Catastrophic Healthcare Expenditures of Hospitalized Patients in the Hospitals of Shiraz in 2013

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Background: Disease often occurs unpredictably and, in the absence of adequate coverage, its expenditures can have significant economic impacts on a family.

Objectives: This study aimed to identify the determinants of exposure to catastrophic healthcare expenditures in the hospitalized patients, in the selected hospitals of Shiraz University of Medical Sciences, Shiraz, Iran.

Patients and Methods: This study was conducted on 376 patients hospitalized in similar wards of a public and a semi-private hospital in Shiraz, Iran. The study data were collected using World Health Organization questionnaire, the Persian version of which it was validated in a previous study. Catastrophic health expenditures payments were calculated based on the households' capacity. Data were analyzed using chi-square test, T-test, Mann-Whitney, and logistic regression by SPSS.

Results: Based on the findings of the present study, 175 (47.3%) of the hospitalized patients were exposed to catastrophic healthcare expenditures in 2013. Additionally, the results of regression analysis indicated that the type of hospital, ward, supplemental insurance status of the head of household, duration of diagnosis, duration of hospitalization, and ability to pay, and not the household's economic status, were effective in reducing the exposure to catastrophic healthcare expenditures.

Conclusions: The high percentage of households, facing catastrophic expenditure in hospitalized patients, revealed an expenditure bottleneck in the health system. Therefore, when planning to reduce excessive expenditures in the health system, a crucial point is to consider hospitalizations.

Keywords: Catastrophic Health Expenditure; Out of Pocket Payment; Hospitalization; Patients; Iran

1. Background

In the recent decades, the progress in healthcare, resulting from the development and evolution of technology, on one hand, and the rise in expectations and level of knowledge about health services, on the other hand, has created difficulties in financing healthcare expenditures (1). A variable percentage of each household's income is spent on healthcare in all societies around the world. The amount of this contribution and its distribution in societies represent the financial burden of healthcare on families (2). Protecting families against the financial burden of healthcare is the responsibility of health systems (3, 4). Financial protection refers to the situation where no household pays more than a reasonable proportion of its income for financing the system of social protection in health or health-specific services. This ratio that includes direct and indirect expenditures should not lead households to, or keep them, in poverty (5). According to the World Health Organization's

(WHO) definition, a fair system is a system in which the households are involved in providing healthcare expenditures, commensurate with their level of income (6). If a household cannot afford to pay, the economic impact of the disease on the household is significant. For example, it can cause continuous loss of investment, indebtedness, and cutting the necessary expenditures (7). Because disease often occurs unpredictably, in the absence of adequate coverage, its expenditures can be heavy, even for high-income households. Moreover, the ratio of expenditures to income may be so high that it can lead to catastrophic financial damage for households (8, 9). Wagstaff and Van Doorslaer, with a basic approach, defined catastrophic healthcare expenditures as "direct payment from out of pocket for healthcare that exceeds a certain threshold of household's income or expenditures" (10). Catastrophic payments of healthcare occur when utilization of health services requires

out of pocket payment or coincides with the households' low capacity to pay and in case of deficit in prepayment mechanisms, such as insurance or taxes (11). What causes more concern about catastrophic health expenditures is its relatively high occurrence, whether in the rich or poor countries of the world (6, 12). Also, according to WHO, in 2006, 50% of health spending in Iran was paid out of pocket (13). This amount was reported to be 24% in the study by Asefzadeh et al. (7), 11.8% in the one by Kavosi et al. (9), and 22.2% in the research by Karami et al. (14). However, numerous studies have shown an ascending trend of this situation (6, 8). Utilization of health services is another important determinant of encountering catastrophic expenditures; the households, which use the hospitalization services, are more likely to be exposed to catastrophic expenditures. Kavosi et al. (9), Rivero et al. (15), and Qyasvand et al. (12) have also approved the relationship between the increase in utilization of hospital services and the number of admissions at hospitals, and chance of being faced with catastrophic expenditures. They believed that the high price of inpatient services and, according to several households faced with catastrophic expenditures, lack of accountability in public hospitals made them use private hospitals services, despite having health insurance and this is yet another cause of this confrontation (9). Evidence has indicated that hospitalization can create financial burden on households. Therefore, studying hospitalization expenditures and calculating the percentage of the households exposed to catastrophic expenditures and the number of patient household members can be a guide for policymakers and decision makers of health and health insurance (16).

