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Original Article

Influencing Factors on Buying Health Supplemental Insurance by the Staff of Shiraz University of Medical Sciences

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Abstract

Introduction: One of the most reliable sources of financing healthcare costs is health insurance. Covering all the services by basic health insurance is not affordable economically, so that some services are covered by supplementary health insurances. This study aimed to determine the factors influencing buying the different levels of Kowsar supplementary health insurance by the staff of Shiraz University of Medical Sciences in 2014-2015.

Methods: This is a cross-sectional study. Two data collection forms were used to collect the data. A sample size of 500 was determined using the rule of thumb. The individuals were selected via using two-stage stratified and systematic sampling. To do the estimation, the ordinal logistic regression model (link function was logit) was specified by the one-sided significant variable tests at the first step. Then, the independent variables were examined by the link test, and the linear relationship among variables was also investigated. The software Excel 2010 and STATA 11.0 (stata corp LLC) were used in this paper.

Results: The findings showed that among the people with supplementary insurance, the majority were males (60%), married (85%), with the basic Tamin Ejtemaei insurance (72.3%). Among those who have not chosen the supplementary health insurance, the largest number were women (69%), unmarried (53%), and insured by Tamin Ejtemaei (80%), respectively. The findings suggest that some factors such as the age, gender, income and cost of insurance packages are the most influential factors on buying different levels of health care insurance. In the first model that included people with supplementary insurance, the income elasticity was significant and positive (Beta=3, P=0.047) and price elasticity of demand was negative (Beta=-0.06, P=0.001). In the second model that complemented those with and without supplementary insurance, the income elasticity was insignificant (Beta=2.46, P=0.085), and the demand price elasticity was negative (Beta=-0.06, P=0.001).

Conclusion: The economic factor seems to be the most influential factor in choosing supplementary insurance. Since this problem causes the low-income households not to use the insurance; therefore, the government is required to allocate some subsidies for low income household to be covered by supplementary health insurance for special services.

Keywords: Supplementary Health Insurances, None for Profit Insurance, Logistic Models, Health Financing

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Introduction

The costs of health care and treatment are uncertain and many diseases often occur suddenly and fast, so as the individuals and households sometimes cannot afford them, while they happen and causes them to suffer catastrophic health expenditures or health poverty (1). The studies have estimated the number of households suffering catastrophic health cost in Iran at a range of 2 to 24 percent and the poverty index resulted from the use of health services between 1.5 to 11 percent in different years and locations (2, 3). Various methods are used for financing health systems. Among them,

health insurance is one of the most important and reliable sources providing health costs (1). Although over 95 percent of the population is under one sort of health insurance coverage (4), about 89 percent of health care services are not covered by basic health insurance which increases the costs paid by people (5, 6). The gaps in the insurance coverage existing in the access of individuals to the services necessitate a new approach to the health insurance as a way to improve health insurance status; in fact, supplementary health insurance provides the insured with the opportunity to use the facilities of the non-governmental sectors, bridging the gap in the delivery of services and

the commitments of the basic health insurances and creating conditions for innovation, diversity and competition in the field of health insurance activity with an emphasis on the participation of individuals in supplying financial sources (7). An Iranian national study by Nosratnezhad et al. in 2016 showed that increase in age, education, income, wealth, and employment opportunities in the public sector increase the possibility of purchasing basic and supplementary insurance coverage (8). A study in 2015 in Iran showed that risk aversion, household income, basic insurance coverage status, employment status, and marital status were the factors affecting people's willingness to pay, and risk aversion had the greatest impact. Also, the price elasticity of health insurance demand showed -1.54. (9). Another research about demand for the supplementary insurance in 2016 in Germany showed that the adults older than 65 years and high-income individuals were the most applicants to purchase supplementary insurances (10). Considering the importance of supplementary insurance in reducing direct payment out of pocket and the small portion of the private sector in the insurance industry of Iran, this study aimed to identify the factors influencing the purchase of different levels of health insurance by the individuals.

Methods

Type of the Study

This is a cross-sectional study that was conducted on 18055 employees of Shiraz University of Medical Sciences; 6873 of them were covered by Kowsar supplementary health insurance. This study was approved by the Ethics Committee of Shiraz University of Medical Sciences with the code of ethics IR.SUMS.REC.1395.S88.

