How the Iranian Health Transformation Plan has changed inequality in healthcare financing in Iran?

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Abstract

Introduction

One of the major goals of health is providing a financing system without inequality; it has a significant impact on people's access to healthcare. The present study aimed to investigate the inequality in households' financial contribution to health expenditure before and after implementation of the Iranian Health Transformation Plan(HTP).

Methods

The present study is a secondary analysis of two waves of a national cross-sectional survey conducted in Iran. The data collected from the Households Income and Expenditure Survey(HIES) in 2013 and 2015. The research sample included 76,195 Iranian households. The inequality in households' financial contributions to the health system(HFC) was assessed using the Gini coefficient, and the concentration index(CI). In addition, by using econometric modeling, the relationship between the implementation of the HTP and inequality in HFC was studied. The households' financial included healthcare and health insurance prepayments.

Results

The Gini coefficient values were 0.67 and 0.65 in 2013 and 2015, respectively, which indicated a medium degree of inequality in HFC in both years. The CI values were 0.54 and 0.56 in 2013 and 2015, respectively, suggesting that inequalities in HFC were in favor of higher income quintiles in the years before and after the implementation of the HTP. Regression analysis showed Households with a female head, with an unemployed head, and with a head having income without a job were more contribution to financing health expenditure. The presence of a household member over the age of 65 was associated to higher level of HFC. The implementation of the HTP had a negative relationship with HFC.

Discussion and conclusion

The HTP, which aimed to provide an equal financing system, did not achieve the intended goal as enough. The implementation of HTP neglected factors at the individual and household levels, such as the presence of members older than age 60 in the family, a female household head, and unemployment; this resulted in a failure to reduce the inequality of HFC. We suggest that policy makers take into account individual factors and features of the household level to reduce inequality in HFC.

Introduction

Equity in the healthcare sector can be achieved by providing health services based on patient needs and their ability to pay. Therefore, a health system can be considered equitable when individuals with the same healthcare needs have access to the same or equal healthcare services and can participate in the

payments equally(1) even if they have different social and economic conditions. Individuals' access to healthcare services and their fair contribution to expenditure are influenced by the financial systems(2).

Out-of-pocket payments in low- and middle-income countries account for a larger share of the financial system than other financing mechanisms(3), so that according to World Health Organization (WHO) report in 2019, household contribution to direct out-of-pocket payments varied from 47% in low-income countries to 34% in middle-income countries(4).

Financial problems in households are considered one of the major reasons for the lack of access to healthcare services(5, 6). Low-income households commonly need more healthcare services than high-income ones(7). In addition, these households are more influenced by the high costs of healthcare services(8). Thus, reduction of the inequality of household's financial contributions to healthcare expenditure is one of the most important goals for governments and health policy-makers(9). A fair health system try to provides all citizens with equal access to treatment and healthcare services, and it protect people from the costs and financial risks of diseases(10) (11). Some developing countries undertake relevant health reforms to reduce the health inequalities(12).

In Iran, inequality in health expenditure is serious concerns. Direct out-of-pocket payments account for half the health expenditure of Iranian households; and nearly 6.97% of Iranian families are exposed to a catastrophic level of healthcare expenditure(13). In recent years, several reforms have been implemented in the Iranian health system; unfortunately, because of structural and nonstructural causes, most of these reforms have not been well successful in achieving equity in the health system (14). In 2014, the Iranian government implemented a new reform plan for the healthcare system named as the Iranian Health Transformation Plan (HTP). The HTP included actions aiming to reduce the amount of payments made by the patients hospitalized in the hospitals affiliated with the Ministry of Health and Medical Education(15).

The present study aimed to investigate the possible inequality in household's financial contributions to healthcare expenditure, including direct and indirect expenditure, before and after the implementation of the HTP.

