A Study of the Demand for Medical Services in Taiwan

By

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Abstract

This paper presents a version of the household production theory to explain the demand for health. In this study we have explored the factors that influence the demand for medical services and medical expenditures in Taiwan. A negative binomial model was used to study the demand for medical services. We found that the demand for medical services and medical expenditures are related to household composition, household income, family size, occupation of the household head, and living environments. In addition, we found higher usage of medical services on average for those households with medical insurances other than the national health insurance.

Key Words: medical service, demand, negative binomial model, count data

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Health care has become one of the important components of Taiwanese households’ expenditures. According to the continuing household income-expenditure survey results, the annual average household medical expenditures increased from NT$8,979 per household or 4.50% of total household expenditures, in 1981 to NT$73,496 or 11.09% of total household expenditures in 2000, an increase of over 700% in two decades (Chang, 2001).

Before 1995, there were several major types of health insurance programs based on policyholders’ occupations, i.e., non-agricultural workers, agricultural workers, and government employees (non-military and military). The insurance premiums and coverage were different among these three types of health insurance programs. In the beginning of 1995, the Taiwanese government developed a new health insurance program. This new health insurance program consolidated the three health insurance programs into one and made health insurance an entitled benefit for all Taiwanese citizens. The budget for this national health insurance program comes from payroll deductions and employers’ contributions. Government financial subsidies are available for those citizens who cannot afford the insurance premium. Citizens covered by the national health insurance program have increased from 92% in 1995 to 96% in 2000.

In order to improve the quality of health care and reduce waste, the Central Bureau of Health Insurance, the agency that is in charge of the national health insurance program, adjusted the payment schedules to hospitals and doctors, increased the required contact time between patients and doctors, and reduced the total number of patients examined by each doctor and hospital. As a result of these improvements in the quality
of health care services, the account balance of the national health insurance system changed from a surplus of NT$1,908 per household in 1995 to a deficit of NT$2,253 per household in 2000 (Chang, 2001). In order to bring the costs of the national health insurance system under control, it is important to understand the factors that influence the demand for medical services by Taiwanese citizens. The purpose of this study is to investigate the factors that affect the demand for medical services and medical expenditures.

**The Demand for Medical Services**

The approach used in this study is based on household production theory (Mincer, 1962; Becker, 1965; Michael and Becker, 1973; Deaton and Muellbauer, 1980). Two related optimization problems are considered. First, the household is assumed to minimize the expenditures necessary to achieve a given level of various non-market goods. One of these non-market could be household’s health (Grossman, 1972a, 1972b). Differentiating this expenditure or cost function then allows the calculation of shadow prices of non-market goods. Next, an alternative representation of the household’s optimization problem, which explicitly depends on these calculated shadow prices, is then formulated. The solution to this problem provides a system of equations that relates the demand for non-market goods to the shadow prices of health.

At the first stage the household may be characterized by cost-minimizing behavior, with medical care inputs assumed to be weakly separable from all other commodity groups (Deaton and Muellbauer, 1980), allowing the expenditure allocation among medical care groups to be in isolation from other commodities. The household’s consumption choices of medical services may be written as:
(1) \[ \min C = p'q + w'l \]
\[ \text{s. t. } H(q, l, z; k) \geq 0, \]

where \( H(q, z; k) \) denotes the corresponding transformation function that converts medical care related goods \( (q) \), labor inputs \( (l) \), and fixed capital stocks \( (k, \text{capital stocks are considered fixed in the short run}) \) into the non-market output vector \( z \), health status. Health status could be measured by work-loss days and restricted-activity days (Grossman 1972a). The solution to equation (1) is the household cost or expenditure function, \( C^0 = C(p, w, z; k) \), indicating the minimal short-run cost of obtaining given levels of medical care related goods at given prices and wage rates \( (w) \). The cost function is positive linear homogeneous, concave in \( p \) and \( w \), increasing in \( z \) and non-increasing in \( k \). Its price derivatives

(2.1) \[ q_i = \frac{\partial C(p, w, z; k)}{\partial p_i} = q_i(p, w, z; k) \]
and

(2.2) \[ l_r = \frac{\partial C(p, w, z; k)}{\partial w_r} = l_r(p, w, z; k) \]

are the derived input demand functions for medical care good \( i \) and the \( r \)th type of labor conditional upon the output \( z \) with given capital vector \( k \). Therefore, the demand for medical services is a derived demand, because services are not consumed directly, but serve to maintain or improve upon a certain health status.

