Original Article

The Distribution of Health Expenditures in Tehran's Districts

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Abstract

Introduction: In 2000 World Health Organization (WHO) announced fairness in financial contribution to health care costs as one of the three goals of health systems. However, conducted studies in Iran reflect the dire situation of health equity in terms of financing health care costs. The aim of the present study is to determine disparities in health expenditures by means of different approaches.

Materials and Methods: The present study is a cross sectional health survey. The sample consisted of 792 households residing in 22 districts of Tehran. The data were collected by WHO questionnaire. Indices of FFC, CI in health expenditure, Lorenz curve and catastrophic health care expenditure were used for measuring inequality in the distribution of health expenditures. Excel software was used to perform the mathematical calculations.

Results: FFC index was 0.57 by optimized method and was equal to 0.62 by ordinary formulas. Concentration index in outpatient services was -0.105, CI in inpatient services was 0.015 and for total health expenditures was equal to -0.044. Also, 7.2 present of households were faced with catastrophic health expenditures. Moreover, the results showed that insurance can be a reason for catastrophic expenditures by itself (45.6 percent of all households facing catastrophic costs).

Conclusion: The results indicated that there is a deep gap between the status of equity which is outlined in the 4th and 5th national plans of development and our current situation. So reforming financial, insurance and structural policies is crucially needed.

K**eywords:** Inequality, FFC index, Concentration Index, Catastrophic Health Expenditures.

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Introduction

In 2000 World Health Organization (WHO) announced fairness in financial contribution to health care costs as one of the three goals of health systems [1]. However, nowadays many factors have caused a significant increase in health care costs. Developments in technologies related to the health care are known as one of these factors – despite the increased quality of services and the enhancement of health levels – [2]. Increased health awareness and individuals' health expectations are also known as another factor for the increase of health care costs [2, 3]. The other factor for increasing costs is that inflation in the health sector has been much higher than that in other economic sectors due to various reasons [3]. Increasing health costs will lead to major problems such as the fact that households, especially vulnerable groups, suffer and encounter difficulties due to health care financing and to afford these costs they will have to reduce their other necessary expenditures thereby declining the families' welfare [2, 4].

The financial burden of health costs, because of reduced savings and less allocation of households' income to other expenses especially items such as proper food or education and trainings considered as human capital accumulation especially in terms of households' children, has an undeniable impact and reduces households' productivity as the key factor in national manufacturing and production processes. So we can clearly consider the negative impact of the declined functionality of the financial system of the health care sector on the process of capital accumulation and as a result of that a prospective reduction in the production growth and economic development can be observed [5]. The possibility exists that a group of households forbear from following up because they cannot afford treatment costs, so the level of health in families and the society would fall down [5].

The main question of the World Health Organization in the context of reviewing the fairness of health care system is as follows: taking society's efforts to redistribute income as a given, what are the fair contributions of households to the health system? As a normative claim, WHO proposed that the sacrifice created by contributing to the health system should be equalized across households independent of their health status or their utilization of health services [6].

This topic recently has been considered as an important issue in Iran so that in article 90 of the Fourth Development Plan it is stated as follows: in order to ensure equitable access to health services for people and reduce the share of low-income and vulnerable households in payments, distribution of resources should be done in a way that fairness in financial contribution (FFC) upgrades to 0.90 and what people pay directly from their pockets must be less than 30 percent and the rate of vulnerable families as a result of catastrophic health

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expenditures should decline to one percent (1%) [7].

But studies done so far in the country indicate the important issue that the index of FFC reflects the dire situation of equity and fairness in the area of households' contribution in health costs. Annually, at least 2 percent of households fall into poverty due to paying for catastrophic medical expenses [8].

Karami *et al.* in a study titled "Evaluation of the catastrophic costs in Kermanshah" showed that 22.2 percent of the studied households faced catastrophic health costs [9].

Razavi *et al.* showed that the rate of households encountering catastrophic health costs increased from 1.97 percent in 1995 to 2.32 in 2002. They found that FFC index has declined and equity in financing health care system has weakened. In this study it was shown that the central economic quintile has more chance to encounter catastrophic costs [8].

Mehr Ara *et al.* indicated that between the years 2003 and 2004, about 2.5 percent of individuals in Iran were at risk of catastrophic health expenditures. They also reached the conclusion that the FFC index has declined with a slow trend from 1995 to 2002 and has slightly improved recently. Health sector policies have failed to make significant changes in improving fairness in financing. Calculating the net effect of the variable of insurance demonstrated that this variable has a negligible impact on preventing families from encountering catastrophic health care expenditures [5].

