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Hardship Financing in Healthcare among Rural Residents in the Gaibandha District: An Application of Binary Logistic Regression

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ABSTRACT

High out-of-pocket expenditures lead to financial hardship in the absence of health insurance coverage, which is prevalent in low- and middle-income countries, including Bangladesh. Households often incur “hardship financing” when they face additional losses by borrowing from a bank, microfinance, or moneylender (with interest) and selling assets, which was 31.4% of 516 sampled respondents in the rural areas of the Gaibandha district in Bangladesh, selected as the study area. In contrast, financing in healthcare by current income or savings, and borrowing from relatives or friends (without interest), is termed “no hardship financing”, which was 68.6%. To investigate the factors affecting the risk of “hardship financing” as the outcome variable with “Yes or No” category, a binary logistic regression was applied, including six independent variables that made statistically significant contributions to the model, such as age, education, family size, the distance to the hospital, outpatient expenditures, and chronic illness. Subsidized healthcare services or health insurance schemes, and accessing to a wealthier social network were suggested, which may protect against the risk of hardship financing. Besides, establishing more healthcare facilities in remote areas with assured quality has been emphasized. Hence, to achieve universal health coverage, policymakers should consider the significant factors associated with hardship financing.

INTRODUCTION

All member countries of the United Nations (UN) are committed to achieving Universal Health Coverage (UHC) as part of the Sustainable Development Goals (SDGs)-3, aiming to ensure financial risk protection for all by 2030 (Tadiwos, 2025; UNDP, 2019). Hence, UHC aims to provide access to quality healthcare without facing financial hardship (Kolesar *et al.*, 2023). Financial hardship is particularly prevalent in low- and middle-income countries due to limited health insurance coverage and high Out-of-Pocket (OOP) payments. In turn, high OOP payments increase economic vulnerability and lead to long-term poverty among households.

Limited access to health insurance and unexpected OOP payments can lead to asset depletion, debt, and reductions in essential consumption, which can prevent access to healthcare. This may eventually result in financial catastrophes, distress financing, and impoverishment (Islam *et al.*, 2017; Leive & Xu, 2008; Russell, 2004; Chuma & Ezeoke, 2012). Health expenditures are considered catastrophic when they exceed a certain percentage of household income or expenditures (Tadiwos, 2025). Besides, health expenses that impoverish individuals or households are defined as those that exceed the internationally or nationally agreed-upon poverty line (Smit, 2009). There are an estimated 930 million (12.7% of the global population) people worldwide who face catastrophic health expenditures (CHE) because they sacrifice at least 10% of their household budgets to finance their healthcare (WHO, 2015).

Financing in healthcare includes sources such as current income or savings; borrowing from relatives or friends (without interest); borrowing from a bank, microfinance, or moneylender (with interest); and selling assets. Households often incur “hardship financing” when they face additional losses by borrowing from a bank, microfinance, or moneylender (with interest) and selling assets. On the other hand, financing in healthcare by current income or savings, and borrowing from relatives or friends (without interest), is termed as “no hardship financing” (Binnendijk *et al.*, 2012). The second category has been regarded as less burdensome than the first in various studies (Asfaw *et al.*, 2010; Kruk *et al.*, 2009; Steinhardt *et al.*, 2009). However, the consequences may differ between those of richer households and poorer ones. Bangladesh has an extensive infrastructure in the healthcare delivery system. However, every year, an estimated 150 million people suffer severe financial hardship, and 100 million falls below the poverty line because of high healthcare expenditures (Tahsina, 2018). In addition, public and private health services coexist in Bangladesh, with a dual healthcare system. In the public sector, outpatient, inpatient, and preventive care are provided largely. Whereas, curative care is mainly provided in outpatient and inpatient settings in the private sector (Islam *et al.*, 2017). However, people often lack access to quality healthcare at an affordable cost, as they expect.

