

## Original Article

# Determining Equity in Household's Health Care Payments in Hamedan Province, Iran

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## Abstract

**Background:** Financial protection of household against the consequences of the health care expenditures is one of the most important functions of health care systems. The objective of this study was to determine the equity in health care payments and determining factors among households in Hamedan, a province in Iran.

**Methods:** In this cross-sectional study, 772 families of patients, who were being discharged from hospitals in Hamedan, were selected for study by using a stratified random sampling method. Required data regarding households' health and non-health expenditures were collected through World Health Organization standard questionnaire by interviews and observation method.

**Results:** According to the findings, 20.7% of households experienced catastrophic health expenditure. The incidence of impoverishment due to out-of-pocket payments for health care was 2.8% among studied households. The highest incidence rate of out-of-pocket health payment indices occurred in the first quintile (poorest or Q1). Variables such as having members under 6 years or over 60 years in household, household size, employment of household head, households' income quintile, existence of the disabled member in households and the education level of the household's head are the most important factors that affect the incidence of out-of-pocket health payment indices.

**Conclusion:** There is considerable inequity in health care financing as well as households' health payments. This requires designing and implementing the operative and protective programs for understanding the important factors that affect equity in health financing, especially for poor households, against the unexpected health expenditures through the health care system.

**Keywords:** Catastrophic health expenditure, inequity, Iran, out-of-pocket payments

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## Introduction

The world health report in 2000 initially opened a new horizon in presenting the national health systems to activate the goals of providing desired health, to meet the people's expectations and to protect the equity in financing healthcare.<sup>1</sup> Today, health system is the largest economic part of the world. Based on the WHO's report, the international total health expenditures in 2007 were over 5.3 trillion dollars that included government public expenditures (35%), social security insurance (25%), private insurance (18%), out of pocket payment (18%), and other expenditures (4%). In low-income countries, the proportion of out of pocket payment is high and much inequity is obvious in healthcare financing.<sup>2</sup> The series of studies conducted

on out-of-pocket payment to get health and medical services in developing countries show that distribution of the resources and services of public health care is unfair regarding the economic incomes of the households.<sup>3-6</sup> For example, in Bangladesh in 1990, 20% of the poor population had about 12% of the public expenditures in health care services, while about 29% of the government subsidy in health sector was devoted to 20% of the wealthy population.<sup>7</sup> The famous study of the World Bank on 50 poor countries showed that despite the large expenditures of health sector, the main challenge in most countries is still the equity in health care financing.<sup>8</sup>

Out-of-pocket payments, as the main financial resource of health care services, have negative effects on equity on health and quantitative indications of health system functions.<sup>9</sup> One of the serious objections is that from the aspect of equity, poor people cannot pay such payments for health services, so using essential health services by them may decrease.<sup>10</sup> Due to the health expenditures, catastrophic expenditures will exist in rich nations, but 90% of the households affected by these expenditures live in less developed countries and children and elder lies are more affected in these countries.<sup>11,12</sup> Out-of-pocket payments for healthcare services can affect household's social and economic welfare.<sup>13</sup>

Based on the WHO's health report in 2012, the proportion of healthcare expenditures in Iran was 7% of Gross Domestic Production (GDP). The state sector and private sector proportions

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in health financing were 40% and 60%, respectively. This shows that the proportion of out-of-pocket health payment from the share of the private sector was 88% and inequity in healthcare financing was obvious.<sup>14</sup>

With regards to the importance of this issue, serious steps have recently been taken in Islamic Republic of Iran to protect household's financing against unexpected healthcare expenditures and to remove inequities in healthcare services. Remarkable actions of the Iranian health system include development of health insurance coverage, implementation of family physician plans, free hospitalization services for casualties of different accidents and for patients with particular diseases, and bed insurance.<sup>15</sup> Regarding the importance of out-of-pocket health payment and efforts of Iranian health system authorities to achieve the equity in health payments, this study aimed to determine the equity in health care payments and the affecting factors among households of Hamedan, a province in Iran.

