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HEALTH SYSTEM REFORM EFFECT ON ELDERLY IN IRAN

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ABSTRACT

Policymakers in Iran have established regulations and executed plans since May 2014. This reform was planned to enhance health system capabilities to decrease out of pocket health expenditures (OOPHE), especially for the elderly. This study aims to investigate whether this goal has been achieved or not. Iranian Household Budget Survey data were gathered for the years 2013 and 2015. To assess the plan's success to reduce elderly's people OOPHEs, this study applies the Difference in Difference approach (DID). To estimate the effect of a policy more accurately, we applied the Propensity Score Matching (PSM) technique to DID. Results from different gender and district-specific assessments of the elderly population in Iran show no significant difference between their OOPHEs before and after the health system reform plan was adopted, but there are some noticeable differences between treatment and control groups after the reform. The new health reform in Iran aims to alleviate high OOP payments for healthcare services, but it has not yet been able to reduce OOP after two years of implementation.

Keywords: *Aged, out of pocket expenditure, Healthcare reform, Health equity.*

INTRODUCTION

Developing countries, including Iran, are facing an aging population and lack of well-designed social welfare systems for the elderly. Disease at older ages goes alongside with an increase in medication use, and healthcare expenditures have been rising faster since 2010 as Iran's economy faced economic sanctions and stagflation, simultaneously. Due-owing financial burdens of healthcare expenditures, many countries have made patients contribute more to medical expenses from their own pockets (Homaie Rad *et al.,* 2017).
Health system reform is different in every country. In Iran, it includes different interventions to increase population covered by basic health insurance, increased care quality in the Ministry of Health and Medical Education affiliated hospitals, reducing out-of-pocket payments, increased primary healthcare quality, launching updated relative value units of clinical services, and updating tariffs to more realistic values. There are some concerns about program sustainability and equity of financing. Securing financial sources and the fairness of the financial contribution to the new programs constitute the main concerns of policymakers (Moradi and Vosogh, 2015). One of the most important objectives of the health system reform plan in Iran was to reduce OOPHEs, which are known as a regressive form of financing mechanisms (Homaie Rad *et al.,*

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2017). The regressive distribution for healthcare expenditures is a particular concern because families cannot withdraw health-related goods and services (Wyszewianski, 1986). Out of pocket expenditure is regressive with low-income families' expenditure as a share of income (Vork *et al.,* 2010). Low-income families pay almost twice their income share for healthcare costs as do high-income families (Rasell *et al.,* 1994). Other vulnerable people are the elderly. Older people ($age \geq 65$) with low-income face higher out of pocket payments as their total income share (Berki, 1986; Flores *et al.,* 2008).

The main purpose of every reform should be the regulation of healthcare consumption to achieve appropriate containment. Reduction in overconsumption of health goods and services and effective use of resources should take place due to the cost obligations, which patients are faced with. User fees also play a significant (patient's awareness of healthcare cost) and educative (patient's awareness of the importance of health) role (Arhin-Tenkorang, 2001). These objectives could have a positive impact on healthcare through saving resources; but higher out of pocket health payments may lead to further inequalities (Feldstein, 2002). Imposing healthcare costs on users could lead to a deterioration in the citizens' health status and further health system expenditure in the future (Feldstein, 2002).

If one decides to follow objectives, it is important to keep in mind the effects on equity; e.g., the impact on household's OOPHE. Out of pocket expenditures are defined as household expenditure on health goods and services; therefore, an increasing reliance on out of pocket payments pushes costs onto those who use health services the most. It is well known that income and health status are positively correlated; therefore, those on low incomes suffer the most from out of pocket payments (Hopkins and Cumming, 2001). Out of pocket payments are the most fragmented across individuals in order to pool the risk. Out of pocket financing (in terms of healthcare) is the most important reason that would characterize unfair distributions of health financing. If OOPHEs, is catastrophic and accompanied with recessions (such as Iran), may lead to impoverishment for some families (Murray *et al.,* 2000; O'Donnell and Rannan-Eliya, 2005; Van Minh *et al.,* 2013). Many studies show that out of pocket payments are the most regressive way to pay for health (Kakwani, 1997; O'Donnell, 2008). This financing exposes people to catastrophic financial risks (Saltman and Figueras, 1997; Wagstaff and Van Doorslaer, 2002).

