

The impact of Gonoshasthaya Kendra's Micro Health Insurance plan on antenatal care among poor women in rural Bangladesh

Mohammad Touhidul Islam*, Isao Igarashi, Koichi Kawabuchi

Health Care Economics, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Tokyo, Japan.

Summary

Low utilization of antenatal care (ANC) by pregnant women, particularly in rural areas, is an obstacle to ensuring safe motherhood in Bangladesh. Currently, Micro Health Insurance (MHI) is being considered in many developing countries as a potential method for assuring greater access to health care, especially for the poor. So far, there is only limited evidence evaluating MHI schemes. This study assesses the impact of MHI administered by Gonoshasthaya Kendra (GK) on ANC utilization by poor women in rural Bangladesh. We conducted a questionnaire survey and collected 321 valid responses from women enrolled in GK's MHI scheme and 271 from women not enrolled in any health insurance plan. We used a two-part model in which dependent variables were whether or not women utilized ANC and the number of times ANC was used. The model consisted of logistic regression analysis and ordinary least squares regression analysis. The main independent variables were dummies for socioeconomic classes according to GK, each of which represented the premiums and co-payments charged by class. The results showed that destitute, ultra-poor, and poor women enrolled in MHI used ANC significantly more than women not enrolled in health insurance. Women enrolled in MHI, except for those who were destitute or ultra-poor, utilized ANC significantly more times than women not enrolled in health insurance. We assume that GK's sliding premium and co-payment scales are key to ANC utilization by women. Expanding the MHI scheme may enhance ANC utilization among poor women in rural Bangladesh.

Keywords: Antenatal care, Micro Health Insurance (MHI), Gonoshasthaya Kendra (GK), poor women, rural Bangladesh

1. Introduction

Antenatal care (ANC) is an important prerequisite for ensuring safe motherhood. ANC demands that pregnant women deliver under the care of skilled birth attendants (1), and its absence is a vital factor in maternal death (2,3). It is effective in detecting and preventing many health problems that women suffer and reduces their vulnerability. Thus, health education and awareness achieved through ANC enables pregnant women to identify the symptoms of maternal

complications and prepares them to seek proper health services in emergencies, thus helping to save the lives of mothers (4).

Even though some progress has been made in maternal health over the past decade through national and global efforts aimed at reaching Millennium Development Goal 5, the number of pregnant women receiving ANC in Bangladesh remains alarmingly low. Impoverished socio-economic conditions interact with cultural and geographical barriers to cause low use of ANC, particularly in rural areas. Moreover, a very inequitable distribution of health facilities and a dearth of medical professionals in rural areas undermine demand for maternal care among pregnant women (5,6). As a consequence, only 46.4% of pregnant women in rural areas are likely to receive ANC even once with a medically trained professional compared to 71.3% in urban areas, even though the WHO recommends at

*Address correspondence to:

Dr. Mohammad Touhidul Islam, Health Care Economics, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo 113-8549, Japan.
E-mail: abir.hce@tmd.ac.jp; abir47@yahoo.com

least 4 ANC visits for safe motherhood (7,8).

Of national health expenditures, 71% come from private sources (9). Thus, out-of-pocket payment dominates over financed health care in Bangladesh. In theory, there is universal coverage through user fees at public health facilities, but since the government spends only US\$3 per capita on health, the health care delivery system cannot offer health services to everyone (US\$1 = 74 taka) (9). The fee for an outpatient consultation, including ANC, at a rural public health facility is free or 3 taka, depending on the type of facility. Quite frequently, however, unofficial fees, mainly in the form of bribes charged at public facilities, raise the cost so much that poor people often cannot afford care as they are not covered by any type of health insurance or other financial protection (10,11). The Household Income and Expenditure Survey 2005 showed that unofficial fees raised the average outpatient consultation fee, including ANC, to 44 taka at public health facilities. Such additional costs further interfere with poor women's use of public health facilities (12). Thus, poor women, and particularly those in rural areas, remain excluded from existing public health service arrangements.

Maternal mortality is extremely prevalent among the lower economic group and in rural areas (13). Eighty percent of the total population resides in rural areas and 43.8% of the rural population lives under the poverty line (14). Maternal improvements will not materialize unless these large, neglected segments are addressed properly by health care intervention. In this context, there is a need to focus on certain pro-poor strategies in rural settings to ensure that poor women have access to maternal care services.

Recently, Micro Health Insurance (MHI) has appeared in many developing countries as a useful tool for making extra financial resources available and elevating demand for health services (15). MHI is a social protection program implemented by a community-based organization, rather than government or a private for-profit company, that provides risk-pooling through low pricing and affordable premiums to cover the costs of essential health care services, to a certain extent, for poor people who are unable to afford formal health insurance (16). It offers more reliable premiums and co-payments than regular health insurance but is limited to defined health risks. Unlike commercial health insurance, MHIs are voluntary and non-profit in nature.

MHIs are usually designed to be simple, charging flat premiums and providing one-size benefit packages, although some offer sliding premium scales, renewal fees, consultations, and drug co-payments to make them more accessible to the poorest groups. MHI mobilizes extra resources in the community but cannot cover total health costs. Previous studies have shown that enrollment in MHI was associated with higher utilization of modern health care and protected the

poor from financial risk (17-19). However, in some MHI schemes, sufficiently rich groups may remain absent when pooling required resources. Thus, many MHIs receive financial support from donors, central and local governments, international non-governmental organization (NGOs), micro finance institutes, trade unions, or cooperatives. These external subsidies help sustain these voluntary organizations in the face of low revenue generation and adverse selection (16).

Such schemes have successfully increased maternal care utilization in West Africa (20). Some MHI schemes have proven beneficial by including the poorest people in developing countries (19,21) but others have excluded them (22,23). To address whether prepayment schemes are effective tools, the World Health Report 2000 showed the necessity of investigating their effects on poor people (24).

MHI is a growing sector in Bangladesh, but is still a new concept. Several NGOs are launching small-scale MHI schemes across the country, particularly in remote areas where conventional health services are unavailable. These schemes mainly provide primary health care services to rural people and prioritize maternal health care services. All of them play the role of both insurer and service provider and only two schemes cover any part of hospitalization costs.

