Demand for Self-Employed Health Insurance

Serbest Meslek Çalışanları İçin Sağlık Sigortası Talebi

Sara Emamgholipour¹, Mohammad Arab¹, Javad Ebrahimzadeh²

ABSTRACT

Objective: Health insurance provides financial support for health care expenditures. There are two types of health insurance: compulsory and voluntary. Voluntary health insurance can be divided into two categories: self-employed and supplementary. In this study, the main factors that affect the demand for self-employed health insurance in Iran were determined.

Materials and Methods: In this cross-sectional study, data were derived from the 2013 Household Income and Expenditure Survey from the Statistical Center of Iran. Then, a logistic regression model was designed to determine the factors influencing health insurance demand.

Results: The age, income, and education level of the head of the household directly correlated with the demand for self-employed health insurance. There was no significant relationship between the demand for health insurance and the gender or marital status of the head of the household. In addition, there were no significant relationships between occupation or house ownership and the demand for health insurance in rural households.

Conclusion: To promote voluntary health insurance, it is helpful to identify effective factors that stimulate the health insurance demand.

Keywords: Income, gender, household size, logistic model, voluntary health insurance

ÖZ


Gereç ve Yöntem: Çalışmada veriler, İran İstatistik Merkezi’nin 2013 Hane Halkı Gelir ve Gider Anketinden elde edildi. Daha sonra Stata12 programı kullanılarak lojistik regresyon modeli oluşturuldu.


Sonuç: İsteğe bağlı sağlık sigortasını teşvik etmek için, sağlık sigortası talebini artıran faktörleri belirlemek faydalıdır.

Anahtar Kelimeler: Ekonomi, lojistik model, isteğe bağlı sağlık sigortası

Introduction

Most diseases occur accidentally and unexpectedly, resulting in direct and indirect costs that cause financial hardship for households. One of the main sources of financing for these increasing costs is health insurance. Insurance is a mechanism that allows risk-averse people to face reduced uncertainty. By purchasing insurance, the uncertainty of a great loss or major expenses can be substituted by the certain prospect of a fixed premium, thus increasing welfare [1].

Voluntary health insurance is a promising way to expand the coverage of public insurance and to provide coverage to people who do not qualify for social health insurance [2]. Although supply and demand are interrelated market forces, suitable demand may be the initial incentive of supply. Therefore, if insurers face limited demand, the size and structure of the insurance supply
will not have the sufficient extent and depth in terms of diversity, quality, and price; thus, insurance companies will provide limited options [3]. Therefore, to attract potential insurance buyers and expand the use of voluntary health insurance across different groups of people, policymakers must understand the factors that determine the health insurance demand.

One form of demand for insurance is voluntary health insurance. Supplementary and/or compulsory insurance decrease direct expenditures on health care in society and prevent families from incurring catastrophic costs. In 2013, 88% of the total private expenses on health in Iran consisted of out-of-pocket expenses; insurance companies, private institutions, and charities were responsible for 12% of private expenses on health. In this study, we aimed to identify and measure the main determinants of voluntary insurance demand. Voluntary health insurance is divided into two categories:

**Supplementary Health Insurance:** Due to the increasing health care costs and lack of coverage of certain health care services by basic health insurance, supplementary health insurance is used to expand health insurance coverage. Generally, the purpose of supplementary health insurance is to provide health facilities in non-governmental sectors for insured people, to address services and commitments not covered by basic health insurance, and to enable innovation, diversity, and competition in the health insurance field by emphasizing cooperation with financial institutions [4].

**Self-employed insurance:** This is awarded to people who work with an employer or alone (self-funding) based on work permits issued by competent authorities or under the recognition of the Social Security Organization [5].

The main question posed in this research was “Which factors affect the demand for self-employed insurance among Iranian households?”