To achieve plan aims, policymakers implemented several interventions, including increasing the population covered by basic health insurance. Prior to the implementation of this plan, a large number of people were not covered by any of the existing insurance, and these people were targeted. It was planned that 4 to 5 million people would be insured, but in implementation, the Ministry of Welfare has insured 9 million people. This Plan for low-income and poor strata provides opportunities for treatments not previously available to them. The overall goal of the plan was to protect citizens against the health costs of vulnerable populations by organizing hospital services and reducing the share of sick pay in public hospitals.

The most important question in health payments is how to design or reform a healthcare system that could protect the most vulnerable people, both income and healthcare costs (Graeve, 2008). Such reforms in Iran healthcare system have been implemented since 2014 and this study is an attempt to assess its success in the elderly with a particular focus (out of pocket health expenditure). The health system reform in Iran was planned to decrease elderly out of pocket healthcare payment by 10% (Homaie Rad *et al.,* 2017) every year and this study aims to investigate whether this goal has been achieved.

METHODS

We use the Household Budget Survey (HBS) dataset in Iran. This survey is a multi-purpose longitudinal household survey which has gathered household's socio-demographic and economic information since 1984. The data were collected by interviewing, where respondents were informed about the importance of this information. This survey was conducted in rural and urban areas in Iran. The publicity of the data has been informed by the Statistical Center of Iran website and also can be accessed through this website (SCI, 2015). This survey is annually in all provinces of Iran performed by Iranian Statistical Center (ISC), a part of the Iran Management and Planning Organization, meaning that the authors did not have any conflicts of interest. Using stratified methods for inhabiting of urban and rural regions for each provenance, households were selected as the study sample. The questionnaire used in this survey was based on the Classification of Individual Consumption by Purpose. Table I demonstrates the characteristics of sample data used in this study. The mean and standard deviation (s.d) are shown for various variables spatially for OOPHE. The mean column also contains a percentage for binary variables.

These characteristics are specified for the area (rural and urban) and gender and for the sample in 2013 (before reform) and 2015 (after reform). Given the fact that gender affects the determination of health expenditure (as a demographic factor) and health expenditure varies between men and women, we consider gender as an influential variable. Also, we divided the sample into urban and rural because before the implementation of the health reform plan, coverage of public insurance services for basic services in rural areas was more than urban areas. We did not use 2014 data, because the reform was implemented during this year and the effects of the reform were not clear. The dataset contained a total of 137,762 (2013: 69,561; 2015: 68,201) which 10,231 are elderly (2013: 4,919; 2015: 5312) households living in both urban and rural provinces of Iran.

The information needed for OOP for the elderly has been extracted from Part 6 of HBS. In this section of household expenditure and income statistics, household's expenditure is divided into pharmaceutical and medical products, medical equipment, medical services, dental services, paramedics services and medical services of general and specialized hospitals. In this study, all these expenditures have been combined to achieve the OOP of the elderly, and the costs associated with durable medical products (such as blood pressure measuring equipment, eyeglasses, hearing aids, etc.) have been reduced. It should be noted that in this study, elderly people are considered to be older than 65 years of age. As can be seen, the average age of the heads of households in the sample is 31,11 and for the elderly is 73,86. Information about health insurance has been extracted from the thirteenth section of HBS. The variable of insurance includes household expenses for health and health insurance. The average of these expenditures for the whole sample is 871282 Rials and for the elderly is 966891 Rials.

Household Budget Survey collects data for the household and household head. All study variables include health expenditure, income, employment, education, marital status, and gender are considered for the household head. As remind income variable belongs to the head of household and all Income and expenditures data adjusting for the inflation rate.