At present, there is little published evidence of the impact of these schemes on maternal care utilization by individuals in Bangladesh. Previous studies of these schemes were mainly conceptual and based on administrative information. The current study focuses on ANC utilization by pregnant rural women under an MHI scheme administered by Gonoshasthaya Kendra (GK), one of the largest health-related NGOs in Bangladesh. An advantage of GK is that it offers health service benefits to the poor with premiums and co-payments on sliding scales. The aim of this study is to evaluate the effect of enrollment in GK's MHI on women, and particularly on poorer women, by examining its ability to enhance ANC utilization in rural areas. The findings are expected to contribute to Bangladesh's health policy.

GK is a pioneering health-related NGO in Bangladesh, established in 1972 in the rural Savar upazila (sub-district) of the Dhaka district, which is 30 km from the capital city. It started a health insurance scheme in 1975 to ensure that poor and marginalized rural people had access to health care services. GK categorizes members into five socioeconomic groups by assessing the socio-economic status of households and provides health services with premiums and co-payments set on sliding scales to protect poor people. Of those enrolled in GK's MHI scheme, 65.5% are destitute, ultra-poor, or poor (25). GK never allows health care providers to impose any unofficial fees on its enrollees above regular premiums and co-payments, effectively protecting them against financial risk. The

plan provides health services to rural areas *via* a tertiary hospital with 150 beds in Savar upazila in the Dhaka district, 10 health centers, and 31 sub-centers across the country.

To provide health services at the community level, GK establishes sub-centers (mini-clinics) in rural areas of all the upazilas covered by GK activities. Every sub-center has a normal delivery facility and drug dispensary. Five to eight paramedics, most of whom are females trained in primary health care, work in a typical sub-center. An experienced paramedic heads each sub-center, a skilled birth attendant and a pathology technician are stationed there, and a doctor visits twice a week. Other paramedics provide ANC, immunize mothers, provide postnatal care, encourage health awareness, and promote nutritional diets among rural women during home visits. They are also responsible for recruiting enrollees in health insurance, organizing medical gatherings and community meetings, and conducting community surveys and other related activities in remote areas to treat pregnant women (Table 1).

2. Materials and Methods

2.1. Data

A questionnaire survey was conducted from October 2010 to February 2011 to collect primary individual data. At present, GK administers MHI schemes in at least part of the rural areas of 16 upazilas in 11 districts. Among these, there is extensive coverage in the rural areas of Dhaka district. For the current study, two upazilas in Dhaka district and three upazilas in other districts were selected. The number of subjects was chosen in light of the population covered by MHI

schemes in these areas. Surveyed were 170 subjects from the rural areas where GK's MHI scheme operates in the two Dhaka district upazilas and 180 subjects from the three upazilas in other districts. Data were collected from GK members utilizing systematic random sampling. The names and addresses of mothers enrolled in MHI were collected from existing GK sub-centers. These names were listed in alphabetical order and numbered from the top. Women with numbers that were multiples of 3 (*i.e.*, 3, 6, 9...) were chosen from the list. The sampling process was repeated if the subject quota was not filled.

For comparison, other rural areas where GK does not operate its MHI or health service activities were chosen from each of the five upazilas noted above (Table 2). Some rural areas where GK operates were saturated with insured households, so a sufficient number of subjects not enrolled in health insurance could not be assembled there. Moreover, GK's MHI scheme had already been in operation in most of the rural areas in the two chosen upazilas in Dhaka district. Additional rural areas where GK's scheme was not in operation were selected from another upazila in Dhaka district to allow selection of a sufficient number of subjects not enrolled in health insurance from the entire Dhaka district. Subjects were 145 individuals in three Dhaka district upazilas and 135 individuals in three upazilas outside Dhaka district. Due to lack of administrative information on births, the addresses of women with infants were collected locally. Data were collected randomly from those rural areas.

Six experienced female interviewers and two field investigators were recruited to conduct this survey. An expert familiar with the designed questionnaire trained these female interviewers to recognize ANC

Table 1. Gonoshasthaya Kendra's Micro Health Insurance

Key features	Characteristics				
Area covered	592 villages in 31 unions of 16 upazilas across 11 districts				
Access status	Voluntary; Entire household				
System providing health service	Tertiary hospital (Dhaka district); Health centers (secondary hospital); Sub-centers (mini-clinics) at the union level; Home visits by health workers; Referral services to public hospitals				
Type of service covered	Curative care; Delivery; Preventive care and family planning				
	Destitute	Ultra-poor	Poor	Middle-class	Rich
Annual premiums (taka/household)	5	6	10	60	80
Co-payments for MHI members (taka)					
Consultation at center	2	3	5	8	12
Consultation in village	Free	Free	2	5	8
Medicine	Free	50%	75%	100%	100%
Normal delivery at mini clinic/center	Free	Free	100	400	500
Caesarean delivery	100	200	1,000	3,600	4,800
Midwife services at home for delivery					
	Ability-to-pay in all classes				
Financial mechanism	Revenue generation from premiums and hospital profits; Subsidies from commercial GK projects; International donations				

Gonoshasthaya Kendra's socioeconomic classes are defined as Destitute: Widows or abandoned women. Ultra-poor: Very distressed families, beggars, and the physically disabled. Poor: Landless farmers, door-to-door vendors, or others who cannot meet basic needs. Middle-class: Households with 2-3 acres of land and who can meet basic needs. Rich: Households with more than 3 acres of land, owners of big shops, highly paid professionals, and those who have savings at the end of the year.