## Materials and Methods

This is a cross-sectional study conducted in Hamedan province, Iran, from January to July 2014. The research community consisted of the families of the patients using the hospitalization services in Hamedan city. The households participating in the study were chosen because they benefited at least once from the hospitalization services during the study. Therefore, the rate of out of pocket payment incidence for health care services would be estimated more exactly in households and can be used for effective health policy making.

### Sample size and sampling methods

In this cross-sectional study, 772 Households of patients, who were being discharged from hospitals in Hamedan, were selected for study using a stratified random sampling method. Samples were then proportionally allocated to each hospital. Hamedan city has four university hospitals, two private hospitals, one military hospital and one hospital run by social security organization. The Sampling method was as follows:

First, the average statistics of the inpatient patients during the first 6 months of the year 2013 were estimated separately for each hospital. Then, the portion of each hospital from total inpatient patients was estimated. The weight of the hospitals in admitting hospitalized patients was specified. Finally, the sample size for each hospital was calculated through multiplying the weight in total estimated samples of the study.

### Data collection

WHO's standard questionnaire for evaluating the equity in healthcare financing was used for collecting households' health and non-health expenditures, as well as other required data.<sup>15</sup> The recall period was considered one year for hospitalization and four weeks for households' outpatient care before the time of the data gathering. The researchers obtained the approval of the ethics committee of the Baqiyatallah University of Medical Sciences and attained institutional permits. The selected households were informed that participation is voluntary. The informed consent letter was obtained from participants.

### Data analysis

Collected data were analyzed by Stata 11.2 version, using  $\chi^2$ -

tests and logistic regression model. In this study, catastrophic health expenditures and impoverishing due to health expenditures have been considered as out-of-pocket expenditure indices.<sup>16</sup>

To evaluate the impoverishing health expenditure, we needed to determine the relative poverty line, so we used the method of household subsistence expenditure ( $SE_H$ ) level. The households that are under the poverty line due to the health expenditures were counted:<sup>17</sup>

$$\text{If } Exp_H < SE_H \text{ and } Exp_H - Hoop_H < SE_H \rightarrow \text{Impoverish}_H = 1$$

$$\text{If } Exp_H \geq SE_H \text{ and } Exp_H - Hoop_H \geq SE_H \rightarrow \text{Impoverish}_H = 0$$

Where  $Exp_H$  represents the total expenditure of household,  $SE_H$  is the household subsistence expenditure and  $Hoop_H$  is the household out-of-pocket health payments.

For calculating the catastrophic health expenditure, households' health care financial contribution ( $HFC_H$ ) was determined through dividing Household Health Expenditure ( $HE_H$ ) to Household Capacity to pay ( $CTP_H$ ). Household spending on health ( $HE_H$ ), prepayments for health insurance, private self-insurance and household out of pocket payments are all for benefitting from healthcare.

Households' capacity to pay ( $CTP_H$ ) refers to the efficient income higher than subsistence level of the households. Considering the incorrect information given by some households regarding their income, their gross costs were considered as their incomes.

For households that their food expenditures were lower than the minimum subsistence, the Households' capacity to pay was equal to the difference of incomes and food expenditure. For the households that their food expenditure was more than the minimum of subsistence, the households' capacity to pay was considered equal to the difference of their income and living expenditures.<sup>15</sup> In other words:

$$\text{If } Food_H < SE_H \rightarrow CTP_H = Exp_H - Food_H$$

$$\text{if } Food_H \geq SE_H \rightarrow CTP_H = Exp_H - SE_H$$

The food expenditures include the household total expenditures in addition to the monetary value of purchased and eaten food by households. The costs of eating out in hotels and restaurants and the spending on smoking, drinking, etc. were not considered in the calculations.

