



Iranian Households' Payments on Food and Health Out-of-Pocket Expenditures: Evidence of Inequality

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Abstract

Background: Inequality in households' payments on food and health expenditures presents the accessibility and utilization patterns between them. This study investigated the Iranian rural and urban households' inequality in payments on food and Out-of-Pocket health expenditures from 1998 to 2012.

Methods: This descriptive study was conducted through the analysis of Iranian Statistics Centre data on Iranian households' income and expenditures. The Gini Coefficients, Concentration and Kakwani indices have been calculated for Iranian rural and urban households' Out-of-Pocket health and food expenditures.

Results: The means of Iranian rural and urban total consumption expenditures inequality were 0.48 and 0.48, respectively. The means of concentration index of food expenditures for rural and urban regions were 0.35 and 0.34, respectively. The means of Out-of-Pocket payments for health services for rural and urban regions were 0.51 and 0.5, respectively. Finally the means of Kakwani index of Out-of-Pocket health payments in rural and urban households were -0.005 and -0.018, respectively.

Conclusion: There are relative high levels of inequality in Iranian households' payments on food and Out-of-Pocket health expenditures.

Keywords: Food expenditure, Out-of-Pocket health expenditure, Inequality, Gini coefficient, Concentration index, Kakwani index

Introduction

Equity has been considered as one of the most important aspects of any health system performance over the two recent decades (1). However, the growth of expenditures in health systems and the value of human life have been two main important concerns for health policy makers (2), the increased awareness among people, social movements against the obvious discrimination between different socio-economic population groups led to a transition to new political and social attitudes.

Such discrimination has been more obvious in basic areas including the food, education and health. Food, education and health services are considered as fundamental factors for human development.

The accessibility and utilization of food and health services have a significant impact on population health status so that any related barrier causes adverse effects on health outcomes.

In the last two decades, several international and global policies and planes have been adopted and implemented to reduce inequalities in the accessibility and utilization of food and health services. The World Health Organization, World Bank, United Nations Children's Funding (UNICEF) and International Monetary Fund have considered the equity as a main goal to their policies.

The Millennium Development Goals include the most explicit and supportive action plan for tackling the inequality and poverty, especially in the areas of food and health care services. In addition, many countries developed and implemented their national health policies and plans to reduce these inequalities and eliminate the poverty. Such policies have been adopted and implemented in recent years by Iranian policymakers. Similarly, there are several national and country level plans and policies addressing some aspects of equity in food and health services, for example; the health and its equity related issues have been stipulated in Iran constitutional law, the Fifth development action plan and Iran National Vision 2025 Document(3). In addition, the equity in health care financing and expenditures and the food security- indicating food equity- have been targeted as the most important aspects of human development. There are several health care financing mechanisms and some kinds of them may lead to adverse impact on the accessibility and utilization of health services. The state-based taxation, social health insurance and private health insurance systems are the main prepayment systems to protect households from the catastrophic and impoverishing effects of health services utilization. The Out-of-Pocket payment is another form of health care financing which may lead to many challenges regarding equity in health services expenditure (4). Nowadays, there is a global consensus on the adverse consequences of Out-of-Pocket payment on the accessibility and utilization of healthcare services, so that governments try to establish a balance between Out-of-Pocket payment and other health care financing methods (5). The security and adequacy of food are two main indicators for assessing the equity in the accessibility and utilization of food (6). The insecurity and inadequacy of

food due to socio-economic status of households have unfavorable effects on population health (7). The results of studies in China, Tanzania and Hungary showed that the main burden of health care expenditures imposed to low income households and also the Out-of- Pocket payment led to considerable inequality in the accessibility and utilization of health services (8-10). In Iran, results of three studies presented a relative high level of inequality in both healthcare and food expenditures (11-13).

This study investigated the Iranian rural and urban households' inequality in payments on Out-of-Pocket health and food expenditures between 1998 and 2012.

