Original Article

The relationship and prioritization of factors affecting catastrophic healthcare costs from viewpoints of patients

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ABSTRACT

Background and objective: The high amount of catastrophic healthcare costs (CHCs) is one of the challenging issues facing modern societies. Therefore, the present study aimed to determine the burden of CHCs on patients admitted to selected hospitals in Semnan and Shahrood. Methods: This study was a descriptive-analytic study and applied in terms of objective. The research population consisted of all patients (n = 36000) referred to Semnan and Shahrood hospitals during 2017. A sample size of 385 patients was randomly determined from five hospitals using Cochran's formula. Data were collected by a questionnaire of 39 questions. The formal and content validity, as well as the reliability of the research tool were estimated with a Cronbach's alpha coefficient of 0.85. Data were analyzed using Stata 10, SPSS 20, and LISREL 7 software. Findings: Significant relationships were found between treatment-related variables, including the presence of disabled and diseased individuals in the family, and CHCs (r = 0.802). There were no significant relationships between insurance coverage and CHCs (r = 0.310). The probability of facing CHCs decreased with increasing household income level (r = 0.761). In order of priority, the effects of three variables included the presence of disabled and diseased individuals in the family (r = 0.802), the presence of family members aged over 65 or less than 5 years (r = 0.772), and household income level (r = 0.761). Conclusion: The results showed that the presence of disabled and diseased individuals in the household had the greatest impact on facing households with CHCs. It is, therefore, recommended to implement insurance plans depending on the health and socioeconomic status of households.

Keywords: Catastrophic health expenditures, health care

Introduction

Today, most people believe that health is one of the essential components of quality of life due to demographic changes and emerging patterns of new diseases, hence, the role of health services is very critical to protect this important issue.[1] Payments for health care are the source of concern for households in many countries around the world as diseases often happen unpredictably, and in the absence of appropriate coverage, can impose catastrophic costs on even high-income households.[2]

According to the World Health Organization (WHO), if healthcare expenses exceed 40% of the income (household's ability to pay), it is regarded as catastrophic.[3] Studies have shown that the incidence of these costs is increasing nowadays.[4] Spending a large part of the household's resources to receive health services can threaten the standard of living in the short and long term. In the short run, households have to ignore the current costs of other goods and services, and in the long run, households will expect such consequences as selling and auctioning assets, discharge of savings or accumulation of debts.[5]

Indeed, catastrophic health costs (CHCs) are not only an important barrier to receive health services needed by people,

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but also regarded as a shock to expenditure because a large part of the household's resources for receiving these services can reduce other uses, such as the education and nutrition of the household.[6]

The quality and composition of health financing have always been a major challenge facing healthcare policy makers and providers, particularly in developing countries.[7] The WHO has identified financial protection against CHCs as one of the three main goals of health systems. Financial protection means that every household should pay a proportional percentage of its income for health services, which implies the need to support household income in order to protect them from falling into poverty.[8] CHCs occur when household health expenditure exceeds a certain threshold and households are required to spend a large portion of their net income on health care.[9]

Despite all the efforts made in this area, it is still observed that health financing in developing countries is dominated by direct payment from the pocket and relative lack of prepayment mechanisms such as taxes and health insurance. Unfortunately, one of the disastrous fallouts of this financing method is the imposition of heavy or so-called catastrophic costs when households deal with illnesses.[10]

In fact, paying attention to the bulk of direct payment from the household's pocket and, consequently, catastrophic costs of healthcare services are the two important factors that should always be considered in health care and policy planning.[11] What raises concerns about CHCs is its relatively high incidence both in rich and poor countries.[12]

Such expenditures involve 44 million households per year, which have become a nightmare for many families and community members, with increasing importance in the politics of many developing countries. Despite considerable scientific studies conducted on health services and ways of payments for the costs, policymakers are still less aware of a desirable health system that protects households from catastrophic healthcare costs, hence, this field requires further scientific and advanced studies.[7] However, health care financing is one of the factors that can potentially affect the well-being of households on the one hand, and the design of health insurance mechanisms to support households on the other hand.[13] Therefore, the present study aimed to determine the burden of CHCs on patients admitted to selected hospitals in Semnan and Shahrood cities.