The mentioned issues clearly demonstrate the importance of such studies in the country. It should be noted that although such studies in a particular period are of paramount importance - to be informed of the current situation - they also need to be done after the implementation of policies in terms of extending equity in order to examine the extent of the effectiveness and success of those policies [10].

Research Methods

This study was a descriptive - analytic study and typical families residing in Tehran in 2012, constituted the study population. The study was a cross-sectional study using a stratified sampling method. The sampling unit in this study is typical families in urban areas of Tehran residing there for at least one year before the date of the data gathering. The preliminary study showed that standard deviation of health expenditures is about 0.7 $. Therefore, a sample including 784 members, for 95% certainty and less than 0.05 $ rate of fault was responsive for the study.

$$n = \frac{Z^2_{1-\alpha/2}\,\sigma^2}{d^2} = \frac{4*(0.7)^2}{0.05^2} = 784$$

Therefore a stratified sampling was done. The sample was formed from 22 categories and each category consisted of 36 families with equal probability in the study. In this study, a questionnaire was used to collect the

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needed data. According to researches about variables of questionnaire by the world health survey that is written in order to measure and evaluate health system performance, the questionnaire of households' budget from Statistical Center of Iran, and related foreign studies to equity in the areas of finance, accessibility and utilization of health services were used [11-21].

In this study, in order to use the catastrophic health expenditures approach, there was a need to calculate the household financial contribution (HFC) in health care which could be determined from the following formula:

HFCH = total household expenditures on health (HexH)

Effective income (constant) is above the subsistence level or payment capacity of households (CTPH), and households' expenditures for health (HexH) include pre-payments for health care services, private and voluntary insurance, and direct out of pocket payments for health care during receiving services [22].

The payment capacity of households (CTPH) is referred to as the effective income above the subsistence level. Due to the unwillingness of most households to declare income information or the misrepresentation by others, total gross expenditures of households are considered as the income. In those households that food cost is less than the minimum subsistence level, payment capacity is equal to the gross expenditures of households minus food cost (if foodh <seH → CTPH = ExpH - foodh) [22].

In case of those households that food cost is more than the minimum subsistence level, payment capacity is equal to gross costs minus the subsistence expenditures of households (if foodh ≥ seH → CTPH = ExpH - seH) [22].

Food costs include total household expenditures in line with providing food, in addition to the monetary value of prepared and consumed food in households. However, the cost of fast foods and outdoor foods (hotels and restaurants) and money which has been spent on cigarettes, tobacco, alcohol and other similar expenses have not been taken into account. According to the theory of the World Health Organization, if expenditures on health exceed more than 40 percent of payment capacity, it would be considered as catastrophic expenditure.

In a global survey of the World Health Organization in 2000, fairness in financial contribution index (FFC) was used. The range of the index was from zero to unity and to the extent that this number is closer to one it indicates a more favorable situation in the field of fairness and equity. In formula, FFC index is calculated by dividing total household expenditures for health care (HE) by payment capacity (3). The purpose of this calculation is to give more value to households that spend a larger share of their income on health care services. This index indicates inequality in the financial contribution of households and is

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calculated by the formula provided by the World Health Organization:

$$\text{Fairness FFC} = \left[1 - 4\frac{\sum_{i=1}^{n}\left|HFC_i - \overline{HFC}\right|^3}{0.125n}\right]$$

(in financial contribution)

In this formula, $\overline{HFC}$ is equal to the average financial contribution of the under studied households. The first technical problem about this model is that the progressive payment systems where rich people should pay more in proportion to their income are considered unfair [3, 23]. The second problem is that the model is relatively insensitive to vertical inequality [24]. The third problem is that the calculation of the purchasing power by subtracting expenses related to food from total expenditures is criticized because sometimes the food expenses of a wealthy family are beyond the survival costs of another family [3, 25] and that is why this type of calculation underestimates the purchasing power of wealthy households [24].

The fourth problem as it has been indicated through some local and technical consultations is that the interval scale has not been defined for features of the FFC index and the index units are inexplicable [26]. These problems led the World Health Organization to change the mathematical model for calculating the FFC index.

$$FFC = 1 - \sqrt[s]{\frac{\sum_{i=1}^{n}|HFC_i - HFC_0|^s}{n}}$$ Where;

$$HFC_0 = \frac{\sum HE_i}{\sum CTP_i}$$

In this study, the concentration index was used for calculating inequality in health care payments. In this step, xi represents the cumulative percentage of the population based on income and yi represents the cumulative percentage of payments for health care services. EXCEL software was used for mathematical calculations and plotting the Lorenz curves.