Table 1: Characteristics of sample data

Variables	Total Sample				Elders			
	2013		2015		2013		2015	
	Mean (%)	s.d	Mean (%)	s.d	Mean (%)	s.d	Mean (%)	s.d
OOPHE (Rial)	839530	395390	2097190	992830	767430	396050	1470490	919040
Age	30.93	20.41	31.86	20.47	74.09	7.08	74.08	7.16
Gender (%)								
Male(=1)	58.28%	0.5	58.31%	0.5	51.42%	0.5	51.74%	0.5
Female(=0)	41.72%	0.5	41.69%	0.5	48.58%	0.5	48.26%	0.5
Employment (%)								
Employed(=1)	29%	0.45	28%	0.45	22%	0.41	20%	0.4
Non-Employed(=0)	71%	0.44	72%	0.45	78%	0.41	80%	0.4
Marital status (%)								
Married(=1)	50.95%	0.27	48.05%	0.31	31.39%	0.39	30.18%	0.30
Divorced(=0)	0.8%	0.27	2.0%	0.31	1.0%	0.39	1.1%	0.30
Widowed(=0)	3.54%	0.27	3.61%	0.31	13.61 %	0.39	12.31 %	0.30
Never married(=0)	29.04%	0.27	32.04%	0.31	12.04%	0.39	12.10%	0.30
Education (%)								

College (=1)	27.20%	0.21	28.10%	0.21	21.00%	0.18	20.00%	0.19
Non-College (=0)	72.80%	0.21	71.90%	0.21	79.00%	0.18	80.90%	0.19
Household characteristic (%)								
Home owner(=1)	74.4%	0.10	71.0%	0.12	79.1%	0.09	77.9%	0.09
Residential location (%)								
Urban	56.37%		56.32%		58.73%		58.66%	
Income (Per Month) (Rial)	22617280	19071625	28722398	19833663	17027464	17200341	17920371	1792920
Insurance (Rial)	870181	689102	871195	689102	969144	717310	970227	719337
Observations	69561		68201		4919		5312	

The association between policy changes and subsequent outcomes is often evaluated by pre-post assessments. Outcomes after implementation are compared with those before. This design is valid only if there are no underlying time-dependent trends in outcomes unrelated to the policy change. If clinical outcomes were already improving before the policy, then using a pre-post study would lead to the erroneous conclusion that the policy was associated with better outcomes. The difference-in-differences study design addresses this problem by using a control group that is experiencing the same trends but is not exposed to the policy change. Outcomes after and before the policy are compared between the treated group and the control group without the exposure and the treated group with the exposure, which allows the investigator to subtract out the background changes in outcomes.

Statistically, the association between policy implementation and outcomes is estimated by examining the interaction between the pre-post and exposed-unexposed variables. If the association exists, this interaction term will be significantly different from zero. Other design and statistical issues should be considered when performing difference-in-differences analysis and are considered in detail elsewhere (Angrist and Pischke, 2008).

Additionally, DID is a flexible causal inference because it can be combined with other procedures such as kernel propensity score (Heckman *et al.,* 1997), which we use. From an algebraic viewpoint, consider the following regression:

$$Y_i = \alpha + \beta T_i + \gamma t_i + \delta(T_i t_i) + \sigma X_i + U_i \qquad (1)$$

Where Y_i and X_i are the dependent and independent variables for individual i respectively; α is the mean outcome for the control group on the baseline period ($t = 0$); $\alpha + \gamma$ is the mean outcome for the control group in the follow up ($t = 1$); $\alpha + \beta$ is the mean outcome for the treated group on the baseline; β is the single difference between treated and control groups on the baseline; $\alpha + \beta + \gamma + \delta$ is the mean outcome for the treated group in the follow-up; σ is the independent coefficient; and finally δ is the DID (Imbens and Wooldridge, 2009). All the assumptions of ordinary least squares are equally applied to DID.