According to the WHO approach, when the Households' costs spent on health care are more than 40% of the capacity to pay, it is considered as catastrophic health expenditure. In this study, we have used the WHO's scenario to diagnose if the households face the catastrophic health expenditures or not.

The  $\chi^2$ -test, logistic model, and Stata 11.2 version were used to determine the relationship between predisposing and enabling variables, as well as the probability of households facing the catastrophic and impoverished health expenditures. In this stage, all variables which were in a significant relationship with each of the health out-of-pocket payment indices according to  $\chi^2$ -test ( $P = 0.20$ ) entered the logit model.

Then, we determined the probability that a household incurs catastrophic or impoverished health expenditure.

In the final step, we specified the concentration index and recognizing health inequities in the phenomenon in which households face with the catastrophic health expenditures.

## Results

The study results showed that there are remarkable differences in the households' capacity to pay in different income quintiles (Table 1).

Based on this study, the average value of the households' health care financial Contribution Indicator or the ratio of households' health payment to their capacity to pay was estimated 0.263. The highest value of this indicator was in the first income quintile and the lowest value was in the fifth quintile (Table 2).

Also, the study results indicated that 20.7% of the households faced the catastrophic health expenditure and 2.8% of them experienced the impoverishment due to out-of-pocket health payments (Table 3).

In addition, the incidence of out-of-pocket health payment indices happened more in the first or the poorest quintiles than others (Table 4).

The concentration index of the catastrophic and impoverishing health expenditures were respectively calculated as -0.7814 and -0.57073. It was reported that unpleasant consequences of the out-of-pocket payment for health care focused on the poor households. In these curves, the horizontal axes clarify the percentage of the population from the poorest to the richest and the vertical axes clarify the percentage of the indices of out-of-pocket health payment (Figures 1 and 2).

The relationship between the predisposing and enabling factors with the incidence of the health out-of-pocket payment indices through logit model

The results showed that factors such as situating of households in the second and third income quintiles, households with educated household heads, decrease the probability of catastrophic health

expenditures. Also, medium and high households size, family member under 6 and 14 years, complementary health insurance, and existence of a certain financial source to get medical and healthcare services, reduce the chance of households facing with catastrophic health expenditures. Factors such as having female household heads, elderly household heads, household members over 60 years of age, disabled members in a household, members with chronic illnesses needing long term care, having own house, and unemployed household head increase the chance of households facing with catastrophic healthcare expenditures (Table 5).

Also, the results revealed that situating the households in the second or higher quintiles rather than the first quintile, household heads with elementary school, and high school education compared to illiterate heads, and having complementary health insurance reduce the probability of facing the impoverishing health expenditures, while elderly members (over than 60), disabled household members, unemployed and elderly household heads increase the probability of encountering the impoverishing health expenditures (Table 6).

## Discussion

Household financial participation in healthcare and consequently out-of-pocket health payment indices can be evaluated precisely, if the healthcare services are used and demanded by the people who need them. Many households cannot demand the required health services due to financial, geographical, and technological barriers. Therefore, the presented statistics should not hide this fact that measuring out-of-pocket health payment indices may not estimate the real incidence of them in the population, especially among the poor people.<sup>18</sup> Therefore, effects of these affairs are not

**Table 1.** The average of households' capacity to pay among income quintiles (US\$: 2014)

CTP	Quintile	The poorest	2	3	4	The richest
Mean		266	654	1243	2115	3564
Std. Deviation		3.41	5.10	1.00	1.19	2.5