Sampling Method

The rule of thumb was used for determining the sample size (11). Based on the model type in this method, for each variable 30 individuals were randomly selected and considering the fact that about 10 variables were examined in this study, the minimum sample size was estimated 300 and to increase the power, the maximum sample size was considered 500 individuals. The sample size for two groups of people with and without supplementary insurance was estimated. Based on the result, the sample size of people with and without supplementary health insurance was estimated 400 and 100, respectively. Since Kowsar supplementary insurance has three different levels of prices based on services coverage and covering costs, the first level has the lowest premium and service coverage and the third level has the highest premium and service coverage; the sampling was conducted based on two-stage stratified and systematic methods as follows.

First step: Each level of the supplementary insurance was considered as a class for sampling. Within each category, the sample size was determined according to the overall sample size and the population of that category (Table 1).

Second step: Within each level, the samples were selected systematically. Then, the first person of each level was selected randomly from number 1 and sampling interval for each level and the others were selected using the above-mentioned sampling interval and after rounding.

Data Collection Tools and Processes

We used two kinds of forms to gather the data in this research. The first form included questions about demographic information and the economic and social variables the data of which were collected from the Well-being and Insurance Unit for employees of Shiraz University of Medical Sciences; the second form was used to assess the health status variable, for which the information was collected from Kowsar supplementary insurance company.

Statistical Analysis and Econometrics

To analyze the data, we designed two suitable econometric models for achieving the objectives of the research; according to the regression models used in previous studies, we entered the type of variables usd in the the model based on the research objectives, as well as the quantity and quality of the collected data.

In the first model, the individuals with Kowsar supplementary health insurance information were entered and the second model included those with and without supplementary insurance. Given that Kowsar supplementary insurance has three levels

Table 1: Sampling at different levels of Kowsar supplementary insurance

Kowsar supplementary insurance levels	Population covered by insurance	Percent of population covered by insurance	Sample size
Level 1	4579	67%	268
Level 2	1203	17%	68
Level 3	1091	16%	64

which are preferable to each other, the ordered logistic regression model was used. This regression is used when the response variable has more than two levels and the response variable levels have sequential characteristics among their levels (12).

The first model is as follows:

Y= *f (D, E, S, H)*

Where Y is buying different levels of supplementary insurance); D is demographic factors function including age, sex and marital status of the head of household; E is economic factors function including income and insurance premiums of the heads of households; S is the function of social factors including the number of insured individuals, type of basic insurance of head of household and the function of health status; H is the amount of using the services delivered by all the household members and in this study they were measured by the number of inpatient and outpatient visits.

The dependent variable (buying different levels of supplementary health insurance) in the first model had three phases. The first phase included the people who had bought the first level of health insurance; the second phase was those who had bought the second-level supplementary health insurance; and the third phase comprised the people who had bought the third level of supplementary health insurance. The third level of supplementary health insurance is the most expensive and has the most coverage than other two levels.

In the second model, the dependent variable (buying different levels of supplementary health insurance) had four phases. The first level included those who had not bought supplementary health insurance; the second was the first level of health insurance, the third phase was the second level of supplementary health insurance, and the fourth had bought the third level of supplementary health insurance.

In the next stage, the usual required tests were used in cross-sectional data to assess and fix the potential problems of cross-sectional data and select appropriate estimation method. To clarify if the variables used were appropriate for predicting the probability of dependent variable or not, the link test was used.

The link test consists of two statistics of Hat and Hatsq. The study pattern is statistically appropriate when the first statistic is significant and the second one is not. The Linearity test was also done to measure the intensity of the linearity among independent variables; to analyze the data and estimate the demand, we used Excel 2010 and STATA 11.0 (stata corp LLC). The sample size and sampling was conducted by a statistician.

Results

The findings showed that among the people with the supplementary insurance, the greatest number belonged to the males (60%), in the age range of 31-40 (45.8%), married (85%), with the number of family members between 1-3 (71.8%), with the basic Tamin Ejtemaei insurance (72.3%), and the highest chosen level was the first level of supplementary health insurance. Among those who have not chosen the supplementary health insurance, the largest number belonged to women (69%), 21-30 year old age group (47%), unmarried (53%), and those insured by Tamin Ejtemaei (80%), respectively.

The results displayed in Table 2 show that in the first model in which only the individuals with supplementary health insurance were entered, the hat test in link statistic was significant (P=0.011), and hat-sq test was non-significant (P=0.751). It shows that the variables of this model were well-chosen; in other words, the used variables to predict the probability of the dependent variable were appropriate. What's more, the significant average of variance inflation rate (Mean VIF<5) showed lack of linearity among the variables.

In the second model in which people with and without supplementary health insurance were entered, hat test in link statistic (P=0.001) and hat-sq test were both significant (P=0.001); it indicates that to improve the second model, other variables should be entered into the model. The average rate of variance inflation was also significant (Mean VIF<5) that shows there was no linearity relationship among the variables.