In 2020, the OOP expenditures by households constituted a total of 68.5% (two-thirds) of the Total Health Expenditures (THE) in Bangladesh, followed by 23.1%

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from government healthcare financing. The remaining portion, including development partners, contributed 5%, while NGOs contributed 2%. Additionally, private corporations, autonomous bodies, and voluntary health insurance, in combination, contributed 2% to healthcare financing (BNHA, 1997-2020). It is noted that approximately five million people in Bangladesh are impoverished by large OOP payments for healthcare every year (Van Doorslaer *et al.*, 2006; Ahmed *et al.*, 2013). Generally, in most low-income rural settings, there is an irregular flow of income, which instigates financial hardship. Consequently, different types of suffering may occur, such as cutting a meal from a household's regular food menu or a child's schooling. However, in-depth studies regarding factors associated with 'hardship financing' in healthcare among people in the rural areas of northern Bangladesh are quite limited. The study will focus on how rural people of the Gaibandha district finance their healthcare expenditures. Besides, the study will identify the factors associated with hardship financing in healthcare among respondents.

MATERIALS AND METHODS

Research Approach

The study was explorative, using both quantitative and qualitative data.

Study Focus

A cross-sectional study was carried out in the rural areas of the Gaibandha district, which was selected as the study area. The survey was conducted from February 2019 to March 2019 and focused on the rural people of the Gaibandha district.

Sampling

A simple random sampling technique was used in two ways for the study. Firstly, four Upazilas were selected from seven Upazilas of the Gaibandha district, named Fulchhari, Gaibandha Sadar, Gobindaganj, and Sundarganj (BBS 2011). Secondly, a total of 516 respondents were selected finally by using the same technique for interviewing.

Sources of Data

The primary data was collected from the respondents in the study area. Relevant books, journal articles, web pages, the Bangladesh budget, and the "Population and Housing Census, 2011, Zila report: Gaibandha" served as the sources of secondary data.

Data

To assess the socio-economic status, the survey questionnaire included socio-economic factors such as gender, age, family size, education, occupation, and annual income. Besides, the respondents were asked about their inpatient and outpatient healthcare expenditures in the year preceding the survey. The respondents were asked whether they had suffered from any type of chronic illnesses. To identify chronic illness, respondents were asked a set of questions related to disease symptoms, length of illness, and regular medicine use. Hence, staying in a hospital for more than 24 hours has been considered inpatient care. On the other hand, outpatient care includes expenditures on drugs, diagnostic tests, and consultations with healthcare practitioners staying in a hospital for less than 24 hours. The inpatient care included medical direct expenses and hospital admissions of the respondents. Besides, the respondents were asked about the distances to the hospital from their residences (travel distance in kilometers). To investigate the sources of healthcare financing, the respondents were asked whether they had used current income, savings, borrowing from relatives, friends, neighbors, banks, moneylenders, or microfinance, and money received by selling assets.

Data Analysis and Presentation

Data has been analyzed using SPSS version 26. To investigate the factors affecting the risk of hardship financing among rural residents in the Gaibandha district, "Binary Logistic Regression" was applied. Thus, "Hardship Financing" is the outcome variable, being a binary category with "Yes or No". A 5% level of significance was used for the study to show the statistical significance. MS Excel was used for data presentation and tabulation.

Limitations of the Study

Variations in knowledge and understanding regarding health conditions, memory recall issues, and overlapping symptoms among patients may lack of accuracy in self-reporting illness episodes. The cross-sectional nature of the study rendered it incapable of capturing seasonal variations in household income or illness-related expenditure and coping strategies. In addition, it is not possible to draw the same conclusions elsewhere without reliable and sufficient data.

RESULTS AND DISCUSSION

Socio-Economic Profile of the Sampled Respondents

Table 1: The socio-economic status of the sampled respondents

Variables	Frequency (n)	Percentage
Gender		
Male	340	65.9
Female	176	34.1
Age		
Lowest up to 30	197	38.2

31-45	198	38.4
45 above	121	23.2
Marital Status		
Unmarried	3	0.6
Married	502	97.3
Widow/Divorce	11	2.1
Family size		
Lowest up to 3	378	73.3
4 to 7	133	25.8
>7	5	1.0
Number of children		
0 to 3	427	82.8
4 above	89	17.2
Education		
Primary	221	42.8
Secondary and Higher Secondary	80	15.5
Graduation / Masters	24	4.7
No education	191	37.0
Occupation		
Service holder	117	22.7
Business	110	21.3
Farmer	94	18.2
Daily labor	195	37.8
Annual income		
Lowest up to 100000	224	64
100001-200000	139	26.9
200000 above	47	9.1
Chronic illness		
Yes	276	53.5
No	240	46.5
Distance to hospital (Km)		
Lowest up to 3	129	25
4-20	278	53.9
20 above	109	21.1

Table 2: Healthcare expenditures from suffering any major disease among the study respondents