Table 2. Study sites and number of subjects

Upazila (sub-district)	District	Location from capital city Dhaka	Enrolled in GK		Not enrolled in GK	
			Target	Obtained	Target	Obtained
Kutubdia	Cox's Bazaar	350 km southeast	60	59	45	42
Cox's Bazaar	Cox's Bazaar	350 km southeast	60	57	45	44
Sreepur	Gazipur	65 km northeast	60	58	45	43
Dhamrai	Dhaka	35 km northwest	85	71	45	43
Savar	Dhaka	30 km northwest	85	76	50	50
Keranigonj	Dhaka	20 km southwest	--	--	50	49
Total			350	321	280	271

utilization based on a specific definition and to apply that definition equally for all of the sample population. Women who consulted or participated in any screening by a health professional regarding their pregnancy, either at home or in a facility, were counted as having used ANC. Interviewers were trained to identify ANC involving the services of a health professional by asking respondents several questions. A health professional was defined as a person with formal medical schooling: a doctor, paramedic, skilled birth attendant, midwife, or nurse. On this basis, consultation of a GK's health visitor or a Family Welfare Visitor recruited by the government was also counted as ANC utilization, but traditional birth attendants, village doctors, and drug vendors were not included in this category.

In order to equally survey both literate and illiterate women, data were collected through direct interviews. That is, interviewers asked all questionnaire items and wrote all of their answers on answer sheets. No respondent filled in the sheet personally. In this study, women who had not given birth within 1 year were excluded from analysis. Datasheets with missing information were excluded, so a total of 321 valid data sheets were obtained from GK members and 271 from non-members (Table 2).

The ethical committee of Tokyo Medical and Dental University and the Bangladesh Medical and Research Council approved this study.

2.2. Statistical model

The analysis of the data was designed to examine the effect of enrollment in MHI by comparing the ANC utilization by women enrolled in MHI and women not enrolled in health insurance. ANC utilization can be considered as consisting of two parts: a woman's choice of whether she utilizes ANC, and how many times she utilizes it. This approach is similar to that in literature concerning health service utilization (26,27). Thus, a two-part model was created (28). The first part of the model was logistic regression analysis. The dependent variable was binary and equal to 1 if an individual woman utilized ANC, 0 if not. The second part was an ordinary least squares (OLS) regression analysis with the number of times ANC was used as the dependent

variable.

In addition, this study attempted to identify how effectively the sliding premiums and co-payments applied to different socioeconomic classes encouraged poor groups to use ANC. Thus, dummy variables for socioeconomic classes according to GK were entered in the model as the main independent variables. As mentioned above, socioeconomic classes according to GK were destitute, ultra-poor, poor, middle-class, and rich (Table 1). Destitute was, however, combined with ultra-poor and only four dummy variables were prepared since there was only one destitute respondent. The coefficient of the socioeconomic class dummies was designated α_n , with the subscript (n) ranging from 1 (Destitute and Ultra-poor) to 4 (Rich). The dummy variable of the specific class n was equal to 1 if an individual woman belonged to the class or was 0 if the woman belonged to another class. Because socioeconomic classes according to GK were indicated only for women enrolled in MHI, women not enrolled in health insurance were not assigned to any class. All of the latter women were pooled into a reference category for the socioeconomic classes in the model.

Moreover, annual household income was entered in the model to exclude its influence on ANC utilization from the estimates of α_n . Cross terms were also entered in the model. These were the product of enrollment status and household income. Enrollment status was expressed as an enrollment dummy and a non-enrollment dummy. The enrollment dummy was equal to 1 if a woman was enrolled in MHI and 0 otherwise. The non-enrollment dummy was equal to 1 if a woman was not enrolled in MHI and 0 otherwise. For ease of interpretation, the cross term with the enrollment dummy was entered in the first part of the model, while the other cross term with the non-enrollment dummy was entered in the second part. In the first part, the cross term and the non-cross term corresponded to the annual household income of women enrolled in MHI and women not enrolled in health insurance, respectively. In the second part, conversely, the cross term and the non-cross term corresponded to the annual household income of the women not enrolled in health insurance and those enrolled in MHI, respectively. The effect of income could thus be separately addressed for women

enrolled in MHI and women not enrolled in health insurance. In addition, the median (60,000 taka) annual household income of all groups was subtracted from the individual values in the model for ease of interpretation. The coefficients of annual household income (non-cross term) and its cross terms with enrollment and non-enrollment were designated β_1 , β_2 , and β_3 , respectively. Estimates of α_n showed the effect of enrollment in MHI on the utilization of ANC in the first part and the number of times ANC was used in the second part. The effect is associated with a specific socioeconomic class n and is based on the entire pool of respondents not enrolled in health insurance, excluding the effect of income and other independent variables. β_1 and β_2 in the first part of the model show the effect of household income among women not enrolled in health insurance and women enrolled in MHI, respectively; β_1 and β_3 in the second part show the same effect among women enrolled in MHI and those not enrolled in health insurance, respectively.

Data on individual, household, and community level attributes included information on the following control variables that might influence ANC utilization (29-32): maternal age (age of woman at last birth), the woman's educational level, and birth order as individual variables; religion and occupation of household head as household variables; and area of residence and distance from a primary health care provider or facility as community level variables. Maternal age, birth order, and distance to a primary health care provider

were input as continuous variables. However, women's educational level, occupation of the household head, religion, and area of residence were input as categorical variables. A woman's educational level was categorized by final grade she attended school. Women who had not received a formal education were categorized as having no education. Grades 1 to 5, grades 6 to 10, and grades 11 and above were designated as the primary, secondary, and high education, respectively. The occupations of household heads were farmers, day laborers, providers of services, businessmen, other, or unemployed. Religions in the model were limited to Muslim and Hindu.

The statistical software used in this study was SPSS version 16. Statistical significance was set at $p < 0.05$.

