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DOES INEQUITY EXIST IN HEALTH CARE USE? EVIDENCE FROM RURAL BANGLADESH

Syed Abdul Hamid, Syed M. Ahsan, Afroza Begum and Chowdhury Abdullah Al Asif

ABSTRACT

This paper analyzes inequity in health care use in rural Bangladesh using data from a survey conducted by Microinsurance Research Unit (MRU) of the Institute of Microfinance (InM) of about 4,000 households drawn from 120 villages. The study focuses on formal health care use over the 12 months preceding the survey. We used ‘need standardized’ approach and ‘decomposition analysis’ for measuring inequity. The paper finds that the use of formal health care is incredibly low (40%). Inequity in formal health care use favors the better-off although the level of inequity is not sizable. Inequity prevails in gender and age groups to some extent. NCDs is a significant contributor amongst the need variables and education of the household head amongst the non-need variables. Obviously, the main concern in rural Bangladesh is the low use of formal health care, not inequity; hence the country needs to innovate upon means of enabling access to formal health care use.

Key Words: Inequity, pro-poor, pro-rich, decomposition analysis, need standardized approach, Bangladesh.

JEL Classification Code: I11, I14, I18 and G28

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DOES INEQUITY EXIST IN HEALTH CARE USE? EVIDENCE FROM RURAL BANGLADESH

1. INTRODUCTION

Increasing the access to and the utilization of quality health care are each imperative for achieving universal health coverage as well as the due success in the poverty reduction measures adopted by many low-income countries.¹ The Government of Bangladesh has invested substantially for increasing access to and use of formal healthcare in rural areas targeting the poor.² There are also substantial efforts by not-for-profit organizations for expanding formal healthcare in rural Bangladesh (e.g., BRAC, Gonoshashthya Kendra, Sajida Foundation). Various development programs (e.g., microfinance) taken up by both government and non-government organizations may also have contributed to promoting healthcare utilization by boosting demand, i.e., enabling the poor to purchase better health services via enhanced income. However, people with equal need may not have been benefited equally. Unequal health care use partly contributes to health inequality (Marmot and Feeney, 1997; Marmot, 2005). Adverse health shocks are known to lead to poverty in low-income countries due to large out-of-pocket payments (Whitehead *et al.*, 2001) as well as inappropriate health care use (Wagstaff, 2002). Hence, there is a vicious cycle of unequal health care use and poverty. It is therefore important to examine the level of inequality in healthcare use for an informed policy discussion.

While the literature on this issue mainly focuses on developed countries (e.g., Ohkusa and Honda, 2003; van Doorslaer *et al.*, 2004; Ourti, 2004; van Doorslaer and Masseria, 2004; Morris *et al.*, 2005; Lu *et al.*, 2007; Schneider and Hanson, 2006; Sin and Kim, 2010; Zhong, 2010), there are a few studies in the developing country context (e.g., Liu *et al.*, 2002; Hidayat *et al.*, 2004; Onwujekwe, 2005; Yiengprugsawan *et al.*, 2011). These studies, as seen below, typically examine the post-insurance outcome on equity and find some positive impact on equity in favour

¹ The two primary criteria for achieving the universal health coverage are (a) ensuring the use of health services by all and (b) prevention of financial hardship in paying for the health services (WHO, 2010).

² “There is a three-tier mechanism for providing health care in rural areas: (i) domiciliary services by a Health Assistant and Family Welfare Assistant at the household level; (ii) Health and Family Welfare Centres at the union level, and (iii) Upazila Health Complexes (UHCs) at the upazila/sub-district level. UHCs provide both outpatient and inpatient services including maternal and child health and family planning; they are the main units for implementing the Essential Services Package which was designed to attain Health for all” (Hamid *et al.*, 2011).

of the poor especially when it came to outpatient care or basic low-cost primary care delivery systems.

Liu *et al.*, (2002) investigated the effects of a pilot health insurance program on both horizontal and vertical inequities in healthcare use in China (out-patient care, hospital care, emergency care and expensive diagnostic procedures). The study found that the poor had no advantage in access to expensive and advanced diagnostic technologies in response to the recent insurance reforms though the latter led to significantly decreased horizontal inequity in outpatient care. Hidayat *et al.*, (2004) measured the effects of a mandatory health insurance program on equity in outpatient care received from public and private providers in Indonesia. They found that insurance did not have any positive effect on income-related equity. Yiengprugsawan *et al.*, (2011) evaluated the impact of the ‘Universal Coverage Scheme’ on inequalities in primary health care use in Thailand and found positive impact favouring the poor. Onwujekwe (2005) evaluated the socio-economic inequities in the treatment of common communicable endemic diseases in Nigeria providing an emphasis on the use of primary healthcare centres where treatments are available for most of the common diseases. The study found income-related inequalities favouring the poor and the rich, respectively, in the use of health care provided by low-level (informal) providers (patented medicine dealers, shops and herbalists) and formal providers (primary health care centres and hospitals).

To date however there does not appear to be any scientific analysis in this area in the context of Bangladesh, home to about 50 million of the world’s poorest.³ This paper examines the level of inequity (giving especial focus on gender issue) in the *use of formal healthcare* (apart from obstetric care) in rural areas of Bangladesh based on a survey of about 4,000 households from 120 villages.⁴ We use both *need-standardized* and *decomposition* analysis methods to measure horizontal inequity. This paper finds incredibly low use of formal health care (40%) where inequity favours the better-off although the level of inequity is not substantial.

³ There are some studies on inequalities in maternal health care use in Bangladesh (Rahman *et al.*, 2008; Anwar *et al.*, 2008; Amin *et al.*, 2010; Hossain, 2010). However, the focus of the present research is on broader dimensions of healthcare.

⁴ Healthcare provided by government, NGO and qualified private providers, together, has been defined as ‘formal’ care (see Section 2.1 for details). Inequality in ‘informal’ health care (i.e., care provided by quacks, drugstore salesmen, homeopathic providers, traditional healers and faith healers) is not at all an issue of policy discussion, and hence it has been ignored in the present analysis.

The remainder of the paper has been organized as follows. Section 2 explains the methodology of the study including the analytical methods and data collection; Section 3 presents the empirical findings; Section 4 provides a discussion and some conclusions.

2. METHODOLOGY

2.1 Definition of formal healthcare

A wide range of therapeutic choices (varying from self-care to modern allopathic medicine) is available in a medically pluralistic society like that of Bangladesh. In this paper we have primarily classified healthcare providers following the relevant literature in the Bangladesh context (Nanda, 1999; BBS, 2007; Hamid *et al.*, 2011) as follows: (i) self-care, (ii) unqualified providers (quacks, drugstore salesmen, homeopathic healers, traditional healers and faith healers), (iii) private hospitals/clinics/chambers, (iv) NGO health centres/hospitals, and (v) government health centres/hospitals.⁵ Like Nanda (1999) and Hamid *et al.* (2011) these can be further classified into: informal (i.e., summing (i) and (ii)) and formal (i.e., summing (iii)-(v)).