The main assumption of difference-in-differences analysis is parallel trends. The parallel trends assumption states that the trends in outcomes between the treated and control groups are the same prior to the intervention. If true, it is reasonable to assume that these parallel trends would continue for both groups even if the program was not implemented. This is tested empirically by examining the trends in both groups before the policy was implemented. In a regression model, this is evaluated by assessing the significance of the interaction term between time and policy exposure in the pre-intervention period. If the trends are significantly different prior to the intervention, a difference-in-differences analysis would be biased and a different comparison group should be sought.

Implementing a DID design requires longitudinal data for at least one observation period among the treatment and control group. In our simulation study, data were available for one period both before and after the intervention and its make difficult to observe the trend for control and treatment groups before the reforms. One solution to reduce the bias is to collect more observations for the treatment and control groups (Lechner, 2010). Also we applied Matching treatment on pre-intervention levels of performance which greatly reduced this bias.

Another way to test for the necessary condition of the parallel trend assumption is drop lags and leads from equation (1) and augment it with the time trend variable t, and the interaction between

T and t. if the coefficient of the interaction term turns out to be statistically equal to zero, one can reasonably expect the parallel trend to hold (Angrist and Pischke, 2009).

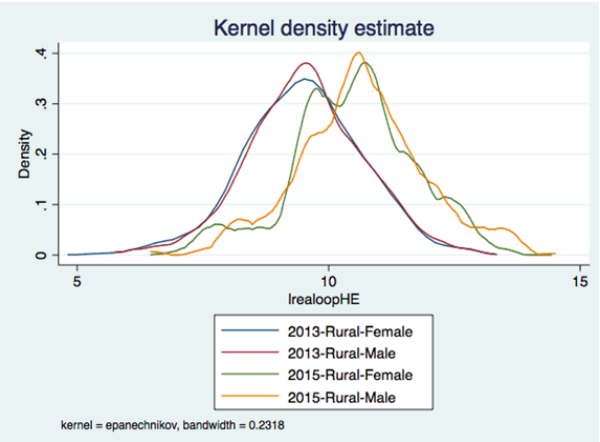
To estimate the policy effects more accurately, we applied the Propensity Score Matching (PSM) technique to DID. Difference-in-differences method provides unbiased estimates if the time trend would have been the same between the control and treatment groups in the absence of the treatment. However, a concern with DID models is that the treatment and control groups may differ in ways that would affect their trends over time, or their compositions may change over time. Propensity score methods are commonly used for this type of confounding in other non-experimental studies. In the statistical analysis of observational data, propensity score matching (PSM) is a statistical matching technique that attempts to estimate the effect of a treatment, policy, or other intervention by accounting for the covariates that predict receiving the treatment. This method creates sets of participants for treatment and control groups. The

goal is to approximate a random experiment, eliminating many problems that come with observational data analysis. The treatment effect estimator, using the propensity score matching technique, matches two groups by an average of similar confounding covariates. In this method, mean confounding covariates are divided into blocks, and outcomes related to each block are compared. Information on PSM could be found in (Huber *et al.,* 2010). We applied Kernel-PSM in DID as it is described in Bergemann (2005). The method is nonparametric methods that compare each treated unit to a weighted average of the outcomes of all untreated units, with higher weights being placed on the untreated units with scores closer to that of the treated individual. These methods exhibit lower variance but may suffer from the inclusion of information from poor matches. To use these methods, a kernel function must be chosen, and its bandwidth parameter must be specified.

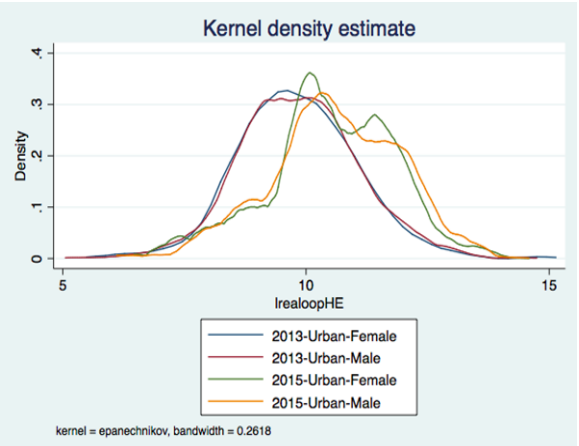
We perform this analysis using alternative specifications. we estimate the effect of the reform using alternative control groups: (1) using all non-treated as a control group and (2) using propensity score matched comparison. Differences in levels or trends prior to the start of intervention between treatment and control groups may result in different expectations for changes in outcomes, and matching can alleviate this concern. Propensity score matching is performed using one-to-one matching (with replacement), and enforcing common support. Common support excludes observations from group with propensity score values that are above the maximum value or below the minimum value of that of the control group's propensity score distribution. The matching procedure was implemented in Stata using a user-written command (Leuven and Sianesi 2003).

