



## Analysis of Rural Households' Behavior in Case of Healthcare Expenditure Considering Income Deciles (Iran: 2009-2014)

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### ABSTRACT

*This study is performed to compare healthcare expenditure patterns of different income deciles of Iranian rural households during 2009 to 2014. The econometric method is ordinary least square (OLS). Data is devised from National household survey data. It consists of healthcare expenditure, family income, the literacy level of parents, number of children and the average age of parents. This paper tries to quantify the degree of effectiveness of each variable on healthcare expenditure among different income deciles. It is also needed to examine if there is a statistically significant difference between effects of variables on healthcare expenditure during different income deciles. The findings verify that there is a significant difference in healthcare expenditure patterns between different income deciles. They show that in the first six deciles a similar pattern is observed. In these deciles, the level of education of parents doesn't demonstrate a significant effect on the healthcare expenditure and a percent increase in the family income increases the healthcare expenditure less than 1%. Moreover, except for education level, other variables have a positive effect on the healthcare expenditure. Almost the same scheme is present on the remaining income deciles. Here, while literacy level of mother has a negative effect on healthcare expenditure, other variables including family income, average age of parents and number of children reveals a positive effect. These results could be interpreted as preventive effect of literacy level. Thus, in rural families, the contribution of mother to the management of healthcare expenditure is more effectual than father. On the other hand, ninth and tenth deciles indicate that a percent increase in family income, result in more than 1% increase in healthcare expenditure. Therefore, healthcare authorities are highly suggested to thrive to lift the awareness level of family. The same instruction could be to categorize base on the average age of parents. This could be performed via government agencies or insurance authorities.*

**Keywords:** Healthcare expenditure, income deciles, rural household, household survey data

### INTRODUCTION

Health economics is to a great extent focused on the healthcare expenditure as the most important indices to work with. Therefore, policymakers and economists need the behaviour of households' healthcare expenditure be analyzed thoroughly. So, this paper tries to identify if the behaviour of rural households in different income deciles is almost the same. There are two different approaches to make use of: macroeconomic or household survey data. Most of the literature is focused on macroeconomic data to devise a comprehensive set of determinants of healthcare expenditure. However, due to the complexities of household survey data, it is used less frequently in experimental studies. For example, high volume of data (around 19000 observations every year) makes the classification and working with the data more difficult. On the other hand, data is micro-founded and reach. So, this paper picks up the household survey data approach to be able to take advantage of all its possibilities.

Grossman is the most well-known and is usually used in establishing basic theoretical model for demand of health care services [1]. According to the literature, it is expected to see a strong relationship between demand for health and healthcare expenditure. This shows the expectations to improve health status by spending more on healthcare. Due to this relation, it is supposed that the affecting variables for health status to determine healthcare expenditure as well.

According to Grossman, age, education and income level are the most influential variables in individual's behaviour toward health and healthcare expenditure. Newhouse's paper is another old source which has examined whether healthcare expenditure is a luxury good or not. Newhouse has estimated income elasticity to be above unity, indicating that the proportion of GDP (gross domestic product) devoted to health expenditure lifts with the rise in per capita income [2]. On the other hand, some researchers like Smith, et al. and Follette and Sheiner believe that household-level estimates may not be predicted and illustrated by macroeconomic data. Therefore, they declare it is more appropriate to estimating income elasticity by making use of microeconomic data [3-5]. For example, the comparison of health expenditure of different income levels by Getzen is based on household survey data at a single point in time [6]. Amy Finkelstein shows that examining the effect of medical service prices on healthcare expenditure without accounting for insurance is not accurate [7,8]. Dalgard and Strulik investigations on the role of age find it to be one of the most important effecting variables of healthcare expenditure [9-11]. Wagstaff's inquiry for influential variables for demand of health and healthcare expenditure finds family income, age of family and family size as the most important ones to be examined [12]. Gerdtham has used Sweden micro data and showed that income, age, and education are the most effective variables [13]. Gregersen has investigated the effects of aging on healthcare expenditure and finds it as the central variable [14].