Variables	Frequency (n)	Percentage
Households with inpatient care costs last year (BDT)		
Lowest up to 1000	322	62.4
1001-10000	109	21.1
10001-25000	51	9.9
25000 above	34	6.6
Households with outpatient care costs last year (BDT)		
Lowest up to 1000	185	35.9
1001-5000	312	60.5
5000 above	19	3.7

Table 3: Healthcare financing of the study respondents

Variables	Frequency (n)	Percentage
Covering costs by using present income	175(33.8)	341(66.2)
Covering costs by using savings	61(11.8)	455(88.2)
Covering costs by borrowing from relatives/neighbors/friends	357(69.1)	159(30.9)
Covering costs by selling assets	146(28.2)	370(71.6)
Covering costs by borrowing from banks/moneylenders/microfinance	80(15.5)	436(84.3)

About 65.9 % of the respondents were male and 34.1% of the respondents were female. Most of the households were male-headed who were responsible for key decisions at the household level. As a larger portion of the male household heads are usually engaged in their occupation or performing daily duties during the daytime, all were not present at home while interviewing. The mean age of the respondents was 38 years, and the age distribution ranged from 18 to 80 years. A large percentage of respondents, 38.2%, were age level from lowest up to 30 years, which has been considered as younger individuals. A total of 38.4% were age level of 31-45 years, whereas 23.2% were 45 years and above old and needed the care the most. Hence, there is a greater possibility of suffering from illness for older individuals than younger individuals because of decreasing immunity as a general consideration.

Hence, daily labor was the main occupation in the study areas among rural residents, with a large percentage of 37.8%. A total of 22.7% were service holders, although most of them were employed in informal sectors, such as salesmen and waiters, and a very small portion was employed in formal sectors. About 21.3% were self-employed in businesses, and 18.3% were self-employed in agriculture. On average, the annual income was BDT 112,852, with a minimum of BDT 18,000 and a maximum of BDT 650,000. Furthermore, 64% of them reported their household income earning less than BDT 100000, 26.9% reported BDT100001 to 200000, and 9.1% reported above BDT 200000 annually.

A larger portion of respondents (37%) had no formal education, 42.8% had primary education, 15.5% had secondary or higher secondary education, and only 4.7% had a graduation or higher degree. The average family size was five (5). The family size ranging from one to three (1-3) was 378 (73.3%), which accounted for the highest number of respondents. Those with household sizes of four to seven (4-7) were 133 (25.8%), while those that had family sizes greater than seven (>7) were 5 (1.0%). It is noted that about 20 households had no children. A total of 82.8% of children were below 3, 17.2% of above 4. About 53.5% had been suffering from chronic illness, whereas 46.5% had not.

Healthcare Expenditures

Table 2 shows that the majority of respondents (62.4%) noticed their inpatient expenditures (Table 2) were up to BDT1000. On the other hand, 21.1% noticed the amount

of BDT1001-10000, 9.9% noticed of BDT10001-25000, and 6.6% noticed of BDT25000 above. For outpatient expenditures (Table 2), the majority of respondents (60.5%) noticed their outpatient expenditures were BDT1001- 5000, followed by 35.9% noticing at the lowest up to BDT1000, and only 3.7% noticing BDT5000 above.

Healthcare Financing

To meet the health expenditures (Table 3), the major portion of the sampled respondents resorted to using their current income, savings, and borrowing from relatives/neighbors/friends, and hence they were considered to have no hardship financing. Besides, they often sold their assets or borrowed money with interest to finance their healthcare expenditures and were considered hardship financing (Binnendijk *et al.*, 2012). Based on the criterion, hardship financing was found among 31.4% of the sampled respondents during the year preceding the survey, and the remaining 68.6% had no hardship financing.

Binary Logistic Regression (BLR) Analysis

In regression analysis, an association between a response variable and one or more explanatory variables is determined. However, there is often a situation where the outcome variable is discrete, with two or more possible values (Hosmer & Lemeshow, 2000). Hence, a BLR is used to model the relationship between a dichotomous dependent variable, which is binary rather than continuous and multiple continuous or categorical independent variables (Hair *et al.*, 2010; Hyeoun-Ae Park, 2013).