RESULTS

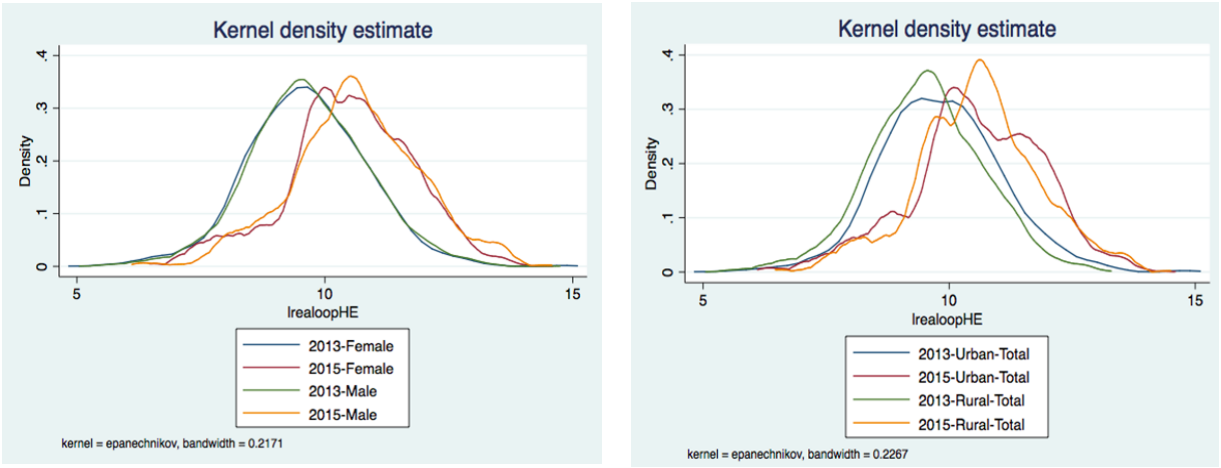
We apply KDE to show differences between the OOPHEs logarithm (LOOPHEs) before (2013) and after (2015) the health reform plan in 2014 graphically. Estimated PDFs are shown in Figure 1.



(a)



(b)



(c) (d)

Figure 1: KDE for different gender and district

This figure has been divided into 4 parts where the horizontal axis displays OOPHEs logarithm (IrealoopHE) which indexed from lowest to highest estimated propensity score and the vertical axis depicts the density of LOOPHEs. Figure (a) and (b) show gender specified LOOPHEs KDE for the elderly in rural and urban areas of Iran before and after health reform, respectively. Figure (c) demonstrates gender specified KDE of LOOPHEs and Figure (d) depicts the only area specified KDE of LOOPHEs. It is obvious from these figures that LOOPHEs for the elderly is higher after the health reform plan; Does this indicate that the plan affected LOOPHE of the elderly? The OOPHEs Density Chart was only intended to provide an overview of how to distribute OOPHEs, and no scientific inference could be made. More solid approaches are needed to make firm conclusions in this regard by applying the DID approach.

