



# Measuring Financial Protection in Hospitalized Patients after the Health Sector Evolution Plan in Iran

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## Abstract

**Background:** Protecting people from catastrophic health payments is widely recognized as an integral component of health systems and universal health coverage.

**Objectives:** This study aimed to measure the financial protection against catastrophic health expenditure among hospitalized patients in Kermanshah, western Iran, after the implementation of the health sector evolution plan of Iran.

**Methods:** This was a cross-sectional study. A total of 544 patients were selected using the proportional allocation to population size technique. A translated version of the world health survey questionnaire was used to collect data. Catastrophic health expenditure was calculated using WHO recommended methodology. Data were analyzed using STATA v.13. The statistical test performed included descriptive statistics and logistic regression.

**Results:** About 4.8% of households with hospitalized patients were faced with catastrophic health expenditures. The total mean out-of-pocket (OOP) medical expenditures of being hospitalized was 819,220 Rials per patient. Mean OOP in patients with catastrophic payment was 2,220,500 Rial. Major determinants of catastrophic payment were associated with surgical cost (OR: 8.09 P Value = 0.000), chronic disease (OR: 2.78 P Value = 0.025), household size (> 6) (OR: 6.70 P Value < 0.036), and economic status of households (Quintile 5; OR: 0.005 P Value = 0.000).

**Conclusions:** The Health Sector Evolution Plan should target and extend aids especially for chronically ill patients, those who need surgery, and those at poorest quintile due to the fact that they are more vulnerable to catastrophic health expenditure. These groups should be the priorities in the health sector evolution plan revision to achieve a more desired outcome.

**Keywords:** Financial Protection, Catastrophic Health Expenditure, Out-of-Pocket Payment, Hospitalized Patients, Health Reform

## 1. Background

Worldwide, millions of people suffer from financial hardship due to out-of-pocket (OOP) health payments (1). As a result, the concept of financial risk protection remains a major focus of many health systems (2, 3) and is a core component of universal health coverage (UHC) (1). Financial protection is defined as access to needed and good quality health services without financial catastrophe. One of the common indicators of financial protection is incidence of catastrophic expenditure due to health payments (1). OOP payment defines as catastrophic if it exceeds a

certain threshold of the household consumption expenditure, the income, or the capacity to pay in a given period (4, 5). The threshold of 40% of capacity to pay widely has applied in the empirical studies (6).

High OOP payments for health care deter people, especially the poor from receiving needed health services due to the fact that they cannot afford to pay for them (3, 7). Often, poorer households are forced to borrow, sell assets, reduce consumption, or resort to their savings in order to pay for health care cost, leading to penury (3, 8, 9). Impact of catastrophic OOP payments for health services is a major challenge to households, especially in the low and mid-

dle income countries as well as OECD countries (6). A well-functioned health system maintains a balance of ensuring that individuals are able to have access to improved health services without facing financial consequences (4, 6, 9). For this reason, measures to prevent catastrophic health expenditure and provision of quality care are of great concern to all countries, institutions, and the academia (1). High OOP payment was a major challenge to the people of Iran and many Iranians were unable to afford the cost in seeking for health care due to it (10). Previous studies in Iran have shown that the incidence of catastrophic health expenditures (CHE) ranges from 6% - 17.7% at the national level (11, 12), and 14.2% - 22.2% at the regional level (13, 14), with an OOP payment of about 52.1% (15). To address this challenge, in 2014, the government of Iran took a bold health reform initiative by instituting the health sector evolution plan (HSEP) (16). More than 3 billion US dollars have been allocated to improve the Iran health system. Sources of funds include 1% value-added tax, 10% of targeted subsidies, and partial general revenue of the government (17).

The main goals of the HSEP was to ensure that everyone has access to health insurance, reduce OOP payments for inpatient services, provide financial protection to patients with specific diseases (such as hemophilia, thalassemia, renal replacement therapy) and poor users, motivate medical doctors to stay in deprived areas of the country, improve quality of care by increasing specialists, as well as improving hospital amenities and lodging services (17, 18).

