

ORIGINAL ARTICLE

Analyzing Out of Pocket Health Expenses: An Assessment based on Cross Section Study in Assam

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Abstract

Background: Increasing out of pocket health expenses is one of the major debates among the policy makers during the recent years. Out of pocket (OOP) health expenses above the catastrophic level leads to impoverishment of the rural poor. **Aims & Objectives:** To analyze the impact of inpatient care in escalating OOP expenses and identifies the factors associated with catastrophic health expenditure in Assam, India. **Material & Methods:** The study is based on the household survey conducted during 2014 - 15 in Nagaon and Nalbari districts of Assam. The factors associated with catastrophic health expenditure are estimated using binary logistic regression model. **Results:** The households are afflicted with a larger burden of healthcare expenditure mainly in case of inpatient care. Due to severe shortage of medical personnel and equipment, residents are compelled to visit private health facilities. Huge costs are borne by the households due to outsourcing of services from government to private sector. **Conclusions:** Provision of protection from financial risk for health hazards and improvement of quality of health care in government hospitals is imperative to improve the existing situation.

Keywords

Health Expenditures; Logistic Models; Health Care Costs; Delivery of Health Care; Health Facilities; Surveys and Questionnaires; India

Introduction

Increasing out of pocket (OOP) health expenses is one of the major debates among the policy makers during the recent years. Out of pocket expense constitutes 62 per cent of total health expenditure in India which is much higher compared to developed countries like United Kingdom and United States (20 per cent) and in BRICS (Brazil, the Russian Federation, India, China and South Africa) countries; it ranges between 20 to 25 per cent. (1, 2, 3, 4, 5) OOP health expenses above the catastrophic level

leads to impoverishment of the rural poor. The dominance of the private sector in India is one of reason of increasing out of pocket (OOP) expenses especially among the vulnerable classes. Moreover, a diversion in the choice of health care has also been observed from the secondary to the tertiary care centres which are largely under the private sector. (6, 7, 8, 9, 10, 11)

Under the above circumstance the paper discusses the status of OOP health expenses in Assam based on a cross section estimate. Assam has occupied the position of being one of the states in India with 'weak

health outcome indicators' under National Health Mission (NHM). On an average 14 per cent of annual earnings are spent on medical care by the people of Assam. The out of pocket expenses as a proportion of total health expenditure is one of the highest in Assam (63 per cent) across the major states of India. (12, 13, 3)

Aims & Objectives

1. To analyze the impact of inpatient care in escalating OOP health expenses.
2. To identify the factors associated with catastrophic health expenditure in Assam (India).

Material & Methods

Study type: Cross-sectional study, **Study Population:** Households and individuals, **Study Area:** The study is conducted in Nagaon and Nalbari districts of Assam. A ranking of districts were carried out based on selected socio-economic indicators with emphasis on primary and secondary indicators of health. The methodology of ranking was followed from Ram and Shekhar. (14) Based on the ranking of districts, Nagaon and Nalbari districts were selected for the study. Further a review of literature was done to identify the forward and backward development blocks from Nalbari and Nagaon. Subsequently, Kaliabor Development Block was selected from Nagaon district and Barbhag Development Block was selected from Nalbari district. Later, from the list of revenue villages, Bamuni Pathar from Kaliabor Development Block and Balagaon from Barbhag Development Block were randomly selected for the study, **Study Duration:** November 2014 to May 2015, **Sample Size Calculation:** Bamuni Pathar constituted all total 247 households, out of which 99 (40 per cent) of the households were selected for the study. Based on the nature of information to be collected, 40 per cent of the households have been selected so as to make the survey more representative. Balagaon constituted all total 278 households, out of which 111 (40 per cent) has been selected for the study, **Strategy for Collection:** The data on hospitalization (inpatient care) cases are collected for a reference period of last 365 days from the date of the survey. The calculation of total OOP health expenses combines expenditure on both inpatient and outpatient care incurred by the households. The data on non-hospitalization cases (outpatient care) are collected for a period of both last 30 days and 365 days reference period, **Data Analysis:** The data

entry and analysis has been done using STATA. Binary logistic regression model was used to identify the factors associated with catastrophic health expenditure.