In the study, a BLR analysis was applied between hardship financing as the dependent variable with “Yes” or “No” category and the independent variables with gender, age, marital status, education, occupation, family size, number of children, income, distance to the hospital, chronic illness, inpatient expenditures, and outpatient expenditures. However, a multivariate analysis was used under the BLR analysis to identify the factors influencing hardship financing while paying healthcare expenditures. The significance value (p-value) of the Wald test has been used in the BLR analysis to determine whether the predictor variables meaningfully contribute to the model (Vakhitova *et al.*, 2018).

Assumptions of BLR Analysis

BLR analysis requires certain assumptions to be satisfied to give a valid result. They are as follows:

The Categories for a Dependent Variable Must be Mutually Exclusive And Exhaustive

It means that every data point should fall into only one category (mutually exclusive), and the categories provided should cover all possible outcomes (exhaustive).

The assumption was checked by defining the categories were defined that no single data point logically fell into more than one category. Besides, the assumption was checked with the numerical data, where the ranges did not overlap.

Binary Dependent Variable

There must be a dichotomous dependent variable, which was checked as dichotomized into “Yes” or “No” categories (Hosmer *et al.*, 2013).

Independence of Observations

The observations should be independent of each other. A simple random sampling has been applied to collect the data, ensuring the independence of each observation. Besides, clustering was avoided, which might introduce dependencies.

No Multicollinearity among Predictors

A key assumption in logistic regression is that the explanatory variables should not be highly correlated with each other. By using tolerance and variance inflation factor (VIF), multicollinearity can be detected easily.

The VIF is defined as the reciprocal of tolerance as follows:

$$VIF = 1 / \text{Tolerance}$$

The tolerance value (Table 4) close to 1 indicated that there was little multicollinearity, which can be accepted. Whereas a value close to zero suggests that multicollinearity may be a threat (Senaviratna and Cooray, 2019). However, the calculated value of VIF was <4, which shows no multicollinearity in the dataset (Jahan, 2022).

Large Sample Size

Predictor variables should consist of at least 10 events per variable as a general rule of thumb (Peduzzi *et al.*, 1996). Hence, there were 12 (twelve) predictor variables, and the events should be 120 (one hundred and twenty). However, 516 (five hundred and sixteen) respondents were selected for the study, which shows a large sample size.

Variables of the Study

The dependent variable was hardship financing, categorized as “Yes” or “No”.

The independent variables used in the study were gender, age, marital status, education, occupation, family size, number of children, income, the distance to the hospital, chronic illness, inpatient expenditures, and outpatient expenditures

Table 4: Nature of the dependent variable with the category codes

Categories of hardship financing	Codes
Yes	1
No	2

Table 5: Nature of the independent variables with the category codes

Designation of Variable	Description of Independent Variables	Codes
X ₁ (X ₁₍₁₎ =Male, X ₁₍₂₎ =Female)	Gender of respondent	1=Male, 2=Female
X ₂ (X ₂₍₁₎ =Lowest up to 30 years, X ₂₍₂₎ =31-45 years, X ₂₍₃₎ =45 years above)	Age of respondent	1=Lowest up to 30 years, 2=31-45 years, 3=45 years above
X ₃ (X ₃₍₁₎ =Unmarried, X ₃₍₂₎ =Married, X ₃₍₃₎ =Married)	Marital Status of the Respondent	1=Unmarried, 2=Married, 3= Widow/Divorce
X ₄ (X ₄₍₁₎ =Lowest up to 3, X ₄₍₂₎ =4 -7, X ₄₍₃₎ =7 above)	Family size of the respondent	1= Lowest up to 3, 2=4- 7, 3= 7 above
X ₅ (X ₅₍₁₎ =0 to 3, X ₅₍₂₎ =4 above)	Number of children	1= 0 to 3, 2=4 above
X ₆ (X ₆₍₁₎ =Primary, X ₆₍₂₎ =Secondary / Higher Secondary, X ₆₍₃₎ =Graduation / Masters, X ₆₍₄₎ = No education)	Education level	1= Primary, 2=Secondary / Higher Secondary, 3= Graduation / Masters, 4= No education
X ₇ (X ₇₍₁₎ =Service holder, X ₇₍₂₎ =Business, X ₇₍₃₎ =Farmer, X ₇₍₄₎ =Daily Labor)	Occupation	1= Service holder, 2=Business, 3= Farmer, 4= Daily Labor
X ₈ (X ₈₍₁₎ =Lowest up to 100000, X ₈₍₂₎ =100001-200000, X ₈₍₃₎ =200000 above)	Annual income (BDT)	1= Lowest up to 100000, 2=100001-200000, 3=200000 above
X ₉ (X ₉₍₁₎ =Lowest up to 3, X ₉₍₂₎ =4-20, X ₉₍₃₎ =20 above)	The distance of the hospital from the Patient’s residence (km)	1= Lowest up to 3, 2=4-20, 3=20 above
X ₁₀ (X ₁₀₍₁₎ =Yes, X ₁₀₍₂₎ =No)	Chronic illness	1= Yes, 2=No
X ₁₁ (X ₁₁₍₁₎ =Lowest up to 1000, X ₁₁₍₂₎ =1001-10000, X ₁₁₍₃₎ =10001-25000, X ₁₁₍₄₎ = 25000 above)	Inpatient expenditures (BDT)	1= Lowest up to 1000, 2= 1001-10000, 3= 10001-25000, 4= 25000 above
X ₁₂ (X ₁₂₍₁₎ =Lowest up to 1000, X ₁₂₍₂₎ =1001-5000, X ₁₂₍₃₎ =5000 above)	Outpatient expenditures (BDT)	1= Lowest up to 1000, 2= 1001-5000, 3= 5000 above

