## Original Article

# Hospitalization and Catastrophic Medical Payment: Evidence from Hospitals Located in Tehran

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### Abstract

**Introduction:** Hospitalized patients constitute the main fraction of users in any health system. Financial burden of reimbursement for received services and cares by these users is sometimes unbearable and may lead to catastrophic medical payments. So, designing and implementing effective health prepayments schemes appear to be an effective governmental intervention to reduce catastrophic medical payments and protect households against it. We aimed to calculate the proportion of hospitalized patients exposed to catastrophic medical payments, its determinant factors and its distribution.

**Materials and Methods:** We conducted a cross sectional study with 400 samples in five hospitals affiliated with Tehran University of Medical Sciences (TUMS). A self-administered questionnaire was distributed among respondents. Data were analyzed by logistic regression and $\chi^2$ statistics. Also, we drew the Lorenz curve and calculated the Gini coefficient in order to present the distribution of catastrophic medical payments burden on different income levels.

**Results:** About 15.05% of patients were exposed to catastrophic medical payments. Also, we found that the educational level of the patient's family head, the sex of the patient's family head, hospitalization day numbers, having made any out of hospital payments linked with the same admission and households annual income levels; were linked with a higher likelihood of exposure to catastrophic medical payments. Also, the Gini coefficient is about 0.8 for catastrophic medical payments distribution.

**Conclusion:** There is a high level of catastrophic medical payments in hospitalized patients. The weakness of economic status of households and the not well designed prepayments schemes on the other hand may lead to this. This paper illustrated a clear picture for catastrophic medical payments at hospital level and suggests applicable notes to Iranian health policymakers and planners.

**Keywords:** Catastrophic medical payments, Gini coefficient, hospitalized patients, out-of-pocket payments, prepayment schemes

## Introduction

Uncertainty is one of the most important aspects of human life which may be observed especially in individuals' and household's health condition.[1,2] In fact, uncertainty in health is a notable issue because of two reasons: firstly in many cases, we do not know when we will suffer from a disease; secondly, we are not aware of how much we should pay for medical services that we receive.[3] Regarding these issues, individuals and households protect themselves with health insurance to reduce the financial burden of probable health risks.[4] The government can use prepayments schemes, such as social health insurance, for financial protection of individuals and households when they are suffering from illness. It is expected that increasing the prepayments schemes coverage and subsequently reducing out-of-pock-et reimbursement mechanism should be an effective governmental policy to establish the fairness in financial contribution and reducing catastrophic medical payments risk.[5]

There are different definitions of catastrophic health payments in the literature, based on the socio-economic indicators considered in estimating it. Generally, the catastrophic health expenditures payments have been calculated using the following two equations:

$$Z = \frac{T}{X} \quad \text{or} \quad Z = \frac{T}{[x\text{-}f(x)]}$$

Where Z is the headcount ratio of catastrophic health expenditures, T is the out-of-pocket payment, and X is the individual's (household) income (or consumption expenditure) level. X-f(x) demonstrates the individual's (household) income (or total consumption expenditure) level minus the individual's (household) food expenditure, also known as capacity to pay. If the income (total consumption expenditure) is considered, catastrophic health expenditures may be defined as: "spending 10% or more of total expenditure on health care might be considered catastrophic, with the rationale that this represents an approximate threshold at which the household is forced to sacrifice other basic needs, sell productive assets, incur in debt, or become impoverished.[5–7] Alternatively, 20% of total expenditure is also used. On the other hand, if the capacity to pay is considered, catastrophic health ex-

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penditure is more often defined as: "spending 40 percent of the capacity to pay on health care might be considered catastrophic". The WHO health equality researchers used this approach to assess the rate of catastrophic health expenditures.[5–8]