Methods

The present descriptive-survey study was conducted to determine the exposure of patients to CHCs at Semnan and Shahroud hospitals in line with the implementation of the health system reform plan in 2017. The statistical population consisted of all patients (n = 36,000) admitted to insurance-covered hospitals in Semnan and Shahroud during 2017. A ratio of 40% was considered for exposure to CHCs. Thus, a sample size of 385 subjects was estimated using Cochran's formula through the stratified random sampling method.

Data were collected by a researcher-made questionnaire, the formal and content validity of which were confirmed by the supervisor and some experts. The reliability of the questionnaire was determined with a Cronbach's alpha coefficient of 0.85.

The questionnaire consisted of 39 questions about the patient's demographic status, social issues of the patient's household, information about the disease, economic status of the household and information on the disease treatment costs. The answer was descriptive or numerical or yes and no, and the last section was based on a three-point Likert scale. Then, the information in the questionnaire was completed by the patient with the help of the medical record and revenue units of the hospital. Data were analyzed by chi-square test and logistic regression analysis using Stata10 software. The effects of variables on CHCs were evaluated by Structural Equation Modeling and LISREL software.

Findings

The household's ability to pay, which is a vital component in obtaining healthcare costs, was calculated through the following procedure. First, household income was obtained including household income earnings plus the amount of subsidy received from the government. Then, essential costs were deducted from household income followed by calculating a household's ability to pay. If the household medical expense was equal to or above 40% of the household income, it was considered as CHCs, which indicated that 23.63% of households faced with CHCs (Table 1).

Table 1. Frequency of households faced with catastrophic healthcare costs

Households with health costs over 40% of paying ability	Frequency	Frequency (%)	Cumulative percentage
Found	91	23·63	23·63
Not found	294	76·37	100
Total	385	100	

A significance level of 0.05 was considered in this model. The findings showed that among demographic variables, the presence of 65-year-old and older individuals in the household was significantly correlated with CHCs, which showed a rising trend with increasing household size, and maximized in households with seven members and above. Female-headed households were more likely to face with CHCs. The probability of facing CHCs was higher in households with disabled or diseased members. There was also a direct relationship between the presence of children aged below 5 years in the households and their exposure to with CHCs. The gender of the household head was also found to affect exposure to CHCs. In addition, an increasing number of hospitalizations amplified the likelihood of facing CHCs. There were significant relationships between CHCs and variables of therapeutic services such as the use of physiotherapy, inpatient, diagnosis, and medicine. Insurance coverage was not significantly correlated with CHCs, but a significant relationship was observed between complementary insurance and CHCs. Also,

increasing household income economically reduced likely confrontation with CHCs (Table 2).

Table 2. The relationship of variables with the incidence of CHCs in the logistic model