3. Results

3.1. Descriptive statistics

The sample population's socio-economic and demographic characteristics are summarized in Table 3. The mean maternal age of surveyed women was 24.3 (Standard Deviation (S.D.) = 4.4) years among enrolled women, which was significantly lower than the 25.2 (S.D. = 4.7) years of among non-enrolled women. The average annual household income of enrolled women was 69.8 (S.D. = 43.2) thousand taka and 74.9 (S.D. = 50.8) thousand taka for non-enrolled women. 28.7% of enrolled women and 28.4% of non-enrolled women

Table 3. Socio-economic and demographic characteristics of the sample population

Variables	Enrolled in MHI (n = 321)		Not enrolled in health insurance (n = 271)	
	Mean	S.D.	Mean	S.D.
Continuous variables				
Maternal age (years)**	24.3	4.4	25.2	4.7
Annual household income (1,000 taka)	69.8	43.2	74.9	50.8
Birth order*	2.3	1.3	2.5	1.1
Distance to a primary health care provider (km)	2.6	1.8	2.7	1.8
Categorical variables				
	Frequency	(%)	Frequency	(%)
Women's educational level				
No education	92	(28.7)	77	(28.4)
Primary	90	(28.0)	83	(30.6)
Secondary	117	(36.4)	95	(35.1)
Higher	22	(6.9)	16	(5.9)
Religion				
Muslim	232	(72.3)	203	(74.9)
Hindu	89	(27.7)	68	(25.1)
Occupation of household head				
Farmer	60	(18.7)	63	(23.2)
Day laborer	95	(29.6)	61	(22.5)
Provider of services	62	(19.3)	56	(20.7)
Businessman	67	(20.9)	57	(21.0)
Other	24	(7.5)	25	(9.2)
Unemployed	13	(4.0)	9	(3.3)
Area of residence				
Outside Dhaka district	174	(54.2)	129	(47.6)
Dhaka district	147	(45.8)	142	(52.4)

N: number of observations; S.D.: standard deviation. A two-tailed *t*-test was performed for each case of continuous variables to test for significant differences (** $p < 0.05$, * $p < 0.10$). A lack of significance was determined using a chi-squared test for each categorical variable.

were without any formal education. On the other hand, 6.9% of enrolled women and 5.9% non-enrolled women were in the higher educational category. On average 72.3% of enrolled women and 74.9% of non-enrolled were Muslims and the rest were Hindus. Among household heads, day laborers (29.6%) dominated in the enrolled group, and more of the non-enrolled household heads were farmers (23.2%) than any other occupation. The average birth orders of women were 2.3 (S.D. = 1.3) and 2.5 (S.D. = 1.1) among enrolled and non-enrolled women, respectively. The average distance to a primary health care provider for enrolled women was 2.6 (S.D. = 1.8) kilometers, with non-enrolled women averaging 2.7 (S.D. = 1.8) kilometers. In this study, 54.2% of the enrolled women and 47.6% of non-enrolled were from outside the Dhaka district and the rest were from rural areas of Dhaka district. There was no significant difference in the socio-economic and demographic characteristics of the two groups except maternal age.

The distribution of ANC utilization among the enrolled respondents, grouped by GK's social classes, and the entire non-enrolled group is shown in Table 4. The ratio of those who utilized ANC among all enrolled women formed an arc with a peak of 34.3% with 2 visits. On the other hand, the ratio among all non-

enrolled women showed a decreasing trend from 39.5% with no use to 5.9% with 4 or more visits. The average number of ANC visits was 2.3 among enrolled women and 1.1 among non-enrolled women. More precisely, in enrolled women grouped by social class, the average number showed an increasing trend of ANC utilization from 1.2 times with the destitute and ultra poor class to 3.1 times with the rich class. Moreover, since the non-enrolled women were not grouped into classes, the distribution of ANC utilization in both enrolled and non-enrolled women is shown by household income quintile instead of GK's social classes in Table 5. Among both the enrolled and non-enrolled women, the average numbers showed increasing trends from the first household income quintile (poorest) to the fifth (richest). The average number was larger for enrolled women than non-enrolled women in every quintile.

3.2. Two-part model

The results of the two-part model are presented in Table 6. The main independent variables of interest are the social class dummies of enrolled women. The results of the first part show that the odds of choosing ANC utilization among destitute and ultra poor enrolled

Table 4. Number and percentage of respondents by times ANC was used by subjects enrolled in MHI by socioeconomic class and for all subjects not enrolled in health insurance

Number of times ANC was used	0	1	2	3	4 or more	Total	Mean
Enrolled in MHI							
Destitute and Ultra-poor	1 (6.7)	11 (73.3)	2 (13.3)	1 (6.7)	0 (0.0)	15 (100.0)	1.2
Poor	10 (5.3)	38 (20.0)	75 (39.5)	43 (22.6)	24 (12.6)	190 (100.0)	2.2
Middle-class	11 (13.6)	8 (9.9)	27 (33.3)	26 (32.1)	9 (11.1)	81 (100.0)	2.3
Rich	2 (5.7)	4 (11.4)	6 (17.1)	10 (28.6)	13 (37.1)	35 (100.0)	3.1
Total	24 (7.5)	61 (19.0)	110 (34.3)	80 (24.9)	46 (14.3)	321 (100.0)	2.3
Not enrolled in health insurance ^a	107 (39.5)	79 (29.2)	51 (18.8)	18 (6.6)	16 (5.9)	271 (100.0)	1.1

^a Individuals not enrolled in health insurance were not classified into socioeconomic classes. Annual household income for women enrolled in MHI by socioeconomic class according to GK was as follows: Destitute and Ultra-poor: 12,000-36,000 taka, Poor: 25,000-80,000 taka, Middle-class: 60,000-120,000 taka, Rich: 108,000-280,000 taka. Income for women not enrolled in health insurance was 15,000-360,000 taka.

Table 5. Number and percentage of respondents by times ANC was used by subjects enrolled in MHI and subjects not enrolled in health insurance by household income quintile