However, regardless of which definition of catastrophic health payments used, the World Health Organization estimates that every year, approximately 44 million households, or more than 150 million individuals, throughout the world face catastrophic expenditure, and about 25 million households or more than 100 million individuals are pushed into poverty by the need to pay for health care services.[9] Worthy of note is the relationship between the shortage of effective prepayment schemes or health insurance plans and so the dominance of out-of-pocket payments in prediction of households catastrophic payments between countries. In fact, it appears that in high-income countries, where households enjoy well designed coverage systems including population coverage, cost sharing and health services coverage, few households experience catastrophic health expenditures. However, in low- and middle-income countries, an important proportion of households face catastrophic health expenditures.[10–12] Moreover, on the micro level, the side effect of experience of catastrophic health expenditures is worse since many households may be forced to sacrifice other basic needs, sell productive assets, incur debts, or become impoverished.[13] Furthermore, many people may decide not to use health care services, simply because they cannot afford either the direct costs like consultations, medicines and laboratory tests, or the indirect costs, such as payments for transport and food.[14] However, unfortunately, the option of financial protection mechanisms to mitigate such burden is very limited.[15–17] As a result, protecting households from catastrophic health expenditure continues to remain a formidable challenge, particularly for countries with high levels of poverty.

Results of research in Iran over the past years present a notable illustration of exposure of Iranian households to catastrophic health payments. Bagheri Lankarani, et al. estimated that about 0.88% of Iranian population were exposed to impoverishing effects of catastrophic health payments in 2006.[18] Moreover, 11.8 % of households of district 17 in Tehran in 2006[19] and about 22.2% of households residing in Kermanshah in 2007 were[20] exposed to catastrophic health payments. The discrepancy between these figures result from different populations studied, the study designs and their data sources. While some have used data from the routine household income data (which has not been specifically designed for health care assessment), others have analyzed survey data from World Health Survey tool that had been conducted on limited samples. Kavosi, et al. provide a detailed discussion of different causes for the observed differences in catastrophic health care expenditure rates.[19] So, we can observe considerable catastrophic health payments within Iranian households, although there is a special emphasis on designing and implementing an equitable health care financing system. Such emphasis may be observed in article 90 of the Fourth Development Plan that expired in 2010, "In order to promote distributional equality in access to health care services and decreasing the contribution of poor and low-income households to health care payments, the Ministry of Health should distribute the resources and facilities in such a way as to limit the household's health payment at a maximum of 30% and finally reduce the catastrophic health payments 1% of the country's total households".[21] Although two years have passed since the end of this plan, the targeted health care financing objectives to promote equity have not been fully materialized yet, and require serious attention. There are some health care reforms that also aim to reduce out-of-pocket payments; for example, the family physicians plan in rural and urban regions.[22] Still, there is no sign of reductions in out-of-pocket share of health care financing in Iran: for example, the out-of-pocket payments accounted for 51% of the total health expenditure in 2002 and 2008.[23]

We aimed to assess catastrophic medical payments in a number of hospitals affiliated with the TUMS and its distribution in patients with different income levels, as well as the determining the factors related to probability of exposure to catastrophic medical payments.

## Material and Methods

### Population and setting

We conducted a cross sectional study of patients discharged from hospitals affiliated with the Tehran University of Medical Sciences. Data collection lasted three months from April to June 2012. All the data were collected from two sources: patient/relative interviews, and patient case notes.

### Questionnaire and data collecting process

All required data were collected through a self-administrated questionnaire. The questionnaire was developed based on the World Health Survey tool.[24] In a previous study, the reliability of the questionnaire was assessed as satisfactory (Cronbach's Alpha 0.85).[25] The questionnaire encompassed four sections: patient's demographic features, illness episodes features, the socio-economic features of the patient's household and patient's hospitalization services bill. Also in illness episodes features, the socio-economic features of patient's household and patient's hospitalization services bill, the required data are available for calculating the catastrophic medical payments occurrence for each patient. The calculation of catastrophic medical payments for each patient has been presented in estimating catastrophic health care expenditure section of this part of the study. The data collecting process encompasses the two following stages:

I. Data related to households' and patients' demographic characteristics, illness episode feature and household's socio-economic features were collected through interviews with patients. In this stage, if the patients were illiterate or very old, the interviewer asked the questions and wrote his/her answers on questionnaire sheets. In the case of very young children or patients who could not answer due to their disease, an adult next of kin who followed the patient's discharge process answered and completed the questionnaire. Patients who were alive at the time of discharge were included in the study.

II. Data related to patients' medical and diagnostic payments in hospitals were collected from the bills received from the hospital accounting department and hospital records. Out of hospital costs were asked directly from the patient or a relative in the manner described in the above paragraph.