The control group in this study includes the elderly who had health insurance before (in 2013) and after (in 2015) the health system reform in 2014 and the treatment group consisting the elderly who were not under the coverage of any health insurance before and after the health reform plan. According to the structure of this plan, only people who had no health insurance could be covered by this plan (otherwise the impact of the plan on their OOP expenditures is indirect and beyond our discussion); therefore, our treatment and control group choices could be reliable, but to estimate this reliability, balancing (parallel) test is inevitable. The control group should be selected in such a way that before and after the implementation of the policy, the process does not change significantly. Given that people with health insurance are likely to pay OOP than others, the implemented policy may not affect the health outcomes of this group, for this reason, a group of elderly people with health insurance can be a good representative for the control group. Results from the balancing test are reported in Table II. The null hypothesis of this test refers to non-parallel trend; therefore, rejecting the null hypothesis means that trends in outcomes between the treated and control groups are the same prior to the intervention. In Table II, parallel trend assumption binds in all six categories at least at 10% significance level. Rejecting the null hypothesis would invalidate the causal interpretation of the estimate, but not rejecting null hypothesis implies only that a necessary condition for the parallel trend assumption holds.

Table 2: Parallel trend assumption test

	Mean control	Mean treated	δ	Pr(|T|>|t|)
$urban_{total}$	19.82	16.7	3.12	0.0084***
$rural_{total}$	19.82	17.09	2.74	0.0205**
$urban_{men}$	19.96	17.22	3.12	0.084*
$urban_{women}$	20.17	17.16	3.008	0.0128**
$rural_{men}$	17.35	19.83	2.48	0.0474**
$rural_{women}$	17.15	19.31	2.15	0.0520*

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Estimated effect of health plan reform on elderly people's OOPHE

	Baseline Diff(T-C)	Follow-up Diff(T-C)	DID	
δ Without Cov	-3.12***	-0.479	2.642	$urban_{total}$
δ With Cov	-2.556**	0.17	2.726*	
δ With Cov & KPSM	-2.523***	-0.049	2.474**	
δ Without Cov	-2.736**	-0.125	2.611	$rural_{total}$
δ With Cov	-1.547	1.33	2.876*	
δ With Cov & KPSM	-1.969**	0.057	2.026	
δ Without Cov	-3.12***	-0.479	2.642	$urban_{men}$
δ With Cov	-2.881***	-0.112	2.769 *	
δ With Cov & KPSM	-2.659***	0.039	2.656**	
δ Without Cov	-3.008**	-0.364	2.643	$urban_{women}$
δ With Cov	-2.688**	-0.054	2.633	
δ With Cov & KPSM	-3.004***	0.59	3.6***	
δ Without Cov	-2.155*	-0.576	1.579	$rural_{men}$
δ With Cov	-2.018*	-0.495	1.523	
δ With Cov & KPSM	-2.321***	-0.495	1.999	
δ Without Cov	-2.472**	-0.013	2.458	$rural_{women}$
δ With Cov	-1.886*	0.621	1.999	
δ With Cov & KPSM	-2.082**	0.442	2.523*	

*** p<0.01, ** p<0.05, * p<0.1

After ensuring that parallel trend assumption binds, we can proceed with the usual DID procedure. Table III shows the estimated baseline, follow-up and difference in different effects separately for gender specific urban and rural area. As can be seen, there are three types for δ estimations for each category, without covariates, with covariates, and with covariates by Kernel Propensity Score Matching (KPSM) specification.

The first estimate (without covariates) considers only the changes in OOPHEs of the elderly and does not consider any explanatory variables that can affect these expenditures. Unlike the first estimate, the second one (with covariates) also considers other explanatory variables described in Table I (which can potentially affect health expenditures). Considering that in empirical studies, the selection of the samples always has a variety of bias, the use of pairing and sorting

techniques to reduce this type of bias seems inevitable, and therefore in the third estimate, KPSM technique is used to pair and match the data.

In Table III, all baseline (pre-treatment) differences between our chosen treatment (T) and control (C) groups (T-C) are negative and highly significant. This negative difference shows that before executing the health reform plan, OOPHEs for the elderly who were not covered by health insurance (control group) were higher than those that were (treatment group); but the situation after implementing the reformatory health plan (follow-up column) was different whether controlling for covariates which affect OOPHEs or considering KPSM specification. The difference between these two groups after the reform declined but it is not significant.