Methods

Data and study population

The present study is a secondary analysis of two waves of the Households Income and Expenditure Survey (HIES), a national cross-sectional survey conducts annually in a representative sample of households in Iran. The data of the HIES in 2013 and 2015 were applied; these years were chosen as the years before and after the implementation of the HTP. The initial study sample included 38,316 rural/urban households in 2013 and 38,252 rural/urban households in 2015, collected from 31 provinces in Iran. Households with imperfect demographic and economic information were excluded from the study; thus, the final sample included 76,195 households. Total household's expenditure data in the HIES

includes the sum of the food and nonfood expenditure of the households based on ten types of costs recorded in the survey questionnaire. Health expenditure (out of pocket payments) and insurance prepayments are among cost recorded. In the current study, household expenditure were adjusted based on the total consumer price index (CPI), and health Expenditure were adjusted based on the price index of the health sector comparing to the base period of 2011.

HFC index, as a dependent variable, was calculated as follows:

$$HFC = \frac{HE}{CTP} = \frac{HE_i}{(exp-food)}$$

In the above equation, “HE” is the total health expenditure of each household, which include social and private health insurance prepayments plus direct out-of-pocket payments for health services. “CTP” is household capacity to pay, which indicates the effective income above the minimum subsistence (living) level. In addition, “exp” is total expenditure of each household. The “food” here is household food expenditure, which is assumed to be the minimum subsistence (living) index.

Data analysis

In the first step, the inequality in household’s financial contribution to healthcare expenditure before and after implementation of the HTP was assessed based on the Gini coefficient, and the CI.

The Gini coefficient is a useful measure for quantifying inequalities within population(16). This coefficient is based on Lorenz curves ranged from 0 to 1. A Gini coefficient of zero means perfect equality in health variable (here HFC), where values are the same for all, and the Gini coefficient next to 1 means huge inequality between households. Concentration index is a relative measure of inequality commonly used to summarize health inequality between subgroups with ordinal ranking(16). The magnitude of the concentration index ranges from -1 to 1. The negative values indicates the health variable is concentrated among disadvantaged groups; and the positive values indicates the health variable is concentrated among advantaged groups. When there is no inequality, the concentration index is 0 (16). In the present study, the ranking variable for estimating CI was the household’s income quintile. We applied the HIES data on weighted gross cost decile at province level to construct a proxy variable for income quintile. Based on weighted gross cost decile, the sample households were allocated into four income quintiles including 1) households with the lowest income (first income deciles), 2) low-income households (the second income deciles), 3) middle-income households (the third income deciles), 4) high-income households (the fourth income deciles).

In the second step, data of the HIES in 2013 and 2015, as the years before and after implementation of the reform plan, were combined as pooled data. Then, econometric modeling was applied to investigate the relationship between the implementation of the HTP and the household’s financial contribution to

healthcare expenditure in Iran. Control variables included demographic variables of the household's head, economic variable, and health related variables.

The regression model used the following formula:

$$Y = \beta_0 + \beta X + u$$

In the above formula, X includes independent variables, and Y is HFC

The independent variables were included into the model according to a forward stepwise approach. For this purpose, first the demographic variables of the household's head i.e., age, gender, employment status, marital status, literacy level, and educational level, as well as number of family members included into the regression model. Then, the total expenditure was included into model, subsequently health related variables including the presence of individuals in the household younger than age five, and the presence of individuals older than age 65 were added. Finally, the variable of reform plan implementation was added to the model.

Results

The descriptive results of the sample of 2013 indicated that about 88% of the household heads were male, and 87% were married. In terms of employment, 71% were employed, and 40% had elementary education levels. The household size in sample of 2013 was 3.63, and the average age of the household heads was 48.5 years. Regarding the sample of 2015, around 86% of the household heads were male, and next to 85% were married. In addition, about 67% were employed, and 38% had elementary education levels. The household size in 2015 was 3.59, and the average age of the household heads was 50.6 years.

Tables 1 present the descriptive statistics of HE and HFC in total sample households, and across income quintiles. On average, both HE and HFC were higher for households in upper income quintiles.