Variable	Component	Households with CHCs (%)		Sig.	Odds ratio
		Faced	**Not faced**		
Gender of household head	Female	(79) 73	(21) 22	0·001	0·4
	Male	(56) 113	(44) 90		
Presence of disabled and diseased family members	Present	(28·2) 18	(72·8) 48	0·001	0·27
	Absent	(23·8) 5	(76·2) 16		
Household size	< 2 members	(26) 24	(74) 70	0·001	0·65
	3-6 members	(25) 38	(75) 115		
	> 7 members	(33)17	(67) 34		
Household head' occupation	Office	(67) 18	(33) 9	0·12	0·31
	Self-employed	(72) 23	(28) 9		
	Retired	(61) 11	(39) 7		
	Unemployed	(50) 3	(50) 3		
Presence of people aged over 65 years in the household	Present	(27) 28	(73) 76	0·017	0·7
	Absent	(26) 74	(74) 207		
Presence of people aged below 5 years	Present	(37) 34	(63) 57	0·04	0·9
	Absent	(35) 102	(65) 192		
Number of admissions	< 7 members	(40) 150	(60) 222	0·012	0·95
	> 7 times	(69) 9	(31) 4		
Insurance coverage	Yes	(67) 204	(33) 101	0·061	0·04
	No	(39) 31	(61) 49		
Complementary insurance coverage	Yes	(42) 103	(57) 139	0·001	0·9
	No	(31) 45	(69) 98		
Pharmaceutical services	Yes	(46) 112	(54) 130	0·004	1
	No	(35) 37	(65) 106		
Hospital services	Yes	(66) 201	(34) 104	0·001	0·97
	No	(33) 27	(67) 53		
Physiotherapy services	Yes	(26) 64	(74) 178	0·006	0·9
	No	(36) 51	(64) 92		
Diagnostic services	Yes	(31) 75	(69) 167	0·007	0·87
	No	(29) 42	(71) 101		
Household income quartiles	Min. 1	(16) 34	(84) 178	0·012	0·24
	2	(12) 12	(88) 92		
	3	(12·5) 3	(87·5) 24		
	Max. 4	(66) 10	(34) 5		
Log likelihood= -67.5	Chi-square (314)=35.194		Pseudo R^2=0.341		

The hypotheses were tested with a structural equation model. This stage tests the relationships defined in the theoretical framework to verify the impacts of studied variables on CHCs.

In studies conducted with structural equation modeling, the normal distribution of variables is analyzed by kurtosis and skewness indices. Bayern (2010) suggested using ranges of 7-7+ and 2-2+, respectively, as acceptable ranges for kurtosis and skewness of the normal distribution. The skewness and kurtosis of all items ranged from -0.84 to -0.54 and -0.74 to +0.46, respectively, except for household head' occupation. Accordingly, all variables are normal except for the above variable (occupation). The results indicate that the household head' occupation had no effects on CHCs. However, other variables had different impacts, including the illness or disability of the household members (0.802), number of household members aged 65 years or older, or less than 5 years (0.772), household income level (0.761), gender of household head (0.649), number of hospitalizations (0.592), supplementary

insurance coverage (0.523), number of household members (0.412), basic insurance coverage of household members (0.310), and household head's occupation (0.014) (Table 3).

Table 3. Analytical statistics for variables affecting catastrophic health costs

Variable	EF	t-value	Skewness	Kurtosis
Type of illness or disability of family members	0·802	48·06	-0·78	0·17
Presence of people aged > 65 years or < 5 years in the household	0·772	51	-0·87	0·32
Household income level	0·761	49	-0·84	0·38
Household head's gender	0·649	52·70	-0·60	0·46
Number of hospitalization	0·592	51·27	-0·79	0·02
Household supplementary insurance coverage	0·523	45·52	-0·77	-0·02
Number of household members	0·412	52·11	-0·54	-0·05
Basic insurance coverage of household members	0·310	47·95	-0·71	0·06
Type of household head's occupation	0·014	49·59	-2·46	-0·74
Chi-Square=5.27, df = 8, P-Value=0.21670				

Discussion

Today, the lack of financial protection against health costs is recognized as a major disadvantage in health systems. This is most evident when households need to receive health services, and not only suffer from the burden of disease, but also that of exposure to CHCs and poverty caused by their health financing.

The study of the first hypothesis showed that the gender of the household head affects CHCs at a level of 0.649 and female-headed households were more exposed to CHCs. Our findings are similar to those of Qayaswand et al. [14] and Panahi et al. [15] regarding significant relationships between household head's gender and CHCs. This can be interpreted by the fact that gender has an impact on the use of health care services, and studies report that women need more health care and diagnostic services than men. If a female is the head of the household, it will increase the likelihood of CHCs. As in other developing or poor countries, average wage level of women is lower than those of men in Iran. As a result, female-headed households have less capacity and ability to pay than male-headed households, and this increases the likelihood of CHCs in such households.