Checking Model Adequacy

In Table 6 to 10, the full model, containing all predictors, was statistically significant, as indicated by a chi-square value of 123.061 with $df = 24$, $p\text{-value} = .000$, meaning $p < .001$, which suggests that the model could distinguish between respondents who reported incurring hardship financing and those who did not. The model explained

between 21.2% (Cox and Snell R-square) and 29.8% (Nagelkerke R-square) of the variance incurring hardship financing and correctly classified 75.8% of cases as a whole. In the Hosmer-Lemeshow test, a high $p\text{-value}$ indicates the model fits the data well ($P > 0.05$). In this case, it suggests that the model's predictions are consistent with observed outcomes, implying a good fit.

Table 6: Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	123.061	24	.000
Block	123.061	24	.000
Model	123.061	24	.000

Table 7: Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.845	8	.553

Table 8: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	519.078 ^a	.212	.298

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 9: Classification Table

Observed		Predicted		
		Hardship Financing		Percentage Correct
		Yes	No	
Hardship Financing	Yes	77	85	47.5
	No	40	314	88.7
Overall Percentage				75.8

Table 10: Collinearity Statistics

	Gender	Age	Marital Status	Education	Occupation	Family size	Number of children	Income	Distance to the hospital	Chronic illness	Inpatient expenditure	Outpatient expenditure
VIF	1.116	1.308	1.081	1.215	1.388	1.302	1.293	1.282	1.113	1.115	1.469	1.491
Tolerance	.896	.765	.925	.823	.721	.768	.773	.780	.898	.897	.681	.671

Parameter Estimates of Binary Logistic Regression

Binary logistic regression was used to assess the factors associated with incurring hardship financing for healthcare services. As shown in Table 11 (parameter estimates), six independent variables made statistically significant

contributions to the model, such as age, education, family size, the distance to the hospital, outpatient expenditures, and chronic illness. On the other hand, the influence of gender, marital status, occupations, the number of children, income, and inpatient expenditures was found to be insignificant.

Table 11: Parameter Estimates of Binary Logistic Regression

Variables (Category)	β (S.E)	Wald	df	Sig.	Exp ^{β}	95% CI	
						Lower Bound	Upper Bound
Intercept=1	-2.293(1.089)	4.431	1	.035***	-	-	-
X ₁							
Gender (Ref: Female)							