2. Objectives

The present study aims to identify the determinants of exposure to catastrophic healthcare expenditures in the hospitalized patients, in the selected hospitals of Shiraz University of Medical Sciences, Shiraz, Iran.

3. Patients and Methods

This descriptive, cross-sectional study was conducted in the selected hospitals of Shiraz in 2013. Among the hospitals of Shiraz, a public and a semi-private hospital were chosen, due to having homogeneous wards for this study. The research population included all the patients admitted in the general internal medicine ward, general surgery, coronary care unit (CCU), intensive care unit (ICU), post-CCU, and neonatal insentive care unit (NICU). The study participants were selected using multi-stage cluster sampling. First, type of hospital (public and semi-private) was considered as a cluster and then, the patients were selected randomly and proportionate to the mass chosen from the selected department. Using the following formula and considering P = 60% (4, 17), $\alpha = 0.05$, and d = 0.05, a 380-subject sample size was determined for the study. In addition, due to application of cluster sampling, coefficient design 2 was considered (Equation 1).

$$(1) \qquad n = \left(\frac{Z_{1-\frac{\alpha}{2}}}{d}\right)^2 \times pq$$

The study data were collected using the expenditures part of WHO's questionnaire entitled "World Health Survey" (WHS) that was developed in 2003, to evaluate the performance of health systems. The reliability and validity of this questionnaire were confirmed in a study carried out by Kavosi et al. They first translated WHS to Persian and then translated it back; then, it was edited six times, by experts. The tool was used in a pilot study and its reliability was also confirmed (9). In order to gather information about the direct treatment expenditures, after randomly selecting the patients, the researcher referred to the hospitals' units of revenue after patients discharge and received their bills. It should be noted that written informed consent forms for taking part in the study were obtained from all the participants. In this study, catastrophic expenditures were calculated based on Xu model. Accordingly, the households with health expenditures over 40% of their ability to pay were considered to be faced with catastrophic expenditures. Household's ability to pay refers to the household's income minus its livelihood expenditures or, in other words, household's food expenditures (18). All data analyses were performed using the SPSS statistical software (version 21) (SPSS Inc., Chicago, IL, USA). The data were analyzed in two stages. First, the households' catastrophic expenditures were computed according to the formula proposed by WHO. Afterwards, descriptive statistics (charts and graphs), chi-square test, T-test, Mann-Whitney, and logistic regression analysis were used to assess the relationship between the dependent variable (i.e., facing catastrophic healthcare expenditures) and independent variables. The significant variables in regression analysis were entered into the model using the backward method and the output demonstrated the variables that affected the incidence of catastrophic expenditures. The selected patients signed or marked (if illiterate) the informed consent forms, before answering our questionnaire.

4. Results

In the present study, 94% of the patients and their families responded to the questionnaire. Finally, 234 patients from the public hospital and 142 from the semi-private hospital participated in the study. The study findings showed that the mean age of the patients and the households' heads were 46.4 and 47.5 years, respectively. Besides, 53.2% of the patients and 58.5% of the heads of the households were male. In addition, 62.8%

of the patients and 85.6% of the heads of the households were married. Moreover, 37.5% of the patients (n = 141) had below primary school education and 8.29% of the households' heads (n = 112) had high school education. Additionally, 172 patients and households' heads (54.7%) lived in Shiraz.