### Sampling and sample size

At the time of the study, there were 16 hospitals affiliated with the Tehran University of Medical Sciences. Following a two-stage quota sampling approach, we first selected five large general hospitals (Table 1), followed by a quota sampling approach to identify the number of patients required in each hospital to reach

the target sample size of 400 (Table 1). Patients were selected at discharge, and random selection was not possible. To reduce the likelihood of selection bias, we collected data from all patients discharge on the day of data collection at each hospital. In order to ensure similarity between the samples selected from different hospitals, respondents were selected only from those discharged from four main clinical wards: surgical, medical, obstetrics and gynecology, and pediatrics.

### Estimating catastrophic health care expenditure

The World Health Organization has defined catastrophic health care expenditure as health services out-of-pocket payments exceeding or equal to 40% of the household's capacity to pay[24] in a particular time span (usually a month or over a year). Catastrophic payments are measured using household survey data. In this study, we assessed such payments among those admitted to hospitals. We used household capacity to pay for calculating catastrophic expenditure and defined it as out-of-pocket payments equal to or exceeding 40% of the households' annual income. Also, in this study, out-of-pocket payment were defined as all direct payments made by patients or their households at the point of receiving the hospital care in hospitals and out of hospitals environment. This included patients' or their families' payments for health care services, drugs and diagnostic services in hospitals and out of hospitals environment. All these payments were relevant to the patient's current disease and were made during the current year. Out-of-pocket payment was defined as the sum of all payments the patient had made to the hospital or out of hospital for the episode of care.

### Statistical analysis

We used logistic regression with odd ratios and $\chi^2$ test to assess the relationship between demographic and other variables with exposure to catastrophic medical payments. The logistic regression's general form is:[26]

$$\Pr\,[y = 1|X] = \frac{\exp\,(x_i\beta)}{1+\exp\,(x_i\beta)}$$

where $y$ is catastrophic expenditure (1 if present, 0 if absent), and $x_i$ is the vector of covariates. There were 19 covariates in this study; patient's sex, educational level (illiterate, below diploma, diploma or graduate, and post graduate), age, residence place (urban or rural); household head's sex, educational level (as above) and job (unemployed, housekeeper, farmer, employee, worker, self-employed, others), having another household member suffering from any diseases, the household's size, insurance coverage for patient, the number of hospitalizations, length of stay in hospital, referral from another hospital, receiving surgical care, out of hospital payment for the same episode of care, household annual income level, house ownership, car ownership, and whether they received financial support from the hospital's social support department.

We also drew a Lorenz curve and calculated the Gini coefficient to present the distribution of catastrophic medical payments in patients of different income levels.

**Table 1.** Selected hospitals information and number of selected patients

| Hospital | Specialties | Beds | Teaching hospital | Discharge rate (monthly) | Number of selected patients |
|---|---|---|---|---|---|
| A | General, tertiary | 530 | Yes | 1100 | 80 |
| B | General tertiary | 338 | Yes | 895 | 68 |
| C | General secondary | 108 | No | 580 | 40 |
| D | General tertiary | 333 | Yes | 1333 | 100 |
| E | General tertiary | 547 | Yes | 1469 | 112 |
| **Total** | | - - - | - - - | 5377 | 400 |

**Table 2.** Occurrence rates of medical catastrophic payments as a proportion of households' annual income as a result of a single admission to the sample hospitals

| Hospital | Percentage of patients experiencing catastrophic medical payments (95% CI) | Mean out of pocket expenditure per patient in Rials (SD) | Mean out of pocket expenditure among patients with catastrophic payments in Rials (SD) |
|---|---|---|---|
| A | 19 (16.41–23.5) | 2965550 (4515040) | 5642400 (8316070) |
| B | 9 (6.53–11.8) | 1858110 (2663430) | 3190000 (3974025) |
| C | 12 (8.26–14.2) | 2521500 (3124500) | 3725000 (4654000) |
| D | 16 (13.52–19.62) | 1751070 (2167540) | 2254570 (2574840) |
| E | 16 (12.65–18.41) | 4757620))2284351 | 4852721 (5806702) |
| **Total** | **15.05 (10.4–17.4)** | **2744588 (3841070)** | **4313085 (7566630)** |