Results

The curve and concentration index of payments for health services (-0.044) represent the inequality in payments toward poor people. In other words, poorer households spend a greater share of their income on health services and health costs, although the rate of inequality is not so high.

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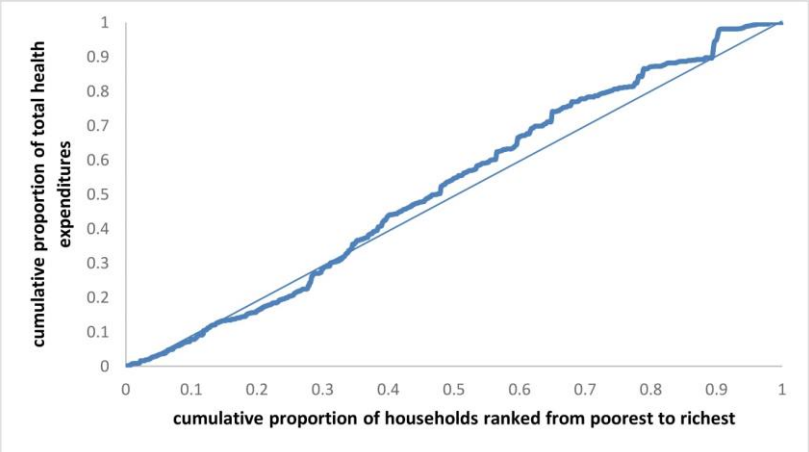

Figure 1: Inequalities in health expenditures

In this study, the concentration index of outpatient health expenditures was equal to -0.105. This number indicates that the direction of the inequality is toward the poor families, although the rate of inequality is not so considerable. In other words, poorer households spend a higher share of their income on outpatient health expenditures.

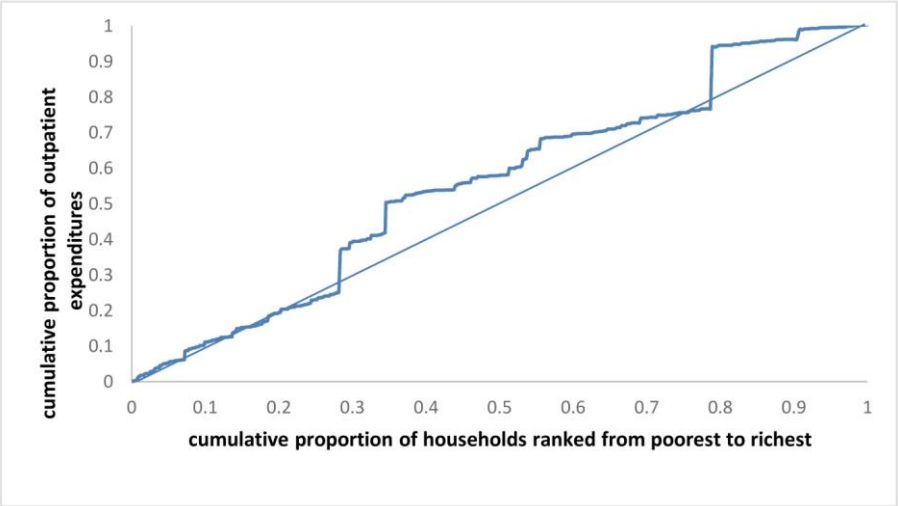

Figure 2: Inequalities in the area of outpatient health expenditures

Also in this study the concentration index of total inpatient health expenditures was estimated to be 0.015 which indicates that equality somehow exists in the field of inpatient health expenditures. It means that to some extent households spend a proportion of their income on inpatient care services.

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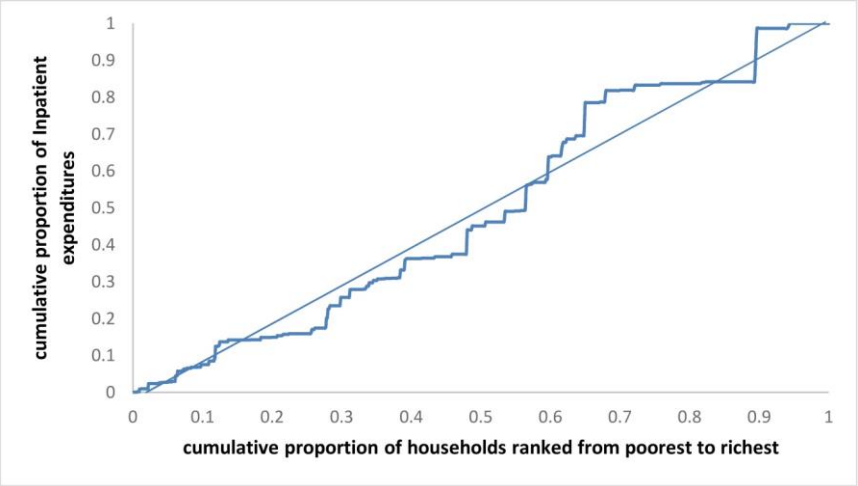