The study of the second hypothesis revealed that the presence of disabled and diseased family members affects CHCs at an impact level of 0.802 being more than other variables. This means that the presence of people with chronic illness in the household increases the likelihood of household exposure to CHCs. This result is in line with those of Qayasvand et al. [14] and Saber Mahani et al. [16] about significant relationships between the disease of household head or other family members with CHCs, as confirmed by similar studies in other countries. Suu, Quat, and Falsa (S) also found that increasing number of patient members in a household would raise the likelihood of confronting CHCs. Each unit increase in the number of people leads to a 1.7-fold elevated exposure to CHCs.[12] Guttaz et al. (2009) also demonstrated that the presence of family members with chronic illness was one of the most important determinants of financial disaster.[17] This finding can be observed because the expenses spent by the household are increased in such a family, thereby, reducing the household's ability to pay due to the illness of the head or other household members, which also amplifies the likelihood of facing CHCs.

The study of the third hypothesis revealed that the presence of people aged over 65 and under 5 years in households had an impact on CHCs at an impact level of 0.772. The higher the number of over 65-years-old and below 5-years-old members in the household, the greater the likelihood of household exposure to CHCs. Studies in some developed countries have also found this factor to have an influence on the incidence of CHCs.[3] In Brazil, Barus also reported that the presence of elderly people in the household increased the risk of exposure to CHCs.[18] Similar to our observations, Qiyasund et al. (2009) proved that the higher the number of young children in the household, the greater the likelihood of a financial disaster for the household.[19] Saber Mahani et al. (2014) also presented evidence of a positive relationship between the presence of people aged below 5 years in the household and increased likelihood of confronting CHCs.[16] This can be explained by the fact that when people aged over 65 and under 5 years are present in higher numbers, the household will have higher needs for health care services, and thus, is more likely to face a health-related financial disaster due to their higher health utilization.

The examination of the fourth hypothesis indicated that household income levels had an impact on CHCs at a level of 0.761, meaning that increased household income will reduce the probabilities of confronting CHCs. This corresponds to those of Qayasvand et al. [19] and Asefzadeh [20] who detected significant relationships between household income levels and CHCs. Apparently, the higher the level of household income, the greater the ability to pay by households, thereby, reducing the probability of facing them with CHCs, as was also confirmed in other countries. Suu, Quat, and Falsa (2016) also found similar results and concluded that households lying at higher income quartiles were less likely to confront with CHCs.[12] In his study, Ekman [21] also concluded that rising income levels reduced the likelihood of confronting households

with CHCs. This finding indicates increasing direct payment from the pocket with rising revenue, that is, higher-income households are more likely to pay more from the pocket with greater probability to face CHCs.

The analysis of the fifth hypothesis disclosed that the household head's occupation was not affected by CHCs at a very low level of 0.014. This is in agreement with that of Qyasvand et al. [19] suggesting no significant relationship between household head's occupation and CHCs. Saber Mahani [16], on the other hand, noticed that households with unemployed heads faced with CHCs. Contrarily, Ekman [21] found reduced levels of exposure to CHCs in households with employed heads. The study of Saber Mahani (2014) was conducted before the implementation of the health system reform plan, so marked changes should have occurred in this important indicator and in its affecting components after implementing the above plan.[16] To explain this finding, it can be stated that although the type of job can have an impact on household income, it is not the only determining factor. For example, a person may be unemployed but has indirect income sources.

According to the examination of the sixth hypothesis, the number of household members has an impact on CHCs at a level of 0.412. Thus, an increasing number of household members raises the likelihood of household exposure to CHCs. Likewise, Qyasvand et al. [19] and Ameri [1] showed significant relationships between the number of household members and CHCs. Suu, Quat, and Falsa (2016) also found household size to be one of the factors associated with the likelihood of facing CHCs. They reported that the probability of the CHCs would increase by 5% for each person added to the household members.[12] However, a study in China indicated that increasing household size had a protective effect against facing CHCs,[13] which is not consistent with that found in here.