Based on the current study findings, 47.3% of the households (n = 175) were faced with catastrophic health expenditures in 2013 (Table 1). Overall, 23 households under study (6.1%) were not covered by any type of insurance, 54.5% of which were exposed to catastrophic expenditures. However, most of the households (N = 165, 43.9%) were covered by social security and the remaining ones were covered by health insurance (33.2%), other insurances (12.5%), armed forces (7.2%) and relief committee (3%). The maximum exposure to catastrophic healthcare expenditures (48.4%) was observed among the patients who were covered by health insurance. Furthermore, 187 households (49.7%) had supplementary insurance and, as a result, they were 59.2% likely not to encounter catastrophic healthcare expenditures (Table 1). Considering household size, 265 households (70.5%) had three to six members. The greatest exposure to catastrophic expenditures was observed in the households with one or two members (52.9%) (Table 1). Also, the highest exposure to catastrophic expenditures was observed in female patients (49.4%) and male heads (48.1%). Moreover, 21.3% of the study households had an over-65-year-old member and 3.5% had a person with less than 5 years of age. This decreased the chance of being exposed to catastrophic healthcare expenditures by 48.3% and 47.6%, respectively (Table 1). In terms of economic status, distributions of the households in the five income quintiles, from the first to the fifth quintile were 77%, 90%, 58%, 72%, and 74%, respectively. The highest and lowest numbers of households were related to the second and third income quintiles, respectively. According to Table 1, as the households' economic level increased, the risk of facing catastrophic healthcare expenditures decreased. Therefore, the lowest exposure was related to the fifth, or the richest quintile (21.6%). In contrast, the households in the first quintile (i.e., the poorest households) had the highest exposure to the catastrophic expenditures (P < 0.001) (Table 1). Based on the findings presented in Table 1, a significant correlation was observed between the type of hospital and facing catastrophic expenditures. Accordingly, the rates of exposure to catastrophic expenditures at the public and the semi-private hospital were 51.7% and 40%, respectively (P < 0.001). Also, there was a significant relationship between the level of exposure to catastrophic healthcare expenditures and the hospital ward. The results showed that the maximum rate of exposure (63.5%) was experienced by the inpatients admitted in the ICU, while the lowest rate (14.8%) was experienced by those admitted in post-CCU. The mean duration of hospitalization, in both exposed and non-exposed patients to catastrophic health expenditures, in the selected hospitals of Shiraz, was 1.5 and 0.7 days, respectively (P < 0.001). In addition, the mean duration of disease diagnosis in the hospitalized patients exposed and not exposed to catastrophic health expenditures was 94.8 days and 58.9 days, respectively (P < 0.001). In general, the households exposed to catastrophic expenditures use different strategies to offset this expenditure. Because each household exposed to catastrophic healthcare expenditures may use several ways to cover this expenditure, the percent becomes more than 100%. In the present study, most of the households (53.2%) used the borrowing-from-strangers strategy. Other strategies used to pay the healthcare expenditures included selling assets (49.1%), current income (48%), savings (47.8%), borrowing from friends and acquaintances (47%), taking a loan (42.6%), and insurance charges (39.4%). The study results revealed no significant relationship between the coping strategies and exposure to catastrophic expenditures. The results of logistic regression analysis have been presented in Table 2. The regression model obtained from the logistic regression indicated the significance of the following variables: hospital type, hospital ward, household's supplemental insurance status, time of diagnosis, duration of hospitalization, and ability to pay the catastrophic healthcare expenditures. However, household's economic status and patient's supplemental insurance status did not influence the patients' exposure to catastrophic healthcare expenditures.