**Table 3.** The Mean outside of hospitals payments per patient for a single admission to the hospitals

| Hospital | Percentage of patients experiencing catastrophic medical payments | Mean out of hospital expenditure per patient in Rials (SD) | Mean out of hospital expenditure among patients with catastrophic payments in Rials (SD) |
|---|---|---|---|
| A | 19 (16.41–23.5) | 2499689 (7224021) | 17500000 (19966980) |
| B | 9 (6.53–11.8) | 3993221 (5596590) | 10333330 (12772990) |
| C | 12 (8.26–14.2) | 9669429 (11331680) | 11451110 (13410375) |
| D | 16 (13.52–19.62) | 6267778 (8266108) | 14542105 (18626987) |
| E | 16 (12.65–18.41) | 2993221 (6278171) | 6217210 (8562905) |
| **Total** | **15.05 (10.4–17.4)** | **5084667.6 (7205423)** | **12008751 (14527326)** |

**Table 4.** The descriptive characteristics the sample

| Variables | Mean | Proportion (%) | Std. Deviation |
|---|---|---|---|
| **Patient's Female Gender** | - - - | 51.1% | 0.5 |
| **Patient's Age** | 46.6 | - - - | 35.1 |
| **Urban Residency Region** | - - - | 87% | 0.336 |
| **Patient's Educational Level** | | | 0.808 |
| Illiterate | - - - | 17.5% | |
| Under Diploma | - - - | 37.2% | |
| Diploma-B.Sc. | - - - | 42.1% | |
| M.Sc. and Higher level | - - - | 2.2% | |
| **Female Household's Head Gender** | - - - | 0.13% | 0.336 |
| **Household's Head Education** | | | 0.795 |
| Illiterate | - - - | 13.5% | |
| Under Diploma | - - - | 39.4% | |
| Diploma-B.Sc. | - - - | 43.4% | |
| M.Sc. and Higher level | - - - | 1.7% | |
| **Household's Member With Diseases** | - - - | 13.2% | 0.351 |
| **Number of Household's Members** | 3.58 | - - - | 1.976 |
| **Having Insurance Coverage** | - - - | 89% | 0.313 |
| **Number of hospitalizations** | 1.57 | - - - | 1.196 |
| **Number of Hospitalizations Days** | 8.54 | - - - | 10.24 |
| **Having Transportation** | - - - | 20.9% | 0.46 |
| **Having Surgery** | - - - | 58% | 0.49 |
| **Out of Pocket Hospital Payments** | 2342360 (Rial) | - - - | 6.939 |
| **Household Head's Job** | | | 0.494 |
| Unemployed | - - - | 4.7% | |
| Housekeeper | - - - | 3.2% | |
| Farmer | - - - | 7.5% | |
| Employee | - - - | 29.4% | |
| Worker | - - - | 9.0% | |
| Private and Self employer | - - - | 41.9% | |
| Other | - - - | 4.0% | |
| **Annual Income of Household** | 51448360 (Rials) | - - - | 415470 |
| **Owning of House** | - - - | 57.6% | 0.51 |
| **Owning of Car** | - - - | 29.4% | 0.63 |
| **Payments covered via hospital's Social Support Departments** | 70470 (Rials) | - - - | 4235 |

**Table 5.** Logistic regression outputs determining the Odds Ratios of incurring catastrophic medical payments for each of the determinant variables and their associated marginal effects

| Variables | Odds Ratio | CI (O.R.) | (95 % CI) | P > |z| | $X^2$ | Std. Error (O.R) |
|---|---|---|---|---|---|---|
| **Female Household's Head Gender** | 3.33 | 1.23 | 8.46 | 0.017 | 4.72 | 0.043 |
| **Household's Head Educational Level** | | | | | **-5.18** | |
| 1 | 0.082 | 1.72 | 0.004 | 0.11 | - - - | 1.55 |
| 2 | 0.033 | 0.67 | 0.002 | 0.026 | - - - | 1.54 |
| 3 | 0.071 | 1.35 | 0.004 | 0.078 | - - - | 1.5 |
| **Hospitalization Days Numbers** | 1.03 | 1.01 | 1.044 | **0.001** | 6.78 | 0.12 |
| **Having made any out of hospital payments** | 2.7 | 1.15 | 6.17 | 0.02 | 1.8 | 0.031 |
| **Quartiles' of Annual Income of Household** | | | | | 8.57 | |
| 1 | 14.26 | 177.96 | 1.14 | 0.039 | - - - | 1.3 |
| 2 | 2.06 | 25.41 | 0.17 | 0.57 | - - - | 1.3 |
| 3 | 0.04 | 0.91 | 11.35- | 0.001 | - - - | 8.5 |