Although some studies have measured CHE in Iran before the HSEP, only tiny literature exist to explain the reduction of OOP payments and catastrophic expenditures after the HSEP. Besides, consistent assessment of financial risk protection, preferably every 2 to 5 years, has been recommended to evaluate and monitor the effect of policy intervention and reform (1).

## 2. Objectives

This study aimed to measure the financial protection against health costs within households with hospitalized patients after the HSEP in Kermanshah, Iran. We anticipate findings will help to improve the HSEP and financial protection against health costs in Iran.

## 3. Methods

This cross-sectional study was conducted on patients discharged from university hospitals in Kermanshah city, western Iran, in 2015. The city has 7 public university hospitals (2 general and 5 specialized hospitals) with a total

number of 1570 active beds and 2 private hospitals. Data was gathered from the 7 public university hospitals. A total sample of 544 patients was calculated using the single proportion formula, where  $p = 15\%$  (the mean proportion of the households faced with CHE in previous regional studies in Iran,  $d = 3\%$  (margin of error) and  $\alpha = 0.05$  (Type I error)). We used the proportional allocation to population size technique in collecting data from each hospital. For each hospital, we selected participants proportional to the number of hospital beds.

Data was collected using a translated version of a questionnaire proposed by the world health organization (WHO) (19). The validity and reliability of translated questionnaire were determined and verified by Kavosi et al. (20). The questionnaire covers individual and household level data. Data on demographic features of hospitalized patients as well as their household heads, food expenditure, total household expenditure on goods and services, household size and OOP health expenditures made by patients or their households at the point of receiving hospital services (mainly charges for health care services, laboratory and diagnostic tests, drugs, and medical equipment) to calculate the proportion of catastrophic health expenditures. In addition, we included a few questions in the questionnaire. For example, patients were asked whether they had surgery and also asked about their length of hospital stay. Therefore, for greater certainty, we calculated Cronbach's alpha for the 40 first samples and its reliability was confirmed with 0.81. An adult family member who followed the patient's discharge process was asked to fill the questionnaires on behalf of patients who were unable to complete the questionnaire due to the condition of their disease. All patients or their family members agreed to participate in the study either orally or in writing. Data collection started from mid September 2015 to mid December 2015.

We used capacity to pay (CTP) (non-subsistence spending) in calculating catastrophic spending (21). CHE was defined when OOP payments on health equal or exceed 40% of household's capacity to pay or non-subsistence spending. CTP is defined as an effective income minus subsistence spending. To reduce the likelihood of short-term fluctuations in income data, total household expenditure was used as the proxy for effective income (22). In this study, CTP is the difference between total household spending and subsistence expenditure. Subsistence expenditure was calculated as the average food spending of the households whose food share fall within the 45th to 55th percentile range across the whole sample, however adjusted based on size of household (21). Households whose OOP medical payments exceed 40% of its CTP were classified to experience catastrophic health expenditures.

A logistic regression model was used to assess the determinants of catastrophic health expenditures. This model is a special type of regression that is applied for binary-outcome variables. In the binary dependent variable model, a predicted value of 1 depicts that households are faced with catastrophic health expenditure, while 0 means that they are not faced with such expenditures. Independent variables commonly used in related studies, both national and international, were also included in the model (3, 5, 23, 24). They include place of residence, sex of house head, expenditure quintile, size of household, and number of member(s) who were chronically sick. We used the odds ratio to interpret the effect size of predictor variables. The STATA v.13 was used to analyze the data. The study protocol was approved by the ethics committee of Kermanshah University of Medical Sciences

#### 4. Results

Overall, 416 out of 544 participants (76.4%) completed the questionnaires. The mean age of patients was 38.92 years. The majority (54.8%) of study participants were female. Furthermore, 46.1% of our interviewees have acquired middle/high school education. The mean length of stay was 10.59 days. However, almost 32.1% of participants had a surgical operation during their stay. Moreover, about 32.1% of the patients reported that other household members need chronic health care. Approximately, 97.6% of the patients had health insurance coverage. Majority (78.1%) of participants resided in urban area. The mean of household size was 4.54. About 52.5% participants were within the low and middle economic status (Table 1).