**Materials and Methods**

Data was extracted from the 2013 Household Income and Expenditure Survey of the Statistical Center of Iran (SCI). All households who participated in this survey had informed consent. SCI collects data through sampling using household questionnaires with clear validity and reliability. This study was approved ethically by ethics committee approval of Tehran University of Medical Sciences. Thus, the data are of sufficient quality for use in statistical and econometric analyses. To study the factors influencing the demand for self-employed health insurance, 5561 urban households and 7454 rural households were considered.

Because the dependent variable is binary (zero and one), the cumulative logistic distribution function is as follows (6):

\[
P_i = \frac{\exp(\beta_1 + \beta_2 \chi_1 + \cdots + \beta_9 \chi_9)}{1 + \exp(\beta_1 + \beta_2 \chi_1 + \cdots + \beta_9 \chi_9)}
\]

where \( \chi = \beta_1 \cdot \chi_1 + \beta_2 \cdot \chi_2 + \cdots + \beta_9 \cdot \chi_9 \) and the dependent variable \( y \) is the demand for self-employed health insurance \( y=1 \) if there is a demand for self-employed health insurance; otherwise, \( y=0 \). Because the probability \( P_i \) is nonlinearly related to \( \chi \) and \( \beta_i \), to estimate this function, it should be linearized (6). Because \( P_i \) gives the probability of buying self-employed health insurance by equation [1], \((1-P_i)\), the probability of not buying self-employed health insurance is as follows:

\[
1-P_i = \frac{1}{1+e^{z}}
\]

Therefore, the following equation can be derived (6):

\[
P_i = \frac{1}{1-P_i} = e^z
\]

Here \( P_i/(1-P_i) \) is simply the odds ratio (OR) in favor of purchasing self-employed health insurance—the ratio of the probability that a household will require self-employed health insurance to the probability that it will not require such insurance.

Thus, the Logit model was regressed to analyze the determinants of self-employed health insurance demand for urban and rural households in Iran.

\[
\ln \left( \frac{P_i}{1-P_i} \right) = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \cdots + \beta_9 X_9 + \epsilon_i
\]

Then, two models were estimated for urban and rural households. \( X \) represents both quantitative and qualitative explanatory variables. The quantitative variables are \( X_1: \) the head of the household’s age, \( X_2: \) income, and \( X_3: \) household size. The qualitative variables are \( X_4: \) the head of the household’s gender, which is binary (1 for male and 2 for female), \( X_5: \) the head of the household’s education level, which includes five levels of education (illiterate, primary, lower secondary, upper secondary, and tertiary; illiterate is considered to be the benchmark), \( X_6: \) occupation, which is classified into three groups (unemployed, self-employed, and day laborer), \( X_7: \) the head of the household’s marital status, which is classified into three groups [single (base group), married, and divorced or widowed], and \( X_8: \) house ownership status, which is classified into three groups [leased (base group), owner-occupied, and mortgaged homes].

**Results**

The results of the logistic regression model for estimating the self-employed health insurance demand are shown in Table 1 and Table 2 for urban and rural households, respectively.

As indicated in Tables 1 and 2, the chi-square statistic of likelihood ratio (LR) for each regression implied the overall significance of the model \((p=0.000)\). In addition, the chi-square statistic of the Hosmer-Lemeshow test represents the compatibility of errors with real observations.

The results show that the coefficients of age, household size, income, and education were statistically significant for both urban and rural households; however, the coefficient of occupation was only statistically significant for urban households. In addition, house ownership in the owner-occupied category significantly affected the demand for self-employed health insurance. Therefore, the relation between the OR and the coefficient can be expressed as

\[
OR = e^\beta
\]

where \( \beta \) is the estimated coefficient for each variable.

Considering the ORs for each year of increase in age, the probability of the demand for self-employed health insurance is increased by 0.03 in both urban households Table 1 and rural households Table 2. If the size of the household increases by one unit (person), the probability of the demand for self-employed health insurance will decrease by 0.14 and 0.13 in urban and rural households, respectively. For one million Rial increase in income, the probability of the demand for self-employed health insurance increases by 0.35 and 0.33 in urban and rural households, respectively, as shown in Tables 1 and 2.