Figure 3: Inequalities in the area of inpatient health expenditures

The results showed that 7.2 percent of all households and 9.6 percent of households that faced some kind of health care costs, encountered catastrophic health expenditures. In addition, 45.6 percent of households facing catastrophic costs faced this phenomenon due to health insurance premiums.

The index number of fairness in financial contribution of households was 0.62 by the ordinary formulas and was estimated to be 0.57 by the optimized method.

Discussion

In the present study, the concentration index of total health expenditures was -0.044. Inequality slightly shifted toward the poor. It means that poor households have to spend a higher share of their income on health care services. The rate of inequalities in outpatient health expenses has increased in proportion to the total health expenditures and has reached -0.105. There has also been an upward trend in the inequality curve. But disparities in inpatient expenses slightly shifted toward the rich and the concentration index in inpatient health expenditures was 0/0105. It means that to some extent richer households spend a larger share of their income on inpatient expenditures. The inequality curve was very close to the line of equality.

The study of Yardim and colleagues showed that unlike our study, the concentration curve for out of pocket health payments was under the Lorenz curve which demonstrated that, by increase in income or payment capacity, the rich pay more out of their pocket for health care services than the poor [16].

The study of Gomez in Turkey has also shown that the last quintile had 5 times more out of pocket payments than the first quintile. The concentration index of out of pocket payments in 2003 was equal to 0/289 and in 2006 was equal to 0/226. In both years of the study, inequality curve was under the equality line which slightly shifted upward in 2006 compared to 2003 [27].

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The present study revealed that 7.2 percent of all households and 9.6 percent of households that were exposed to some kind of health costs, encountered catastrophic health costs.

The results indicated that premiums can be a predisposing factor for facing catastrophic health expenditures. 45.6 percent of households that encountered catastrophic health costs because of the premiums were affected by this phenomenon. Indeed, about 3.29 percent of the households in this study faced catastrophic expenditures due to premiums.

In some studies, such as the study of Galaraga *et al.* [28] and Seperu *et al.* [29] insurance has been by itself a predisposing factor for exposing the risk of catastrophic health expenditures. Tax-based health financing systems and social and private insurances can safeguard people against unwanted health expenses by sharing risks between individuals with different levels of need and health status [30].

Xu *et al.* found that the rate of households that are facing catastrophic health expenditures is widely different among countries, from 0.01% in Czech Republic and Slovakia to 10.5% in Vietnam. They stated that in most developed countries there are advanced social organizations such as social insurance or tax-based health care systems which protect families against unwanted and unexpected health expenses [31].

Among the developed countries, Portugal, Greece, Switzerland, and America, are the only countries that have 0.5% or more of households that encounter catastrophic health care expenditures. The rate of catastrophic health expenditures in some countries is in the transition phase and in some Latin American countries is in its highest [31].

Also the percentages of households that have been facing catastrophic health costs for some Asian and African countries including Azerbaijan, Bangladesh, Kyrgyzstan, Morocco, Republic of Korea and Yemen, are estimated to be, 7.15, 1.21, 0.62, 0.17, 1.73, and 1.66 percent respectively [31].

In other studies, the percentage of households facing catastrophic health expenditures in the Islamic Republic of Iran has been different: for example, in the study of Kavosi *et al.* [32] in 17 districts of Tehran (11.8%), in the study of Karami *et al.* [9] in Kermanshah about 22.2 percent, and in the study of Razavi and colleagues [8] from 97/1% in 1995 to 32/2 percent in 2002. In a study in Thailand by Lim Vatanunz *et al.* this percentage was between 8 to 14 percent [33].

In a study of Gatsadzet in Georgia, this percentage shifted from 8.2% in 1999 to 7.11% in 2007 [17].

Also Fazaeli in a study of catastrophic health costs demonstrated that the rate of population facing catastrophic health expenditures at the national level was 2.6 percent in 2006. This index, despite minor

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changes, has had no significant changes during the study period and has increased about 0.13. Reviewing the index procedure in urban areas shows continuous improvement and has decreased from 0.18 to 0.15. While in rural areas, the rate of this index had a downward trend until 2004, it slightly rose in 2005 but again it seems that its downward trend began in 2005 [34].