Results

1. Analyzing the impact of Inpatient care in escalating OOP expenses.

1.1 Hospitalization (inpatient care) expenditure in Bamuni Pathar

Component wise distribution of OOP expenses among the rural households in Bamuni Pathar indicates that share of expenditure on doctor's fees as a proportion of total average OOP is 1 percent. Expenditure on diagnostic tests is 15 percent, medicines and drugs 65 percent. A notably large proportion of residents are forced to purchase medicines from private pharmacies as most of the medicines are out of stock in government health facilities. Similarly, most of the diagnostic tests are outsourced to private health facilities due to their unavailability in government facilities. In absolute terms, average expenditure on purchase of medicines was Rs. 30,300 while the average OOP expenses were Rs 46,770 from government health facilities [Table 1].

OOP expense from private sources for hospitalization cases shows that 4 percent of average OOP expenditure is spent on doctor's fees, diagnostics tests 14 percent, and drugs and medicines 38 percent. A major share is also spent on medical appliances (17 percent), attendant charges (8 percent), bed charges (10 percent) and other expenses (9 percent). In Bamuni Pathar average OOP expenses by private sources is much higher than expenditure by government sources. The total average OOP expenses are Rs. 156,800, which is almost three times higher than what it is in case of government health facilities.

Majority of the hospitalization cases (56 per cent) are treated in private health facilities because of low quality care, low seat capacity, over crowdedness, lack of specialists and lack of sophisticated health equipment in the government health facilities. Hospitalization cases result in heavy expenses on account of bed charges, medicines and drugs and doctor's charges. If the duration of stay is long then the cost is even higher resulting in high OOP expenses. Amount spent on attendant charges and transportation to reach private hospital or the FRU cannot be considered trivial

1.2 Hospitalization (inpatient care) expenditure in Balagaon

Majority of the households visit public health facilities for hospitalization cases in Balagaon. The households prefer government health facilities because of low cost and easy accessibility. Among all the components of OOP, 79 percent of the total OOP expenses are made on purchase of medicines and drugs, 12 percent on diagnostic charges and 6 percent as other expenses. In absolute terms, households in Balagaon spend an average amount of Rs. 36,885 in government health facilities and Rs. 3,110 in private health facilities [Table 2]. The share of expenditure on doctor's fees is 8 percent, 16 percent for diagnostic tests, and 48 percent on drugs and medicines of the total OOP expenses from private sources

The difference in OOP due to private sources between both villages is worth discussing. Although Bamuni Pathar is a relatively more backward village than Balagaon, OOP from private sources is much higher. The single reason for this difference is the presence/absence of public health facilities nearer village. The nearest health facility accessible by people in Bamuni Pathar is the FRU (which is an upgraded block PHC). The FRU is usually overcrowded, and has severe shortage of medical personnel and equipment which compel residents to visit private health facilities for treatment. Balagaon has more options of public facilities (a sub-centre, mini PHC, PHC, CHC as well as a civil hospital) closer to the village. Therefore people have a strong preference for public facilities.

2. Identification of the factors associated with catastrophic health expenditure in Assam (India).

Logistic regression analysis is carried out to identify the factors influencing catastrophic health expenditure in both the villages. Health payment is considered as catastrophic if it exceeds a certain proportion with respect either total income or total consumption expenditure of the household. (15, 16, 17)

The dependent variable used in the model is "whether an individual is incurring a catastrophic expenditure exceeding 10 percent of total consumption expenditure of the households or not" if 'yes' the variable takes the value 1, or 0 otherwise. The 10 percent threshold level is considered here as

the acceptable catastrophic level in relevance to the availability of village data.