According to our findings, almost 4.8% of patients experienced catastrophic health expenditures due to OOP payments. We also did not observe the incidence of catastrophic health expenditures in the psychiatric and obstetrics hospitals (B and F). While the total mean OOP health expenditures of being hospitalized was 819,220 (1,623,930) Rials per patient, that of patients with catastrophic payment was 2,220,500 (1,967,320) Rials (at the time of this study, \$1 was equal to 34,000 Iranian Rials (IRR)) (Table 2).

Table 3 presents the estimated odds ratio from a logistic regression model for 40% catastrophic threshold. Catastrophic health expenditures were found to be statistically significantly associated with households whose members reported of suffering from at least 2 chronic diseases (OR = 4.29; 95% CI = 1.20 - 15.29). Results also revealed that, the odds of facing catastrophic health expenditures was about 8 times higher among households where their hospitalized member had undergone surgery (OR = 8.09; 95% CI = 2.59 - 25.23). Moreover, larger households (> 6 members) were statistically significantly more

**Table 1.** Descriptive Results of the Sample Hospitalized Patients in the Seven Public University Hospitals in Kermanshah, Iran, 2015

Variables	Values <sup>a</sup>
Age	45.99 ± 16.91)
Number of Hospitalizations Days	10.80 ± 5.84)
Size of households	4.54 ± 1.65)
<b>Level of education</b>	
Illiterate and primary school	226 (53.8)
Middle And high school	135 (33.3)
Academic	54 (12.9)
<b>Job of house heads</b>	
Unemployed	100 (23.8)
Employee	54 (12.9)
Self-employer	174 (41.4)
Other	92 (21.9)
<b>Having chronic disease</b>	(32.9)
<b>households headed by female</b>	(6.2)
<b>Urban Residents</b>	328 (78.1)
<b>Having Surgery</b>	141 (33.5)
<b>Having Insurance Coverage</b>	410 (97.6)
<b>Female Gender</b>	230 (54.8)
<b>Household Head's educational level</b>	
Illiterate and primary school	146 (34.8)
Middle And high school	190 (45.2)
Academic	84 (20)
<b>Household expenditures quintiles</b>	
1st Quintile	4 (1)
2nd Quintile	78 (18.6)
3rd Quintile	138 (32.9)
4th Quintile	74 (17.6)
5th Quintile	126 (30)

<sup>a</sup>Variables are expressed as mean ± SD or No. (%).

likely to face catastrophic health expenditures (OR = 7.14; 95% CI= 1.13 - 45). With an increasing household size, the likelihood of facing catastrophic health expenditures increased. Households within the higher expenditure quintile were significantly less likely to face catastrophic expenditure compared with the lower quintile, and with increasing households' monthly expenditure, the likelihood of facing catastrophic health expenditures declines. Household heads aged over 65 years; the sex of house heads and place of residence had no statistically significantly relationship with the likelihood of catastrophic payment. The

**Table 2.** Rate of Occurrence of Catastrophic Health Expenditures and Mean Out-of-Pocket Expenditures in Participants in Kermanshah, Iran, 2015

Hospital	Patients <sup>a</sup>	Pocket Expenditure <sup>b</sup>	Pocket Expenditure <sup>c</sup>
A	8.70	1642390 (1556250)	1292500 (94290)
B	0.00	217220 (396750)	-
C	3.33	867330 (1021890)	1005000 (63630)
D	5.00	893730 (760910)	2475000 (247480)
E	4.00	581600 (1045490)	4350000 (989940)
F	0.00	479420 (942960)	-
G	6.85	812000 (2260270)	2384000 (2492780)
<b>Total</b>	<b>4.8</b>	<b>819220 (1623930)</b>	<b>2220500 (1967320)</b>

<sup>a</sup>Percentage of patients experiencing catastrophic health expenditures

<sup>b</sup>Mean out of pocket expenditure in Rials (SD).