Table 3 shows the results of the first ordered logistic regression model; in this model, there was a negative and significant relationship between the age of th head of household and buying supplementary

Table 2: Link test results to assess the independent variables of the study in the first and second models

Model type	Test	Variable coefficient	Standard deviation	Statistic [z]	P value	Mean VIF
First model	Hat	0.891	0.352	2.53	0.011	1.17
	Hat-sq	0.004	0.015	0.32	0.751	
Second model	Hat	1.202	0.116	10.28	0.001	1.17
	Hat-sq	0.009	0.002	4.47	0.001	

Table 3: Estimating the coefficient of independent variables in the first model (people with supplementary health insurance)

Variable		Variable coefficient	Standard deviation	Statistic [z]	P value	Log Likelihood	The coefficient of determination p-seudo
Age		-0.12	0.031	3.84	0.001	-85.79	0.751
Gender	Female	Reference					
	Male	0.86	0.469	1.83	0.067		
Marital status	Married	Reference					
	Unmarried	-0.93	0.614	1.52	0.128		
Type of basic insurance	Tamin Ejtemaei insurance	Reference					
	Iranian health insurance	0.81	0.530	1.53	0.125		
Income		3	1.541	1.98	0.047		
Premium		-0.06	5.691	10.04	0.001		
Insured indemnification		3.6	1.221	0.30	0.767		

Table 4: The relationship between buying and not-buying supplementary insurance by the staff of Shiraz University of Medical Sciences

Variable		Variable coefficient	Standard deviation	Statistic [z]	P value	Log Likelihood	Determination coefficient R^2
Age		-0.11	0.029	3.81	0.001	-89.58	0.849
Gender	Female	Reference					
	Male	0.85	0.464	1.84	0.046		
Marital status	Married	Reference					
	Unmarried	-1.03	0.643	1.61	0.106		
Type of insurance	Tamin Ejtemaei insurance	Reference					
	Iranian health insurance	0.77	0.521	1.49	0.136		
Income		2.46	1.431	1.72	0.085		
Premium		-0.06	5.521	11.31	0.001		

health insurance (P=0.001). It means that as the age increases, the probability of choosing higher levels by people (levels with more coverage and more expensive) decreases about 0.12%. The gender of the household head was also significant at 90% level, and it was correlated with buying supplementary health insurance, so that men were 0.86% more willing to buy higher levels of supplementary insurance. The income of the head of household had a significant relationship and direct correlation with buying the supplementary health insurance and it means that the income elasticity of demand was positive, so that for every one percent increase in income, the demand of people to buy higher levels of insurance (third level) was 3% more. The package price or premium that the head of insured household pays had an inverse and significant relationship with buying the supplementary health insurance and this means that the price elasticity of demand was negative; that means, the more the price of the package will increase, the less the people's willingness to buy more expensive levels

up to 0.06% will be. Results indicated that marital status, type of basic insurance and indemnity of the insured or the cost that the insurance company pays (total cost of household members' treatment) had no significant relationship with buying supplementary health insurance.

Table 4 shows the results of ordered logistic regression in the second model. In this model, age and premiums had a significant relationship with buying different levels of insurance (P<0.05); age and premium had a significant and inverse relationship. As age increases, the probability of choosing higher levels of supplementary insurance by people decreased and the increasing prices of supplementary insurance led to lower demand for the higher levels. Men were also 0.85% more likely to choose higher levels. Income elasticity of demand was not significant in this model (P>0.05).

Comparison of the Log Likelihood of models also showed that the first model (85.79) compared to the second (89.58) ws a better one because of entering more input variables in the first model.

Discussion

Increasing demand for supplementary health insurance which is a type of private insurance in the country can be considered as a tool of health policymakers to reduce the direct payment from the household pockets; two models were estimated in this study in order to analyze the willingness to buy supplementary insurance. The findings in the first model, which reviews the choice of one of the three levels of supplementary insurance among the insured, showed that with increasing the age of the head of household, buying higher levels of supplementary insurance was significantly reduced. In other studies, such as the HaGani et al. (2018), Nosratnezhad and colleagues (2014), and Mefton et al. (2006), it was shown that there was a significant inverse relationship between age and demand for supplementary insurance (13-15). In a study by Lange et al. (2016), it was shown that in Germany, most of the applicants of buying supplementary insurance were the people older than 65 years and age was directly related to the demand of supplementary insurance (10). Based on the hypothesis that aging increases the risk of disease and consequently the need for health services increases, it was expected that older people tend to buy more insurance coverage, which was rejected in this study. It seems that choosing the higher levels of supplementary insurance of this case can be due to the reason that at higher levels (the third level), some services such as dentistry and infertility are offered which are not provided at other levels and the younger people choose that level more due to the risk of these kinds of problems.