The functional form of the model is:

$$Z_i = \alpha + \beta_1 (\text{Awareness 108}) + \beta_2 (\text{OH}) + \beta_3 (\text{DI}) + \beta_4 (\text{CM}) + \beta_5 (\text{HS}) + \beta_6 (\text{SDW}) + \beta_7 (\text{TF}) + \beta_8 (\text{SCF}) + \beta_9 (\text{SOH}) + \beta_{10} (\text{MI}) + \beta_{11} (\text{CS}) + \beta_{12} (\text{EDU}) + \beta_{13} (\text{RSBY}) + \beta_{14} (\text{BPL}) + \mu_i$$

Bamuni Pathar

The data has been analyzed using STATA software. The logistic model is statistically significant with a significant Likelihood Ratio Test (L-R Ch2) of p value less than .01 for Bamuni Pathar village. The count R2 is found to be .85 while the adjusted count R2 is found to be .61. For a dummy variable, dy/dx is the discrete change of dummy from 0 to 1 which is called the marginal effects. The independent variables which are found to have a significant and causal relationship with the dependent variables are household size, duration of illness, households with chronic morbidity, safe drinking water, monthly income of the households and availability of toilet facility in the households. The co-efficient β_4 (household size) is found to have a positive and significant relationship with catastrophic expenditure at 10 percent threshold level. Higher the household size higher is the probability of catastrophic payment. The partial probability of the variable indicates that as the household size increases the probability of catastrophic payment increases by .08 points. The coefficient β_3 (DI) is found to have a positive and significant relationship with the dependent variable indicating that higher the duration of illness, higher is the catastrophic health expenditure. The partial probability of the variable indicates that as the duration of illness increases by one unit, the probability of catastrophic payment at 10 percent level increases by .0009 percent. Similarly, β_4 (CM) is found to have a positive and significant relationship with the dependent variable. The partial probability of the variable indicates that as households with chronic morbidity increases by one unit, the probability of catastrophic payment at 10 percent level increases by .7 points. In many cases it has been observed that, due of negligence of diseases at the initial stage, as time continues, it becomes chronic, and a heavy amount is to be paid for treatment of chronic illnesses. The coefficient β_6 (SDW) shows a negative and significant relationship with the dependent variable.

Higher the use of safe drinking water lower will be the catastrophic expenditure at 10 percent catastrophic threshold level because of minimal illnesses. The partial probability of the variable indicates that as the proportion of households using safe drinking water increases, the probability of catastrophic payment at 10 percent level decreases by .32 points. β_7 (TF) has a positive and significant relationship with catastrophic health expenditure. The partial probability of the variable indicates that as the use of toilet facility increases the probability of catastrophic payment increases by .22 points. The relationship is positive probably because at the higher catastrophic expenditure (say 15 percent or 25 percent), impact of non-use of toilet facility might be higher. The β_{10} coefficient monthly income (LN_MI) has a negative and significant relationship with catastrophic health expenditure. As income of the household increases, catastrophic expenditure of the household declines. The partial probability of the variable indicates that as the monthly income of the households increases the probability of catastrophic payment decreases by -.07 points [Table 3]

The logistic model is statistically significant with a significant Likelihood Ratio Test (L-R Ch2) of p value less than .01 for Balagaon. The value of count R2 is .77 while the adjusted count R2 is .324. The variables which are found to have a causal and significant relationship with catastrophic expenditure at 10 percent threshold level are duration of illness, households with chronic morbidity, monthly income and educational level of the head of the households. The coefficient β_3 (DI) is found to have a positive and significant relationship with the dependent variable indicating that higher the duration of illness, higher is the catastrophic health expenditure. The partial probability of the variable indicates that as the duration of illness increases by one unit, the probability of catastrophic payment at 10 percent level increases by -.26 percent. Similarly, β_4 (CM) is found to have a positive and significant relationship with the dependent variable. The partial probability of the variable indicates that as households with chronic morbidity increases by one unit, the probability of catastrophic payment at 10 percent level increases by .26 percent. The β_{10} coefficient monthly income (LN_MI) has a negative and significant relationship with catastrophic health expenditure. As income of the household increases,

catastrophic expenditure of the household declines. The partial probability of the variable indicates that as the monthly income of the households increases the probability of catastrophic payment decreases by -.27 points. The coefficient β_{12} (EDU) has a negative and significant relationship with the dependent variable which shows that catastrophic expenditure is lower for households with higher education in comparison to the illiterate households. The partial probability can be explained in the similar manner as explained earlier [Table 4].