Materials and Methods

Data and Study Design

This study was conducted through the analysis of Iranian Statistics Center (ISC) data. The source of data used in this study was the annual Iranian Rural and Urban Households' Expenditures and Income Surveys (IRUHEIS) conducted by Iranian Statistics Centre between 1998 and 2012. These surveys have covered the average of 18632 rural and 17843 urban households from 1998 to 2012.

The Centre collected these data through a direct interview with households' head or an informed adult in each household. These data were categorized into 13 modules: food, beverages, clothing, housing, health, education, recreation and entertainment, fuel and waste, furniture and fixtures, transport and communications, cultural affairs, fast food, hotel and durable goods and services (14).

The health services module includes all expenditures on medicine, medical devices and supplies, preventive, treatment and rehabilitative services through Out-of-Pocket or other reimbursement mechanisms. The health expenditure includes the households' contribution to entitlement in health insurance coverage as well as premium.

Variables

Households' annual food expenditure: Expenditure on food includes all payments made to re-

ceive the needed nutritious materials including for meat, dairy, cereal and bean, bread and flour, biscuits and cakes, oil and butter, fruits and vegetables, nuts, sweets and sugar, additives and dressing, cigarette and tobacco.

Households' annual health expenditure: Expenditures on health includes all payments made for premium, preventive, treatment and rehabilitative services. These include all payments made for outpatients over the 1 past month and hospitalization services over the last year.

Households total consumption expenditure: All payments made to receive the goods and services that categorized in mentioned 13 modules.

Households' nonfood expenditure: This refers to households' payment on all the mentioned 13 modules except food expenditure. This is calculated through the households' total consumption expenditure minus households' food expenditure; all payments made to meet the households' non-food needs.

Data analyzing

The data were analyzed in three following stages:

1. Calculating the inequality level between Iranian total consumption expenditures: In this stage, the inequality level between rural and urban households' total payments on consumption expenditures has been calculated. The Gini coefficients were calculated as a measure of inequality levels in rural and urban households' payments on consumption expenditures separately. The Gini coefficient calculated as(2):

$$GC = 1 - \sum_{k=1}^n (X_k - X_{k-1})(Y_k + Y_{k-1})$$

Where, GC is the Gini Coefficient, X_k is the cumulative percent of population, Y_k is the cumulative percent of income/expenditure

2. Calculating the inequality between Iranian households' food expenditures: The Gini coefficients, Concentration and Kakwani indices were calculated to show the inequality between rural and urban households' payments on food expenditures (2).

Concentration index is derived from a curve called Concentration curve. The concentration curve includes two orthogonal axes; the horizontal axis shows the household's rank in the quintiles of income (expenditure). The vertical axis shows the cumulative frequency of the interested health variable (such as households' food or health expenditure). In other words; it plots shares of the health variable against quintiles of the living standards variable.

If the food (health) expenditure takes higher (lower) values amongst poor, the curve will lie above (below) the perfect equality line. If the concentration of food (health) variables is in favor of poor, the curve moves to the above of equality line. The concentration index is equal to the double of the area between the perfect equality line and the concentration curve. The values of index lie between -1 to +1; if the curve moves to the above of the perfect equality line, then the value is negative and it becomes positive for inverse situation (14). Concentration index calculated as (2):

$$CI = \frac{2}{\mu} Cov(h, r)$$

In this formula, CI is the concentration index; μ is the mean of households' food (health) payments studied and $Cov(h, r)$ is covariance of households' food (health) expenditure with the rank of household based on total consumption expenditure.

The Kakwani index calculated as:

$$\Pi_K = C - G$$

Where, C represents the Concentration index of health variables (here food and health expenditure), and G is the Gini coefficient for individual or households' socio-economic (standard of living) status.

Kakwani index value ranges from -2 to +1. If the concentration curve becomes dominant, the index value will be positive and if the Lorenz curve becomes dominant, the index value will be negative (15&16).