2.2 Measuring inequity in healthcare utilization

Horizontal inequity (*HI*) measures the extent to which health care use is related to income after controlling for need (Wagstaff and van Doorslaer, 2000). In measuring horizontal inequity we have used two commonly used methods: need standardization and decomposition analyses of the concentration index. A need standardized method, the difference between the concentration index for actual use (C_a) and the concentration index of need standardized use (C_n , which is the difference between actual and need expected health care use, plus the overall sample mean), has

⁵ In a series of papers Ahmed (2001) and Ahmed *et al.* (2000, 2003, 2005, 2006) broadly classified healthcare providers into five categories: (a) self-care, (b) para-professional village practitioners (who receive a one-year training comprising of diagnosis and treatment of common ailments, medical assistants who complete a 3-year medical programme, and government and non-government community health workers), (c) qualified allopathic practitioners (licensed providers who have professional medical degrees), (d) unqualified practitioners allopathic (drugstore salesmen, quacks), and (e) traditional healers including homeopathy providers. Since the survey respondents may have limited knowledge about the detailed qualifications of the providers, use of such a classification in the survey questionnaire may lead to uninterpretable responses, which would necessitate conducting a detailed survey of providers prior to the household survey.

been used in measuring horizontal inequity in some studies (Ohkusa and Honda, 2003; Schneider and Hanson, 2006; Shin and Kim, 2010).⁶ This can be expressed as

$$HI_n = C_a - C_n \quad (1)$$

where C , takes a value ranging from -1 to +1.⁷ HI_n in equation (1), therefore, takes values in the range -2 to +2. No socioeconomic inequity corresponds to the zero value, pro-rich inequity (a higher share of health care use of higher income groups than their share of needs) for positive values and pro-poor inequity (a higher share of health care use of lower income groups than their share of needs) for negative values. The larger the absolute value of the index the higher is the inequity.

As HI in the above method is computed using only need variables, a potential bias may arise if non-need factors (income, education, supply side issues, etc.) correlated with health care use not included in the regression analysis (van Doorslaer *et al.*, 2004; O'Donnel *et al.*, 2008). Thus, decomposition analysis of the concentration index (where non-need factors are also included in the regression analysis) has also been used in the micro data (i.e., survey data where individual level of information is available) in measuring inequity in health care utilization (Wagstaff *et al.*, 2003; van Doorslaer *et al.*, 2004; Lu *et al.*, 2007; O'Donnel *et al.*, 2008; Shin and Kim, 2010).

Wagstaff *et al.* (2003) illustrate that the concentration index of health care use can be decomposed, in the context of a linear model, into the contributions of various factors such as

⁶ Regression methods are used in calculating the concentration index measuring income-related inequalities in health care use:

$$\frac{2\sigma_R^2}{\mu} y_i = \alpha + \beta R_i + \varepsilon_i; i = 1, 2, \dots, N$$

where y_i is the health care use by individual i , μ is the mean of y_i , R_i is the weighted relative fractional rank of the i^{th} individual in the socio-economic distribution from the poorest to the richest, σ_R^2 is the weighted variance of R_i and N is the sample size.

⁷ A positive (negative) value of a crude concentration index signifies health care use favouring the rich (the poor). Similarly, a positive (negative) value of a need standardized concentration index implies that health care need is more concentrated among the rich (the poor). Health care use or need is equally distributed irrespective of income if the value of a concentration index is zero.

need-standardizing variables and non-need variables to identify the sources of socio-economic inequality in health care use. A linear model of health care use can be expressed as

$$y_i = \alpha + \sum_k \gamma_k x_{ik} + \sum_l \delta_l z_{il} + \varepsilon_i \quad (2)$$

where x_k denotes the ‘need-standardized’ variables; z_l denotes non-need variables; and α is a constant. Based on the linear additive model the concentration index (which shows the overall inequality in health care utilization), can be re-written as

$$C = \sum_k \lambda_k C_{xk} + \sum_l \lambda_l C_{zl} + \frac{GC_\varepsilon}{\mu} \quad (3)$$

where, C_k and C_l are the concentration indices for the respective variables (x and z) and

$\lambda_k = \frac{\gamma_k \bar{x}_k}{\mu}$ where \bar{x}_k is the mean of the determinant k , μ is the mean of health care and analogously for λ_l .

In equation (3), the first term on the right hand side denotes the partial contribution of need variables and the second, that of non-need variables. The last term denotes the contribution of income inequality where GC_ε is the generalized concentration index for the error term. This can be computed as a residual, which is the difference between the concentration index and the sum of the factor’s contributions (Wagstaff *et al.*, 2003; O’Donnell *et al.*, 2008).

Since health care utilization is often a binary, categorical or count variable non-linear models (e.g., logit or probit model) are preferable. Thus, equation (3) can be estimated using the logit or probit model.

As C in equation (3) still includes valid socioeconomic differences in health care use for the variation in need, it presents the measure of socioeconomic inequality rather than the degree of

inequity in healthcare use. Thus, the index of horizontal inequity (HI_d) can be obtained from the decomposition analysis using the indirect standardization method as follows:

$$HI_d = C - \sum_k \lambda_k C_{.k} \quad (4)$$

According to decomposition analyses, horizontal inequity is the total inequality (the sum of the absolute contribution of both need and non-need factors and the contribution of the residual term) minus need-related inequality. HI_d also ranges from -2 to +2, with a positive (negative) value indicating pro-rich (pro-poor) inequity.

2.3 Data

This paper uses the data on health care seeking behaviour obtained from a 2009 household survey, which successfully collected data from 3,941 rural households (accounting for 19,424 individuals) from 120 villages spread over seven out of 14 districts in rural Bangladesh where Grameen Kalyan (GK), a social business company affiliated with the Grameen Bank, had been operating its prepaid card-based micro health insurance (MHI) scheme. The survey used a program-control design such that ten healthcare delivery centres were selected purposively taking into consideration a suitable mix of old and new centres and the geographic variation among these locations. Each GK program area physically comprises of an approximate radius of 8 km around the respective health centre. One comparable Union Council, the smallest civil administrative unit in Bangladesh, adjacent to each GK program centre was then selected purposively to serve as the ‘control’ area in question. The control areas lay wholly outside the radius of GK operational boundary but shared similar characteristics in all other aspects. A sample of 7 villages were randomly selected from each of the 10 program strata and 5 villages from each of the 10 control strata from a listing of all the villages in both these strata, thus yielding a total of 120 villages, considered as primary sampling units (PSUs). Thus the survey covered 70 program and 50 control villages. The number of program hhs came to 2,477, of whom 935 were GK cardholders (CH) and the remainder 1,542 were non-cardholders (NCH), while the number of control hhs stood at 1,464.⁸

⁸ Three sets of instruments were used to conduct the survey: (i) semi-structured household survey questionnaire, (ii) a bidding game questionnaire for eliciting the willingness to pay and the willingness to join a micro health insurance package, and (iii) a village survey questionnaire for collecting village-level attributes.