**Table 2.** Households' Health Care Financial Contribution Indicator among income quintiles

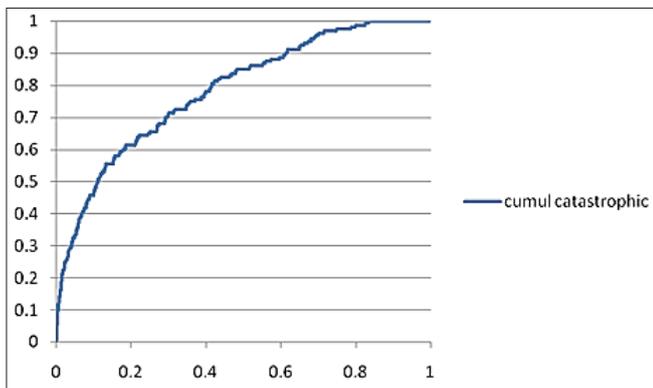
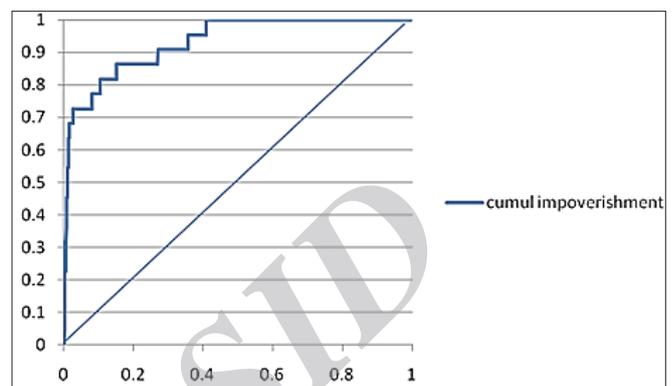
HFC	Quintile	The poorest	2	3	4	The richest
Mean		0.315436	0.203880	0.172236	0.0402262	0.041625
Std. Deviation		1.24	0.12	0.10	0.02	0.01

**Table 3.** Incidence of out-of-pocket health payment indices among the studied households

out-of-pocket health payment indices		Households Characteristics	Percent
Facing catastrophic health expenditures:	No	612	79.3
	Yes	160	20.7
Facing poverty before out-of-pocket health payment	No	752	97.4
	Yes	20	2.6
Face to poverty after out-of-pocket health payment	No	730	64.9
	Yes	42	5.3
Impoverishment due to out-of-pocket payment for health care	- - -	22	2.8
Stuck deep in poverty due to out-of-pocket payment for health care	- - -	20	2.6

**Table 4.** The share of each quintile from Catastrophic and Impoverished Health Payments (%)

Quintile	Catastrophic health Payment	Impoverishment due to health payment
The Poorest	73.7	90
2	23.2	10
3	3.1	0
4	0	0
The Richest	0	0
<b>Total</b>	<b>100</b>	<b>100</b>

**Figure 1.** Concentration curve in distribution of catastrophic health expenditures**Figure 2.** Concentration curve in distribution of impoverishing health expenditures

counted in calculating and estimating the health financing indices. These factors affect the households' health financing contribution and the catastrophic and impoverishing healthcare expenditures.<sup>19</sup>

Our study showed 20.7% households faced with catastrophic health expenditures. According to the researches, the rate of the households experiencing the catastrophic healthcare expenditures in different health systems was reported from 0.6% to 66%.<sup>20,21</sup> In our study, it was shown that 2.8% of the households experienced the impoverishment due to health care payments and 2.6% of the poor households were in a deep poverty before healthcare payments. Conducted studies displayed that there is no doubt about the effects of healthcare expenditures on impoverishing the households. Health payments increase the number of impoverished households and lead the poor households to deep poverty and impoverishment.<sup>20-22</sup> In a study by WHO, it was shown that over 44 million households in the world experienced the impoverishment aroused from medical treatment and health expenditures.<sup>23</sup> A report in Asia-Pacific region indicated that out-of-pocket payment for health care impoverished 37 million people in India, 32.4 million people in china, and 5 million in Bangladesh. In other words, it was estimated that about 2.7% of the population (nearly 78.3 million people) in developing countries were impoverished due to out-of-pocket payment for health care. Out-of-pocket health payment increased the impoverishment rate to over 33% in Vietnam, 18.9% in china, 16.8% in Bangladesh and over 11.9% in India.<sup>24</sup>