- Calculating the inequality between Iranian households' Out-of-Pocket health expenditures: The Gini coefficients, Concentration and Kakwani indices were calculated to show the inequality between rural and urban household's payments on health expenditures.

All calculations have been done based on current and constant prices. The constant price allowed us to remove the inflation effect on inequality levels. The Iranian Statistics Center set 2002 as the base year for rural and 2004 as the base year for urban households.

Results

The calculated Gini coefficients, Concentration and Kakwani indices have been presented in three sections and five tables. The Iranian rural and urban households' inequalities in the total consumption have been presented in Table 1. The inequality between Iranian rural households in terms of payments on food expenditures and then Out-of-Pocket health expenditures has been presented in

Tables 2 and 3, respectively. , the inequality between Iranian urban households in the payments on food expenditures and then Out-of-Pocket health expenditures has been presented in Tables 4 and 5, respectively.

Inequality in total consumption expenditures between Iranian households

The Gini coefficients for Iranian rural and urban households in total consumption have been presented in Table 1.

The mean of Gini coefficients for rural households was more than 0.4 based on both current and constant scenarios. It ranges from 0.41 to 0.47 in current price scenario and 0.43 to 0.52 in constant price scenario. The inequalities in urban total consumption was more than 0.4 for all studied period and ranges from 0.41 to 0.48 based on current price and also from 0.4 to 0.5 based on constant price. Generally in both rural and urban households the total consumption expenditures based on constant price is more than current price scenario.

Table 1: The inequality between rural and urban households in payments on total consumption

Inequality Quantities	Rural Households (Base Year: 2002)		Urban Households (Base Year: 2004)	
	Total consumption (current price)	Total consumption (constant price)	Total consumption (current price)	Total consumption (constant price)
Years				
1998	0.41	0.46	0.44	0.48
1999	0.45	0.48	0.43	0.48
2000	0.46	0.48	0.41	0.4
2001	0.43	0.48	0.44	0.5
2002	0.43	0.43	0.45	0.5
2003	0.43	0.48	0.45	0.5
2004	0.43	0.49	0.45	0.45
2005	0.45	0.5	0.48	0.48
2006	0.43	0.48	0.46	0.49
2007	0.46	0.51	0.45	0.5
2008	0.47	0.52	0.45	0.5
2009	0.47	0.5	0.45	0.49
2010	0.46	0.5	0.44	0.49
2011	0.44	0.49	0.48	0.48
2012	0.45	0.5	0.47	0.47
Mean	0.44	0.48	0.45	0.48

The inequality levels in rural households' payments on food expenditures and Out-of-Pocket health expenditures

The inequality in rural payments on food expenditures have been presented in Table2, also the inequality in rural payments on Out-of-Pocket health expenditures have been presented in Table 3. The means of Gini coefficients for rural households' food expenditures were 0.37 and 0.38 based on current price and constant price, respectively. The

Gini coefficient for food expenditures ranges from 0.31 to 0.44 based on constant price.

The mean of concentration index for rural households' food expenditures were 0.34 and 0.35 based on current price and constant price, respectively. The Concentration index ranges from 0.31 to 0.42 based on constant price.

The inequality in rural households' Out-of-Pocket health payments has been presented in Table3.

Table 2: The inequality between rural households in payments on food expenditures