The household questionnaire focussed on many socio-economic variables including the demographic context (age, gender, education, etc.), occupation of the household head and that of all members, borrowing-lending behaviour, food expenditure, non-food expenditure, income, distribution of operating land and non-land assets, experience with shocks, health status, healthcare choices and out-of-pocket expenses. A series of specific questions regarding the health outcome were asked of the respondents including the type of illnesses, duration, severity and type of provider sought at the first contact and at the second contact (if any) separately for each episode of illness suffered by any member of the household.

It is important to settle the issue of the ‘recall period’ over which health care utilization data is to be collected. A detailed review of the literature suggests that various authors use anywhere from 15 days to 12 months for this purpose. In principle, however, choice of the recall period for healthcare utilization must satisfy the twin objectives: (a) minimizing the recall bias and (b) maximizing the sample of target subjects (O'Donnell *et al.*, 2008). In the literature some used 1 month (e.g., Hidayat *et al.*, 2004; Lu *et al.*, 2007; Yiengprugsawan *et al.*, 2011), some used 2 weeks (e.g., Schneider and Hanson, 2006; Shin and Kim, 2010 collecting information on outpatient care) while a growing number of studies have used 12 month recall for collecting information on inpatient procedures (e.g., Wagstaff and van Doorslaer, 2003; Lu *et al.*, 2007; Yiengprugsawan *et al.*, 2011). Most authors use 12 months recall period in the study of inequity in health care (outpatient and/or hospital care) utilization (e.g., Liu *et al.*, 2002; van Doorslaer and Masseria, 2004; van Doorslaer *et al.*, 2004; Ourti, 2004; Morris *et al.*, 2005; Zhong, 2010). The present survey has collected information both over 90 days as well as 12 months; the analysis to be presented below, however, is based on 12-month data to reach the adequate number of observations.

3. FINDINGS

3.1. Salient characteristics of the sample

A total of 3,941 households out of the 4,010 households were successfully interviewed. The overall response rate was about 98 per cent. Household heads were the respondents in most (83%) and spouses in 15 per cent of the cases (Table 1). Most (about 88 %) of the households

were male-headed. Average education level of the household head was seen to be 3.2 years and the average age about 46 years. The average household size was 4.45. The mean of per capita daily consumption (both food and non-food) is about BDT66 equivalent to nearly one US Dollar. About 30 per cent of the household heads were absorbed in the agriculture sector followed by day labour (about 16%) and small business (about 14%). The employment profile is however not shown in the Table.

3.2. Utilization of formal health care

In the survey we asked about any acute or chronic condition suffered by any individual in the household over the 12 months preceding the interview. We also asked whether they received any treatment for their illnesses, and if so, what type of care they had received. About 88 per cent (3,459 out of 3,941) households reported at least one episode of illness; about 55 per cent of them had more than one episode in one year.

At the individual level, about 33 per cent of the sampled individuals had some sort of self-reported morbidity over the preceding 12 months, and an overwhelming majority (about 98%) of them sought some kind of health care (Figure 1). Outpatient care was utilized by most of the patients (95%). It is further seen about 81 per cent of all who sought care, had only one visit, about 17 per cent had two and about 2 per cent had three or more. The incidence of communicable diseases (CDs) and non-communicable diseases (NCDs) was mostly equal in the sample. About 80 per cent of the patients had acute conditions and about 20 per cent chronic conditions.⁹ About 48 per cent of the patients were severely ill (bed-ridden) and 39 per cent moderately ill.¹⁰

⁹ We used both WHO fact sheets and CMS (Council for Medical Schemes) guideline for defining chronic diseases.

¹⁰ We asked a structured question to identify the severity of illness using the following options: (i) bed ridden, (ii) inability to stand properly, (iii) inability to sit properly, (iv) inability to walk properly, (v) inability to perform regular activities and (vi) not much ill. We classified the first one as severe, (ii)-(v) moderately severe and (vi) not much severe.

Table 1: Basic characteristics of the respondents and households

Indicators	Total	Programme Areas			Control Areas
		MHI card holders	Non-cardholders	Total	
(i) Category of respondents (%)					
Household head	83.02 (3,272)	80.86 (756)	83.20 (1,283)	82.32 (2,039)	84.22 (1,233)
Spouse	15.12 (596)	17.75 (166)	15.05 (232)	16.07 (398)	13.52 (198)
Other adult members	1.85 (73)	1.39 (13)	1.75 (27)	1.61 (40)	2.25 (33)
(ii) Gender of the household head (%)					
Male	87.67 (3,455)	91.66 (857)	85.47 (1,318)	87.81 (2,175)	87.43 (1,280)
Female	12.33 (486)	8.34 (78)	14.53 (224)	12.19 (302)	12.57 (184)
(iii) Other indicators:					
Average educational level of the household head	3.20 [4.04] (3,941)	3.18 [4.12] (935)	3.22 [4.10] (1,542)	3.20 [4.11] (2,477)	3.19 [3.92] (1,464)
Average age of the household head	46.16 [13.81] (3,941)	46.92 [12.51] (935)	46.07 [14.28] (1,542)	46.39 [13.64] (2,477)	45.77 [14.09] (1,464)
Average household size	4.45 [1.82] (3,941)	4.63 [1.78] (935)	4.33 [1.89] (1,542)	4.45 [1.85] (2,477)	4.45 [1.78] (1,464)
Male female ratio	52:48	52:48	51:49	51:49	52:48
Average per capita daily consumption (BDT)*	65.74 [37.97] (3,937)	71.17 [40.43] (934)	63.49 [39.96] (1,540)	66.39 [40.30] (2,474)	64.64 [33.64] (1,463)