## Results

The results of this research are presented in three sections: the first section includes the descriptive results; the second section presents the results of applied logistic regression with related statistics and the final section reports the distribution of catastrophic medical payments occurrence in different socio-economic categories.

Four hundred questionnaires were distributed among the patients. Sixteen patients refused to complete the questionnaires and 25 patients did not answer all questions, resulting in a 90% response rate.

The catastrophic medical payments occurrence rates in the hospitals are presented in Table 2, alongside the average occurrence

rate of catastrophic medical payments in each hospital.

Also, we depicted the outside of hospitals payments for all patients and those exposed to catastrophic medical payments in Table 3.

After presenting the results on hospital level, we examined the descriptive results related to our selected respondents. Table 4 presents the descriptive results, including: the patients' and their demographic features, the illness episodes features, the socio-economic status of the patients' households and total out of pocket payments to the hospital.

51% of the participants were female. The mean age was 47 years, 87% lived in urban area, and had an average household size of 3.6. About 45% had an education level of high school diploma or above. About 13% of the patients reported that another member of the family suffered from a disease. Also, insurance coverage was available for 89% of patients. The mean length of stay for the current hospitalization was 8.54 days. One fifth of the patients had been transferred from another hospital, and about 58% had a surgical operation during their stay. The average out-of-pocket payments for all patients was 2340000 Rials (2237 US$). The average annual income was about 51450000 Rials (49139 US$) for all households. The average monetary support provided by the social support departments was low (Table 4).

Table 5 presents the results of logistic regression analyses to investigate the possible relationships between probability of catastrophic medical payments and the covariates. Our findings suggest that the households with a female head were more likely to suffer from catastrophic medical payments (OR: 3.3; 95 % CI: 1.2 – 8.5). Also, with increasing educational level and household income, the likelihood of catastrophic expenditure decreased substantially. The lowest income quartile had over three times the chance of facing catastrophic expenditure compared with the highest earning quartile, and those with the lowest educational level had 1.6 times higher chances of facing such expenditures compared with the highest educational group (Table 5). Also, increase in hospitalization length and any payments out of the hospitals for receiving the required services lead to higher chances of catastrophic medical payments.

Finally, we described the distribution of catastrophic medical payments for different levels of patient's household income and then the Gini coefficient was calculated. Figure 1 demonstrates that the probability of catastrophic medical payments occurrence decreases with increasing household income level. Also, we pres-

ent the inequality in catastrophic medical payments for different income levels by calculating the Gini index and Lorenz curve.

The corresponding Gini coefficient for catastrophic medical payment was equal to 0.8 which presents a high level of inequality among the income groups (Figure 2).

## Discussion

We observed that about 15.05% of patients were exposed to catastrophic medical payments after a single admission to the sample publicly funded hospitals. The mean out-of-pocket payment for all patients was 2744588 (3841070) Rials (equivalent to 262.1 US$ (367)) and for patients experiencing catastrophic payments was 4132938 (7566630) Rials (equivalent to 395 US$ (723)). The findings showed that household head's educational levels, household head's sex, number of days hospitalized, having made any out of hospital payments linked with the same admission and household's annual income levels were related to a higher likelihood of exposure to catastrophic medical payments. While 61% of patients from households belonging to the first income quartiles (annual income 0 – 36 million Rials) were exposed to catastrophic medical payments, there were no patients from the last three deciles that had been exposed to catastrophic medical payments.