Male	.471(.258)	3.340	1	.068	1.602	.966	2.654
X₂							
Age (Ref:45 above years)							
Lowest up to 30 years	.853 (.326)	6.862	1	.009***	2.348	1.240	4.446
31-45 years	.711(.295)	5.816	1	.016***	2.037	1.142	3.631
X₃							
Marital Status (Ref: Widow/Divorce)							
Unmarried	-1.213 (1.566)	.601	1	.438	.297	.014	6.394
Married	-.499 (.806)	.383	1	.536	.607	.125	2.949
X₄							
Family size (Ref: 7 above)							
Lowest up to 3	-1.949 (.669)	8.497	1	.004***	.142	.038	.528
4 to 7	-1.452 (.600)	5.856	1	.016***	.234	.072	.759
X₅							
Number of children (Ref: 4 above)							
0 to 3	-.312 (.344)	.820	1	.365	.732	.373	1.438
X₆							
Education (Ref: No education)							
Primary	.198 (.281)	.494	1	.482	1.218	.702	2.113
Secondary / Higher Secondary	-.106 (.389)	.074	1	.785	.899	.419	1.928
Graduation / Masters	1.848 (.713)	6.720	1	.010***	6.346	1.570	25.656
X₇							
Occupation (Ref: Daily Labor)							
Service holder	.028 (.345)	.007	1	.936	1.028	.523	2.022
Business	-.336 (.317)	1.120	1	.290	.715	.384	1.331
Farmer	.555 (.397)	1.952	1	.162	1.742	.800	3.795
X₈							
Annual income (Ref: 200000 above BDT)							
Lowest up to 100000	-.389 (.491)	.628	1	.428	.678	.259	1.773
100001-200000	-.760 (.484)	2.470	1	.116	.468	.181	1.207
X₉							
Distance to the hospital (Ref: 20 km above)							
Lowest up to 3	-1.251 (.435)	8.268	1	.004***	.286	.122	.672
4-20	-1.149 (.408)	7.943	1	.005***	.317	.143	.705
X₁₀							
Chronic illness (Ref: No)							
Yes	-.828(.244)	11.538	1	.001***	.437	.271	.705
X₁₁							
Inpatient expenditures (Ref: 25000 above BDT)							
Lowest up to 1000	.620 (.491)	1.596	1	.206	1.859	.710	4.865
1001-10000	.709 (.509)	1.943	1	.163	2.032	.750	5.506
10001-25000	-.240 (.525)	.208	1	.648	.787	.281	2.201
X₁₂							
Outpatient expenditures (Ref: 5000 above BDT)							
Lowest up to 1000	1.851 (.641)	8.343	1	.004***	6.366	1.813	22.351
1001-5000	.846 (.585)	2.090	1	.148	2.330	.740	7.336

Notes: ***P significant at 0.05 for the Wald test

The Logistic Model

A multiple linear regression model can be written as follows where the left-hand side expresses the log-odds or logit:

$$\ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K$$

The equation can be re-written also as follows:

$$\pi(X) = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K}}$$

Where π is the event probability, α is the Y-intercept, B_1, \dots, B_K are parameters of the slope, and X_1, \dots, X_K are the explanatory variables. α and β 's is estimated by the maximum likelihood estimator (MLE) approach (Abdulqader, 2017; Peng *et al.*, 2002).

The Model of Binary Logistic Regression

The following model was run:

$$\text{Hardship Financing} = \alpha + .853X_{2(1)} + .711X_{2(2)} - 1.949X_{4(1)} - 1.452X_{4(2)} + 1.848X_{6(3)} - 1.251X_{9(1)} - 1.149X_{9(2)} - .828X_{10(1)} + 1.851X_{12(1)} + .846X_{12(2)} + \epsilon$$

Where α (alpha) is the intercept (2.293), X_1, \dots, X_{12} are the explanatory variables, $\beta_1, \dots, \beta_{12}$ are the regression coefficients, and ϵ the error term.

Factors Influencing Hardship Financing by Using BLR Analysis

In the BLR analysis, regression coefficients and odds ratios (OR) were interpreted with factors affecting hardship financing. They were as follows:

Socioeconomic and Demographic Parameters with Hardship Financing

The β 's are the regression coefficients (Table 7), indicating the direction of the relationship between the independent variables and the logit of hardship financing. Hence, a direct or positive relationship exists between them when β 's is positive. On the other hand, a negative relationship exists between the two when β 's is smaller than zero (negative). The analysis is as follows:

Age Level

The estimated value of β implies that the estimated change in the logit/log-odds of hardship financing is for every 1-year increase in age level. The positive coefficients ($\beta=0.853$ and $\beta=0.711$) indicated that the respondents in the age level lowest up to 30 and between 31-45 years were more likely to incur hardship financing compared to the respondents aged 45 and above. Besides, the age level was statistically significant with hardship financing. The OR [exp (β)=2.348] indicated that the respondents of the age level lowest up to 30 years were 2.348 times more likely to experience hardship financing compared to the reference category (the respondents of the age 45 and above). Added to this, the OR [exp (β)=2.037] indicated that the respondents in the age level between 31-45 years were 2.037 times more likely to experience hardship financing than the respondents aged 45 and above. Hence,

the younger respondents were more likely to experience hardship financing than the older respondents.

