	1.723***
5th (richest)	2.887***	2.923***	2.056***	2.080***	2.201***	2.121***	2.206***	2.188***
Age								
<20 years ^a								
20-34 years		.841	.957	.986	.977	.973	.971	.982
35-49 years		.978	1.291	1.338	1.319	1.313	1.312	1.340
Education								
No education ^a								
Primary			1.455***	1.452***	1.447***	1.457***	1.457***	1.445***
Second. & above			2.057***	2.034***	2.011***	1.977***	1.965***	1.935***
Household size								
2-3 ^a								
4+				.772	.773	.771	.767	.771
Living children								
No children ^a								
1 child					1.541**	1.541**	1.378	1.401
2 & above					1.057	1.048	.934	.951
Partner's Occupation								
Farmer								
Labourer (agri, non-ag)						1.254	1.265	1.299*
Semi-skilled labourer						1.165	1.187	1.204
Small businessman						1.118	1.137	1.149
Well-paid occupation						1.440*	1.453*	1.447*
Residence location								
Urban ^a								
Rural							1.167	1.176
Discussed FP with partner								
Never								
Once or twice								1.173
More often								1.253

*** p<0.001, ** p<0.01 * p<0.05, ^a Reference Category

Well-paid occupation: Land owner, professional worker, & big businessman

Health and Family Planning Management Structure in Bangladesh, 2005), this study found that women in urban areas had higher ANC utilization than those in rural areas (Tables 1, 2 and 3). A possible explanation is that there are more facilities and service providers in urban than in rural areas. Moreover, urban mothers have more interaction with knowledgeable mothers and consequently may have a higher degree of awareness. Finally, discussing family planning with their partner also contributed to ANC use.

Use of Delivery Place Facilities

Although place of delivery is an important factor for delivery outcome and health of the mother and the newborn, Barkat and Majid (2003) found that 96% of deliveries take place at home in Bangladesh. Another study (Reproductive Health in Rural Bangladesh Volume 2) revealed that over 90% of all deliveries were at home with untrained attendants, often in unsafe and unhygienic conditions. The findings in Tables 1, 4 and 5 show that most deliveries took place at the marital or another home, while only a small proportion (10.7%) occurred in health facilities.

Pregnancy delivery is one of the most sensitive issues in the life of women; hence a safe delivery place is essential. A study revealed that home delivery remains almost universal in Bangladesh and that use of a delivery place is higher among wealthier households (30%), educated mothers (23%) and in urban areas (22%) (Bangladesh Maternal Health Services and Maternal Mortality Survey 2001 Final Report [BMHS] 2003). Our study found a similar trend in the context of wealth, age, education, living children, household size, partner's occupation, location and discussion of FP with partners (Tables 1, 4 and 5). Similar to findings for ANC (Table 2), besides wealth, other positive characteristics (education, well-paid occupation, no living children, discussion with partners, etc.) influenced the use of delivery facilities. However, Table 1 revealed that wealth combined with the other positive characteristics further increases use of delivery facilities.

PNC Utilization

The three Bangladesh DHS surveys have provided data on ANC, place of delivery and delivery assistance, and limited information on PNC (Streatfield and Sabir, 2003) Another study revealed that of the three phases (ANC, delivery place and PNC), PNC is the most neglected (Goodburn et al. 1994). These two studies have similar findings to ours (Tables 1, 6 and 7). We also noticed that the magnitude of odds ratios is not much wider between the poorest and the richest quintiles in Table 7; as has been observed, this magnitude is wider in Tables 3 and 5. Possible reasons might be the associated costs, lack of privacy, preoccupation with the newborn, no reason to go and limited opportunity. The BMHS 2001 report also revealed that less than one in five women with recent deliveries reported having a PNC checkup for themselves and our study finding was almost identical, with an average of 19% of women received PNC. Logistics models (Table 7) showed that after wealth, education is the most powerful positive influence on PNC use.

Overall Conclusions

Proper care during pregnancy and after childbirth is important for the health of both the mother and her child. Findings revealed in Table 2 that only 56% of women utilized ANC; this figure dropped dramatically to 19% for PNC use (Table 6). Hadi and Gani (2005) found that about 37% of pregnant women had received ANC, while only half of them (18%) had used PNC. All background characteristics in this study differed significantly in influencing use of ANC services; however, this was not true for use of PNC, where mother's age, household size and household location were not found to be important.