In this study, we focused on assessing the impact of a single hospital in-patient admission on experiencing catastrophic medical payments. Our study is different from several previously published studies that have measured catastrophic health expenditures at sub-national or national levels in Iran. Most studies focus on assessing households' expenditure data to estimate the proportion of households that annually experience catastrophic medical payments. A national study in Iran in 2007 estimated that about 2.5% of all households had been exposed to catastrophic health expenditures with rural residency, household head's unemployment, having family members under 12 or above 60 years of age, and lack of health insurance coverage as determinants of probability of household's exposure to catastrophic health expenditures.[27] Also, another study conducted in a low-income Iranian community in 2008 concluded that about 11.8% of households faced catastrophic health expenditures with healthcare utilization (especially inpatient and dentistry care), household's economic status, having member over 65 years of age and having a disabled member as the determinants of exposure to catastrophic healthcare expenditure.[19] Both studies had concluded that inpatient care
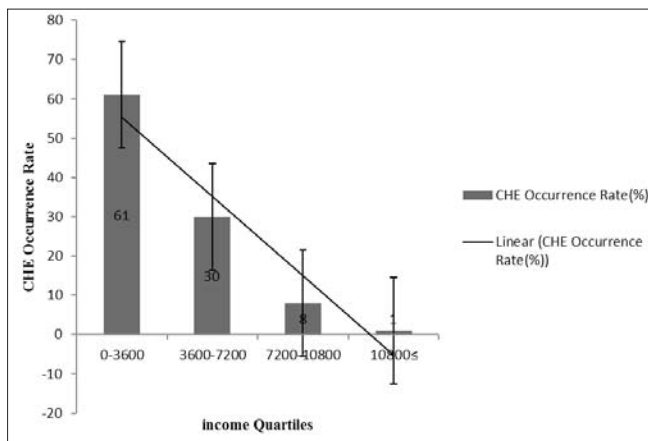


**Figure 1.** The proportion (%) of catastrophic medical payments occurrence among different income quartiles
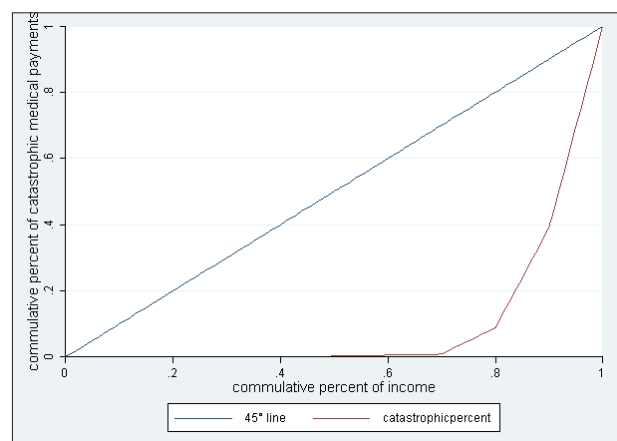


**Figure 2.** Distribution of catastrophic medical payments between different Income Levels

was a major determinant of household catastrophic payments. Our study is helpful in providing a more detailed picture of how a single inpatient admission can produce severe financial hardship for certain households.

Most international studies have also measured catastrophic medical payments at household levels. Examples of such studies were conducted in Burkina Faso, Georgia, India,[15,16,28,29] and also in multi-national studies.[7] In all of these studies, hospitalization was a determinant of household catastrophic expenditure. As such, it is important that future studies focus on better understanding of such payments and identifying potential policy solutions. In this light, an important finding of our study was that 'outside hospital' health care expenditure related to hospital admission was a main determinant of catastrophic payments. In fact, in our sample, 54 patients were exposed to catastrophic medical payment, of which 32 patients (about 60%) faced this situation due to out of hospitals payments (e.g. purchasing medicines or medical devices). Such expenditures are usually related to certain diagnostic services (e.g. MRI imaging), purchasing costly medications (e.g. chemotherapy drugs) or devices (e.g. prosthetics). Such services may not benefit from the level of insurance support available to inpatient services and are therefore more likely to contribute to catastrophic medical payments. As such, any intervention should consider such peculiarities in health care provision in order to be effective in reducing catastrophic expenditures.