Compared to the international research results, our results showed that there are some differences in the incidence of out-of-pocket health payment indices, which can be due to differences in economic and social structures of different countries and regions under study, as well as different healthcare systems in different countries, especially in the financial protection area. Studies

show that the proportion of households experiencing catastrophic healthcare expenditure depending on health systems structure, population characteristics, families socio-economic status, and definition of catastrophic health expenditures. There is no consensus on definition of catastrophic health expenditures and impoverishment threshold.<sup>25,26</sup> Also, difference in data collection tools is the most important factor that leads to differences in studies results, because of validity and reliability of data collection tool and method of data gathering.

The study indicated that the distribution of catastrophic health expenditures and impoverishment due to health payments focused on poor people, which has been confirmed in similar studies as well.<sup>27,28</sup> Therefore, it can be stated that poor people are more likely to encounter the serious consequences of healthcare expenditures.

Our study indicated that having children less than 6 years in households has a significant reducing effect on catastrophic healthcare expenditures. This finding doesn't go along with other literatures, which have indicated children as an important factor on exposure to catastrophic costs.<sup>19,29</sup> This disparity can be explained by a fact that the households with young children are those who usually have younger parents. Therefore, these households are expected to have desired health conditions. In Iran's health system, performing cheap and even free prevention programs or medical plans for mothers and children are effective factors that remove imposed financial pressure of health expenditures on households.

According to the study, having an old household member (over 60) or an elderly household head increase the probability of catastrophic healthcare expenditures and lead to impoverishment. Other studies also confirm the results of our study for exposure of households to catastrophic healthcare expenditures,<sup>25,30-33</sup> and in experiencing impoverishment.<sup>34,35</sup> Elderly people are more likely to go through health risks; so they need more healthcare

**Table 5.** The characteristics of households faced with catastrophic expenditures and its determinants

Variable	Frequency of faced households	%of faced household in the same characteristic	P-value	OR	95% CI for OR	
					Upper	Lower
<b>Predisposing factors</b>						
<b>Age of household head</b>						
Young (20–40)	24	12.7	---	1	---	---
Middle aged (40-60)	53	18.3	0.10	1.53	2.59	0.91
Elderly (over 60)	83	28.3	0.00	2.71	4.47	1.65
<b>Household head education</b>						
Illiterate	81	28.8	---	1	---	---
Elementary school	49	17.6	< 0.001	0.52	0.79	0.35
Junior high school	13	20	0.19	0.64	1.24	0.33
High school	14	13.3	< 0.001	0.38	0.70	0.20
University graduated	3	6.7	< 0.001	0.17	0.58	0.05
<b>Household size</b>						
1–2	61	34.5	---	1	---	---
3–6	90	16.8	< 0.001	0.38	0.56	0.26
> 7	9	15	< 0.001	0.33	0.72	0.15
<b>Household head gender</b>						
Female	23	26.7	---	1	---	---
Male	137	20	0.14	0.68	1.14	0.40
<b>Having Member &lt; 6 years</b>						
No	133	27.7	---	1	---	---
Yes	27	14.6	0.01	0.58	0.91	0.37
<b>Having Member &lt; 14 years</b>						
No	116	25.5	---	1	---	---
Yes	44	13.9	< 0.001	0.47	0.69	0.32
<b>Having Member &gt; 60 years</b>						
No	67	15.8	< 0.001	0.51	0.72	0.35
Yes	93	26.8	---	1	---	---
<b>Having Disabled member</b>						
No	138	19.9	---	1	---	---
Yes	22	27.5	0.10	1.52	2.54	0.90
<b>Having Member(s) with chronic diseases</b>						
No	108	19.5	---	1	---	---
Yes	52	23.7	0.19	1.28	1.86	0.088
<b>Enabling factors</b>						
<b>Having complementary health insurance of household head</b>						
No	130	22.1	---	1	---	---
Yes	30	16.6	0.09	0.68	1.06	0.44
<b>Having Own house</b>						
No	14	11.7	---	1	---	---
Yes	146	22.4	< 0.001	2.18	3.92	1.21
<b>Household head employment</b>						
Unemployed	69	31.8	< 0.001	2.37	3.41	1.65
Employed	91	16.4	---	1	---	---
<b>Having other financial sources</b>						
No	156	20.4	---	1	---	---
Yes	4	57.1	0.032	5.20	23.49	1.15
<b>Quintile</b>						
The Poorest	118	25.1	---	1	---	---
Second	37	16.4	0.01	0.58	0.88	0.39
Third	5	11.9	0.06	0.40	1.05	0.15
Fourth	0	0	0.99	---	---	---
The Richest	0	0	0.99	---	---	---