Barati, et al. have examined average healthcare expenditure of different income classes in Kerman province (IRAN) from 1996 to 2002. They find average healthcare expenditure of low income households to be significantly different from middle and high income households in rural areas. They also find rural expenditures different from rural ones. Nevertheless, even in the rural areas, there average expenditure is significantly different among various income classes [15]. Ardalan and Rasael investigated aging and the rapid growth of elderly to devise future healthcare expenditure prospects. They examined aging population statistics in several courtiers including Iran, and clarified the significance of the rate growth of aging population in the decades to come. They report a drastic difference on healthcare expenditure for less than 65 years and over 65 years. Finally, the importance of aging population and future healthcare expenditure studies is concluded [16].

## METHODS

This study uses rural Iranian household survey data from 2009 to 2014. Data is collected from statistical centre for Iran. The eminent aspect of this paper is categorization of the variables based on the income deciles. This is done by Microsoft Access. Estimates are performed by STATA. Further to the mentioned literature, a universal list of influential variables of healthcare expenditure is examined. The list includes family income, average of age of father and mother, education level of father, education level of mother and number of children. Due to the structure of the data and the nature of research question, ordinary least square (OLS) is the most appropriate method to be used. First, we have examined the behaviour of households during 2009 to 2014 to see whether it is similar among various income deciles or not? Then, after verifying the difference, we have estimated healthcare expenditure function at different income deciles. The estimated equation is:

$$\ln \text{expenditure} = \alpha_0 + \alpha_1 * \ln \text{income} + \alpha_2 * N\_children + \alpha_3 * \text{Age} + \alpha_4 * \text{education\_f} + \alpha_5 * \text{education\_m} \quad (1)$$

In which,

$\ln \text{expenditure}$  stands for the logarithm of healthcare expenditure of family,

$\ln \text{income}$  stands for the logarithm of family income,

$N\_children$  stand for the number of children in family,

$\text{education\_f}$  stands for the level of education of father,

$\text{education\_m}$  stands for the level of education of mother,

and  $\text{Age}$  stands for the average age of father and mother.

Equation (1) is estimated for different income deciles each year. Consequently, it would be probable to recognize influential variables of healthcare expenditure in different income deciles each year for the duration of 6 years. There-

fore, the central question of this research about household’s behaviour among income deciles will be answered and policy implication could be suggested to policymakers and insurance authorities.

**RESULTS**

In our methodology, we first examined if there is a statistically significant difference among various income deciles on influential variables of healthcare expenditure during 2009 to 2014. Table 1 shows different income deciles do have a significant effect on the level of effectiveness of variables. However, the education level of father doesn’t have a significant effect on healthcare expenditure of family.

Figure 1 shows the average healthcare expenditure of different income deciles each month. It is evident from the graph that the healthcare expenditure scheme for various income deciles varies considerably in response to deciles change. Moreover, regardless of evolution of healthcare expenditure during time, the overall pattern is almost the same.

According to these results, it is evident that the pattern of healthcare expenditure regarding income deciles is approximately similar during these 6 years. Therefore, we can go one step forward and estimate effecting variables of healthcare expenditure in different income deciles during 2009 to 2014. This is an experimental approach. A plenty of estimations and post estimation tests were performed. Consequently, the best categorization is concluded to adopt every two consecutive deciles as a group. So, our data is divided to five different groups and every group encompasses two deciles. This means that behaviour of every two deciles is same and the results are shown in Tables 2 and 3.

The Table indicates that the influential variables of healthcare expenditure in the first through sixth income deciles are family income, average of age father and mother and the number of children respectively. This means that the education levels of parents are not an important factor in these income deciles. In addition, all the variables have a positive relationship with healthcare expenditure. Therefore, an increase in family income, average of age father and mother and number of children is expected to increase healthcare expenditure of these income deciles in the survey period. Due to the logarithmic nature of family income and healthcare expenditure, coefficient of *lnincome* shows that in deciles one through six, a percent increase in the family income, results in less than 1% increase in healthcare expenditure during 2009 to 2011. Moreover, in other income deciles, influential variables of healthcare expenditure are family income, average of age father and mother and the number of children and the education level of mother respectively. The results demonstrate that family income, average of age father and mother and the number of children have positive effects on healthcare expenditure. The reverse is true for the education level of mother, which has a negative effect. This could be interpreted as preventive effect of education. According to this effect, as level of education of parents’ increases, their ability for managing health level of family increases considerably. So, it is expected to see a decrease in healthcare expenditure of family. It should be mentioned that the effects of all variables on healthcare expenditure increases in upward moving on income deciles. This implies that there is an increasing trend of the absolute value of coefficients for all the variables each year. Therefore, effectiveness of variables on healthcare expenditure increases by upward moving in income deciles. In this respect, we could consider healthcare expenditure in the ninth and tenth income deciles as a luxury good to the family. In fact, this results show that different income deciles have different accessibility to health expenditure because the coefficient of *lnincome* has increasing trend by increasing income deciles. Also, it is clear that in the last two income deciles sensitivity of healthcare expenditure is more in comparison of the first two income deciles.