Also, we found a considerable inequality in patients' exposure to catastrophic medical expenditure. The Gini coefficient was calculated at approximately 0.8 between defined economic groups. It seems that income and its related inequality can explain a major fraction of patient's catastrophic medical expenditures. Indeed, we can say that the insurance plans in Iran have not had an influential impact on reducing the financial burden of illness. Inequality, alongside its related aspects, has been considered by Iranian health policy makers and planners during the recent decade. The Ministry of Health started many surveys on regional and national levels to investigate the utilization of health services in different socio-economic groups. Also, the health indicators advisory program with a special focus on social determinants of health has been established at national and regional levels through the Ministry of Health and medical universities; nevertheless, shortage of financial resources and health system capacity causes the Iranian health system to focus on providing health services and sometimes challenges in distributional aspects of access to health care might be overlooked. Kavosi, et al. found that households of lower socio-economic status are more likely to face catastrophic health expenditure in the 17th district of Tehran.[19] In an Indian study, Pal, found that despite the efforts to reduce differences among various social classes in India, socially deprived classes are still vulnerable as they are more likely to experience financial catastrophe due to illness.[30]

A notable finding in this paper is the ineffectiveness of hospitals' Social Support Departments in financial support of patients and reducing the burden of patient's imposed costs in hospitals. The most important reasons are probably the passive role of these departments in seeking the vulnerable and eligible patients and the low financial capacity and limited budget which is allocated to these departments. This situation has developed to a worse point, because the Iranian health policymakers conducted major reforms in health systems during recent years; the hospital autonomy is one of the controversial aspects of these reforms which empha-

sizes the financial independence of hospitals affiliated with the Ministry of Health. Jafari, et al. found that the financial aspect of hospitals autonomy reforms plan, was the easiest and most accessible aspect of the autonomy reform plan. Nevertheless, the medical universities collect a fraction of the hospital generated fees (normally about 5 per cent). As for the rest, the hospital managers are not sure whether they receive all their money or whether parts of it will be allocated to other hospitals considered 'more in need'.[31] So, this condition imposes financial limitations on hospitals and may shift these limitations to patients and cause even more financial pressure on them.

Another important finding of this research is related to the current health insurance schemes and their impact on catastrophic medical payments. Despite the researchers' expectations, the current health insurance in Iran did not have a significant impact on preventing the occurrence of catastrophic medical payments. There is widespread health insurance coverage in Iran and most Iranian households were covered by different health insurance schemes. The Social Security Organization, Medical Services Insurance Organization and Army and Military Health Insurance are the main health insurers which cover large proportions of the Iranian population. In fact, during the past years the Iranian government has tried to cover every citizen by health insurance, but the system design and its implementation has major inadequacies in terms of cost sharing levels and service coverage. Fundamental reforms in Iranian health insurance plans should be implemented as soon as possible to protect health care users against catastrophic medical payments. Ekman states, "the Zambian current insurance plan is not found to provide financial protection against the risk of catastrophic payments; indeed, insurance is found to increase this risk",[6] while in India, Devadasan found that two Indian community health insurance (CHI) schemes appeared to be effective at halving the incidence of catastrophic health expenditure among hospitalized patients.[11]

This study was conducted in five hospitals affiliated with the Tehran University of Medical Sciences, so it is probable that our results cannot be generalized on a national or regional scale. Also, we only considered patients who had been discharged alive and we disregarded the catastrophic impact of medical services on families of dead patients.

Socio-economic variables at the household level are the most important determinants of catastrophic medical payments relative to other covariates which have been considered in this study, while insurance coverage does not present a desirable effective support against the catastrophic medical payments. So, the national health policymakers and planners should pay more attention to the design and implementation of the insurance schemes based on household's socio-economic situation. In fact, the health insurance coverage needs to be revisited and targeted based on household's socio-economic situation. The hospitals financial structure and flow, especially their relations with the insurers, need more attention and must be revised by government. The hospitals' social support departments should be redefined to assume an active role in seeking and finding the poor and deprived patients and providing effective financial supports.

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## Conflict of Interest:

*The authors declare that there is no competing interest.*

## Authors Contribution:

*HS, MA, HG and AR devised the study. HG and HS collected data. HG and AR conducted the statistical analyses and drafted the manuscript. All the authors read and approved the manuscript.*

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