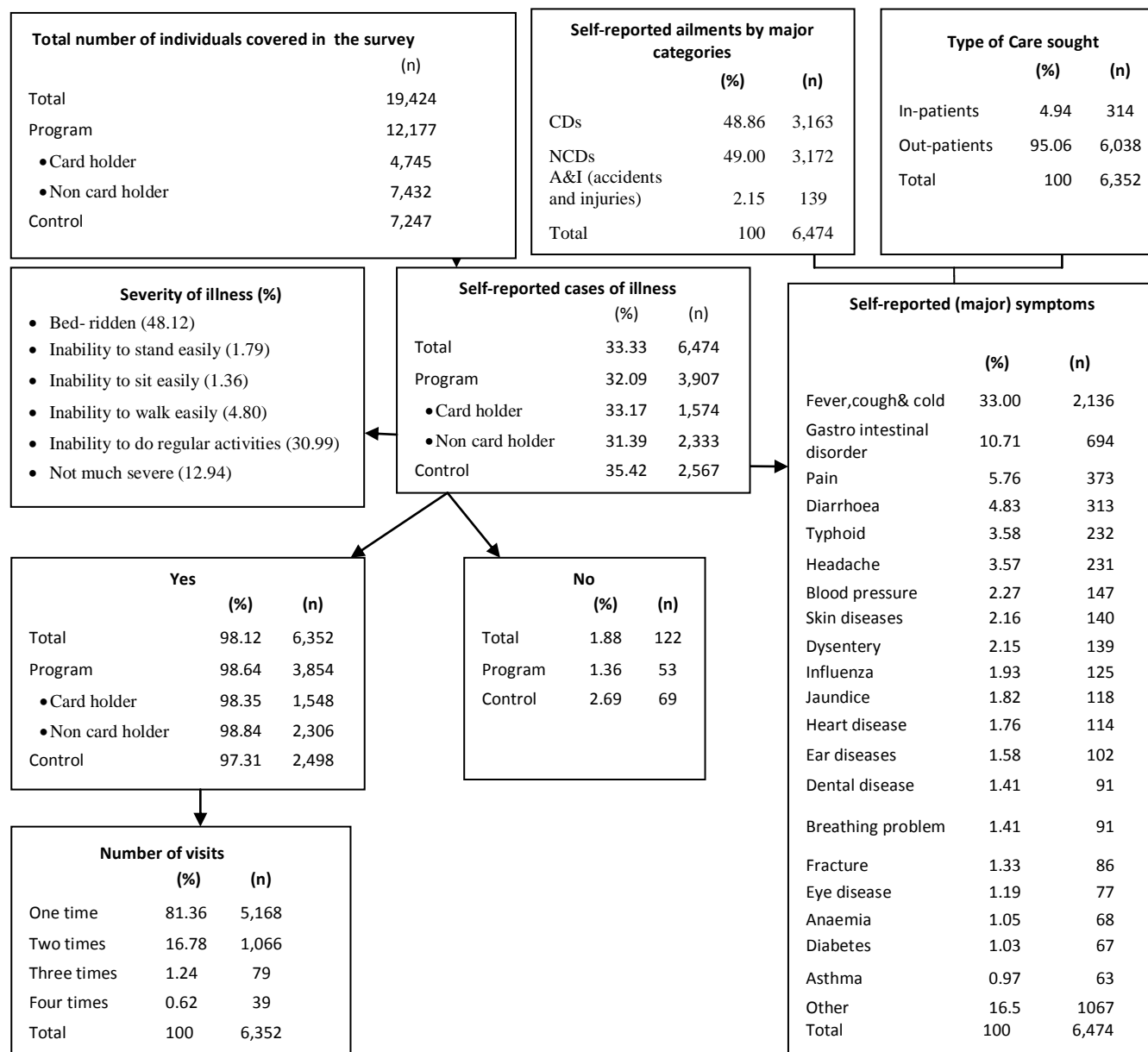
Note: Figure in round parentheses is the number of observations and squared parentheses is the standard deviation.

*Four observations were dropped due to missing data on household consumption.

It is seen that self-reported cases of illness increases as one moves up the hierarchy of expenditure quintiles (Table 2). The difference is significant ($p < 0.01$) both between the poorest and the richest quintiles and between the poor and the non-poor (i.e., those below and above the poverty line, respectively).¹¹

¹¹ We estimated the poverty line expenditure by using CBN approach where we used, following Ravallion and Sen (1996), the cost of a normative food bundle (consisting of rice, wheat, pulses, milk, mustered oil, beef, fish, potato and both leafy and non-leafy vegetables) which provides the minimal nutritional requirement of 2,122 kcal per day per capita. We computed food poverty line, as done in the report of Bangladesh *Household Income and Expenditure Survey (HIES)-2005* (BBS, 2007), by adding the products of multiplications of the price of each item with the quantities given in the bundle. We computed “upper non-food allowance” by taking the median amounts spent on non-food items of those households whose per capita food expenditure is close to the food poverty line. We used the upper poverty line (BDT61) by adding the food poverty line with the upper non-food allowances.

Figure 1: A schematic view of self-reported illnesses



A majority of the patients seeking health care, as shown in Table 2, chose informal providers (60%) over private (about 26%), government (about 11%) and NGOs (about 3%). The latter three comprise the formal sector. The overall use of formal health care, thus, is 40 per cent; the rate is even lower among the poorest (35.71%).

As seen in Table 2, as one moves up the income hierarchy, the utilization of formal care (especially private care) responds positively. Overall, the poorest quintile shows a significantly lower ($p < 0.01$) utilization of formal care than the richer (fourth and fifth) quintiles. It is also seen that the non-poor has significantly ($p < 0.01$) higher utilization of formal care than the poor. However, there is no such difference between the poorest and the richest in the use of public health care. There is also little difference between the poorest and the richest in using NGO provided health care, a small segment of the market.

Table 2: Self-reported cases of illness and utilization of health care by expenditure quintiles

Expenditure quintile / Poor and non-poor	Self-reported cases of illness	Type of provider				
		Informal Provider Total % (n)	Formal provider			
			Government % (n)	Private % (n)	NGO % (n)	Total* % (n)
1st quintile (Poorest)	29.82 (1,236)	64.29 (792)	13.31 (164)	19.24 (237)	3.17 (39)	35.71 (440)
2 nd quintile	32.25 (1,306)	63.36 (811)	11.02 (141)	22.89 (293)	2.73 (35)	36.64 (469)
3rd quintile	32.67 (1,271)	60.97 (764)	11.33 (142)	24.74 (310)	2.95 (37)	39.03 (489)
4 th quintile	35.05 (1,321)	59.75 (775)	8.4 (109)	28.6 (371)	3.24 (42)	40.25 (522)
5 th quintile (Richest)	37.56 (1,335)	51.83 (666)	10.35 (133)	33.46 (430)	4.36 (56)	48.17 (619)
Poor	31.10 (3,533)	64.50 (2,220)	11.77 (405)	20.69 (712)	3.05 (105)	35.50 (1,222)
Non-poor	36.48 (2,936)	54.66 (1,588)	9.78 (284)	31.98 (929)	3.58 (104)	45.34 (1,317)
Total	33.33 (6,469)**	60.00 (3,808)	10.86 (689)	25.85 (1,641)	3.29 (209)	40.00 (2,539)

Note: Non-health household expenditure was considered in computing expenditure quintiles.

*Sum all of formal categories.