According to Tables 1 and 2, the ORs show that the probability of the demand for self-employed health insurance in the category of primary education in urban (rural) households increases by 0.6 (0.97) - compared to the illiterate (base) group. The ORs for urban (rural) households are 1.6 (2.17) in the lower secondary category, 1.72 (3.11) in the upper-secondary category, and 1.81 (4.8) in the tertiary category. In urban households, the probability of the self-employed
health insurance demand in the self-employed occupation category increases by 1.97 units compared to the unemployed (base) group; and the corresponding probability in the day-laborer occupation category increases by 1.6 units. In urban households, the probability of the demand for self-employed health insurance in the owner group increases by 0.3 compared to the tenant households (base).

There was no statistically significant difference in the demand for self-employed health insurance according to gender and marital status in either urban or rural households. In addition, there were no statistically significant relationships between occupation or house ownership and the self-employed health insurance demand in rural households.

Discussion

Self-employed health insurance demand in both urban and rural households is not affected by the gender of the head of household. Shafie and Hassali found similar results; however, Nguyen and Knowles and Christiansen et al. [7-9] established that the probability of the demand for health insurance in households headed by men was more inclined to pay for voluntary health insurance [10]. The differences in these results may be due to the different roles and decision-making power that men and women have in their families in various societies.

The demand for self-employed health insurance in both urban and rural households has a negative relationship with household size. The results of the study by Nguyen and Knowles reflect that the demand for purchasing health insurance in families with more than one school-aged child decreased by 2% [8]. Other studies have also concluded that family size has a negative effect on the demand for health insurance [11-13]. Nevertheless, as the number of family members increases, the household will spend more expenditure on housing, clothing, food, transportation; as a result, the household’s ability to pay, living standard, and the probability of the demand for voluntary health insurance decrease. In addition, according to the results, the effect of household size on the demand for self-employed health insurance is less in urban households than in rural households.

In both urban and rural households, the demand for self-employed health insurance increases as the age of the head of the household increases; Christiansen et al. [9], Nakhaei and Kamuei [11], Asgary et al. [12], Getzen [14], and Ebrahimzadeh et al. [15] also found positive relationships between these two variables. In France, young people aged 20 to 24 years are less likely to have voluntary health insurance coverage [16]. Possible reasons for this are the high opportunity cost of lost wages in middle age during sickness, high motivation to recover from illness more rapidly, and the greater likelihood of developing a disease on aging.

In both urban and rural households, there is a positive and significant relationship between the self-employed health insurance demand and income. Nguyen and Knowles [8], Shafie and Hassali [7], and other studies have reported the same relationship [17, 18]. In fact, the higher the income level, the greater the ability in rural areas. Therefore, assuming that other conditions are constant and considering household size, the probability of the demand for self-employed health insurance is higher in cities than in rural areas.

Table 1. Regression results of the logistic model for self-employed health insurance demand among urban households