The households are afflicted with a larger burden of healthcare cost mainly in case of inpatient care, the cost being higher in Bamuni Pathar village. The little dependence on government health facility also leads to major costs because medicines and diagnostic tests are done from private sources. This is a cost addition to public health facilities. Moreover, there is lack of quality care and problem of accessibility to basic health facilities in Bamuni Pathar village which results in high costs on attendants and transportation even in the government hospitals. A majority of the patients are also compelled to visit the private hospitals because of inefficient functioning in the government hospitals. This results in higher cost of care from private sources in comparison to the government sources.

In Balagaon, the average expenditure on hospitalization is higher in the government health facilities in comparison to the private health facilities because people prefer to go the government health facilities where costs are low. Moreover, the village has more options of government health facilities with easy accessibility and better care in comparison to Bamuni Pathar.

Discussion

The study supports the claim in the literature that OOP expenditure on health is exceedingly high. Expenses on hospitalization cases are one of the prime factors behind high OOP health expenses which are supported by studies of Moreover, a major proportion of total OOP health expenses are spent on purchase of drugs and medicines. In the existing literatures also it has been found that drugs and medicines comprise a major part of OOP health expenses of the households especially in rural areas. (18, 19, 20, 9)

Treatment of chronic diseases is much expensive in comparison to acute diseases as the sophisticated facilities are not available within the village coverage and households have to travel to private hospitals which are located far away from the village. This is also found to be true for the study villages specifically for the backward village. The study also found that chronic morbidity and longer durations of illnesses as two important factors associated with catastrophic health expenses. Those households who have members with chronic illnesses and longer duration of illnesses are exposed to higher catastrophic expenses. Lack of nutritious food and proper care in the early stages of life lead to higher prevalence of chronic diseases in the later stage specifically among the rural poor which is also evident from the present study (21, 22, 23, 13) Again, a significant association has been found between social determinant of health like safe drinking water and availability of toilet facility specifically in the backward village of Bamuni Pathar. Better the social determinants of health lower the households' exposure to catastrophic health expenditure. Similarly, a negative relationship has been found among catastrophic health expenditure, economic status and educational level of the households (24)

Conclusion

The households are tormented with a larger burden of healthcare cost mainly in case of inpatient care the cost being higher in Bamuni Pathar village. This is because a considerable amount of money is spent on purchase of medicines and drugs from the private pharmacies due to lack of supply of medicines in the government health facilities. Therefore people seeking treatment even in government health facilities has to incur heavy OOP expenses. Diagnostic tests are largely outsourced from the government health facilities to private health facilities adding to the households' burden of expenses. Households are compelled to rely on private health facilities because of lack of quality care in the nearby government health facilities. The civil and district hospital is far away from the village. In Balagaon however the physical availability of public facilities is relatively better off. Hospitalization is largely sought in the nearby civil hospital and is easily accessible.

The analysis also shows that factors like duration of illnesses, proportion of chronically ill member, lower monthly income, safe drinking water, availability of

toilet facility are some of the factors associated with greater burden of catastrophic health expenditure. In order to improve the situation, it is important to identify the households who are more vulnerable to OOP expenses. Moreover, the study draws the attention of the policy makers towards high degree of financial protection against the impact of illness. Provision of protection from financial risk for health hazards and improvement of quality of health care in government hospitals is imperative to improve the existing situation.

Recommendation

A modest attempt is made in the paper to focus on the existing quality of public health care in the state which is lagging far behind to materialize the goal of universal health coverage for all. Thus it may widen the scope on the part of the government for undertaking proper policy implications for correcting the existing scenario of the public health sector in the vicinity. Mere introduction of health insurances schemes will not materialize until and unless the practical operational sides of these schemes are looked upon.

Limitation of the study

The study however suffers from some limitations which includes the problem of recalling by the respondents. However, carefulness has been taken while collecting the data by looking at the patient's medical bill. Inclusions of other household variables like dependency ratio and number of elderly members in the households in the logistic regression could have broadened the scale of analysis. Lastly, the analysis of model with different threshold levels could have provided a better overview of the scenario.