5. Discussion

The present study aimed to investigate the status of the determinants of exposure to catastrophic healthcare expenditures in the hospitalized patients, at the selected hospitals of Shiraz University of Medical Sciences, Shiraz, Iran, during 2013. Based on the findings of this study, 175 hospitalized patients (47.3%) were faced with catastrophic healthcare expenditures. Different household surveys, in different regions of Iran, have reported this rate to vary from 11.8% to 24% (7, 9, 14). Also, several studies have indicated the rising trend of this exposure, among which the one performed by Razavi et al. is worth mentioning. In this study, the proportion of the households exposed to catastrophic healthcare expenditures was estimated to be 1.97% in 1997 and 2.32% in 2002 (6). A study performed by WHO about Iran also confirmed the high percentage of the households that were exposed to catastrophic expenditures. This percentage ranged from 2.2% to 2.5%, between 1995 and 2007 (8). Studies conducted on catastrophic healthcare expenditures have surveyed the costs of the households or a particular disease. Therefore, since the target population was the inpatients who referred to service delivery centers to receive health services in any event, factors such as poverty or lack of physical and geographical access did not prevent them from not consuming health services, self-care, or going to traditional healers.

Table 1. The Relationship Between the Study Variables and Exposure to Catastrophic Healthcare Expenditures Among the Patients in the Selected Hospitals of Shiraz, 2013[a, b]

Variables	Catastrophic Expenditures		P Value
	Exposure	Lack of Exposure	
Household economic status			< 0.001
Quintile 1, poorest	52 (68.4)	24 (31.6)	
Quintile 2	52 (57.8)	38 (42.2)	
Quintile 3	27 (46.6)	31 (53.4)	
Quintile 4	28 (48.9)	44 (61.1)	
Quintile 5, richest	16 (21.6)	58 (78.4)	
Type of hospital			0.002
Public	119 (51.7)	111 (48.3)	
Semi-private	56 (40)	84 (60)	
All admitted patients	175 (47.3)	195 (52.7)	
Ward			< 0.001
General internal	41 (53.9)	35 (46)	
General surgery	37 (43.5)	48 (56.5)	
CCU	24 (42.1)	33 (57.9)	
post-CCU	4 (14.8)	23 (85.2)	
ICU	61 (63.5)	35 (36.5)	
NICU	8 (27.6)	21 (72.4)	
Household head's state of health insurance			0.5
Yes	163 (46.8)	185 (53.2)	
No	12 (54.5)	10 (45.5)	
Patient's supplementary insurance status			0.01
Yes	75 (40.8)	109 (59.2)	
No	99 (54.4)	83 (45.6)	
Household head's complementary insurance status			0.002
Yes	73 (39.2)	113 (60.8)	
No	100 (55.9)	79 (44.1)	
Household size			0.46
One-two members	27 (52.9)	24 (47.1)	
Three-six members	124 (47.3)	138 (52.7)	
> Seven members	23 (41.1)	33 (58.9)	
Gender of patient			0.25
Female	86 (49.4)	88 (50.60)	
Male	89 (45.4)	107 (54.4)	
Gender of household head			0.38
Female	71 (46.1)	83 (53.9)	
Male	104 (48.1)	112 (51.09)	
Person under 5 years old			0.58
Yes	5 (38.5)	8 (61.5)	
No	170 (47.6)	187 (52.4)	
Person over 65 years old			0.52
Yes	33 (43.4)	43 (56.6)	
No	142 (48.3)	152 (51.7)	

[a] Data are presented as No. (%).
[b] Abbreviations: CCU, coronary care unit; ICU, intensive care unit; NICU, neonatal intensive care unit.

Table 2. The Odds Ratio of Facing Catastrophic Healthcare Expenditures in the Patients Admitted in the Selected Hospitals of Shiraz, During 2013, Using Logistic Regression [a]

	Model Parameters Value	Exp (B) Odds Ratio	95% CI		Level of Significance
			Maximum	Minimum	
Type of Hospital					
Public		0.36	0.68	0.18	0.002
Semi-private		1			
Ward					
General internal		13.34	64.64	2.75	0.001
General surgery		11.04	53.06	2.29	0.003
CCU		14.35	73.82	2.79	0.001
post-CCU		3.34	22.41	0.49	0.21
ICU		41.65	212.08	8,18	< 0.001
NICU		1			
Household head's supplementary insurance status					
Yes		0.31	0.54	0.17	< 0.001
No		1			
Time of diagnosis		1	1.001	1	0.009
Hospitalization duration		1.11	1.14	1.07	< 0.001
Ability to pay		1	1	1	< 0.001
Consonant		0.19			0.04
-2LL	331.81				
Cox and Snell R square	0.33				
Negelkerke R square	0.44				

[a] Abbreviations: CCU, coronary care unit; ICU, intensive care unit; NICU, neonatal insentive care unit.