Overall, OOPHEs have decreased from 2013 to 2015. In the urban population, OOPHEs reduce from -3.12 to -0.47 (Without Cov), -2.55 to 0.17 (Without Cov) and -2.52 to -0.04 (With Cov & KPSM), but coefficients in Follow-up column are not statistically significant. The rural population also show similar results to urban community outcomes. The effect of the health plan reform on the OOPHEs of the elderly is shown in the DID column. Third column result shows that not only after reform OOPHEs were reduced but also it increased. In the urban population, OOPHEs increased in all three estimate method that in without Cov method is not significant. In rural population, this coefficient (2.876) is significant just in with Cov estimation method.

The implementation of this plan has had a significant effect on the HEOOP of elderly males (2.656) and females (3.6) in urban areas, but the positivity of these coefficients also indicates an increase in OOP expenditure. Rural men and women also show similar results to urban community outcomes, as HEOOPs have increased for women (2.523) and rural males (1.999), but this increase is not significant at 5%.

There are some important conclusions in the technical method application and the estimated net effect of the health plan reform. From the technical point of view, considering KPSM in DID estimation made the estimated coefficients more significant than they were without it.

DISCUSSION

In recent decades, the number of elderly people has increased worldwide. The increase in the elderly population has been mainly due-owing two reasons: increased longevity and reduced fertility rates (United nation, 2015). Increasing the aging population has always been accompanied by problems such as increased health costs. The plan we investigate came into force in Iran, 2014 and one of the goals of the reform plan was to reduce the health expenditure paid out of the pockets of the elderly. Our purpose was to examine the success rate of this reform plan.

Several studies show that in developing countries, all families, including the poor, allocate a large portion of their income to OOP health expenses (Makinen, 2000; Leive and Xu, 2008). Financial protection should be the principal objective of any health system. This involves how far people are protected from the financial consequences of illnesses. Commonly used indicators for financial protection are OOP payments as a share of total health expenditure; OOP spending as a share of household consumption (sometimes non-subsistence expenditure as used in our analysis) by income classes; and the percentage of households driven into poverty by catastrophic expenses (Yardim *et al.,* 2008).

The net effect of health system reform on the OOPHEs of the elderly is positive but not significant in all categories. It seems that applying KPSM makes the estimation of the effect of health system reform on the OOPHEs more significant, but it cannot guarantee any firm and impenetrable conclusion. We cannot confirm the failure of health system reform, but it seems the health system reform has neither lowered the OOPHEs nor has it achieved much, after almost two years from its implementation.

Our second conclusion, which can be made based on the DID column is explained in the last paragraph. The net effect of the health system reform (which is all positive) on the OOPHEs is not preferable to the health ministry of Iran because this effect is positive.

The DID approach estimates the effect of a treatment on the outcome of interest (here OOPHE) net from the existing (pre-treatment) difference between the two groups; therefore, the counterfactual point can be estimated in an unbiased way with respect to parallel trend assumption (which is binding in our case study). This explanation is given to make it clear that our estimation of coefficients is unbiased; so, a positive estimation would refer to some problems with the plan, which should be considered seriously.

The implementation of this plan has had a significant effect on the HEOOP of elderly males (2.656) and females (3.6) in urban areas, but the positivity of these coefficients also indicates an increase in OOP expenditure. Consequently, the implementation of the reform has not reduced the health costs of the elderly, rather it has increased these costs. What is evident is that the increase in spending for urban women has been more than urban men. Healthcare expenditures are associated with age, and this effect was highest among the elderly (Mahmud *et al.,* 2017).

Rural men and women also show similar results to urban community outcomes, as HEOOPs have increased for women (2.523) and rural males (1.999), but this increase is not significant at 5%. Increasing health spending in rural areas is also higher for women than for men.