** Four households were dropped in computing expenditure quintiles because of missing expenditure data.

3.3. Inequity in Formal health care utilization

The data has been primarily split into poor and non-poor and then to compare *HI*, each of these subsets have been further demarcated by gender (male vs. female), age-group (child vs. adult vs. elderly), borrowing status (MFI borrowers vs. others), type of MFI borrowers (GB vs. non-GB), Grameen Kalyan's (GK) micro health insurance placement status (program vs. control) and enrolment status in GK micro-health insurance (card holders vs. non-card holders). Each such category (if relevant) has been further split into male and female to understand clearly whether

gender matters in the use of formal health care. Note that splitting the data into 5 expenditure quintiles (i.e., instead of a two-way grouping along ‘poor’ and ‘non-poor’) may have yielded a more detailed understanding of horizontal inequity. However, this would have left us with very few observations in each cell for meaningful analysis and estimation and hence the rationale for the choice of the breakdown of expenditure quintiles.

Weighted proportion of formal health care use: The weighted proportions reported in Table 3A show that the actual use of formal health care increases sharply as we move up the hierarchy of age groups among both the poor (27.6%, 38.4% and 42.8% for child, adult and elderly respectively) and the non-poor (35.5%, 47% and 50% for child, adult and elderly respectively) while there is no difference between the male and the female. Hence, children are heavily deprived in actual use of formal health care. If we consider the gender differential among the age groups it is observed that female children are more deprived than male children in actual use of formal health care in both poor and non-poor groups; this deprivation is even higher ($p < 0.01$) among the non-poor. However, the female use more formal care than the male among the adult and the elderly, especially in the non-poor group.

If we focus on the participation behaviour of the household in MFI interventions, it is seen that the utilization of formal health care is significantly ($p < 0.01$) lower among MFI borrowers than others (either non-borrowers or non-MFI borrowers) irrespective of income (Table 3B). The male in MFI borrowing households appear to have a higher use of formal care than the female among both the poor and the non-poor. However, there is no such gender pattern among others (i.e., non-borrowers or non-MFI borrowers) among the poor while the pattern significantly ($p < 0.01$) favours the female in the non-poor group. Overall however, Grameen Bank (GB) borrowers enjoy significantly ($p < 0.01$) higher use of formal care than non-GB borrowers in both income groups. Similarly the GK program areas, effectively signifying the placement of a basic, though formal, care program, boast significantly ($p < 0.01$) higher use of formal care than control, again among all income groups. Finally, it is seen that the utilization of formal care is significantly ($p < 0.01$) higher among members of Grameen Kalyan (GK) micro health insurance (MHI) scheme than among non-members in the non-poor group while there is no difference among the poor.

Crude concentration index: The positive sign of the crude concentration indices described in Tables 3A and 3B shows that the utilization of formal health care is concentrated among the better-off for most sub-categories (as discussed above) in the non-poor group. For the poor, the negative sign indicates that this was concentrated among the worse-off for the female, children (both male and female), adult female, male in the MFI borrowing-household, female in the non-MFI borrowing (including non-borrowing) household, GB borrowers, GK program areas and both MHI card and non-card holders. In Table 3A none of the negative values of the concentration indices, i.e., those along the gender dimension, happen to be statistically significant. However in 3B the negative values were indeed strongly significant among the poor in the categories of GB borrowers and respondents in the GK program area regardless of the MHI cardholding status. Moreover, for each of the latter categories, the concentration indices were significantly positive, indicating actual use of health care strongly concentrated among the non-poor.

Table 3A: Weighted proportion, crude concentration indices, need-standardized horizontal inequities and inequities estimated using decomposition analysis by age and gender

Economic status	Category		Weighted proportion	Concentration index	Horizontal inequity	
					Need standardized	Decomposition
Poor	Gender	Female	0.346	-0.006	-0.004	-0.004
		Male	0.348	0.005	-0.009	0.021
Non-poor	Gender	Female	0.440	0.041**	0.034	-0.049
		Male	0.446	0.014	-0.004	0.024
Poor	Age*	Child				
		Female	0.261	-0.038	-0.031	-0.036
		Male	0.290	-0.038	-0.031	-0.035
		Total	0.276	-0.036	-0.032	-0.030
		Adult				
		Female	0.385	-0.004	-0.01	0.003
		Male	0.382	0.008	-0.009	0.022
		Total	0.384	0.001	-0.01	0.011
		Elderly				
		Female	0.443	0.004	-0.028	0.021
		Male	0.416	0.139**	0.056	0.167
		Total	0.428	0.074	0.021	0.094
Non-poor	Age*	Child				
		Female	0.280	0.036	0.021	0.044
		Male	0.421	-0.007	0.004	-0.014
		Total	0.355	0.004	0.011	-0.004
		Adult				
		Female	0.480	0.027	0.011	0.030
		Male	0.454	0.031	0.005	0.041
		Total	0.470	0.028*	0.006	0.035
		Elderly				
		Female	0.543	0.055	0.025	0.058
		Male	0.470	-0.039	-0.091	0.015
		Total	0.503	0.010	-0.021	0.031

Note: *** indicates significance at 1% level, ** at 5% and * at 10%.

* Age below 15 years has been defined as child, age 15-64 years as adult and age 65 years and above as elderly.

(i) In column 5, among the non-poor, the differences in actual health care use between the male and the female is significant at 1% level for all age-groups while among the poor this difference is significant at 1% level for children and 10% level for the elderly. The differences among the age-groups (children vs. adult vs. elderly) are significant at 1% level irrespective of the poor and non-poor.

The socioeconomic inequality in health care utilization as represented by the crude concentration index is different for different categories of variables; the higher the magnitude, the higher the inequality (Tables 3A and 3B). For instance, the inequality is substantially larger in absolute value for MHI cardholders than non-cardholders in both poor and non-poor groups (-0.034 vs. -0.025 for the poor and 0.054 vs. 0.030 for the non-poor) although here the inequality favours the worse-off among the poor but the better off among the non-poor. The inequality is also larger, again in absolute value, for the female in general, female children, elderly female and the female in MFI borrowing households than their male counterparts in the non-poor group while for the poor, the inequality is substantially larger for elderly males and males in non-MFI borrowing households.