Number of times ANC was used	0	1	2	3	4 or more	Total	Mean
Enrolled in MHI							
1st quintile (poorest)	5 (6.0)	26 (31.0)	30 (35.7)	16 (19.0)	7 (8.3)	84 (100.0)	2.0
2nd quintile	3 (5.3)	14 (24.6)	23 (40.4)	11 (19.3)	6 (10.5)	57 (100.0)	2.1
3rd quintile	6 (10.7)	8 (14.3)	20 (35.7)	13 (23.2)	9 (16.1)	56 (100.0)	2.3
4th quintile	6 (10.3)	3 (5.2)	22 (37.9)	21 (36.2)	6 (10.3)	58 (100.0)	2.4
5th quintile (richest)	4 (6.1)	10 (15.2)	15 (22.7)	19 (28.8)	18 (27.3)	66 (100.0)	2.8
Total	24 (7.5)	61 (19.0)	110 (34.3)	80 (24.9)	46 (14.3)	321 (100.0)	2.3
Not enrolled in health insurance							
1st quintile (poorest)	33 (61.1)	15 (27.8)	5 (9.3)	1 (1.9)	0 (0.0)	54 (100.0)	0.5
2nd quintile	26 (53.1)	16 (32.7)	6 (12.2)	1 (2.0)	0 (0.0)	49 (100.0)	0.6
3rd quintile	19 (32.2)	27 (45.8)	10 (16.9)	3 (5.1)	0 (0.0)	59 (100.0)	0.9
4th quintile	18 (32.7)	15 (27.3)	13 (23.6)	6 (10.9)	3 (5.5)	55 (100.0)	1.3
5th quintile (richest)	11 (20.4)	6 (11.1)	17 (31.5)	7 (13.0)	13 (24.1)	54 (100.0)	2.2
Total	107 (39.5)	79 (29.2)	51 (18.8)	18 (6.6)	16 (5.9)	271 (100.0)	1.1

Annual household income quintiles were as follows: 1st quintile: 12,000-36,000 taka, 2nd quintile: 40,000-50,000 taka, 3rd quintile: 54,000-70,000 taka, 4th quintile: 72,000-95,000 taka, 5th quintile: 96,000-360,000 taka.

women was a significant 70.9 times more than among the overall group of non-enrolled women, controlling for household income and other independent variables. Similarly, the odds among the poor class of enrolled women were also a significant 29.6 times higher. These results point to enrollment in MHI as being effective in women's choosing ANC utilization for certain poor groups, corresponding to GK's destitute, ultra poor, and poor social classes. On the other hand, the results of the second part show that the number of ANC visits undergone by poor, middle, and rich classes of enrolled women was significantly larger by 0.98, 0.87, and 0.81 visits, respectively, than among whole non-enrolled women. It is possible that enrollment in MHI is effective in increasing the number of ANC visits, except for those in the destitute and ultra poor classes.

Moreover, the first part of the model showed that household income was positively associated with the odds of choosing ANC utilization, and the second showed it to be positively associated with a higher number of ANC visits. These results indicate that with an increase in household income of 1,000 taka, non-enrolled women were 1.01 times more likely to choose ANC utilization at an income level of 60,000 taka, and enrolled women underwent an additional incremental 0.007 visits. Furthermore, the cross term of enrollment status and household income tended to show larger effects than the non-cross term but was not significant in either the first part or the second part. Income effects are always pro-rich in both choice of ANC and the number of visits undergone among both enrolled and non-enrolled women.

The educational level of women was also significant in the first part of the model. Those attaining higher educations had 12.6 times higher odds, and those with secondary educations had 2.2 times higher odds associated with choosing ANC utilization than those with no formal education. The odds of choosing ANC utilization, however, were significantly lower (0.79 times) for an increase of one rank of birth order. In addition, as the results of the second part, the number of ANC use occurrences was significantly lower (by 0.068 visits) for a 1-kilometer increase in distance from their residence to a primary health care provider. Those who were residents of Dhaka district also underwent a larger number (by 0.26 visits) of ANC occasions than those who lived outside the Dhaka district.

4. Discussion

The results of the two-part model showed that higher household income affected both the utilization of ANC and the number of times ANC was used. This is not surprising. The magnitude of the income effect did not differ for women enrolled in MHI and women not enrolled in health insurance because enrollment status was adjusted with socioeconomic class dummies

for women enrolled in MHI in the model. However, the odds ratios for the "destitute and ultra-poor" and "poor" dummy variables were significantly greater than 1 in the first part and the coefficients for the "poor", "middle-class", and "rich" dummies were significantly positive in the second part (Table 6). These results suggest that GK's MHI plan could increase women's use of ANC among the destitute, ultra-poor, and poor and the number of ANC visits by all socioeconomic classes except the destitute and ultra-poor. A previous study also showed that MHI schemes contributed substantially towards increasing ANC utilization among women enrolled in MHI (18). However, that study did not address the benefits of those schemes for specific socio-economic groups. The ability to encourage ANC utilization by destitute, ultra-poor, and poor women makes GK's MHI plan an advantageous initiative for poor rural women although the plan does not seem to have the effect of increasing the number of ANC visits among the destitute and ultra-poor.

The increase in use of ANC can be attributed to the design of the plan. GK's health insurance program uses sliding premium and co-payment scales based on socioeconomic class. GK offers membership to destitute, ultra-poor, and poor households with much lower premiums and exempts the destitute and ultra-poor from payment for some health services (Table 1). In fact, even the destitute and ultra-poor tend to use ANC more than women not enrolled in health insurance, although specific classes of women enrolled in MHI and corresponding classes of women not enrolled in health insurance cannot be compared (Table 4).

Another indicator, household income quintile, that served as a proxy for socioeconomic classes according to GK also indicated that the percentage of those who utilized ANC one or more times was higher among women enrolled in MHI than among those not enrolled in GK in every quintile (Table 5). This implies that sliding premiums and co-payments favorable to the destitute, ultra-poor, and poor are effective in persuading them to use ANC, although attention should be paid to the incomplete correlation of income quintile with socioeconomic classes according to GK. Moreover, the odds ratios of socioeconomic class dummies increased substantially from the middle-class to poor and further from poor to destitute and ultra-poor (Table 6). Indeed, there are large discontinuous decreases in the amount of annual premiums and some co-payments from the middle-class to poor and from the poor to ultra-poor (Table 1). Policymakers have argued that sliding premiums and co-payments are key to including people excluded from community society in health service provision, while MHI schemes with flat premiums and coverage have been criticized for their tendency to exclude the poor (16,22,32). A previous study noted that women enrolled in MHI might begin using the formal health care system through an MHI