Others have announced that this vast difference might result from the limited number of samples, as well as from different data and sampling instruments (9). Therefore, there is a significant difference among the results obtained from local and national studies, regarding the percentage of the households exposed to catastrophic health expenditures. This suggests that health policy makers, at any level, should measure changes in health system performance, identify the factors influencing the health system, and develop policies that allow achieving better results at national and international levels. The findings of the current study demonstrated a significant relationship between hospital type and exposure to catastrophic healthcare expenditures. Accordingly, the chance of exposure to catastrophic expenditures was almost 7.2 times higher among the hospitalized patients in the semi-private hospital, compared to those hospitalized in the public hospital. It seems that in Iran, due to long waiting time in public hospitals and also, physical distances of the contracted insurance providers, people have to use private hospitals services and higher tariffs of services in the private sector lead to higher payments. Dressler (2005) argues that the use of several healthcare services, provided by private providers and regional hospitals, constitute an important factor in imposing expenditures on poor people. Long distance from free and cheaper providers forces poor people to use more expensive, although closer, in terms of distance, services (19). The present study results also indicated a significant relationship between exposure to catastrophic healthcare expenditures and admission ward. Based on the results, in comparison to the patients hospitalized in NICU, the chance of exposure to catastrophic expenditures was 41.6, 13, 14, 11, and three times higher among the patients in ICU, general internal, CCU, general surgery, and post-CCU, respectively. The higher expenditures of the critical wards can be the reason for the higher chance of being encountered with catastrophic expenditures. Furthermore, a significant relationship was found between the mean duration of hospitalization and the time of diagnosis and the risk of encountering catastrophic health expenditures (P < 0.001). As Table 2 depicts, no significant difference was observed between the patients exposed and not exposed to catastrophic expenditures, regarding the duration of diagnosis. Despite the expectation that early diagnosis leads to earlier intervention, thereby reducing the overall treatment expenditures, it seems that this issue did not have any impacts on reduction of expenditures among the patients under study. Yet, the duration of hospitalization

was 1.11 days higher among the patients exposed to catastrophic healthcare expenditures, compared to the non-exposed group. Similarly, Sue and colleagues (2006) concluded that increase in the length and number of courses of treatment increased the risk of catastrophic healthcare expenditures (20). Kavosi et al. (9), Rivero et al. (15), and Qyasvand et al. (12) and Bazyar (21) also confirmed a relationship between increased consumption of inpatient services and frequency of hospitalization and risk of exposure to catastrophic expenditures. Generally, the increase in the number of hospitalizations results in increases in the rate of consumed services, eventually enhancing the risk of exposure to catastrophic expenditures. According to the structure of the payment system in Iran's hospitals, which is faced with serious problems, such as challenges resulting from inappropriate and unbalanced tariffs (22), continuous challenge between insurance organizations and hospitals (23), and demand for induced services imposing additional expenditures (23), it is important to consider all the factors affecting exposure to catastrophic expenditures, with the aim of reducing the impact of hospital services. In such a context, the implementation and completion of insurance coverage can be helpful. According to WHO's report in 2010, universal coverage can be an appropriate strategy for protecting households against health expenditures (24). The results of the present study showed that, although the percentage of the households facing catastrophic expenditures in the basic insurance group was lower, compared to the group without basic insurance; the difference was not statistically significant. However, supplementary insurances played an effective role in protecting the patients against the financial burdens caused by diseases. According to the results, the probability of exposure to catastrophic healthcare expenditures increased by 3.2 times in the patients whose household heads were not covered by supplementary insurance, compared to those who had supplementary insurance. This fact contains this message for Iran's health policy makers and insurance organizations that, although the number of people who are covered by health insurance system is in a good condition, reconsideration is necessary, in terms of service packages and expenditures-sharing requirements. Although it seems that the gap between services and expenditures of supplementary insurance is covered by basic insurance, because the supplementary insurance premiums are high and may not be afforded by the weak economic quintiles, the government should pay subsidy in order to support people with lower income levels to use supplementary insurance or even reconsider the service packages of the basic insurance. Qyasvand et al. (12) and Keshavarz et al. (25) also believed in the effectiveness of having supplemental insurance coverage in several treatment expenditures. The results of the present study did not show any significant relationship between exposure to catastrophic healthcare expenditures and household size (P = 0.46) and having a member over 65 years of age (P = 0.52). Nevertheless, the households with one two members and