Table 3B: Weighted proportion, crude concentration indices, need-standardized horizontal inequities and inequities estimated using decomposition analysis by borrowing, MFI membership, GK Program and MHI enrolment status

Economic status	Category		Weighted proportion	Concentration index	Horizontal inequity	
					Need standardized	Decomposition analysis
Poor	HH Borrowing Status	MFI Borrower	Female	0.295	0.029	0.029
			Male	0.310	-0.023	-0.029
			Total	0.303	0.003	-0.002
		Others (Non-borrower including non-MFI borrower)	Female	0.392	-0.020	-0.018
			Male	0.390	0.048	0.032
			Total	0.391	0.010	-0.003
Non-poor	HH Borrowing Status	MFI Borrower	Female	0.403	0.085***	0.068
			Male	0.431	0.028	0.002
			Total	0.416	0.057***	0.036
		Others (Non-borrower including non-MFI borrower)	Female	0.486	0.005	0.009
			Male	0.465	-0.001	-0.016
			Total	0.477	0.002	-0.003
Poor	Category of MFI borrower	GB borrower	0.323	-0.038***	-0.041	-0.023
		Non-GB borrower	0.284	0.037***	0.03	0.038
Non-poor	Category of MFI borrower	GB borrower	0.434	0.045***	0.026	0.044
		Non-GB borrower	0.400	0.063***	0.042	0.058
Poor	Area	Program	0.358	-0.026***	-0.026*	-0.018
		Control	0.336	0.024***	0.013	0.029
Non-poor	Area	Program	0.450	0.036***	0.016	0.040
		Control	0.435	0.020***	0.015	0.016
Poor	GK MHI enrolment status	Card holders	0.359	-0.034***	-0.02	-0.036
		Non-card holders	0.358	-0.025***	-0.026	-0.016
Non-poor	GK MHI enrolment status	Card holders	0.487	0.054***	0.037**	0.047
		Non-card holders	0.442	0.030***	0.009	0.037

Note: *** indicates significance at 1% level, ** at 5% and * at 10%.

Dependent variable: Receiving healthcare from formal providers (1 = yes, 0 = no)

i) In column 5, among the non-poor, the gender (male vs. female) difference in actual health care use is significant at 1% level for both MFI borrowers and the other (i.e., non-MFI borrowers and non-borrowers) while among the poor this difference is significant at 5% level for MFI borrowers only. The differences between the MFI borrowers and the other, GB and non-GB borrowers, program and control areas are significant at 1% level among both the poor and non-poor groups but this difference is significant ($p < 0.01$) between cardholders and non-cardholders only among the non-poor.

Horizontal inequity: The horizontal inequities estimated following the need-standardized method and decomposition analysis (as discussed in Section 2.2) are displayed in last two columns of Tables 3A and 3B. We run probit regressions encompassing both need and non-need variables for decomposition analysis while in the need-standardized method we included only the need variables such as age of the patient (in years), self-reported duration of illness (in days), type of diseases (CDs, NCDs and A&I), and self-assessed severity of the illness (extremely severe, moderately severe and not much severe). The latter two are multiple dummy variables where ‘CDs’ and ‘not so severe’ were respectively considered as the reference category. Although age and gender are used as need factors in most studies of this kind (e.g., Ohkusa and Honda, 2003; van Doorslaer *et al.*, 2004; Morris *et al.*, 2005; Schneider and Hanson, 2006; Lu *et al.*, 2007), we did not use gender as an explanatory variable since we split the subjects into male and female as stated above. Schneider and Hanson (2006) used self-assessed severity of illness and duration of hospitalization while we used total duration of illness for both outpatient and hospitalization. Instead of categorizing the type of illnesses into acute and chronic, as used in the earlier literature (e.g., van Doorslaer *et al.* 2004; Morris *et al.* 2005), we grouped these into CDs, NCDs and A&I since the duration of illness is strongly correlated with acute and chronic categories. The non-need variables are: education of the household head (in years), enrolment status in GK MHI (=1 for yes, 0 otherwise), total number of illness episodes in the household and total number of children in the household.

The analysis shows that there are pro-poor need standardized horizontal inequities (see the negative sign) in using formal health care for most categories of interest among the poor while for the non-poor, there are pro-rich need standardized horizontal inequities (i.e., positive sign, Tables 3A and 3B). More precisely, the lower income households within the poor group used a higher share of formal health care than their share of health care needs, while the higher income households among the non-poor group uses a higher share of formal care than their share of health care needs for most categories of variables (as depicted above).

Among the poor, the need standardized *HI* is considerably higher in absolute value for the elderly male than the elderly female (*HI*: 0.056 vs. -0.028 where the former shows pro-rich and the latter pro-poor inequities) and in program areas than control areas (*HI*: -0.026 vs. 0.013). In the non-poor group, the inequity is noticeably higher in absolute value for the female than the male (*HI*: 0.034 vs. -0.004), elderly male than elderly female (*HI*: -0.091 vs. 0.025), MFI borrowers than non-borrowers (*HI*: 0.036 vs. -0.003), the female than the male in MFI borrowing households (*HI*: 0.068 vs. 0.002), non-GB borrowers than GB borrowers (*HI*: 0.042 vs. 0.026) and GK MHI card holders than non-card holders (*HI*: 0.037 vs. 0.009).

Horizontal inequity estimated through decomposition analysis in the last column of Tables 3A and 3B shows that, for most categories, inequity favours the better off irrespective of the poverty status. However, inequity favours the worse-off among the female, both poor and non-poor, among male children in the non-poor group and among poor children (both male and female, Table 3A). Focussing on the poor, inequity appears to favour GB borrowers, GK program areas respondents, i.e., including both members and non-members of MHI (Table 3B).

There is however substantial difference in the pattern of inequity for the same set of variables between the ‘need-standardized’ and ‘decomposition’ approaches. Often the magnitude differs a lot, but the sign also reverses in some cases. For example, among the non-poor inequity in absolute value is substantially higher for the female vis-à-vis the male in both approaches, though the sign is different. For the elderly non-poor, the orders of magnitude as well as the sign differ between the two measurements of *HI* (Table 3A). Moving over to Table 3B inequity (favouring the rich) measured by decomposition analysis is substantially higher in program than in control areas (among the non-poor) while there is no such difference in the need standardized approach. The discrepancy in the direction of inequity between the two methods of conducting *HI* analysis however disappears for the set of variables when the ‘concentration index’ is highly significant ($p < 0.01$), as seen in the bottom half of Table 3B. The magnitudes however continue to fluctuate, though mostly over a modest range.

Contribution of the determinants to the total observed inequality: The contribution of each determinant is obtained by multiplying the marginal effect of the respective variable by its mean and the concentration index and then dividing the product by the mean or proportion of

healthcare use.¹² Unadjusted percentage contribution of each determinant (i.e., the figures in parentheses in Tables 4A and 4B) is obtained by dividing the absolute contribution (absolute value of the deterministic contribution) by the total explained proportion of the concentration index.