Table 6. Factors affecting antenatal care (ANC) utilization

Independent variables	Logistic regression ^a		OLS ^b	
	Odds ratio	<i>p</i> value	Coefficient	<i>p</i> value
Constant	0.874	0.902	1.060	0.083
Socioeconomic class (Reference: Not enrolled in health insurance)				
Destitute and ultra-poor [α_1]	70.859	0.001	0.056	0.904
Poor [α_2]	29.605	0.000	0.976	0.002
Middle-class [α_3]	1.746	0.296	0.865	0.001
Rich [α_4]	0.675	0.763	0.805	0.045
Annual household income (1,000 taka) [β_1]	1.013	0.003	0.007	0.015
Enrollment in MHI: Household income (1,000 taka) [β_2]	1.026	0.143	--	--
No enrollment in health insurance: Household income (1,000 taka) [β_3]	--	--	0.004	0.268
Maternal age (years)	1.007	0.803	0.003	0.810
Birth order	0.789	0.023	0.000	0.999
Distance to primary health care provider (km)	0.889	0.074	-0.068	0.019
Women's educational level (Reference: No education)				
Higher	12.648	0.018	0.468	0.065
Secondary	2.247	0.006	0.172	0.246
Primary	1.561	0.126	0.060	0.704
Religion (Reference: Muslim)				
Hindu	0.958	0.875	0.038	0.725
Occupation of household head (Reference: Unemployed)				
Farmer	1.910	0.339	-0.074	0.807
Day laborer	1.353	0.645	-0.030	0.918
Provider of services	1.749	0.410	0.166	0.577
Businessman	2.072	0.286	0.104	0.702
Others	1.983	0.356	0.088	0.786
Area of residence (Reference: Outside Dhaka district)				
Dhaka district	1.162	0.150	0.263	0.012
Number of observations	592		461	
R^2	0.241 (Cox & Snell)		0.282	
	0.370 (Nagelkerke)			

OLS: Ordinary least squares. ^a Dependent variable: ANC utilization (any utilization = 1, no utilization = 0). ^b Dependent variable: Number of times ANC was used. Greek letters in square brackets represent the coefficients of the main independent variables in the model.

plan by using non-maternal health services, which also might result in them seeking maternal health care services for the first time (20).

As noted earlier, enrollment in MHI is effective in increasing the number of ANC visits among all classes except the destitute and ultra-poor. The coefficients of the "poor", "middle-class", and "rich" dummies in the second part of the analysis are significant and decreasing in that order (Table 6). This implies that lower premiums and co-payments prompt women in these three classes to undergo more ANC visits. However, the smallest premiums and co-payments, for the destitute and ultra-poor, do not increase the number of times they use ANC. Approximately three-fourths of this class utilized ANC only once while an equal proportion of the other classes did so twice or more (Table 4). That said, a similar proportion of women enrolled in MHI utilized ANC twice (35.7%) as did those who used it once (31.0%) among the first income quintile (Table 5). This suggests that low income may not be the sole factor in a greater number of ANC visits. Other factors may be involved. A study showed that restriction of a woman's mobility during pregnancy is prevalent among the ultra-poor due to deep-rooted cultural beliefs and that they may also be uncomfortable

receiving health services due to misconduct and negligence by health professionals. Eventually, the study found that they believe that ANC would not benefit them except to confirm pregnancy (34). Such cultural beliefs and norms may override the beneficial economic effects from any social protection program and restrain poorer women from utilizing ANC more than once.

In addition to sliding premiums and co-payments in GK's MHI plan, there may be other factors that influence ANC utilization. First, GK's health workers provide home health care and health education in the areas they service. This type of service may bring about a change in health care-seeking behavior among women enrolled in MHI. Actually, the demand for ANC is very low among rural women as they have limited awareness of its importance in achieving safe motherhood (7). In this context, health workers' ability to increase awareness may influence women's health beliefs and lead them to receive the ANC offered by GK paramedics at home or at health facilities. In fact, having a higher or secondary level education was associated with utilization of ANC, which agrees with previous studies (35,36). This can be explained by the fact that education develops women's understanding

of better health practices and empowers them to make their own decisions. Thus, a woman's educational level and GK's health education may combine to encourage women to use ANC to improve their health.

In addition, the government of Bangladesh has recruited Family Welfare Visitors to visit door-to-door and provide health education regarding maternal health, but there are not enough of them to cover the whole country (6). Moreover, they are not accountable for their activities. GK's health workers, however, are accountable to the representatives of the community for any maternal or child deaths, including family members of victims, at "Death Meetings" – special meetings arranged by GK. Moreover, local GK management is obliged to investigate the cause of death in the field and submit a death report to a higher authority within 72 h. Such accountability may cause GK health workers to encourage rural women to seek maternal services, including ANC (3).

Another facet of GK's scheme is that it offers community participation in health service delivery through a village health committee consisting of representatives from different sectors. The committee is headed by an elected female member of the local government (3). Moreover, GK, with the involvement of the village health committee, conducts need assessment surveys and arranges community meetings among rural households. These activities help build trust and confidence in GK among rural women. Further, such civic engagement and reciprocal linkages ultimately form social capital among GK members. There is an association between social capital and the use of health services, as previous studies have revealed (16,37). Hence, such community cohesiveness might also induce rural women to seek ANC. However, which step this factor influences, utilizing ANC or more frequent ANC visits, cannot be addressed with the variables available in this study.

The current results indicate that women who reside in the rural areas of Dhaka district visited ANC more often than did their counterparts (Table 6). The rural areas of Dhaka district have the benefit of being linked to the capital city. Doctors from the City of Dhaka frequently visit and provide health care in those rural areas. In addition, there are different private and NGO hospitals and clinics, including those run by GK, with better technical equipment, pathology instruments, and facilities than in other areas. Thus, residents of those rural areas have access to better quality treatment. As previous studies have noted, increased quality of care leads to greater patient satisfaction (38,39), so better quality may prompt residents to increase their ANC utilization by increasing their overall satisfaction. Due to increased numbers of health campaigns sponsored by different organizations, better access to mass media may have also influenced women to use ANC more often (31). There is also a link between the number of ANC visits

and the distance from a woman's residence to a primary health care provider (Table 6). This result implies that poor communications and transportation systems in rural areas and transport costs are important obstacles to women wishing to visit ANC more often (3).