Quantities Inequality Year	Food Expenditures (Current Price)			Food Expenditures (Constant Price)		
	Gini Coefficients	Concentration Index	Kakwani Index	Gini Coefficients	Concentration Index	Kakwani Index
1998	0.36	0.33	-0.08	0.36	0.33	-0.13
1999	0.38	0.36	-0.09	0.4	0.36	-0.12
2000	0.37	0.34	-0.12	0.37	0.33	-0.15
2001	0.37	0.34	-0.09	0.38	0.34	-0.14
2002	0.35	0.32	-0.11	0.35	0.32	-0.11
2003	0.36	0.33	-0.1	0.36	0.33	-0.15
2004	0.35	0.33	-0.1	0.35	0.33	-0.16
2005	0.31	0.28	-0.17	0.31	0.28	-0.22
2006	0.33	0.31	-0.12	0.33	0.31	-0.17
2007	0.38	0.35	-0.11	0.38	0.35	-0.16
2008	0.38	0.35	-0.12	0.38	0.35	-0.17
2009	0.41	0.38	-0.09	0.42	0.39	-0.11
2010	0.41	0.39	-0.07	0.42	0.41	-0.09
2011	0.4	0.39	-0.05	0.43	0.4	-0.09
2012	0.41	0.4	-0.05	0.44	0.42	-0.08
Mean	0.37	0.34	-0.098	0.38	0.35	-0.137

Table 3: The inequality in rural households' payments on Out-of-Pocket health expenditures

Inequality Quantities Years	Health Expenditures (Current Price)			Health Expenditures (Constant Price)		
	Gini Coefficient	Concentration Index	Kakwani Index	Gini Coefficient	Concentration Index	Kakwani Index
1998	0.57	0.55	0.14	0.57	0.56	0.1
1999	0.51	0.5	0.05	0.52	0.5	0.02
2000	0.64	0.61	0.15	0.64	0.62	0.14
2001	0.56	0.54	0.11	0.55	0.53	0.05
2002	0.21	0.2	-0.23	0.21	0.2	-0.23
2003	0.54	0.52	0.09	0.53	0.52	0.04
2004	0.52	0.51	0.08	0.52	0.51	0.02
2005	0.56	0.54	0.09	0.56	0.54	0.04
2006	0.53	0.51	0.08	0.53	0.51	0.03
2007	0.54	0.51	0.05	0.54	0.51	0
2008	0.51	0.5	0.03	0.51	0.5	-0.02
2009	0.49	0.49	0.02	0.52	0.52	0.02
2010	0.49	0.47	0.01	0.53	0.53	0.03
2011	0.5	0.48	0.04	0.54	0.53	0.04
2012	0.5	0.49	0.04	0.55	0.54	0.04
Mean	0.51	0.49	0.05	0.52	0.51	0.021

The means of rural households' Gini coefficients for Out-of-Pocket health expenditures were 0.51 and 0.52 based on current price and constant price, respectively. The Gini coefficient ranges from 0.21 to 0.64 for the inequality in rural households in payments on Out-of-Pocket health expenditures based on constant price. The means of Concentration index for the inequality in rural households' Out-of-Pocket health expenditures were 0.49 and 0.51 based on current price and constant price, respectively. Moreover, the Concentration index for rural households' Out-of-Pocket health expenditures ranges from 0.2 to 0.62 based on constant price.

The Lorenz and Concentration index for rural households' Out-of-Pocket health expenditures were plotted in Fig. 2.

The inequality levels in urban households' payments on food expenditures and Out-of-Pocket health expenditures: The inequalities levels between Iranian urban households' payments on food expenditures and Out-of-Pocket health expenditures have been presented in Tables 4 and 5, respectively.

The means of Gini coefficients for the inequality in urban households' payments on food expenditures were 0.37 and 0.36 based on current price and constant price, respectively.