services and due to their physical weaknesses, they cannot work and support themselves and their families financially, therefore the probability of encountering the catastrophic healthcare expenditures rises.

Based on this study, the effect of household head education level on the probability of facing catastrophic healthcare

expenditures was vice-versa. The higher their education is, the less the probability of out-of-pocket health payment indices for them. The conducted studies confirm the effect of household head education level on the incidence of out-of-pocket health payment indices.<sup>19,36,37</sup> High level of education helps people to live a good life, prevent diseases, and have welfare. Well educated people

**Table 6.** The characteristics of the households faced impoverishing health expenditures and its determinants

Variable	Frequency of faced households	% of faced household in the same characteristic	P-value	OR	95% C.I for OR	
					Upper	Lower
<b>Predisposing factors</b>						
<b>Age of household head</b>						
Young (20–40)	4	2.1	---	1	---	---
Middle aged (40–60)	4	1.4	0.54	0.64	2.61	0.16
Elderly (over 60)	14	4.8	0.14	2.32	7.16	0.75
<b>Household head education</b>						
Illiterate	15	5.3	---	1	---	---
Elementary school	4	1.4	0.01	0.25	0.79	0.08
Junior high school	1	1.6	0.23	0.28	2.20	0.03
High school	2	1.9	0.16	0.34	1.53	0.07
University graduated	0	---	0.99	---	---	---
<b>Having Members &gt; 60 years</b>						
No	7	1.6	0.032	0.37	0.92	0.14
Yes	15	4.3	---	1	---	---
<b>Having Disabled member</b>						
No	17	2.5	0/06	0.37	1.05	0.13
Yes	5	6.3	---	1	---	---
<b>Enabling factors</b>						
<b>Having complementary health insurance of household head</b>						
No	20	3.4	0.10	3.20	13.84	0.74
Yes	2	1.1	---	1	---	---
<b>Household head employment</b>						
Unemployed	13	6	< 0.001	0.25	0.61	0.10
Employed	9	1.6	---	1	---	---
<b>Having Other financial sources</b>						
No	22	2.9	---	1	---	---
Yes	0	0	0.6	0.99	---	---
<b>Household head's health insurance</b>						
No	2	4.8	---	1	---	---
Social security	8	2.6	0.42	0.52	2.55	0.10
Medical Services	8	2.5	0.42	0.52	2.54	0.10
Imdad (Relief) Committee	3	13	0.24	3	19.42	0.46
The Armed Forces Medical Services	1	1.4	0.31	0.29	3.29	0.02
<b>Quintile</b>						
Poorest	20	1.4	---	1	---	---
Second	2	0.9	0.032	0.20	0.86	0.04
Third	0	0	---	---	---	---
Fourth	0	0	---	---	---	---
Richest	0	0	---	---	---	---

have better economic, financial, and social conditions. They also have more capacity to pay for health services.