those without members above 65 years of age were faced with catastrophic expenditures at an increased rate. In a study in Thailand, a very weak relationship was found between household size and exposure to catastrophic expenditures (25). However, according to the study by Mehrara et al. (23), further adjusted household size would increase exposure to catastrophic expenditures (23). In addition, Razavi et al. (6), Ranson et al. (24) and Kavosi et al. (9) disclosed that existence of a person over 65 years old in the household was effective in causing catastrophic expenditures. Although any person over 65 years of age needs more healthcare compared to normal people and, therefore, the existence of such a person in the household will be more likely to lead to greater spending of household's capacity to pay for health expenditures, the results of our study did not show any significant relationship in this respect. Since this result was not in accordance with that of most studies, it needs to be investigated more closely. Generally, lack of complete coverage by insurances, expensive healthcare expenditures and economic disadvantages that have a considerable role in exposure to catastrophic expenditures force patients to adopt a variety of strategies to cope with them. In the present study, 53.2% of the households made use of borrowing-from-strangers strategy and other strategies employed to pay the healthcare expenditures, which included selling assets (49.1%), current income (48%), savings (47.8%), borrowing from friends and relatives (47%), taking a loan (42.6%) and insurance charge (39.4%). Whitehead et al. (26), Damme et al. (27), Ensor et al. (28), and Morduch et al. (29) also reported borrowing, while Skarbinski et al. (30), Kamolratanakul et al. (31), and Peters et al. (32) mentioned selling assets, as the dominant strategies to smooth consumption during health shocks. In several cases, the strategy used to deal with high health expenditures is not highly significant, although it will have an adverse effect on the household. For example, the households with low assets and without savings or access to social networking to get help use their current income to pay for health expenditures. Besides, in order to increase their ability to pay, they will use other household expenses, such as children's education and clothing expenditures. This, on the long term, will have negative effects on the household's social status (34). Therefore, in addition to imposing immediate shocks on households, health expenditures and, particularly, catastrophic expenditures may throw households into a disease-poverty trap on the long term due to the methods used to deal with these expenditures. The results of this study indicate that, although contribution of patients to financing treatment, preventing moral hazards, and creating patient efficiency might be the goals of the health system, this should not jeopardize one of the most important goals of the health system; i.e. providing medical services for patients (2). The high percentage of households facing catastrophic expenditure in hospitalized patient showed an expenditure bottleneck in the health system. Therefore, if the health system has planned to reduce this indicator, a strategic point, which should be considered, is

represented by hospitals. Moreover, the health system should develop health policy which encourage treatment in non-hospital level institutions of the health system, such as home care, family physician office, which put lesser expenditure on patients and, in turn, health system, as a whole.

This study, like other studies on household expenditures, had several limitations, including the recall bias of the expenditures by the patients, which was largely reduced by shortening the recall period and using the patients' billing documentation.

Acknowledgements

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