Table 4A: Deterministic and unadjusted % contribution of the determinants to the total observed inequality

Econom ic status	Category		Determinants									
			Need variables						Non-need variables			
			age	NCDs	I&A	Duration	Extremely severe ill	Moderately severe ill	Education of HH head	MHI enrolme nt status	No. of illness episodes in HH	No. of children in HH
Poor	Gender	Female	0.001 (2.62)	0.007 (31.61)	-0.003 (-13.95)	-0.005 (-24.44)	-0.005 (-21.70)	0.004 (18.52)	0.010 (47.17)	0.006 (26.76)	0.001 (5.51)	0.006 (27.91)
		Male	-0.001 (12.37)	0.000 (-1.90)	-0.006 (110.35)	-0.006 (115.89)	0.000 (5.69)	-0.002 (37.84)	0.011 (-202.24)	-0.001 (10.81)	0.001 (-12.03)	-0.001 (23.21)
Non- poor	Gender	Female	0.003 (9.08)	0.000 (0.23)	0.001 (4.08)	0.002 (6.07)	-0.008 (-23.00)	0.010 (28.53)	0.019 (57.76)	0.003 (8.36)	0.002 (5.44)	0.001 (3.44)
		Male	-0.001 (-26.11)	-0.005 (-183.49)	0.001 (30.10)	-0.002 (-80.48)	-0.003 (-116.17)	0.001 (23.90)	0.012 (418.69)	0.005 (179.64)	-0.002 (-83.68)	-0.002 (-62.39)
Poor	Age*	Child	0.001 (4.99)	0.006 (55.03)	-0.004 (-33.34)	-0.010 (-92.84)	0.001 (9.41)	0.000 (2.21)	0.015 (133.95)	-0.002 (-19.14)	0.003 (26.92)	0.001 (12.81)
		Adult	0.000 (3.36)	0.002 (25.04)	-0.004 (-52.39)	-0.005 (-60.87)	-0.004 (-53.54)	0.000 (2.76)	0.010 (125.45)	0.006 (84.12)	0.002 (28.50)	0.000 (-2.44)
		Elderly	0.000 (-1.25)	-0.009 (36.43)	-0.005 (18.57)	-0.007 (27.03)	0.000 (1.74)	0.001 (-2.49)	0.013 (-52.20)	-0.002 (6.22)	-0.016 (64.12)	0.000 (1.83)
Non- poor	Age*	Child	0.000 (-1.56)	-0.004 (-12.84)	0.000 (-1.63)	0.012 (41.82)	-0.006 (-22.15)	0.007 (25.74)	0.017 (59.67)	0.004 (14.82)	-0.001 (-4.43)	0.000 (0.57)
		Adult	0.000 (2.54)	-0.007 (-47.82)	0.002 (13.58)	-0.003 (-18.18)	-0.002 (-11.93)	0.002 (14.50)	0.016 (113.48)	0.004 (26.29)	0.001 (4.38)	0.000 (3.18)
		Elderly	-0.003 (9.39)	-0.014 (43.23)	0.002 (-5.20)	-0.005 (15.32)	-0.005 (16.31)	0.005 (-16.23)	0.003 (-9.39)	-0.001 (3.33)	-0.004 (12.24)	-0.010 (31.00)

Note: 1. Figures in parentheses are the unadjusted % contribution of the determinant to the concentration index. Positive (negative) values reveal pro-rich (pro-poor) orientation and zero is perfect equivalence.

2. To make the results presentable we did not show the gender breakdown in this table.

* Age below 15 years has been defined as child, age 15-64 years as adult and age 65 years and above as elderly.

¹² *Marginal effect of the determinant:* The marginal effect of each determinant indicates its association with the likelihood of visiting a formal provider, while its magnitude implies the strength of the association.

Concentration index of the determinant: The positive or negative concentration index of each determinant refers to the concentration of individuals with the particular variable over higher or lower income groups respectively.

Table 4B: Deterministic and unadjusted % contribution of the determinants to the total observed inequality

Economic status	Category		Determinants									
			Need variables					Non-need variables				
			age	NCDs	I&A	Duration	Extremely severe	Moderately severe	Education of HH head	MHI CH status	No. of illness episodes in HH	No. of children in HH
Poor	HH's Borrowing Status	MFI Borrower	0.001 (2.54)	0.004 (16.26)	-0.003 (-12.93)	-0.007 (-32.70)	0.001 (4.08)	-0.001 (-3.68)	0.014 (63.80)	0.005 (23.02)	0.003 (11.98)	0.006 (27.64)
		Others (Non-borrower including non-MFI borrower)	0.000 (0.91)	0.004 (77.88)	-0.004 (-85.94)	-0.004 (-75.38)	-0.008 (-159.86)	0.002 (34.49)	0.010 (200.02)	0.001 (14.84)	0.004 (81.01)	0.001 (12.02)
Non-poor	HH's Borrowing Status	MFI Borrower	0.001 (1.82)	0.002 (5.10)	0.001 (4.46)	0.000 (-0.41)	-0.004 (-12.89)	0.003 (8.83)	0.021 (63.44)	0.009 (27.21)	0.001 (3.47)	0.000 (-1.03)
		Others (Non-borrower including non-MFI borrower)	0.002 (19.04)	-0.006 (-64.26)	0.001 (11.03)	-0.001 (-5.33)	-0.007 (-72.72)	0.007 (71.96)	0.011 (119.58)	-0.001 (-8.32)	0.000 (1.13)	0.003 (27.91)
Poor	Category of MFI borrower	GB borrower	0.000 (-0.49)	-0.006 (34.29)	-0.001 (5.51)	-0.012 (69.72)	0.001 (-6.27)	0.002 (-11.41)	0.008 (-46.48)	0.002 (-10.28)	-0.011 (66.22)	0.000 (-0.81)
		Non-GB (other MFI) borrower	0.000 (-0.69)	0.011 (16.26)	-0.006 (-9.29)	-0.003 (-4.06)	0.000 (-0.03)	-0.003 (-3.83)	0.023 (33.67)	0.000 (0.51)	0.028 (41.45)	0.018 (26.01)
Non-poor	Category of MFI borrower	GB borrower	-0.001 (-3.59)	0.005 (28.72)	-0.001 (-7.22)	-0.001 (-2.90)	-0.005 (-29.04)	0.004 (21.89)	0.017 (93.23)	0.011 (59.82)	-0.010 (-57.51)	-0.001 (-3.38)
		Non-GB (other MFI) borrower	0.003 (9.27)	-0.002 (-4.45)	0.005 (13.87)	-0.001 (-2.73)	-0.003 (-7.28)	0.002 (4.35)	0.026 (68.92)	0.000 (-0.34)	0.010 (27.16)	-0.003 (-8.76)
Poor	Area	Program	0.000 (1.32)	-0.001 (-16.96)	-0.003 (-38.61)	-0.006 (-80.30)	0.003 (41.54)	-0.001 (-8.28)	0.011 (138.20)	0.006 (79.95)	-0.004 (-50.89)	0.003 (34.04)
		Control	0.002 (15.95)	0.008 (69.78)	-0.004 (-36.03)	-0.005 (-46.41)	-0.008 (-73.11)	0.003 (24.26)	0.012 (102.33)	N/A	0.007 (58.57)	-0.002 (-15.34)
Non-poor	Area	Program	0.000 (0.96)	0.000 (0.93)	0.001 (6.24)	-0.001 (-5.54)	-0.009 (-62.88)	0.005 (36.62)	0.014 (93.88)	0.005 (32.52)	-0.001 (-7.48)	0.001 (4.74)
		Control	0.004 (17.15)	-0.003 (-14.90)	0.002 (9.73)	0.000 (-0.87)	-0.002 (-8.41)	0.004 (15.96)	0.019 (83.82)	N/A	0.003 (13.66)	-0.004 (-16.13)
Poor	GrK MHI card holding status	Card holders	0.000 (1.79)	-0.002 (-30.65)	0.001 (7.59)	-0.002 (-23.32)	0.003 (38.20)	0.002 (27.19)	0.013 (163.85)	N/A	-0.001 (-7.72)	-0.006 (-76.92)
		Non-cardholders	0.000 (-8.42)	-0.001 (39.60)	-0.005 (200.11)	-0.006 (244.21)	0.003 (-140.39)	-0.001 (49.30)	0.010 (-440.18)	N/A	-0.005 (210.33)	0.001 (-54.56)
Non-poor	GrK MHI card holding status	Card-holders	-0.001 (-2.28)	0.007 (28.08)	0.000 (0.06)	0.002 (9.39)	-0.004 (-16.74)	0.002 (8.57)	0.017 (72.00)	N/A	0.001 (3.94)	-0.001 (-3.02)
		Non-card holders	0.001 (36.79)	-0.002 (-69.77)	0.001 (44.22)	-0.003 (-94.10)	-0.011 (-356.54)	0.007 (230.85)	0.012 (370.40)	N/A	-0.001 (-18.50)	-0.001 (-43.33)