Relevance of the study

The paper adds knowledge to the literature of out of pocket expenses on health in the north-eastern region of India, specifically in Assam. It is highly significant to examine the nature of out of pocket expenses in the state, which is characterized by "weak health outcome indicators".

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Tables

TABLE 1 COMPONENTS OF OOP EXPENSES IN HOSPITALIZED CASES, GOVERNMENT AND PRIVATE, BAMUNI PATHAR, IN NUMBER AND PERCENTAGE

Components of OOP medical expenses	Government sources		Private sources	
	Average expenditure	Share	Average expenditure	Share
Doctor's fees	360	1	6100	4
Diagnostic tests*	6900	15	21500	14
Bed charges	260	1	16300	10
Attendant charges	2800	6	12100	8
Medicines and drugs*	30300	65	59800	38
Medical appliances	3200	7	27000	17
Other expenses	2950	6	14000	9
All expenses	46770	100	156800	100

Source: Survey data, 2014

Note: Data on hospitalized cases has been collected for a reference period of 365 days. * Diagnostic tests and medicines and drugs are largely purchased from private clinics and pharmacies. However the estimate for government sources shows diagnosis and medicines referred by government doctors but purchased from private sources. The estimate under private sources implies items referred by private doctors and bought from private sources as well.

TABLE 2 AVERAGE EXPENDITURE ON VARIOUS COMPONENTS OF MEDICAL EXPENSES (IN RS.) AND SHARE OF EXPENDITURE ON VARIOUS COMPONENTS TO TOTAL AVERAGE EXPENDITURE (IN PERCENT) IN TOTAL HOSPITALIZED CASES (BOTH GOVERNMENT AND PRIVATE) IN BALAGAON

Components of OOP expenses	Government sources		Private sources	
	Average expenditure	Share	Average expenditure	Share
Doctor's fees	0	0	250	8
Diagnostic tests	4500	12	500	16
Bed charges	635	2	500	16
Attendant charges	500	1	200	6
Medicines and drugs	29000	79	1500	48
Other expenses	2250	6	160	5
All expenses	36885	100	3110	100

Source: Survey data, 2014

Note: Data on hospitalized cases has been collected for a reference period of 365 days.

TABLE 3 RESULTS OF LOGISTIC REGRESSION MODEL FOR FACTORS DETERMINING CATASTROPHIC HEALTH EXPENDITURE IN BAMUNI PATHAR VILLAGE

Explanatory variables	Maximum Likelihood estimates (MLE)		Marginal effects (MFX)		95 % confidence Interval	
	Co-efficient	Standard Error	dy/dx	Standard Error		
Awareness about 108 ambulance services (1=yes; 0, otherwise) (AWARENESS 108)	-.24805	.74471	-.03715	.1229	-1.8793	1.3832
Operational holdings (in acres) (OH)	-.0665	.26503	-.0101	.0700	-.96097	.82793
Duration of illness (in number of days) (DI)	.0064**	.00271	.00098	.0005	.00114	.01178
Whether any member suffering from any kind of chronic illnesses (1=yes, 0, otherwise) (CM)	5.010***	1.2117	.7067	.0888	2.6353	7.3852
Household size (in numbers) (HS)	.5298**	.2525	.0807	.0405	-1.0247	-.03490
Use of safe drinking water (1=Yes, 0, otherwise) (SDW)	-.5298*	1.0067	-.3205	.1782	-3.8246	.12154
Availability of toilet facility (1=Yes, 0, otherwise) (TF)	1.640*	.9830	.2296	.1354	-.28590	3.5676
Source of cooking fuel (1=Biogas, 0, otherwise) (SCF)	-2.2408	1.3687	-.1882	.0763	-4.9236	.44195
Structure of house (1=Pucca, 0, otherwise) (SOH)	1.0353	1.2039	.1982	.2665	-1.3242	3.3950
Log of monthly income (in Rs.) (LN_MI)	-1.3028**	.6511	-.1986	.1030	-2.5791	-.02656
Caste (1=General, 0, Otherwise) (CS)	-.5605	1.1105	-.0777	.1454	-2.7372	1.6161
Education of the respondent (1=above primary but below secondary 0, otherwise) (EDU1)	-.0275	.93238	-.0041	.1419	-1.8549	1.7999
Education of the respondent (1=secondary and above, 0, otherwise) (EDU2)	.97211	1.157	.1789	.243	-1.2968	-1.2968
Availability of RSBY card (1=Yes, 0, Otherwise) (RSBY)	-.7290	.8424	-.1021	.10773	-2.3801	.92206
Availability of Below Poverty Line Card (1=Yes; 0, otherwise) (BPL)	1.5681	1.315	.1505	.0867	-1.8793	1.3832
Observations:99						
Prob>chi2: .0000						
Pseudo R2:.55						
Count R2:.85						
Adjusted count R2: .61						
Crag and Uhler's R2: .70						