The shadow values of the \( z_k \) are defined as (Deaton and Muellbauer, 1980)

(3) \[ \pi_k = \frac{\partial C(p, w, z; k)}{\partial z_k}, \quad k = 1, \ldots, g. \]

The advantage of utilizing the cost function to characterize the household’s transformation of market inputs into non-market outputs is that it can provide a direct means of imputing values to the non-market goods, \( z \). Therefore, given the solution of
(1), shadow prices for various medical care goods may be obtained by simple
differentiation.

With these shadow prices the second-stage optimization problem of determining
the levels of various non-market goods can be defined as

\[
\begin{align*}
\max & \quad U(z) \\
\text{s. t.} & \quad C^0 = C(p, w, z; k), \quad \text{or} \quad C^0 = g(\pi^*z); \\
\end{align*}
\]

where \( U \) represents a well-defined utility function; \( \pi = (\pi_1, ..., \pi_g) \) are the shadow prices;
and \( C^0 \) is the minimized cost of equation (1) for given \( p \). Note that this optimization
problem is different from the conventional budget-constrained utility maximization
problem of demand theory in the sense that the expenditure constraint in this context is a
nonlinear function of \( \pi^*z \).

With the nonlinear budget constraint, the explicit solution to this optimization
problem is difficult to obtain. Nevertheless, given the shadow prices of \( z \), the implicit
form of solution to the second-stage optimization can be written as

\[
(5) \quad z_k = z_k (C^0, \pi), \quad k = 1, \ldots, g,
\]

which states that the demand for various non-market goods is a function of total
expenditures \( C^0 \), their shadow values \( \pi \), -- which are determined by the first-stage
optimization. Therefore, given estimated shadow values \( \pi_i \)s and expenditure, the price
and expenditure elasticities for the nonmarket output \( z_i \)s can be obtained.

In Grossman’s model (1972a), health -- a non-market good, is considered as a
durable good that depreciates. By means of investment, the stock of health can be
accumulated by combining medical services and other inputs, such as time, to produce
new health that counters the effects of aging. The dependent variable for the demand for
medical care equation (2.1) in Grossman’s study (1972a) is personal (individual) medical expenditures and the explanatory variables include the stock of health (respondents’ subjective evaluation of their health status, i.e., poor, fair, good, and excellent), age, education, wage rate, family income, and family size. Grossman did not estimate the demand for health, i.e., equation (5), instead, he estimated an investment equation under the assumption that health stock equals gross investment minus depreciation. The typical form of the individual’s demand function for medical services that emerges from the Grossman model is

\[ M_t = f(H_t, w_t, p_t, t, x_t, E). \]

The demand for medical services \( (M_t) \) is influenced by the health status \( (H_t) \), the wage rate \( (w_t) \), a price vector for medical services \( (p_t) \), a time trend \( (t) \), a vector of environmental effects \( (x_t) \), and education received by the patient \( (E) \). Variables \( w_t, p_t, t, x_t, \) and \( E \) do not directly affect the level of \( H_t \). A higher wage rate leads to a substitution of time for medical services, because time becomes relative more expensive. For the Taiwanese health care program, policyholders have to pay a uniform co-payment for each doctor’s visit, therefore, the impact of \( p_t \) will be a constant and deleted from the empirical analysis. Using the terminology of the Grossman model, the rate of depreciation for the health capital stock increases with age or the time trend variable \( t \) should have a positive impact on the demand for health services. If environmental factors are damaging to health, their impact on \( M_t \) should be positive too. Theory predicts a negative impact of education on the demand for health services, if education contributes to a more efficient production of health.
While some past studies used individual medical records (e.g., Cameron et al. 1988; Akin et al. 1998; Windmeijer and Silva, 1997; Pohlmeier and Ulrich, 2001; Grossman 1972a), this study assumes household as the medical service consumption unit. The reasons are that household members may provide transportation to doctor’s office and/or hospitals for the sick members, especially if the sick members are very young or very old and they need help to get medical services. In addition, household members could also provide certain basic health care for the sick members and reduce the need to seek medical help. For these reasons, it would be difficult to estimate the household effects on the demand for medical services if individual medical records were used.