Note: 1. Figures in parentheses are the unadjusted % contribution of the determinant to the concentration index. Positive (negative) values reveal pro-rich (pro-poor) orientation and zero is perfect equivalence.

The positive (negative) value of the contribution suggest that if all other factors were equal, the total socio-economic inequality in formal health care use would be lower (higher) if that

determinant had equal distribution among the socio-economic groups (instead of the magnitude of the concentration indices) or if that determinant had no association with the likelihood of accessing formal health care (instead of the marginal effects).

Contribution of the determinants to the overall observed inequality can be interpreted as follows. Among the poor, the contribution of NCDs, a need variable, for the female is 0.007 or 31.6 percent to the total observed inequality in formal healthcare use (Table 4A).¹³ In other words, the total inequality in formal healthcare use favouring the better-off among the poor, *ceteris paribus*, would have been about 32 percent lower if formal health care use for NCDs were equally distributed across the socio-economic groups, or, if NCDs were not associated with formal health care use at all. Duration of illness had the negative inequality contribution (-0.005 or -24.44%). For the poor female, among the non-need variables, education of the household head had a positive contribution (0.010 or 47.2%) to the total observed inequality in formal healthcare use. It can be similarly interpreted as stating that the total observed inequality in formal healthcare use favouring the better-off among the poor, other things equal, would be about 47 percent lower if all the household heads of the poor female group were equally educated irrespective of the income level or if the education of the household head had no association with formal healthcare use.

Among need variables, extreme severity, duration and NCDs were the major contributors among the need variables while education of the household head was the most important contributor among the non-need variables explaining the observed inequality in health care. Duration and extreme severity of illness however had mostly a negative inequality contribution to total observed inequality. Non-need factors contributed mostly to the pro-rich direction for most of the categories.

4. DISCUSSION AND CONCLUSIONS

This study delineates the level of utilization of and inequity in the use of formal health care, giving a particular focus on the gender factor in rural Bangladesh. In determining horizontal inequity we used both the need-standardized approach and the decomposition analysis. We split

¹³ Note that NCDs for female had a higher likelihood of visiting formal providers and were disproportionately concentrated among the rich indicated by the positive marginal effect (0.196) and the positive concentration index (0.025) respectively (the magnitudes are not shown in Table).

the data primarily into poor and non-poor and then allocate each group into different subgroups along the following lines: gender, age, borrowing status, type of MFI member, micro health insurance placement status and enrolment status in micro-health insurance. We also split each category (if relevant) into male and female for a clearer understanding whether gender matters.

The results show that the utilization of formal health care is very low (about 40%) and especially so among the poorest (36%). About two-thirds of the formal health care market has been supplied by private facilities and about one-fourth by Government facilities while NGOs played a small role (Table 2). Interestingly, the poorest and the richest have almost equal use of government and NGO care. Private sector however dominates the formal health care scene and thus the poorest are more deprived presumably due to their inability to meet the costs. This leads to a significant difference in the degree of formal care accessed by the richest & the poorest quintiles. The difference is also significant ($p < 0.01$) while comparing the poor and the non-poor (Table 2).

The need-standardized method reveals that there are pro-poor horizontal inequities in formal care use among the poor and pro-rich inequities among the non-poor while decomposition results show that in most cases the inequity favours the better off in both poor and non-poor groups. Non-need factors, especially education of the household head, mostly contribute to this pro-rich direction. However, surprisingly, the level of inequity is not prominent except in a few cases. Severity of illness, duration and the incidence of NCDs appear to be the main contributors amongst the need factors of the underlying inequities.

Both methods show that inequity is considerably higher for the non-poor female compared to the non-poor male even though both groups had about equal actual health care use. A similar pattern of difference is seen for the non-poor children, which however tallies with their actual use of health care. A very similar level of inequity prevails between both the poor female and male children (for all measurement methods) and in spite of that the former had significant less use of actual health care than the latter. Difference in inequity is also not prominent between the adult female and the adult male while there is some difference between the elderly female and elderly male in both poor and non-poor groups. There is also some variation in inequity among the age groups for both the poor and non-poor. Inequity exists by borrowing status of the household to

some extent while this does not extend to the type of MFI membership, Grameen Kalyan's MHI placement status or the enrolment status in GK MHI in either poor or non-poor groups.

Thus after all, inequity may not be the topic of main public policy focus; low use of formal health care is the primary deficiency the health system in rural Bangladesh. Moreover, prevailing inequity resides mainly in the utilization of private health care and NCDs is a significant contributor to this inequity. Thus Bangladesh needs to innovate upon means of enabling access to formal health care use. In the latter context, the scope of making the government facilities more efficient in allocating rural healthcare is plagued by both budgetary limitations as well as by daunting governance issues in the face of reported endemic corruption. Developing appropriate risk-pooling modalities such as low-cost micro health insurance schemes may be an innovation that needs to be seriously considered, which is gaining popularity in many contexts similar to that in Bangladesh.

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