The study here provided two important findings: the use of reproductive health services was largely inadequate at the aggregate level, and significant health sector inequality exists in Bangladesh. Though it is not certain whether the increased access to and the availability of services would lead to increased utilization of services among the poor and disadvantaged (Magadi, Madise et al., 2000), there was evidence to suggest that lack of availability of health services not only reduced the coverage

of services but also forced many women to seek alternative healthcare providers not acceptable by any standard (Whitehead et al. 2001). The socio-economic and regional inequality in the use of reproductive health services was very wide and poor women living in under-served regions suffered a greater burden than others during pregnancy and the post-natal period (Magadi, Madise et al., 2000).

Echoing the comments of Hadi and Gani (2005), although reproductive health services were expanded in the last two decades, they did not promote health equality because the services were available largely to urban centers. As a result, use of reproductive health services has remained very low among the poor and in under-served rural areas. Even in urban and better-served rural areas, the poor–rich inequality has continued to exist because health services were not designed for the poor (Hadi et al. 2001).

Inequalities in health and services utilization very largely reflect inequalities at individual and household levels, such as age, education, household size, living children, partner's occupation, location and discussion of family planning with partner (Wagstaff, 2002). This indicates that country policies and programs might need to aim at combating health sector inequalities. These include the quality and availability of health services, levels of knowledge and awareness – especially health-specific knowledge and awareness. Programs are needed to increase awareness and affordability in order to reduce inequalities among women irrespective of age, family size and existence of living children.

Bangladesh continues to face a formidable challenge in the improvement of health of the poor. In a society where incomes of the poor are too low to buy a minimum essential package, the provision should be developed to provide essential health services according to a sliding scale of fees for easily identified subgroups of the population. The health needs of the poor should be recognized and health interventions should be tailored to match the specific livelihood strategies of poor households. The distribution of health resources should focus not only on the size of the population but also on the burden of diseases (Whitehead et al. 2001). As a short-term policy measure, targeted health interventions may produce desired outcomes. Evidence suggests that a targeted approach has the potential to significantly raise access to health services in Bangladesh (Chowdhury and Bhuiya 1999; Hadi et al. 2001).

Since the focus of the health program should be equitable health development, the current health system should include pro-poor health components (Hadi and Gani 2005). Essential elements of this strategy should be the sensitization of the community to the benefits of this approach, inclusion of the poor in decision-making and raising access of the poor to basic health resources and services. Healthcare should not only be subsidized for the poor, but the mode of services must be appropriate to reach them. Policy options to improve maternal health should also include testing new initiatives and systematic interventions that would help in designing the most effective intervention models for the poor and disadvantaged. Health development can only be ensured by enhancing the lives of women and by providing them with freedom (Sen, 1999). Poor women in Bangladesh should be given that freedom to avoid ill health during pregnancy and escapable maternal mortality.

Long-term policy options must incorporate several other issues, including expansion of health programs to under-served poor regions and behavioral change through adult education among relatively older women, women belonging to a bigger household size, and women with children. Among other alternatives, re-allocation of health resources to reduce poor–rich gaps may be the viable option. The study argues for the development of new approaches that will prioritize the needs of the poorest and most disadvantaged.

Regarding policy issues, health ministries might work more closely with other ministries, but should also take a wider view, for example, exploring alternative delivery methods to reach the poor and finding improved ways of increasing knowledge among the poor about healthy behaviours. Expanded pro-poor health development programs could substantially improve access to and utilization of health services among the poor.