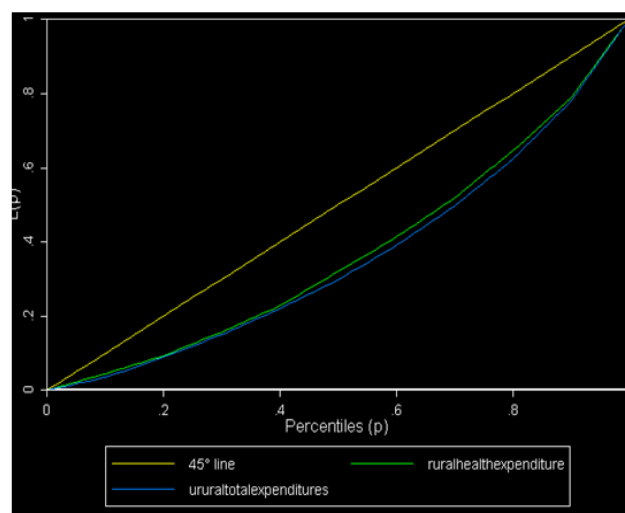


Fig.2: The Lorenz and concentration curves for rural households' Out-of-Pocket health expenditures (2012)

The Gini coefficient for food expenditures ranges from 0.27 to 0.55 based on constant price. The means of Concentration index were 0.32 and 0.34 based on current price and constant price respectively. The Concentration index ranges from 0.25 to 0.5 based on constant price.

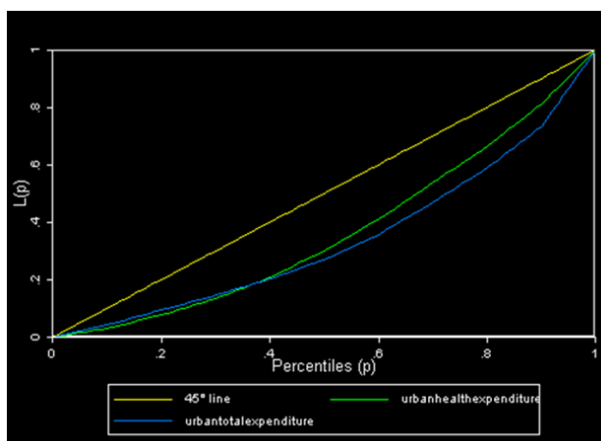
The inequalities in urban households' Out-of-Pocket health payments have been presented in Table 5.

Table 4: The inequality in urban households' payments on food expenditures

Inequality Quantities Years	Food Expenditures (Current Price)			Food Expenditures (Constant Price)		
	Gini Coefficient	Concentration Index	Kakwani Index	Gini Coefficient	Concentration Index	Kakwani Index
1998	0.3	0.26	-0.18	0.28	0.26	-0.22
1999	0.3	0.3	-0.13	0.3	0.3	-0.18
2000	0.55	0.49	0.08	0.55	0.5	0.1
2001	0.33	0.3	-0.14	0.32	0.3	-0.2
2002	0.3	0.3	-0.15	0.29	0.28	-0.22
2003	0.31	0.3	-0.15	0.3	0.29	-0.21
2004	0.33	0.32	-0.13	0.33	0.32	-0.13
2005	0.3	0.3	-0.18	0.29	0.28	-0.2
2006	0.3	0.31	-0.15	0.27	0.25	-0.24
2007	0.38	0.36	-0.09	0.38	0.36	-0.14
2008	0.38	0.36	-0.09	0.38	0.36	-0.14
2009	0.41	0.39	-0.06	0.41	0.4	-0.09
2010	0.43	0.4	-0.04	0.42	0.39	-0.1
2011	0.44	0.41	-0.07	0.44	0.4	-0.08
2012	0.45	0.42	-0.05	0.46	0.41	-0.06
Mean	0.37	0.32	-0.102	0.36	0.34	-0.14

Table 5: The inequalities in urban households' payments on Out-of-Pocket health expenditures