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of variable</th>
<th>Coefficient (B)</th>
<th>Odds ratio</th>
<th>Wald statistic</th>
<th>P-value</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>−6.36</td>
<td>0.002</td>
<td>−8.7</td>
<td>0.000</td>
<td>(0.000, 0.007)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>0.03</td>
<td>1.03</td>
<td>7.16</td>
<td>0.000</td>
<td>(1.022, 1.038)</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td>−0.096</td>
<td>0.9</td>
<td>−3.03</td>
<td>0.002</td>
<td>(0.852, 0.966)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td>0.3</td>
<td>1.35</td>
<td>19.87</td>
<td>0.000</td>
<td>(1.314, 1.396)</td>
</tr>
<tr>
<td>Gender</td>
<td>(base) Male</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.1</td>
<td>1.11</td>
<td>0.39</td>
<td>0.7</td>
<td>(0.654, 1.886)</td>
</tr>
<tr>
<td>Education</td>
<td>(base) Illiterate</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>0.472</td>
<td>1.6</td>
<td>3.57</td>
<td>0.000</td>
<td>(1.237, 2.077)</td>
</tr>
<tr>
<td></td>
<td>Lower secondary</td>
<td>0.474</td>
<td>1.6</td>
<td>2.96</td>
<td>0.003</td>
<td>(1.174, 2.2)</td>
</tr>
<tr>
<td></td>
<td>Upper secondary</td>
<td>0.54</td>
<td>1.72</td>
<td>3.3</td>
<td>0.001</td>
<td>(1.245, 2.379)</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>0.59</td>
<td>1.81</td>
<td>2.8</td>
<td>0.005</td>
<td>(1.194, 2.751)</td>
</tr>
<tr>
<td>Occupation</td>
<td>Unemployed (base)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Self-employed</td>
<td>1.09</td>
<td>2.97</td>
<td>3.64</td>
<td>0.000</td>
<td>(1.653, 5.338)</td>
</tr>
<tr>
<td></td>
<td>Day laborer</td>
<td>0.96</td>
<td>2.6</td>
<td>3.15</td>
<td>0.002</td>
<td>(1.438, 4.753)</td>
</tr>
<tr>
<td>Marital status</td>
<td>(base) Single</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>0.23</td>
<td>1.26</td>
<td>0.37</td>
<td>0.709</td>
<td>(0.368, 4.334)</td>
</tr>
<tr>
<td></td>
<td>Divorced or widowed</td>
<td>0.48</td>
<td>1.62</td>
<td>0.73</td>
<td>0.468</td>
<td>(0.437, 6.053)</td>
</tr>
<tr>
<td>House ownership</td>
<td>(base) Tenant</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Owner-occupied</td>
<td>0.25</td>
<td>1.3</td>
<td>2.02</td>
<td>0.044</td>
<td>(1.007, 1.655)</td>
</tr>
<tr>
<td></td>
<td>Mortgaged</td>
<td>−0.35</td>
<td>0.76</td>
<td>−1.27</td>
<td>0.2</td>
<td>(0.414, 1.207)</td>
</tr>
</tbody>
</table>

*Hosmer-Lemeshow chi2=10.17; p=0.253
*LR chi2 (14)=256.02; p=0.000
*Both Hosmer-Lemeshow and Likelihood Ratio (LR) statistics indicate goodness of fit and have chi2 distribution.
of a household to pay and the probability of a household to demand voluntary health insurance. It has been found that as income increases, the probability of voluntary health insurance demand increases more in rural than in urban households.

There is a positive significant relationship between the education level of the head of the household and the demand for self-employed health insurance in both urban and rural households; this relationship is stronger in rural households than in urban households. Nguyen and Knowles found that students whose head of the household has tertiary education are 14% more likely to be insured than those whose head of the household is illiterate or has elementary education [8]. Other studies have also shown that as the education level increases, the demand for health insurance increases [15, 18-21]. In our study, households whose heads have tertiary education were more likely to be covered under health insurance than those whose heads are in other education groups. In the study by Nakhaei and Kamuei [11], the group with graduate education showed the highest demand for voluntary health insurance.

Table 2. Regression results of the logistic model for self-employed health insurance demand among rural households