Our finding can be justified by the fact that household consumption expenditure for housing, clothing, food, commute, and so on account for a larger portion of household income, which consequently lowers household income leading to the increased probability of facing CHCs in such households.

After examining the seventh hypothesis, it was found out that insurance coverage did not have a significant effect on the probability of household exposure to CHCs at a level of 0.310. Supplementary coverage, on the other hand, reduced the likelihood of household exposure to CHCs at a level of 0.523. These are similar to those of Qyasvand et al. [19] and Saber Mahani [16] about significant relationships between household basic insurance coverage and CHCs. Ekman [21] also realized that health insurance not only did not reduce the likelihood of facing CHCs, but also increased this probability in Burkina Faso. To justify this, he stated that the amount and per capita of services and cares provided to patients as well as factors such as the quality of assurance of provided services and no coverage of many health care services led to the increased amount of direct payments by patients and eventually elevated the likelihood of facing CHCs. In Thailand, Samcotra and Lagrada (2006) reported that the implementation of insurance policies and prepayment mechanisms was found to be the most important factor in protecting households against CHCs, so that the number of households facing CHCs declined after the implementation of universal insurance in Thailand.[22] However, O'Donnell et al. [10] presented evidence that health insurance increased the risk of exposure to CHCs by households in China through encouraging people to use more services and even advanced services.

Unlike expectations, insurance plans had no effects on preventing the incidence of CHCs. It seems that the design and implementation of insurance plans with no consideration of important factors such as the socioeconomic status of households, demographic characteristics, trends of patterns and, finally, the epidemiology of diseases in Iran are among the reasons for inefficiencies of social health insurance plans and programs in protecting patients.

Examination of the eighth hypothesis revealed that the number of hospital admissions affects encountering with CHCs at a level of 0.592. This finding is in line with that of Qayasvand et al. [19] who detected a significant relationship between the number of hospital admissions and facing CHCs at a level of 0.042. Suu, Quyat, and Falsa (2016) concluded that increasing the length and number of treatment periods could increase the likelihood of exposure to CHCs. Also, an average of one unit increase in the number of illness frequency elevated the likelihood of facing CHCs by 1.5-1.7 times. Therefore, increasing the number of admissions raises the services provided to the patient and the subsequent cost of health care, which can also amplify the likelihood of facing CHCs.

In this study, a frequency of 23.63% was obtained for households faced with CHCs. A frequency of 3.8% was reported by Ameri,[1] which was 0.6% higher than those in neighboring countries, such as Turkey, in that year. Ameri et al. [23] showed that the proportion of households faced with CHCs has had an increasing trend in recent years. By comparing this trend with the present study, it can be realized that this upward trend has continued until now. The findings of researchers suggest that there are significant differences in the amounts of CHCs between countries, ranging from zero in Slovakia, the United Kingdom, and the Czech Republic to over 10% in Brazil and Vietnam.[3]

Conclusion

The results of this study showed direct relationships between CHCs and the type of illness or disability of household members, the presence of individuals aged 65 years and above, and children under 5 years old in the household, and household income level, respectively. Also, about 23.63% of households encountered with CHCs. According to the upstream laws of Iran, however, these indicators should be much lower than the obtained values. Therefore, accurate and timely explanation of this problem can help health policy makers to adopt preventive policies and appropriate ways to resolve the problem. This will be feasible only by the creation of a tax system and efficient social insurances. Accordingly, the range of the population

covered by prepayment mechanisms should be increased in this respect.

Also, the illness and disability of the household members, the presence of people aged 65 years or older or less than 5 years in the household, and low household income levels influenced the exposure of households to CHCs. Therefore, support should be provided to households with chronic diseases, elderly, and disabled individuals. Besides, cost-effectiveness assistance packages should be designed, and decisions on the level of health payments should be taking into account the characteristics of the households.

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Conflict of interest

The authors declare no conflicts of interest.

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