The results of Table 3 show the similar conduct for the households in the first until sixth income deciles as period 2009 to 2011. Hence, the education level of parents is not important in these income deciles in the period 2012 to 2014 as well. In addition, all variables have positive effects on healthcare expenditure. Therefore, we expect an increase in the healthcare expenditure of these income deciles during research period due to the increase of family income, average of

**Table 1 Influential variables of healthcare expenditure in various income deciles**

<b>Lndaraman</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>t</b>	<b>P&gt;t</b>
<b>Lnincome</b>	0.711	0.009	101.56	0.00
<b>Education_m</b>	0.001	0.000	-10.42	0.02
<b>N_children</b>	0.099	0.004	-38.83	0.03
<b>Age</b>	0.009	0.000	34.12	0.04
<b>Decile</b>	0.007	0.002	3.68	0.023

**Table 2 Influential variables of healthcare expenditure in various income deciles: 2009-2011**

Year	Income deciles	Results/variables	Lnincome	N_children	Age	Education_f	Education_m	
2009	first and second	Coef.	0.792	0.045	0.004	*	*	
		P>t	0.000	0.001	0.001	*	*	
	third and fourth	Coef.	0.850	0.071	0.005	*	*	
		P>t	0.000	0.009	0.092	*	*	
	fifth and sixth	Coef.	0.897	0.080	0.006	*	*	
		P>t	0.000	0.009	0.003	*	*	
	seventh and eighth	Coef.	0.952	0.098	0.006	*	-0.004	
		P>t	0.000	0.073	0.017	*	0.056	
	ninth and tens	Coef.	1.150	0.110	0.007	*	-0.005	
		P>t	0.000	0.012	0.000	*	0.063	
	2010	first and second	Coef.	0.764	0.151	0.005	*	*
			P>t	0.000	0.007	0.001	*	*
third and fourth		Coef.	0.801	0.280	0.005	*	*	
		P>t	0.000	0.000	0.001	*	*	
fifth and sixth		Coef.	0.857	0.307	0.005	*	*	
		P>t	0.000	0.037	0.001	*	*	
seventh and eighth		Coef.	0.918	0.471	0.009	*	-0.004	
		P>t	0.000	0.009	0.001	*	0.006	
ninth and tens		Coef.	1.165	0.879	0.012	*	-0.004	
		P>t	0.000	0.008	0.002	*	0.033	
2011		first and second	Coef.	0.764	0.339	0.005	*	*
			P>t	0.000	0.005	0.003	*	*
	third and fourth	Coef.	0.715	0.404	0.006	*	*	
		P>t	0.000	0.050	0.002	*	*	
	fifth and sixth	Coef.	0.898	0.524	0.009	*	*	
		P>t	0.000	0.003	0.004	*	*	
	seventh and eighth	Coef.	0.911	0.622	0.010	*	-0.008	
		P>t	0.000	0.028	0.001	*	0.034	
	ninth and tenth	Coef.	1.191	0.713	0.015	*	-0.009	
		P>t	0.000	0.000	0.004	*	0.032	

age father and mother and the number of children. Here again the effect of income increase on healthcare expenditure is similar to the previous period. Thus, if family income increases 1%, healthcare expenditure would be increased less than 1%. However, influential variables on healthcare expenditure in the other income deciles are family income, average of age of father and mother, the number of children and the education level of mother. The results reveal that family income, average of age of father and mother and the number of children have positive effects on healthcare expenditure, but the education level of mother has a negative effect. This is mainly related to the preventive effect of education. This implies that in response to the improvement in the level of education of mother, the health level of family more effectively could be managed more easily. The other important result is that effects of all variables on healthcare expenditure increases by increments in income deciles. This illustrates that we are facing an increasing trend of the absolute value of coefficients for every variable in each year. Therefore, effectiveness of variables on healthcare expenditure increases by upward moving in income deciles. In this respect, we could consider healthcare expenditure in the ninth and tenth income deciles as a luxury good to the family.