<sup>c</sup>Mean out of pocket expenditure among patients with catastrophic payments in Rials (SD).

model goodness-of-fit based on the Hosmer-Lemeshow test was satisfactory with 40% threshold levels.

## 5. Discussion

This study aimed to measure financial protection against catastrophic health expenditures among households whose member was hospitalized after the HSEP of Iran. By comparison with pre-reform, the findings suggested that the exposure to catastrophic expenditure has been decreased. However, catastrophic health expenditures have yet been remained in some cases, which will be discussed in this section.

Catastrophic health expenditures, as identified in our study, was lower compared to the findings of previous studies, which were conducted before the HSEP in Kermanshah (22.2%) (13) as well as Tehran (15.6%) (23). Catastrophic health expenditures were not experienced by patients in the psychiatric and obstetrics hospitals. In the obstetrics hospital, this may be because of financial protection of HSEP for normal delivery and lower length of stay in this hospital. In the psychiatric hospital, one reason may be due to the fact that services and procedures are relatively less expensive and therefore it is cheaper in these types of hospitals. A study by Piroozi et al. after the implementation of HSEP, also revealed similar incidence of catastrophic health expenditures, i.e. about 5% among households in the Kurdistan province (25). Furthermore, according to a study by Limwattananon et al. in Thailand, the percentage of exposure to catastrophic expenditures for households using inpatient care was 31.0% in 2000 (before universal coverage), compared with 15.1% and 14.6% in 2002 and 2004 (after universal coverage), respectively (26).

A study after health transformation plan (HTP) in Turkey also revealed a decreasing trend of catastrophic health expenditures during 2003 - 2009. CHE was 0.75% in 2003 and 0.59% as well as 0.48% in 2006 and 2009, respectively (27).

In our study, the mean out of pocket payment for all patients and patients who faced catastrophic payment were 819,220 (1,623,930) and 2,220,500 (1,967,320) Rials, respectively, i.e. lower than what the study has revealed in Tehran before Iran's health reform (23). The decrease in the OOP was mainly due to the fact that all needed drugs and equipment are now funded through the HSEP. A household survey conducted by Somkotra et al. on payments for health care and its effect on catastrophe and impoverishment on Thai households, also revealed a fall in OOP after their UHC reforms (28).

According to our study, households whose members had undergone surgical operation were significantly more likely to incur catastrophic health expenditures. A modeling study on catastrophic expenditure to pay for surgery worldwide showed that each year, approximately 33 million people worldwide suffer from catastrophic expenditure due to surgical care and almost 3.7 billion people will experience catastrophic payment if they undergo surgery treatments (2). A study by Nguyen et al. in Vietnam, on surgical cost and catastrophic expenditure among hospitalized patients with injuries, showed a substantial financial burden of households due to surgery. Moreover, surgery was strongly associated with risk of catastrophic health payments (29). Although most inpatient services are greatly financed by the government, the incidence of catastrophic OOP expenditure remains among those who need surgical treatments. Therefore, the government of Iran should improve the benefit package of patients who need surgical operations as well as the less privileged citizens. One probable reason for this result is that only the direct cost of health services were considered in our study. Although non-medical costs, such as transportation, accommodation, and food are important contributors of catastrophic expenditure and OOP medical payment (3), they were excluded from this research.

Catastrophic health expenditures were found to be statistically significantly associated within households having at least 2 chronic diseases. Studies have also revealed that having members with chronic diseases in the household increases risk of catastrophic expenditure (3, 6, 20, 30-32). Besides, findings of post-reform study in Iran showed that the presence of disabled members in the household induced catastrophic payments even after the HSEP (25). Chronic diseases substantially put a huge financial burden on household budgets due to the fact that chronically ill patients are subjected to routine and long-term visits, testing, as well as medications and therefore, households' abil-

**Table 3.** Logistic Regression of Incurring Out-of-Pocket Health Expenditures and Its Determinants in Participants in Kermanshah, Iran, 2015<sup>a,b</sup>