Note: Education of the respondents (1=illiterates, 0, otherwise) EDU3[®] where[®] refers to reference group

*** Implies significant at 1percent level ** implies significance at 5 percent level; * implies significance at 10 percent level. For a dummy variable, dy/dx is the discrete change of dummy from 0 to 1

TABLE 4 RESULTS OF LOGISTIC REGRESSION MODEL FOR FACTORS DETERMINING CATASTROPHIC HEALTH EXPENDITURE IN BALAGAON VILLAGE

Explanatory variables	Maximum Likelihood estimates (MLE)		Marginal effects (MFX)		95 % confidence. Interval	
	Co-efficient	Standard Error	dy/dx	Standard Error		
Awareness about 108 ambulance services (1=yes; 0, otherwise) (AWARENESS 108)	.0030	1.011	.0006	.2287	-1.9793	1.9855
Operational holdings (in acres) (OH)	-1.178	.8203	-.2666	.1851	-2.7859	.42983
Duration of illness (in number of days) (DI)	.0029***	.0009	.0006	.0002	.00117	.00476
Whether any member suffering from any kind of chronic illnesses (1=yes, 0, otherwise) (CM)	1.306**	.7115	.2662	.1184	-.08825	2.7010
Household size (in numbers) (HS)	.1831	.1396	.0414	.0316	-.09053	.45689
Use of safe drinking water (1=Yes, 0, otherwise) (SDW)	.2364	.5996	.0525	.1309	-.93870	1.4117
Availability of toilet facility (1=Yes, 0, otherwise) (TF)	.7513	.8320	.1537	.1502	-.87936	2.3820
Source of cooking fuel (1=Biogas, 0, otherwise) (SCF)	.0231	.5681	.0052	.1285	-1.0904	1.1366
Structure of house (1=Pucca, 0, otherwise) (SOH)	.2830	.71672	.0656	.1697	-1.1217	1.6878
Log of monthly income (in Rs.) (LN_MI)	-1.230*	.4559	-.2785	.1042	-2.1242	-.33695
Caste (1=General, 0, Otherwise) (CS)	.5517	.5554	.1224	.1212	-.53688	1.6403
Education of the respondent (1=above primary but below secondary 0, otherwise) (EDU1)	-1.358*	.7907	-.2954	.1627	2.9080	.19151
Education of the respondent (1=secondary and above, 0, otherwise) (EDU2)	-1.6543**	.8347	-.3400	.1529	-3.2905	-.01824
Availability of RSBY card (1=Yes, 0, Otherwise) (RSBY)	.8987	1.465	.1720	.2265	-1.9731	3.7705
Availability of Below Poverty Line Card (1=Yes; 0, otherwise) (BPL)	-.2306	.5581	-.0526	.1282	-1.3246	.86334
Observations:111						
LRch2: 42.97						
Prob>chi2: .0000						
Pseudo R2:.30						
Count R2:.77						
Adjusted count R2: .32						
Crag and Uhler's R2: .44						
<p>Note: Education of the respondents (1=illiterates, 0, otherwise) EDU3[®] where [®] refers to reference group, *** implies significant at 1percent level ** implies significance at 5 percent level; * implies significance at 10 percent level. For a dummy variable, dy/dx is the discrete change of dummy from 0 to 1</p>						