However, access to health care facilities should be available within each treatment area or control area, whether covered by GK's activities or not, and is equivalent to enrollment status in this study. It is unlikely that the basic health service facilities provided by GK improve overall accessibility to health care since the average distance to a primary health care provider does not differ significantly for treatment and control areas (Table 3). In fact, even in control areas outside the Dhaka district there are many health care facilities on which women can depend for health services. These include a single upazila health complex (secondary level public health facility), a union (sub-upazila) level health center (public), a family welfare center (public), a community clinic (public), other NGO clinics (except in Kutubdia upazila), and a few private health professionals. In control areas within the Dhaka district, there are even more facilities. There are a few private clinics, several NGO clinics, and a higher number of private practitioners, along with public facilities. Although the health care delivery structure is supplemented by GK's sub-centers in treatment areas in districts both inside and outside Dhaka, access to facilities has not improved considerably compared to the existing structure in the control area. Rather, the MHI itself appears to be effective in increasing women's utilization of ANC.

Significantly, women who had borne fewer children (who had a lower birth order) visited ANC at least once. Presumably women are more concerned about their early pregnancies and visit ANC at least once.

The present study showed that 7.5% of women enrolled in MHI did not receive any ANC, and the MHI plan was not effective in increasing the number of ANC visits undergone by destitute and ultra-poor women. The reasons for these problems should be addressed to improve this situation. The impact of MHI schemes on other maternal indicators should also be investigated to justify their potential to ensure safe and healthy maternity. Nevertheless, GK's MHI scheme can be seen as an effective tool in enhancing ANC utilization among rural pregnant women. This study implies that successful implementation of MHI schemes by other NGOs or organizations can complement the government's policy to extend access to ANC to some extent to the poor women of rural Bangladesh.

However, there are several limitations to the findings of this study. First, sliding premium and co-payment scales are decided in accordance with the socioeconomic classes defined by GK, and these classes were not applied to women not enrolled in health insurance. Women enrolled in MHI cannot be

specifically compared with the corresponding classes of women not enrolled in health insurance to determine the effect of the sliding scales. In other words, inferences are made but definitive proof is lacking. Second, analysis with limited cross-sectional data can only show the static state, not dynamic changes. Also, no statistical test can be conducted to directly examine the effect of MHI in reducing the disparity of ANC utilization by socioeconomic class due to a lack of time-series information. Third, self-reporting by respondents may carry some bias. Fourth, women who gave birth within the past year were selected as sample subjects. Thus, a few women who utilized ANC earlier might not report the exact number (over- or under-reporting) of ANC visits due to recall bias. If the over and underreporting biases balance each other out, the regression analysis estimates should be free of bias. If the biases are unequal, the regressions may be biased. Fifth, though ANC utilization and more frequent ANC visits are assumed to bring about better antenatal outcomes, the quality of ANC has not been taken into account in this study. Further study should focus on the components and quality of ANC under MHI schemes.

In conclusion, this study pointed to GK's MHI scheme in Bangladesh as encouraging poor rural women to use ANC. The scheme encourages all women, except for the poorest, enrolled in MHI to use ANC more frequently. Sliding premium and co-payment scales are seen as one of the key features of this scheme. MHI schemes are expected to be part of the solution to ensuring safe motherhood.

Acknowledgements

The authors would like to thank Dr. Rezaul Haque, Rural Health Director, and Dr. Manzur Kadir Ahmed, Senior Director of Health and Training, for their permission to conduct this survey. The authors also wish to thank SM Fardous Kabir of the Statistics and Research Department, Gonoshasthaya Kendra, for providing valuable information and feedback. Finally, the authors wish to sincerely thank all of the rural women who patiently answered this survey.

References

- Anwar I, Killewo J, Chowdhury ME, Dasgupta SK. Bangladesh: Inequalities in utilization of maternal health care services – evidence from Matlab. Health, Nutrition and Population (HNP) Discussion Paper, Reaching The Poor Program Papers No. 2. The World Bank, Washington DC, USA, 2004. <http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/RPP2Bangladesh.pdf> (accessed December 11, 2011).
- Bhatia JC. Levels and causes of maternal mortality in southern India. *Stud Fam Plann.* 1993; 24:310-318.
- Chaudhury RH, Chowdhury Z. Maternal mortality in rural Bangladesh: Lessons learned from Gonoshasthaya Kendra programme villages. *Asia Pac Popul J.* 2008; 23:55-78.
- Bloom SS, Lippeveld T, Wypij D. Does antenatal care make a difference to safe delivery? A study in urban Uttar Pradesh, India. *Health Policy Plan.* 1999; 14:38-48.
- Islam MS, Ullah MW. People's participation in health services: A study of Bangladesh's rural health Complex. Bangladesh Development Research Working Paper Series (BDRWPS) 7. Bangladesh Development Research Center (BDRC), Falls Church, USA, 2009. http://www.bangladeshstudies.org/files/WPS_no7.pdf (accessed December 11, 2011).
- Ahmed SM, Hossain MA, Rajachowdhury AM, Bhuiya AU. The health workforce crisis in Bangladesh: shortage inappropriate skill-mix and inequitable distribution. *Hum Resour Health.* 2011; 9:3.
- National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International. Bangladesh Demographic and Health Survey 2007. Dhaka, Bangladesh and Calverton, Maryland, USA: NIPORT, Mitra and Associates, and Macro International, 2009. [http://www.measuredhs.com/pubs/pdf/FR207/FR207\[April-10-2009\].pdf](http://www.measuredhs.com/pubs/pdf/FR207/FR207[April-10-2009].pdf) (accessed December 11, 2011).
- United Nations Statistics Division. Millennium Development Goals Indicators. United Nations, New York, NY, USA. <http://unstats.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=763> (accessed December 11, 2011).
- World Health Organization. Core health indicators, database 2008. http://apps.who.int/whosis/database/core/core_select_process.cfm?countries=all&indicators=nha (accessed December 11, 2011).
- Werner WJ. Micro-insurance in Bangladesh: Risk protection for the poor? *J Health Popul Nutr.* 2009; 27:563-573.
- Killingsworth JR, Hossain N, Hedrick-Wong Y, Thomas SD, Rahman A, Begum T. Unofficial fees in Bangladesh: Price, equity and institutional issues. *Health Policy Plan.* 1999; 14:152-163.
- Cockcroft A, Andersson N, Milne D, Hossain MZ, Karim E. What did the public think of health services reform in Bangladesh? Three national community-based surveys 1999-2003. *Health Res Policy Syst.* 2007; 5:1.
- National Institute of Population Research and Training (NIPORT), ORC Macro, Johns Hopkins University and ICDDR, B. Bangladesh Maternal Health Services and Maternal Mortality Survey 2001. Dhaka, Bangladesh and Calverton, Maryland, USA: NIPORT, ORC Macro, Johns Hopkins University, and ICDDR, B, 2003. <http://www.measuredhs.com/pubs/pdf/FR142/00FrontMatter00.pdf> (accessed December 11, 2011).
- Asian Development Bank. Bangladesh quarterly economic update Asian Development Bank, Dhaka, Bangladesh, 2006. http://www.adb.org/documents/economic_updates/BAN/2006/mar-2006.pdf (accessed December 15, 2011).
- Preker AS, Carrin G, Dror D, Jakab M, Hsiao W, Arhin-Tenkorang D. Effectiveness of community health financing in meeting the cost of illness. *Bull World Health Organ.* 2002; 80:143-150.
- Tabor SR. Community-based health insurance and social protection policy. Social Protection Discussion Paper Series, No. 0503, The World Bank, Washington