In this study, the gender of the household head had an impact on supplementary health insurance selection. In the studies conducted by Taylor and Ward (2006) and also king and Mossialos (2005), there was a significant relationship between gender and demand and men were applying for insurance more than women (16, 17). Cawley and Simon (2005) in their article concluded that the attraction of insurance coverage by the employer was more for men; which means that if the premium increases one percent, the demand in men decreases more than one percent (18). According to the results, it seems that probably on the one hand, in many cases the households are male-headed, so more women are concerned with the potential costs of household health and are not risk taker. On the other hand, female employees may only be covered themselves and theother family members have been insured to another insurance company by their spouses.

The findings have also shown that there is a significant and direct relationship with the income of the head of household to buy higher levels of supplementary health insurance. In a study by Long et al. (2016), Nosratnezhad et al. (2016), Ebrahimzadeh et al.(2015), Motlagh et al.(2015), and Liu et al (2011), it was shown that families with better economic situation were the most applicants of buying supplementary insurance and the household income was the most important factor in buying health insurance (10, 8, 19-21).

The findings also showed that the package price or premium that the heads of insured households pay for have a significant and inverse relationship with health supplementary insurance, which is logical based on the law of demand. A study was conducted in 2016 to evaluate the difference in price elasticity of demand for health insurance in various countries; in this study, competition management is used by many health insurance companies to control the costs and quality of health services, and successful competition is related to the price elasticity of demand. A total of 49 studies from countries such as United States, Germany, the Netherlands and Switzerland showed significant differences in price elasticity. Optional price elasticity for basic health insurance in the United States was between -0.02 to -1; the price elasticity is more in Germany and it is between -0.6 to -4.2 and it was estimated -2 for mandatory private insurances of Switzerland. In the Netherlands, the price elasticity was below -0.5. Age, gender and other social and economic factors, particularly insurance premiums, benefits, and coverage were the major factors affecting the price elasticity, in the supplementary insurances, the premium levels of employer has a greater impact on the elasticity (22). Romley and colleagues (2015) also came into conclusion that there was an inverse and significant relationship between price and demand (23).

This study also showed that there was no significant relationship between marital status and buying supplementary insurance. In the study carried out by Shahraki (2019), Nosratnezhad et al. (2014) and Abu Bakr (2012) concluded that there was no significant relationship between marital status and the demand for private insurance (14, 24, 25). What's more, there was no significant relationship between the type of basic insurance and buying different levels of supplementary insurance.

In this study, the variable of indemnification paid to the insured or the cost that is paid by the insurance (total cost for all household members) was considered as an indicator of health status, so the households that received more indemnification, used health

services more and perhaps it can be said that they had lower health status, while the results showed that this variable did not have any significant relationship with supplementary health insurance.

Probably, the indemnification was not a good way to measure the health status of the insured. Mefton et al. (2006) and Cline and David (2003) have evaluated the effect of health status on buying supplementary health insurance and it showed a significant and direct relationship with buying health insurance (15, 26). However, in the study of Gustafsson-Wright (2009), most of the determining indicators of health status, such as medical expenses, have been ineffective in the amount of supplementary insurance demand (27). In the second model, the insured of Kowsar insurance and uninsured individuals chose one of three levels of supplementary insurance and entered the variables of age, sex, marital status, income, number of household members, the type of basic insurance, and health status into the model.

The results of this model were almost similar to the first model, and its only difference was the relationship between the income of the households and buying supplementary health insurance which did not have any significant relationship, and the income elasticity of demand was also not significant. In the study of Mohammadi et al. (2015), the income elasticity was also not significant and the individuals demands from the supplementary insurance were more determined based on the structures and patterns of individual behaviors such as risk-averseness of individuals, and the income of individuals was not effective on choosing supplementary insurance (9).

Limitations

The limitations of this study included lack of some important and influencing variables such as health status and family size in the second model and we did not have such information.

Conclusion

According to the results of the study, it seems that the economic factor is the most influential item in the choice of supplementary insurance. Since this leads to lack of using insurance by low-income families, it is necessary for governments to consider determining premiums or denial of payment for such households. Also, given that the elderly have less frequently bought this type of insurance, it is recommended that Kowsar insurance should cover the services needed by the elderly at all levels as the risk of the disease is higher among them.

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