It can be seen that the difference in OOP of the elderly has decreased for those who have been covered by the health insurance (control group) and those who did not have health insurance (treatment group) after implementation, but this decrease in none of the groups were not meaningful, or in other words, they did not differ from zero. But, as explained in the methodology section, this difference is not important, but the difference in differences before and after the implementation of the program (here the reform plan) is of policy importance, which in fact explains the concept of using the DID approach. The difference between the groups' differences in the fourth column of table 3 is given as DID. The results of the estimation of δ in DID method in urban areas show that the OOP of the elderly after the implementation of the plan has not only not decreased, but also increased significantly. Estimation of δ coefficient with regard to explanatory variables and also the correction of KPSM in urban areas was 2.474, which is significant at 5% level and the positive result of this factor indicates a significant increase of these expenditures for the elderly living in urban areas. The numerical value of estimating the coefficient δ with regard to explanatory variables and also the correction of KPSM is obtained in rural areas of 2.026. The positive result of this factor indicates an increase in the health expenditure of the rural elderly, but, if observed, this increase is not significant. Therefore, it can be concluded that the implementation of the health reform plan has not had a significant effect on the OOP of the rural elderly.

Similarly, a survey was done in north Iran, which aimed to financially evaluate the HTP, discovered that the reform was not successful in decreasing OOP payments or the inequity of

the payments, while it was successful in reducing the number of households experiencing CHE (Homaie Rad *et al.,* 2017).

Much evidence has shown that the government was successful in achieving this goal. In a study conducted in Sari, Iran, the authors reported that the percentage of OOP payments for drug and inpatient services decreased significantly (Homaie Rad *et al.,* 2015). A study in Isfahan reported that the percentage of OOP payments for inpatient services decreased to nearly 17% after the reform (Vahdat and Heydarina, 2015). Similar policies have been adopted in other developing countries; China and Turkey. The Zhang *et al.,* (2013) study on Health Reform and OOP Payments in China found the new health reform aims to alleviate high OOP payments for healthcare services, but it has not yet been able to reduce both OOP-to-total health Expenditures (THE) and OOP-to-disposable personal income (DPI) ratios simultaneously. Our findings are similar, implying that health system reform has neither lowered OOPHEs nor has it achieved much, after almost two years from its implementation.

A study evaluated the financial protection in health reform in Turkey between 2003 and 2009 (Asfaw *et al.,* 2004). Findings show that the probability of incurring and the volume of OOP spending increased gradually in publicly insured households between 2003 and 2009, which is different from our results. One reason for this difference has been mentioned in Turkish study more years have passed since the implementation of the plan. Unlike previous studies in Iran, we analysed data at national level and also for urban and rural areas separately. In addition to Homaie Rad *et al.,* (2017), Sarkhanlou *et al.,* (2016), Vahdat*et al.,* (2015), we provide a more reliable method for analysing data.

limitation

Our study is subject to some limitation. First, the study is limited by data availability. We just access to one period data before and after reform and it affects our result, we try to reduce this bias by using more observations and also PSM method. Second, the result related to some of the self-reported variables, such as monthly household income per capita, should be interpreted with caution.

CONCLUSIONS AND POLICY IMPLICATION

To reduce the OOP payments, it is important for the government to increase investment in healthcare. However, in the past two decades, many developing countries have been enthusiastically embarking on the path of decentralization (Asfaw *et al.,* 2004). Consequently, local governments, which lack fiscal revenues, are likely to underinvest (Zhang *et al.,* 2013). We investigate whether health system reform plan in Iran has had a significant effect on the elderly people's out of pocket health expenditures; and if there is an effect, how could it be explained and in what manner. Health system reforms in Iran have been implemented since 2014 and we attempted to assess its success in a particular group (the elderly people) and with a particular focus (out of pocket health expenditure) (Homaie Rad *et al.,* 2017). Microdata from the household budget survey (2013 and 2015 waves) was used and the DID method, spatially with kernel propensity score matching specification, was applied. According to our results, we cannot draw firm conclusions, but we found that this plan is yet to achieve its purpose in terms of the elderly people's OOPHE reduction. This study also addressed gender specified rural and

urban districts of Iran and conclusion for every category was the same, no matter what district was chosen and what gender was specified.

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