Table 1. Descriptive statistics of HFC

Income quintile	HE & HFC			
	2013		2015	
	HE in PPP int. \$ (SD)	HFC	HE in PPP int. \$ (SD)	HFC
first quintile	4.12 (2.06)	0.01	5.3507 (3.69)	0.01
second quintile	11.72 (4.01)	0.02	16.09 (7.50)	0.03
third quintile	24.29 (9.78)	0.04	36.03 (18.49)	0.05
forth quintile	115.84 (150.30)	0.11	142.1 (232.69)	0.10

The results of the Gini coefficient, and CI are reported in Tables 2. The Gini coefficient values in 2013 and 2015 were equal to 0.67 and 0.65 ($P_value < 0.05$), respectively, indicating very similar degrees of inequality in HFC in the years of 2013 and 2015; a medium degree of inequality in HFC was found among the sample households in each mentioned year.

The CI values in 2013 and 2015 were equal to 0.54 and 0.56 ($P_value < 0.05$), respectively. Degree of inequality in HFC was not reduced in 2015; even, it increased by 0.02. Comparison of the CIs values estimated for 2013 and 2015 indicates that inequalities in in HFC were in favor of higher income quintiles in the years before and after the implementation of the HTP.

Table2: Gini coefficient and CI values for HFC

year	Gini coefficient value	p-value	CI value	p-value
2013	0.67	0.000	0.54	0.000
2015	0.65	0.000	0.56	0.000

The results obtained from estimating the ordinary least square (OLS) regression models, for household data, are presented in stepwise mode in Table 3.

Table 3: Results of regression model for pool data at household level

variable	Model 1	Model 2	Model3	Model 4
Family size	-0.214**	-0.186 **	-0.175 **	-0.172 **
Age	-0.0162**	-0.010 **	-0.0224 **	-0.0198 **
Gender (ref = female)	0.633**	0.662 **	0.774 **	0.735 **
Employment status (ref= employed)				
Unemployed				
	1.912**	1.793 **	1.777 **	1.798 **
Has an income without a job	1.122**	1.021 **	1.001 **	0.967 **
Marital status (ref = married)	-0.205	-0.3	-0.42	-0.37
Educational level (ref = Primary)				
Middle and high school	-0.541**	-0.479 **	-0.471 **	-0.424 **
Diploma and post-diploma	-1.472**	-1.271 **	-1.252 **	-0.837**
academic education	-0.436**	-0.265 **	-0.252 **	-0.534 **
Informal training	-0.199	-0.251	-0.319	-0.035
Total expenditure of family	-	-1.340**	-1.33**	-1.028 **
Under<5	-	-	-0.036	-0.031
Over>65	-	-	0.956**	0.930 **
Implementation of the HTP				-1.129 **
Observations =36042	Prob > F = 0.0000	F(14, 36028) = 59.71	Adj R-squared = 0.0183 R-squared = 0.0187	

** : Significance at the 5% level

To investigate the relationship between the potential variables and the HFC, the sign of the coefficients and the significance level were assessed.

According to the first model, the following variables were significant: household size, age, gender, employment status and educational level

Specifically, household size, and household head's educational levels of middle school, high school, diploma, and academic degree were negatively associated with the HFC. Moreover, as the age of the household head rose, the HFC to healthcare decreased very slowly. On the other hand, the households with a female head, with an unemployed head, and with a head having income without a job were more contribution to financing health expenditure.

The presence of a household member younger than age five had no significant relationship with the HFC. However, having a member older than age 65 in the family was statistically significant, and the positive sign of its coefficient indicated its association with the HFC. In other words, when there were individuals older than age 65 in the household, the HFC increased. The implementation of the HTP was significantly and negatively associated with the reduction in HFC, although the association was rather low.

Discussion And Conclusion

The present study aimed to investigate the association of the implementation of the HTP to the degree of inequality in HFC. The results suggested that implementation of this reform plan had no great association to the reduction of inequality in the household contributions to healthcare financing.

The Gini coefficient and CI values were 0.67 and .54 in 2013, and 0.65 and .56 in 2015, respectively, indicating very similar degree of inequality in the household contributions to healthcare financing across the studied years. In other words, after the implementation of the reform plan, inequality did not decrease in considerable size. In a study conducted in China, Chek (2008) reported positive values for CIs in urban and rural regions in 2002 and 2007(17). In addition, in another work by James (2008), the obtained results indicated the progressiveness of the financial system of the healthcare system in Ghana(7). Moreover, in a study on Palestinian households, Abu-Zaineh et al. (2004) investigated the equity status of healthcare payments using the CI. As indicated by the results, the HFC to healthcare was concentrated on the rich(6). Almasian et al. (2010) studied the equity status in Iranian health system financing using the CI. The data used in their study collected from 2001 to 2010. Their results were similar to our study and indicated the existence of inequality in the distribution of healthcare expenditure among different income groups, so that rich people contributed to the healthcare financing more than others.(18) Thus, the findings of the three above-mentioned studies indicate that the rich have more contributed to the health care financing than others, which is consistent with the result of the present study.