Inequality Quantities Years	Health Expenditures (Current Price)			Health Expenditures (Constant Price)		
	Gini Coefficient	Concentration Index	Kakwani Index	Gini Coefficient	Concentration Index	Kakwani Index
1998	0.54	0.48	0.04	0.53	0.52	0.04
1999	0.62	0.61	0.18	0.62	0.61	0.13
2000	0.62	0.6	0.19	0.62	0.6	0.2
2001	0.66	0.58	0.14	0.41	0.34	-0.16
2002	0.57	0.55	0.1	0.57	0.56	0.06
2003	0.5	0.48	0.03	0.5	0.49	-0.01
2004	0.5	0.51	0.06	0.53	0.5	0.05
2005	0.54	0.53	0.05	0.54	0.53	0.05
2006	0.5	0.49	0.03	0.5	0.49	0
2007	0.51	0.5	0.05	0.51	0.5	0
2008	0.5	0.5	0.05	0.51	0.5	0
2009	0.51	0.49	0.04	0.49	0.47	-0.02
2010	0.52	0.5	0.06	0.51	0.49	0
2011	0.51	0.48	0	0.52	0.48	0
2012	0.53	0.49	0.02	0.51	0.5	0.03
Mean	0.54	0.52	0.07	0.52	0.5	0.025

**Fig. 3:** The Lorenz and Concentration curves for urban households' Out-of-Pocket health expenditures (2012)

The means of Gini coefficients for urban households' Out-of-Pocket health expenditures were 0.54 and 0.52 based on current price and constant price, respectively.

The Gini coefficient ranges from 0.41 to 0.62 based on constant price. The means of Concentration indices of urban households' Out-of-Pocket health expenditures were 0.52 and 0.5, respectively. The concentration index ranges from 0.34 to 0.61 based on constant price.

The Lorenz and Concentration curves for urban households' Out-of-Pocket health expenditures were presented in Fig.3.

Discussion

The means of Gini coefficients and Concentration indices show relative high levels of inequality in payments on food expenditures and Out-of-Pocket health expenditures for both rural and urban households. The inequality levels especially for rural households' payments on Out-of-Pocket health expenditures are more than urban households in terms of constant price. In general, the inequality levels in rural households' for both payments on food and health expenditures are greater than urban households. The inequality levels based on constant price are greater than current price for both rural and urban payments on food and health expenditures. In addition, over the studied period, the Kakwani indices were negative for both rural and urban households' payments on food expenditures. Therefore, the burden of food expenditures has been incurred by low-income (poor) rural and urban households. The means of Kakwani index for rural households' payments on food expenditures were -0.098

and -0.14 for urban households, respectively; that show a worse distributive condition in urban regions especially in poor households' accessibility to food. Conversely, the Kakwani index for Out-of-Pocket health expenditures was positive – although their amounts are very low- indicating that the health services payments incurred by high-income (rich) households. However, this is very low and little. There are relatively unexpected results because over the last 15 years, main parts of health care financing through Out-of-Pocket payments have been incurred by Iranian rural and urban households. The World Health Organization statistics reported that the mean proportion of Out-of-Pocket health payment as a percent of total health expenditures was about 0.54 over the last 15 years (17). Therefore, we expected that the Kakwani index became negative and against the poor households. However, this might be related to cosmetic and cesarean surgeries that have had a growing trend especially in recent decade. The middle and high-income Iranian households tend to utilize these services more than low income and poor households. These two services are relatively expensive and not affordable for low income or poor households.

The Kakwani index amounts were very low which might be due to the improved and obligatory well-designed prepayment schemes. The dominance of private health care financing especially through Out-of-Pocket payments during current two decades led to an unfair pattern health care financing in Iran. There are four major health insurers in Iran; the Social Security Organization, Medical Services Organization, Military and Armed Forces Insurance and Imam Khomeini Relief Foundation. Each of these governmental or public insurers has their own policies and plans to protect their insured people and often there is no coordination between them. This inconsistency led to increased health system expenditures. One of the most frequent consequences of this fragmented structure is contradictory statistics for the population with no health insurance coverage (10-26 percent). There are persons with double health insurance coverage (18). Following implementation of the Iranian Rural Health Insurance in 2005, a main

part of Iranian rural and marginalized households have been covered by a national insurance scheme, two other important aspects of health care financing including the cost-sharing and benefit package have been ignored. These issues, in turn, have led to impose a major financial burden on covered population.