- DC, USA, 2005. <http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/0503.pdf> (accessed December 15, 2011).
17. Criel B, Kegels G. A health insurance scheme for hospital care in Bwamanda district, Zaire: Lessons and questions after 10 years of functioning. *Trop Med Int Health.* 1997; 2:654-672.
 18. Chankova S, Sulzbach S, Diop F. Impact of mutual health organizations: Evidence from West Africa. *Health Policy Plan.* 2008; 23:264-276.
 19. Ranson MK. Reduction of catastrophic health expenditures by a community-based health insurance scheme in Gujarat, India: Current experiences and challenges. *Bull World Health Organ.* 2002; 80:613-621.
 20. Smith KV, Sulzbach S. Community-based health insurance and access to maternal health services: Evidence from three West African countries. *Soc Sci Med.* 2008; 66:2460-2473.
 21. Yip W, Berman P. Targeted health insurance in a low income country and its impact on access and equity in access: Egypt's school health insurance. *Health Econ.* 2001; 10:207-220.
 22. Bennett S. The role of community-based health insurance within the health care financing system: A framework for analysis. *Health Policy Plan.* 2004; 19:147-158.
 23. Ekman B. Community-based health insurance in low-income countries: A systematic review of the evidence. *Health Policy Plan.* 2004; 19:249-270.
 24. World Health Organization. The World health report 2000 – health systems: Improving performance. World Health Organization, Geneva, Switzerland, 2000. http://www.who.int/whr/2000/en/whr00_en.pdf (accessed December 11, 2011).
 25. Hassan MR, Surur SH, authors; Labonté R, GK Research Team, editors. Study on GK's comprehensive primary health care (CPHC) model: Social capital, community participation, gender empowerment and health care access for the marginalized. Gonoshasthaya Kendra, 2011. <http://www.globalhealthequity.ca/electronic%20library/Study%20on%20GK%20Comprehensive%20Primary%20Health%20Care%20CPHC%20Model%20September%202011.pdf> (accessed December 15, 2011).
 26. Wang H, Yip W, Zhang L, Wang L, Hsiao W. Community-based health insurance in poor rural China: the distribution of net benefits. *Health Policy Plan.* 2005; 20:366-374.
 27. Habibov NN, Fan L. Modeling prenatal health care utilization in Tajikistan using a two-stage approach: Implications for policy and research. *Health Policy Plan.* 2008; 23:443-451.
 28. Smits J. Estimating the Heckman two-step procedure to control for selection bias with SPSS. 2003. <http://home.planet.nl/~smits.jeroen> (accessed May 8, 2012).
 29. Collin SM, Anwar I, Ronsmans C. A decade of inequality in maternity care: Antenatal care, professional attendance at delivery, and caesarean section in Bangladesh (1991-2004). *Int J Equity Health.* 2007; 6:9.
 30. Islam MR, Odland JO. Determinants of antenatal and postnatal care visits among indigenous people in Bangladesh: A study of the Mru community. *Rural Remote Health.* 2011; 11:1672.
 31. Simkhada B, van Teijlingen ER, Porter M, Simkhada P. Factors affecting the utilization of antenatal care in developing countries: Systematic review of the literature. *J Adv Nurs.* 2008; 61:244-260.
 32. Magadi MA, Madise NJ, Rodrigues RN. Frequency and timing of antenatal care in Kenya: Explaining the variations between women of different communities. *Soc Sci Med.* 2000; 51:551-561.
 33. Ranson MK, Sinha T, Chatterjee M, Acharya A, Bhavsar A, Morris SS, Mills AJ. Making health insurance work for the poor: Learning from the Self-Employed Women's Association's (SEWA) community-based health insurance scheme in India. *Soc Sci Med.* 2006; 62:707-720.
 34. Choudhury N, Ahmed SM. Maternal care practices among the ultra poor households in rural Bangladesh: A qualitative exploratory study. *BMC Pregnancy Childbirth.* 2011; 11:15.
 35. Raghupathy S. Education and the use of maternal health care in Thailand. *Soc Sci Med.* 1996; 43:459-471.
 36. Cleland JG, van Ginneken JK. Maternal education and child survival in developing countries: The search for pathways of influence. *Soc Sci Med.* 1988; 27:1357-1368.
 37. Hendryx MS, Ahern MM, Lovrich NP, McCurdy AH. Access to health care and community social capital. *Health Serv Res.* 2002; 37:85-101.
 38. Mendoza Aldana J, Piechulek H, al-Sabir A. Client satisfaction and quality of health care in rural Bangladesh. *Bull World Health Organ.* 2001; 79:512-517.
 39. Andaleeb SS, Siddiqui N, Khandakar S. Patient satisfaction with health services in Bangladesh. *Health Policy Plan.* 2007; 22:263-273.

(Received January 25, 2012; Revised July 19, 2012; Accepted July 25, 2012)