The econometric model used in the present study revealed that, given other variable constant, after the implementation of the HTP, households' financial contribution to healthcare increased. Thus, the reform plan might not achieve the intended goals on reduction of the households' contribution to health care

expenditure. It seems that the reform plan paid little attention to individual and household factors influencing the HFC to health expenditure. As a result, the general approach of the plan, based merely on financial transformation, may not play an effective role on the reduction of inequality in HFC. Therefore, in the current study, the potential household's correlates of HFC included into the regression models as control variables. As expected, the finding confirmed the significant correlation between these household's factors with the HFC to healthcare expenditure.

Demographic variables were the first category of controls. We found that households with more members, those with a better-educated head, and with an older head had, on average, lower contributions to healthcare expenditure. Existing literature supports these findings. Alizadeh et al. (2002) applied econometric method to study the correlates of HFC to health expenditure in Iran. The findings suggested that a larger family size, employment status of the household head, and her/his literacy reduced the HFC to healthcare expenditure(19) However, inconsistent with current work, Alizadeh et al.'s study reported that the increased age of the households heads resulted in a higher contribution of the households to healthcare expenditure.

Regarding to demographic correlates, we also found the femaleness of the household head and the presence of a family member older than age 65 led to an increased households' financial contribution to the healthcare expenditure. Health variables were the other category of potential correlates included into regression models. Among them, the presence of family members older than age 65 related to an increase in the average financial contribution of the household to the healthcare expenditure. Gender of the household head, and age structure of its members are important for policymaking. Households with a female head are at higher risk of economic vulnerability. Moreover, older citizens are supposed to need necessary healthcare services; more than others; it can cause an increase in healthcare expenditure among households with an old aged member. These findings imply that although the HFC to healthcare expenditure is concentrated among the rich, vulnerable families, aside from their income situations, paid higher proportion of their capacity to pay for healthcare services before and after of the HTP. As a result, vulnerable groups might incur unaffordable health expenditure, Therefore, in order to achieving the effective policy making, health system reforms are supposed to prioritize the healthcare needs of these special households. In line with this finding, Ramezani et al (2020) confirmed that vulnerable social classes incurred more burden of HFC to healthcare expenditure(20).

In conclusion, if purposeful health system reforms consider diversities in demographic characteristics and health status of households, they can help reduce inequality in the Iranian households' contribution to health care financing.

The present study was subject to some limitations. Household income in national surveys can be subject to inaccuracies because it relies on self-reports. To mitigate this limitation in the current study, household total expenditure was taken as an index for the income level.

Abbreviations

The Iranian Health Transformation Plan (HTP)

The Households Income and Expenditure Survey (HIES)

Concentration index: CI

World Health Organization: WHO

Consumer price index: CPI

Household's financial contribution: HFC

Household capacity to pay: CTP

Ordinary least square: OLS

Declarations

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Availability of data and materials:

Data are available from the authors upon reasonable request and with permission of the Statistical Center of Iran.

Ethics approval and consent to participate:

All participants of the survey had provided consent for participating in the study before the interview. All stages of the current study were ethically reviewed and approved by the ethics board of Tabriz University of Medical sciences. The ethical code is IR.TBZMED.REC.1396.301.

Competing interests:

The authors declare that they have no competing interests.

Consent for publication :

Not applicable

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Authors' contributions:

Conceptualization: All authors contributed to the study conception and design. S.N supervised the study. M.M and S.N contributed to Methodology. Data collection, data processing, and data analysis were performed by M.R, S.N and M.M. The first draft of the manuscript was written by MM and M.R. All authors read and approved the final manuscript.

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