Education

The positive coefficient ($\beta=0.198$) with the primary education level, the negative coefficient ($\beta=-0.106$) with the secondary and higher secondary education level, and the positive coefficient ($\beta=1.848$) with the graduation/master's level represented the change in the log-odds of incurring hardship financing compared to those with no education. Hence, the respondents with primary education and graduation/master's level had a much higher likelihood of experiencing hardship financing than those without education. In contrast, the respondents with secondary and higher secondary education had less likelihood of experiencing hardship financing than the respondents with no education.

The OR [exp(β)=1.218] indicated that the respondents who had primary education were 1.218 times (21.8%) more likely to report hardship financing than those who had no education; the respondents who had secondary and higher secondary education were 0.899 times (10.1%) less likely to report hardship financing than those who had no education; the respondents who had graduation/master's degree education were 6.346 times (534.6%) more likely to report hardship financing than those who had no education, holding all other variables constant. Thus, education level was a good predictor of incurring hardship financing by the recorded value of the odds ratio, and was statistically significant with hardship financing.

Family Size

The estimated change in the logit/log-odds for every 1 member increases with the family sizes, lowest up to 3 and 4-7 members at -1.949 and -1.452, respectively. Thus, the negative coefficients ($\beta=-1.949$ and $\beta=-1.452$) represented that the respondents of the family size lowest up to 3 or 4-7 members were less likely to incur hardship financing than those of 7 or above.

The OR [exp (β)=0.142] indicated that the respondents of the family size lowest up to 3 were 0.142 times (85.8% lower) less likely to incur hardship financing compared to the reference category (the respondents with family sizes of 7 and above. Added to this, the OR [exp (β) =0.234] indicated that respondents of family sizes of 4-7 members were 0.234 times (76.6% lower) less likely to incur hardship financing than those of 7 and above.

Distance to the Hospital

The estimated change in the logit/log-odds of hardship financing for every 1 km increases with the distance of the hospital from the residence. The coefficients ($\beta=-1.251$, when the respondents lived within the distances of the hospital of lowest up to 3 km and $\beta=-1.149$, when the respondents lived within the distances of the hospital between 4-20 km) represented the estimated change in the log-odds of incurring hardship financing compared to the respondents who lived within the distances of above

20 km. As the coefficients were negative, it expressed that the respondents who lived closer to the hospital (less than 20 km) were less likely to incur hardship financing compared to those who lived across away (above 20 km). The OR [exp (β)=0.286] indicated that the respondents who lived within the distances of the hospital at the lowest up to 3 km, were 71.4% less likely to incur hardship financing than the respondents who lived within the distances of above 20 km. Added to this, the OR [exp (β)=0.286] indicated that the respondents who lived within the distances of the hospital between 4-20 km were (or 68.3%) less likely to report hardship financing than the respondents who lived within distances of above 20 km, holding all other variables constant. However, the distance was statistically significant with hardship financing.

Healthcare Expenditures with Hardship Financing Annual Outpatient Expenditures

The positive coefficients (β =1.851, when the respondents' annual outpatient expenditures were up to 1000 BDT and β =.846, when the respondents' annual outpatient expenditures were between the 1001-5000 BDT) represented the change in the log-odds of incurring hardship financing compared to the annual outpatient expenditures above 5000 BDT among respondents.

The OR [exp (β)=6.366] indicated that the respondents with annual outpatient expenditures up to 1000 BDT were 6.366 times more likely to incur hardship financing than those with annual outpatient expenditures of above 5000 BDT. The OR [exp (β)=2.330] indicated that the respondents with annual outpatient expenditures between 1001-5000 BDT were 2.330 times more likely to report incurring hardship financing than those with outpatient expenditures above 5000 BDT annually, holding all other variables constant. Thus, a strong and statistically significant relationship existed between annual outpatient expenditures and hardship financing. Nevertheless, the analysis confirmed that annual outpatient expenditures were a strong predictor of incurring hardship financing by the recorded value of the odds ratio.

Morbidity Parameters with Hardship Financing Chronic Illness

The negative coefficient (β =-0.828) represented the change in the log-odds (logit) of incurring hardship financing among respondents who have suffered from chronic illness compared to those having no chronic illness. However, it expressed that having a chronic illness among respondents reduced the likelihood of incurring hardship financing compared to the reference category (the respondents having no chronic illness).