**CONCLUSION**

This paper investigated household behaviour of various income deciles regarding healthcare expenditure during 2009 to 2014 in rural areas of Iran. This is done base on the recognition of influential variables of healthcare expenditure. The findings show similarities between the behaviours of the first six income deciles. In these deciles, the education level of parents doesn't show any significant effect on healthcare expenditure. The most noteworthy finding is that in these income deciles 1% increase in the family income, leads to less than 1% increase in the corresponding healthcare expenditure. Moreover, in these income deciles, other variables have positive effects on healthcare expenditure. We also face a similar pattern in other deciles. Hence, family income, average of age of father and mother and the number of children all have positive effects on healthcare expenditure. However, the education level of mother affects the

**Table 3 Effecting variables of healthcare expenditure in various income deciles: 2012-2014**

Year	Income deciles	Results/variables	lnincome	Child_N	Age	Education_f	Education_m	
2012	first and second	Coef.	0.701	0.055	0.004	*	*	
		P>t	0.000	0.001	0.000	*	*	
	Third and fourth	Coef.	0.818	0.062	0.003	*	*	
		P>t	0.000	0.033	0.026	*	*	
	Fifth and sixth	Coef.	0.089	0.072	0.007	*	*	
		P>t	0.000	0.011	0.001	*	*	
	Seventh and eighth	Coef.	0.965	0.114	0.007	*	-0.004	
		P>t	0.000	0.012	0.002	*	0.028	
	Ninth and tenth	Coef.	1.195	0.130	0.014	*	-0.004	
		P>t	0.000	0.015	0.003	*	0.032	
	2013	first and second	Coef.	0.742	0.050	0.003	*	*
			P>t	0.000	0.001	0.003	*	*
Third and fourth		Coef.	0.832	0.073	0.005	*	*	
		P>t	0.000	0.005	0.004	*	*	
Fifth and sixth		Coef.	0.891	0.074	0.005	*	*	
		P>t	0.000	0.008	0.005	*	*	
Seventh and eighth		Coef.	0.954	0.085	0.007	*	-0.005	
		P>t	0.000	0.005	0.002	*	0.020	
Ninth and tens		Coef.	1.086	0.086	0.010	*	-0.006	
		P>t	0.000	0.001	0.007	*	0.019	
2014		first and second	Coef.	0.781	0.063	0.004	*	*
			P>t	0.003	0.001	0.009	*	*
	Third and fourth	Coef.	0.841	0.064	0.004	*	*	
		P>t	0.025	0.003	0.059	*	*	
	Fifth and sixth	Coef.	0.946	0.078	0.007	*	*	
		P>t	0.002	0.004	0.001	*	*	
	Seventh and eighth	Coef.	0.989	0.081	0.007	*	-0.010	
		P>t	0.014	0.007	0.008	*	0.080	
	Ninth and tenth	Coef.	1.280	0.110	0.010	*	-0.012	
		P>t	0.000	0.002	0.004	*	0.041	

healthcare expenditure reversely which is attributed to the preventive effect of education. The other noteworthy finding is that the contribution of mothers to the management of healthcare expenditure in rural families is more prominent than fathers. On the other hand, in the ninth and tenth deciles, 1% increase in family income would result in more than 1% increase in healthcare expenditure. Therefore, healthcare authorities are highly suggested to thrive to lift the awareness level of family. The same instruction could be to categorize base on the average age of parents. This could be performed via government agencies or insurance authorities. Indeed, these results indicate that different income deciles have different accessibility to health care expenditure and the most important effecting variable on healthcare expenditure is income. This means that accessibility of households to health services depend on their income. Another important point is that importance of effecting variables increase during income deciles. The most important reason behind this matter can be related to accessibility of households to health services. In addition, if budget of households increase, ability for using health services will increase and this factor affect effectiveness of effecting variables on healthcare expenditure.

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