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References

- Ahmed, S.M., Abbas Bhuiya et al., *Monitoring the status of health equity in Bangladesh: the BHEW Survey 2002*, March 2003
- Bangladesh Demographic and Health Survey 2004 Report*, NIPORT, available at http://www.measuredhs.com/pubs/pub_details.cfm?ID=%20526&ctry_id=1&SrchTp=ctry&flag=sur
- Bangladesh Maternal Health Services (BMHS) and Maternal Mortality Survey 2001*, Final Report, NIPORT, ORC Macro, JHU-Maryland & ICDDR,B, December 2003
- Barkat, A. and Murtaza Majid. *Adolescent Reproductive Health In Bangladesh: Status, Policies, Programs, and Issues*. Policy project, January 2003
- Bhuiya, A., M. Choudhry, F. Ahmed and A.M. Adams (2001). 'Bangladesh: An Intervention Study of Factors Underlying Increasing Equity in Child Survival'. In T. Evans, M. Whitehead, F. Diderichsen, A. Bhuiya, and M. Wirth (eds). *Challenging Inequities in Health. From Ethics to Action*. Oxford University Press: New York.
- Chowdhury, A.M.R. and A. Bhuiya (1999). 'Do poverty alleviation programmes reduce inequalities in health? The Bangladesh experience'. In D. Leon and G. Walt (eds). *Poverty, Inequalities and Health*. Oxford University Press: Oxford.
- Evans, T., M. Whitehead, F. Diderichsen, A. Bhuiya, and M. Wirth (eds) (2001). *Challenging Inequalities in Health. From Ethics to Action*. Oxford University Press, New York.
- Filmer, D. and L. Pritchett 1998. 'Estimating wealth effects without income of expenditure data – or tears: An Application to Educational Enrollments in States of India'. *World Bank Policy Research Working Paper*.
- Filmer, D. and L. Pritchett (2000). 'Estimating wealth effects without expenditure data- tears: An application to educational enrollments in states of India'. *World Bank Policy Research Working Paper No. 1994*. World Bank: Washington DC.
- Goodburn, E.A., M Choudhury, R. Gazi, et al, *Maternal Morbidity in rural Bangladesh*, BRAC In collaboration with the London School of Hygiene and Tropical Medicine, 1994.
- Hadi, A. and M. Showkat Gani, 2005. Socio-economic and Regional Inequality in the Utilization of Reproductive Health Services in Bangladesh, *Indepth Network 2005*.
- Hadi, A., S.R. Nath and A.M.R. Chowdhury 2001. 'The Effect of Micro-credit Programmes on the Reproductive Behaviour of Women in Rural Areas of Bangladesh'. In Z. Sathar and J.F. Philips (eds). *Fertility Transition in South Asia*. Oxford University Press: New York.
- Krasnik, A., (1996) 'The concept of equity in health services research'. *Scandinavian Journal of Social Medicine*. 24(1): pp. 2-7.
- Leon, D. and G. Walt. 1999. 'Poverty, Inequality, and Health in International Perspective: A Divided World?' In D. Leon and G. Walt (eds). *Poverty, Inequality and Health*. Oxford University Press: Oxford.
- Magadi, M.A., N.J. Madise and R.N. Rodrigues 2000. 'Frequency and timing of antenatal care in Kenya: explaining the variations between women of different communities'. *Social Science and Medicine*. 51:pp. 551-561.
- Makinen M., H. Water, M. Rauch, et al. (2000). 'Inequalities in healthcare use and expenditures: empirical data from eight developing countries and countries in transition'. *Bulletin of the World Health Organization*. 78(1): pp. 55-65.
- Mitra, S.N., A. Al-Sabbir, A.R. Cross and K. Jamil. 1997. *Bangladesh Demographic and Health Survey 1997-1997*. NIPORT, Mitra Associates and Macro International: Dhaka.
- Sen. A. 1999. 'Health in development'. *Bulletin of the World Health Organization* 77(8): pp. 619-623.
- Streatfield, P. K., and Ahmed Al-Sabir *Policy Implications. Bangladesh Maternal Health Services and Maternal Mortality Survey 2001*, Final Report, NIPORT, ORC Macro, JHU-Maryland & ICDDR,B, December 2003.
- Thomas T. Kane, Barkat-e-Khuda, & James F. Philips. *Reproductive Health in Rural Bangladesh Policy and Programmatic Implications*, Vol-2, 1997.

Wagstaff, A. 2002. 'Poverty and health sector inequalities'. *Bulletin of the World Health Organization*. 80(2): pp. 97-105.

Wagstaff, A. and N. Watanabe 1999. *Inequalities in child malnutrition in the developing world*, DECRG, The World Bank, Washington, DC.

Whitehead, M., G. Dahlgren, and L. Gilson 2001. 'Developing the Policy Response to Inequalities in Health: A Global Perspective'. In T. Evans, M. Whitehead, F. Diderichsen, A. Bhuiya and M. Wirth (eds). *Challenging Inequities in Health. From Ethics to Action*. Oxford University Press: New York.

WHO 2000. 'Pregnancy Exposes Women in poor states to 200-fold risk of death, compared with rich ones, says WHO'. *Populi*. 27(2). pp. 4.