The OR [exp (β) =.437] indicated that the respondents having chronic illness had 56.3% lower odds (1 - 0.437 = 0.563 or 56.3% decrease) of incurring hardship financing compared to the reference category (the respondents who have no chronic illness). However, it expressed that the respondents with chronic illness were less likely to

require hardship financing compared to the reference category. Nevertheless, the chronic illness was statistically significant with hardship financing.

Discussion

The younger respondents may face more financial instability, which leads to seeking hardship financing. On the other hand, the older respondents may be more financially established, which reduces their need for hardship financing.

The respondents with primary education have limited opportunities for a stable job. This allowed them to face financial instability, and increased the likelihood of their incurring hardship in financing them. The respondents with secondary/higher secondary education have better job opportunities with better stable income. This allowed them to plan and manage healthcare financing in a better way, which reduced incurring hardship of financing. The respondents with an education level of graduation/master's degree may have higher living standards. It enhanced their living expenditures even in healthcare, leading to financial stress. Moreover, the graduates don't always get their job they expect. However, a mismatch between education level and the demands of the job market exists. Thus, on one side, the underemployment situation among graduates and on the other side, increased expenditures even in healthcare led to a financially unstable situation.

The individuals with large family sizes may face higher financial pressure due to more dependents. Hence, the situation led them to rely more on hardship financing. In contrast, smaller families may have fewer financial obligations or be better able to manage their finances.

The respondents who lived closer to the hospital were financially more relieved by spending less money on seeking healthcare than those who lived farther distances from the hospital. Thus, they were facing less financial hardship. On the other hand, the respondents who were living far from the hospital were delaying in seeking treatment, which led to more suffering from illnesses and facing financial hardship.

The respondents with lower outpatient expenditures were more likely to incur hardship financing than the respondents with high outpatient expenditures. Although the result may seem quaint at initially, it reflected immeasurable socioeconomic dynamics and healthcare access in Bangladesh. Households incurring lower outpatient expenditures often belong to poorer socioeconomic conditions. Thus, the lower outpatient expenditures don't necessarily indicate lesser healthcare needs but rather financial constraints which limits their ability to seek or afford care. Consequently, even minimal outpatient expenditures can strain their limited resources, leading to hardship financing mechanisms such as borrowing or selling assets. On the contrary, high outpatient expenditures may reflect greater healthcare needs and financial ability, which allowing them to access in healthcare services without financial hardship. Moreover,

a time gap between the inflow of income and outflow of health expenditures can lead to hardship financing (Binnendijk, 2014). Added to this, the incalculable timing of hospitalization and the urgent need for large amounts of funds increase the risk of hardship financing. Having a chronic illness, the respondents were facing less hardship financing compared to those who had no chronic illness, which was an exception. Many indirect costs could be generated, such as loss of income of the chronically ill patient, and transportation costs, which could independently lead to the risk of hardship financing. However, the study explored that the respondents with chronic illnesses might plan better for healthcare expenditures compared to those with sudden illnesses (without chronic illnesses) and those incurring no hardship financing.

CONCLUSION

Improvement in healthcare accessibility can be ensured by financial assistance. Education cannot be a safeguard for financial distress; thus, educational outcomes should be aligned with labor market demand. However, the government should take initiatives to promote a better job market to reduce the unemployment situation. Besides, education policies should be developed by emphasizing skills relevant to the present job market to reduce underemployment situations. Thus, this will reduce the financial distress in healthcare financing. Moreover, the policymakers may extend financial support to people suffering from non-chronic diseases for those facing financial hardship. Those initiatives would enhance financial risk protection and would mitigate vulnerability due to the devastating economic effects of health shocks. The frequency of outpatient healthcare utilization is substantially higher than that of inpatient healthcare utilization, which is a crucial consideration. Hence, health reforms are needed to tackle a less stable (declining) financial situation due to high outpatient expenditure, which is a significant predictor of financial hardship. Thus, subsidized healthcare services or health insurance schemes can be introduced to reduce the economic burden among respondents. Additionally, accessing a wealthier social network may increase the likelihood of households being able to obtain interest-free loans, which may protect against the risk of hardship financing. Besides, establishing more healthcare facilities in remote areas with assured quality should be emphasized. Hence, in order to achieve universal health coverage and to protect households against financial hardship, policymakers should consider these determinants.

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