In addition, there was a significant relationship between household head gender with an incidence of catastrophic healthcare expenditures. Female household heads are more likely to encounter catastrophic healthcare expenditures.<sup>30–33</sup> In developing and low-income countries, female household heads cannot usually get a good job with high income, so households with male guardians have better opportunities to get better jobs and have a lower probability to encounter catastrophic healthcare expenditures.

In the present study, the relationship between having a household member with a chronic disease and a probability of out-of-pocket payments for healthcare was not significant, although in some other studies it was the opposite.<sup>30,33</sup>

According to our study's results, another factor affecting the likelihood of running into catastrophic healthcare expenditures is the existence of a disabled member in a household. This has been stated in many studies in different levels.<sup>27,35,38,39</sup> Different shocks

on life have many effects on household's welfare. Existence of disabled members in households can increase the expenditures of healthcare because of chronic physical and mental problems, as well as clinical and rehabilitation treatments. Since these people cannot work and move normally, they cannot have incomes and this increases the household healthcare expenditures, especially in poor families. Our study suggests the health policy makers to offer free health services to disabled people with long life problems.

Another factor, which is very effective on the probability of encountering with catastrophic healthcare expenditures, is household size. According to the results, the households with more than three members have a reduced probability of facing with catastrophic healthcare expenditures. This result may seem a little unexpected, since other studies have suggested that the size of households is an effective factor on increasing the catastrophic healthcare expenditures.<sup>19,32,37</sup> The justification for this result is that a large household causes economies of scale for the whole household and diseconomies of scale for the health expenditures,

so it reduces the number of times that household refer to get health services.

In our study, health insurances do not have a significant effect on the reduction of catastrophic healthcare expenditures and impoverishment due to health payments, but having supplementary health insurance as prepayment mechanism prevents families from facing unpleasant consequences of health care expenditures. Lack of insurance coverage causes patients to pay much for diagnostic and hospitalization services out-of-pockets, while people with supplementary insurance pay a little more than insurance packages. Some studies have mentioned the preventing effects of health insurances on catastrophic healthcare expenditures.<sup>25,28,38-41</sup> In some other studies, the preventing effects of health insurances on impoverishment have also been confirmed.<sup>40,41</sup> Meanwhile, some studies introduce insurance as an encouragement to persuade people to benefit from advanced health services, so it can increase out-of-pocket health payment through induced demand from both supplier or buyer sides and this will make families face with catastrophic costs.<sup>42,43</sup>

According to our findings, as shown in other studies,<sup>9,30,32,36</sup> having employed household heads can have an important effect on reducing the risk of catastrophic health expenditures and impoverishment.

A household head with good income and good job can reduce the risk of catastrophic health expenditures due to a good payment capacity and having income more than living expenditures.

In the end, it should be mentioned that the information about the household's expenditures and health services utilization is able to create bias. In this study, to reduce the limitations, the recall period for outpatient care considered four weeks and it estimates less than the real amount of the yearly household's outpatient payments. Also, it is one of the limitations of this study and contributes to show the out-of-pocket payment indices less than the real amount. In our study, many households avoided expressing their real incomes. To remove these limitations, we used the gross expenditures instead of incomes; which is considered as another limitation of this study and affect out-of-pocket health payment indices. Also, it should be explained that since the households reported their health status and other expenditures, they might have made mistakes in some cases to give precise information, because they do not have the capability of evaluation and recognition and it may affect the results of this study.

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## Competing interests

The authors declare no competing interests.

## Authors' contributions

**Designing of paper:** Aziz Rezapour, Shahram Tofighi, Abbas Ghanbary, Mojtaba Sepandy; **Designing of tables and graphs:** Abbas Ghanbary; **Writing primary draft:** Jalal Arabloo, Vahid Alipour; **Manuscript revision:** Aziz Rezapour, Jalal Arabloo, Shahram Tofighi, Vahid Alipour, Mojtaba Sepandy, Payam Mokhtari, Abbas Ghanbary.

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