The policy adopted by the insurers caused serious deductible, copayments and coinsurance that all of them impose a kind of Out-of-Pocket payments on households. The lack of a systematic health technology assessment (HTA) has resulted in many constraints for benefit package and health system expenditures (19).

Two previous studies on Iranian rural and urban household's health expenditures reported a considerable inequality between income groups. In a study, the mean of calculated Concentration index for Iranian rural and urban households' payments on health expenditures were 0.38 and 0.31, respectively and the Kakwani indices for rural and urban households were -0.02 and -0.11, respectively (20). In another study, the mean of Gini coefficients of the inequality between Iranian rural and urban households' payments on health expenditures were 0.4 and 0.5, respectively (21).

In Tanzania Concentration index for the payments on Out-of-Pocket health expenditures, which was equal to 0.34, and the Kakwani index was calculated equal to -0.08. Tanzanian health financing system is mildly regressive and needs to be reformed specially in health insurance schemes (9). Another study conducted in Hungary showed a highly regressive health financing system because of the dominance of Out-of-Pocket payments. This study concluded that Hungary health care financing system needs to pay more attention to low income groups especially regarding pharmaceuticals goods. Similarly, health policy makers should eliminate the informal payments (10). Mills et al. conducted a research on three African countries include Ghana, South Africa and Tanzania. They concluded that the health care financing system through Out-of-Pocket payments regressive in all three countries (5).

Food expenditures constitute a substantial share of Iranian rural and urban household consump-

tion expenditures. Rural households spent about 39% and urban households spent about 32% of their annual expenditures on food in 2012 (12). The food consumption pattern in Iran over the last years has been changed considerably. According to the Iranian 5th Development Action Plan, the Ministry of Health with the collaboration of the Ministry of Agriculture is responsible for Iranian household's food security. Although these two organizations have adopted and implemented many policies and plans to provide food security and equality, unfortunately there is no comprehensive and systematic survey to assess their performance. The food security and food intake adequacy depend on household's socio-economic status and the households' payments on food expenditures. The results of two national surveys in Iran- conducted in 1997 and 2005- presented a substantial food insecurity and inequality, especially in low-income (poor) households. These 2 studies reported: "the lack of micro-nutrition in households consumption basket is considerable and lower than 70% of population can meet the average nutritional needs" (22, 23).

In two other studies, financial and economic accessibility barriers were considered as the main determinants of Iranian households' food insecurity (23, 24). Interestingly, findings of a research indicated the association between more spending on highly valuable food and nutritious materials such as meat, dairy and fruits while such association was not seen for high -energy food (calorie) (25). There are two studies that measured the inequality levels of food expenditures for rural and urban households placed in Tehran and Kerman provinces. These studies found; the values for Gini coefficients were 0.34 and 0.37 in urban and rural regions of Tehran (21); and 0.18 and 0.3, in Kerman respectively (13).

Limitation

Data collected by Iranian Statistics Center included all Iranian payments on health expenditures. These data include some unnecessary services such as cesarean and cosmetic surgeries. There is a growing trend to utilize these services between

Iranian households and this may not have significant effect on households' health expenditure.

Conclusion

Despite great emphasis of Iranian national laws and plans on the food and health equity, we did not observe any favorable changes in these areas. Although, some unstable reforms and actions have been implemented by Iran governmental officials to reduce the food and health inequality, we did not observe permanent and substantial results. Severe constraints regarding the levels and distribution of agricultural and health sectors' budgets, weakness in designing and implementing effective food and health care financing mechanisms as well as the shortage in the utilization of food and health services by households have led to a substantial inequality. In health sector, in particular, the Iranian policy makers should focus on cost-sharing levels and benefit packages as well as the population coverage. Establishing a comprehensive household's health and socio-economic status database is substantial to set equal financial contribution.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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