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of variable</th>
<th>Coefficient (B)</th>
<th>Odds Ratio</th>
<th>Wald statistic</th>
<th>P-value</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>−6.8</td>
<td>0.001</td>
<td>−6</td>
<td>0.000</td>
<td>(0.000, 0.009)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>0.03</td>
<td>1.03</td>
<td>4.98</td>
<td>0.000</td>
<td>(1.017, 1.04)</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td>−0.13</td>
<td>0.87</td>
<td>−3.34</td>
<td>0.001</td>
<td>(0.804, 0.945)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td>0.28</td>
<td>1.33</td>
<td>12.45</td>
<td>0.000</td>
<td>(1.273, 1.393)</td>
</tr>
<tr>
<td>Gender (base) Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>0.7</td>
<td>2.03</td>
<td>1.94</td>
<td>0.053</td>
<td>(0.992, 4.158)</td>
</tr>
<tr>
<td>Education (base) Literate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td></td>
<td>0.68</td>
<td>1.97</td>
<td>3.94</td>
<td>0.000</td>
<td>(1.405, 2.757)</td>
</tr>
<tr>
<td>Lower secondary</td>
<td></td>
<td>0.77</td>
<td>2.17</td>
<td>3.29</td>
<td>0.001</td>
<td>(1.368, 3.447)</td>
</tr>
<tr>
<td>Upper secondary</td>
<td></td>
<td>1.13</td>
<td>3.11</td>
<td>4.33</td>
<td>0.000</td>
<td>(1.863, 5.209)</td>
</tr>
<tr>
<td>Tertiary</td>
<td></td>
<td>1.58</td>
<td>4.8</td>
<td>3.8</td>
<td>0.000</td>
<td>(2.165, 10.947)</td>
</tr>
<tr>
<td>Occupation (base) Unemployed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td></td>
<td>0.38</td>
<td>1.46</td>
<td>1.42</td>
<td>0.155</td>
<td>(0.866, 2.457)</td>
</tr>
<tr>
<td>Day laborer</td>
<td></td>
<td>−0.08</td>
<td>0.91</td>
<td>−0.3</td>
<td>0.76</td>
<td>(0.526, 1.597)</td>
</tr>
<tr>
<td>Marital status (base) Single</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td></td>
<td>0.8</td>
<td>2.25</td>
<td>0.8</td>
<td>0.42</td>
<td>(0.304, 16.611)</td>
</tr>
<tr>
<td>Divorced or widowed</td>
<td></td>
<td>0.74</td>
<td>2.1</td>
<td>0.7</td>
<td>0.48</td>
<td>(0.259, 16.991)</td>
</tr>
<tr>
<td>House ownership (base) Tenant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner-occupied</td>
<td></td>
<td>0.28</td>
<td>1.32</td>
<td>0.86</td>
<td>0.39</td>
<td>(0.7, 2.499)</td>
</tr>
<tr>
<td>Mortgaged</td>
<td></td>
<td>0.04</td>
<td>1.04</td>
<td>0.07</td>
<td>0.94</td>
<td>(0.314, 3.484)</td>
</tr>
</tbody>
</table>

*Hosmer-Lemeshow chi²=17.44 p=0.258  
*LR chi² (14)=689.87 p=0.0000  
*Both Hosmer-Lemeshow and Likelihood Ratio (LR) statistics indicate goodness of fit and have chi² distribution.

In urban households, the demand for voluntary health insurance is less than that in the house owner and mortgage groups; however, rural households typically include house owners or multiple people living in one house. Tenants pay lower rents in rural areas than in cities; thus, this does not greatly affect the ability of rural households to pay for insurance.

Although demand and supply are interrelated in the insurance market, a suitable demand may be the initial inducement for supply. Therefore, an improvement in insurance demand can increase the size and structure of the insurance supply. Thus, to attract potential insurance buyers and widen the scope of voluntary health insurance across different groups of people, policymakers must understand the determinants of health insurance demand.

According to our results, the demand for self-employed health insurance is directly correlated with the age, income, and education level of the head of the household. Since individuals should pay premiums alone, it is expected that the demand for voluntary health insurance will increase among educated, high-income, and aged people.
Ethics Committee Approval: Ethics committee approval was received for this research from the ethics committee of Tehran University of Medical Sciences, Tehran, Iran.

Informed Consent: Written informed consent was obtained from households who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - S.E., J.E.; Design - S.E.; Supervision - S.E.; Funding - S.E., M.A.; Materials - J.E., S.E.; Data Collection and/or Processing - J.E.; Analysis and/or Interpretation - S.E., J.E.; Literature Review - J.E.; Writing - S.E.; Critical Review - S.E., M.A.; Other - S.E.

Acknowledgement: The authors would like to express their thanks to Tehran University of Medical Sciences for providing access to library and web sources.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that study has received no financial support.

References