Variables	Odds Ratio	Std. Err.	P >  z	(95% CI)
<b>Dependent variable<sup>c</sup></b>				
<b>Independent Variables</b>				
Hospitalization day number	1.06	0.044	0.146	(0.978 - 1.15)
Having surgery	8.09	4.69	0.000	(2.59 - 25.23)
Having at least 2 chronic diseases	4.29	2.78	0.025	(1.20 - 15.29)
Gender of house heads	0.759	0.891	0.815	(0.075 - 7.59)
House heads aged over 65 years	0.480	0.361	0.330	(0.110 - 2.09)
Settlement	0.563	0.377	0.392	(0.151 - 2.09)
<b>Household size</b>				
3 - 6	0.460	0.374	0.341	(0.093 - 2.27)
> 6	7.14	6.70	0.036	(1.13 - 45.00)
<b>Household expenditures quintile</b>				
Quintile 2	0.076	0.101	0.052	(0.005 - 1.02)
Quintile 3	0.041	0.050	0.009	(0.003 - 0.453)
Quintile 4	0.005	0.008	0.001	(0.0002 - 0.126)
Quintile 5	0.003	0.005	0.000	(0.0001 - 0.0733)

<sup>a</sup>LR chi2 (12) = 55.25, Log likelihood = -52.583754, Prob > chi2 = 0.0000.

<sup>b</sup>Hosmer-Lemeshow goodness-of-fit test, chi2 (8): 9.57, Prob > chi2 = 0.2969, number of observation = 416.

<sup>c</sup>CHE (1 = experienced CHE; 0 = otherwise).

ity to pay for cost of hospitalization is decreased (33). Our findings indicate that the governments' financial support for hospitalization care is not effective in targeting people who need the services. Moreover, we found that households with more than 6 members were significantly more likely to face catastrophic health expenditures. This was consistent with findings of studies that were conducted in Egypt, Serbia, and China (6, 31, 34). That is, as size of households increased, patients were statistically significantly more likely to spend more than 40% of their capacity to pay on hospital charges. Our findings also revealed a higher incidence of catastrophic health expenditures among low and middle-expenditures households. Result showed that households belonging to lower expenditure quintiles were significantly more likely to face catastrophic health expenditures. However, as supported by previous studies (23, 27, 30-32), catastrophic medical expenses decreased as household's quintile expenditure increased. Also, according to finding of one post-reform study, households with low economic status are more likely to experience CHE (25). In addition, HSEP should target and extend aids to poor patients who are more vulnerable to catastrophic health expenditures. In our study, male house heads, number of hospitalization days, place of residence, sex of heads of household, and house heads who are over 65 years of age, were

not statistically significant risk factors of catastrophic expenditure. On the other hand, some studies have revealed place of residence (5, 6, 35) and house heads over 65 (36) as significant determinants of catastrophic expenses, which were not consistent with our findings.

Our study has some limitations. For example, we only investigated catastrophic health expenditures based on hospitalization costs experienced by patients or their households, without considering post and pre-hospital costs (indirect cost). Additionally, this study was conducted in Kermanshah city, western Iran. That is, our incidence rate of CHE might not be the true representation of the overall incidence rate after the HSEP in Iran. As such findings should be interpreted with caution. We therefore recommended further research to investigate the magnitude of catastrophic expenditures due to both inpatient and outpatient services, especially after HSEP in Iran.

### 5.1. Conclusions

After the HSEP, the role of government in financial protection has been increased considerably. By comparison with pre-reform studies, OOP and catastrophic expenditures have been decreased. However, significant gaps exist within the health system of Iran and catastrophic health expenditure has yet been experienced. HSEP should target

and extend aids especially for chronically ill patients, those who need surgery, and those at poorest quintile since they are more vulnerable to catastrophic health expenditure. These groups should be the priorities in HSEP revision to achieve more desired outcome.

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## Footnotes

**Authors' Contribution:** The overall implementation of this study including design, data analysis, and manuscript preparation was the results of joint efforts by individuals who are listed as coauthors of this paper. All authors have made extensive contributions to the review and finalization of this manuscript.

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