The comparison of the results of this study with those of most recent studies by Iranian researchers in Qazvin (Minoo-dar) indicated that the rate of households confronting catastrophic health expenditures was 24% as estimated by Asefzadeh *et al.* [35]. It also showed that 4.1% of households were exposed to catastrophic health expenditures in Kerman, as calculated by Nekoeimoghadam *et al.* [36].

Jane Lee has estimated that the percentage rates of households facing catastrophic health expenditures in South Korea in consecutive years are as follows: 5.6% in 1996, 5.27% in 1997, 4.6% in 1998,% 4.9 in 1999, 4.8% in 2000, 4.66% in 2001, 4.9% in 2002, 5.16% in 2003, 5.32% in 2004 and 5.51% in 2005 [37].

The present study demonstrated that fairness in financial contribution index of households was equal to 0.62 by ordinary formulas and was 0.58 by the optimized method. The results of the study of Danesh Kohan *et al.* in Kermanshah showed that the rate of the FFC index was equal to 0.57 [38]. The study of Fazaeli indicated that the FFC index has improved significantly in urban areas and has increased from 0.84 to 0.85 over the period, but in rural areas this index has had a downward trend and has declined from 0.829 to 0.825. Overall, the rate of this index has improved from 0.833 to 0.835 in the country [34].

The results of the study by Razavi *et al.* showed that FFC Index has been declining during the study period and equity in financing health care system has weakened [8]. World Health Report (2000) has estimated the average value of FFC index to be about 0.57 for all countries [1].

According to the World Health Organization report, Colombia, Luxembourg, Denmark, and Jibouti achieved the best place in terms of fairness in financial contribution index in the health sector among the 190 countries of the world. The Islamic Republic of Iran was 112th in the world rank order which reflected the dire situation of this country in this area in comparison to such countries as the United Arab Emirates which ranked 21th, Kuwait which ranked 31, Saudi Arabia which ranked 37, Palestine which ranked 39, Turkey which ranked 49, Bangladesh which ranked 51, Iraq which ranked 65, Bahrain which ranked 75, Pakistan which ranked 26, Qatar which ranked 70, Algeria which ranked 74, and Lebanon which ranked 101[1].

It should be stated that Iran has had a better place in the world ranking than some other countries like Azerbaijan with a ranking of 118, Malaysia which ranked 122, Egypt which

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ranked 126, Yemen which ranked 131, and Syria which ranked 141 [1].

Gotsadze has compared FFC index in 19 countries. The best result was 0.941 for Slovakia and the worst was 0.68 for Georgia. England, Canada, Germany, Hungary and Czech Republic were all above 0.9. FFC for nine countries including Slovenia, France, Thailand, Kyrgyzstan, Lithuania, Switzerland, Estonia, USA and Latvia was less than 0.9 but more than 0.8. In three other countries, that is, Ukraine, Vietnam and Azerbaijan, FFC was calculated to be between 0.6 and 0.7, [17].

According to Gotsadze's study there was a negative relation between FFC and the number of households facing catastrophic health expenditures. For example in Slovakia, the country's FFC index was equal to 0.941 and the number of households facing catastrophic health expenditures was zero, whereas in Georgia, with the worst FFC index, equal to 0.68, 11.72 percent of households were facing catastrophic health expenditure which means that countries with better FFC have fewer households facing catastrophic Expenditures [17]. In a recent study in Qazvin province by Tofighi *et al.*, FFC index was estimated to be 79% (0.79), better than this study but still showing that there was relative inequity in the provision of health services [39].

Conclusions

According to the mentioned issues, our study is to some extent different from other conducted studies and this phenomenon is not unexpected regarding the different social and economic structures and different health care systems which rule in the countries. In the Islamic Republic of Iran, the index of fairness in financial contribution (FFC) of households in the health sector has quickly found a special place in the justice programs of the country due to its unique characteristics in terms of conducting a realistic assessment of the extent of achieving the goals and objectives in this domain. It is noteworthy that in the context of article 90 of the Fourth Development Plan of the country, FFC index is stipulated to be above 0.9 as an index of equity in households' contribution to health financing in order to improve equity in accessibility and financing [8].

But according to the results of our study, the rate of this index in the under studied population was estimated to be far less than the amount stipulated in national development plans (0.9), and this matter clarifies the considerable degree of inequality in households' contribution in the financing of health care system. It also highlights the fact that effective interventions of the health system are needed in this area. Considering the fact that the fourth Development Plan was completed in 2009, none of the issues related to fairness in financial contribution of households in the health sector have been monitored and reported continuously in the country as they were mentioned in the program.

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