**Data and Explanatory Variables**

Our data source is the household income and expenditure survey conducted by the Taiwanese government in 2001. The survey covers a wide range of micro-level information on socioeconomic characteristics of households and their members, including specific variables on housing conditions as well as the types of health insurance subscribed and health care utilization.

The medical services ($M_i$) considered in this study are the number of visits to doctors and the days of hospital confinement. Since there was no information about the health status of household members, we grouped household members into seven age groups by their gender and use these variables as proxies of household’s health status. The reason behind this practice is that pre-school age children usually need more medical services when they are building up their immune abilities. Adolescents and persons younger than 50 years are probably the healthiest among people of all ages and require less medical services than other people. For those people older than 50 years, their health
status usually decline and require more medical services. There are also gender related
differences in the demand for medical services. For example, women of childbearing
ages may require more medical services than their male counterpart of the same age
groups. This practice captures the general health status of the population by age and
gender. In addition, it also covers the effect of time trend variable in Grossman’s model,
t, on the demand for medical services.

The environmental factors used in this study include household size, types of
household, conditions of living quarters, employment, whether the household had other
types of health related insurance (e.g., accident medical insurance), and the type of
household head’s occupation. Household size could have different impacts on the
demand for medical services. More people in a household could provide care for sick
household members and thus reduced the need for medical services; but at the same time,
it could provide more frequent personal contacts, spread contagious diseases such as flu,
and increase the need for medical services. In addition, households of large size may find
it easier than those of small size to provide transportation for the very young and the very
old household members to visit doctor or hospitals. Similarly, the types of the
households, i.e., whether they are extended families (families that have three or more
generations living together) or not, may reduce or increase the demand for medical
services. A priori, we do not know what to expect about the direction of the impacts of
household size and the type of household on medical services.

The type of housing unit and the size of the living area per household member
were used to represent the conditions of living quarters. Multi-story housing units in
Taiwan are usually equipped with elevators and more residents per building than single-
or two-story housing units. Elevators and the higher density of people in a given area usually mean more outside contacts and chances to catch contagious diseases, thus increase the potential need for medical services. For individual households, the average size of living area per person is also a measure of opportunity of personal contacts.

Because of the lack of information of the total number of days worked by household members, household income was used as a proxy of wage rate. A higher household income affects positively the ability to pay for medical services and a higher opportunity cost for the waiting time due to foregone earning.

Military personnel and their dependents used to receive free health care services. Under the national health insurance program, military personnel still have the free medical benefits from the government; however, their dependents are covered by the new national health insurance program and do not receive medical services from military hospitals. Besides the military free health care, health insurance system for non-military government employees had the longest history, then the health insurance program for non-farm works, and the health insurance program for farm workers had the shortest history. In this study, we included four dummy variables for the occupation of household heads: agriculture, self-employed, military, and unemployed, to capture the differences in medical service usages of these four types of households against non-military government employees. To estimate the impact of education on the demand for medical services, we included a dummy variable that has a value of one if the head of the household had college education, otherwise, it has a value of zero.

In addition to the factors that influence the demand for medical services, we are also interested in the factors that affect the medical expenditures for the Taiwanese
households. As shown in (2) and (3), the total medical expenditure \( C^0 \) is a function of the same set of explanatory variables as those found in the demand for medical service equations (2). Household medical expenditures include co-payment expenses, hospital charges, medicine and medical equipment expenses, and accident medical expenses. Medical expenditures exclude health insurance premiums. Sample statistics of the variables used in the analysis are presented in Table 1.

A brief examination of the sample statistics presented in Table 1, one found that sample households had an average of 40 visits to doctors per year and there were 3.55 persons per household, or more than 10 visits per person per year. The high frequency of doctors’ visits may be attributed to how often that doctors require patients to go back for rechecks. The general practice in Taiwan is that the doctor would prescribe a three-day supply of medicine; therefore, it will take three to four visits for a bout of flu. The Central Bureau of Health Insurance is looking into the practice and experiment with a per case fee schedule instead of per visit fee schedule to save the overall expenses of the national health insurance program.

**Statistical Model**

Three equations need to be estimated: number of visits to doctors, days of hospital confinement, and medical expenditure. Note that the number of visits to doctors and the days of hospital confinement are discrete in nature, i.e., they are count data. The econometrics related to random counts has been discussed in the biometric literature (see Patil, 1970, for a general reviews). Count data have been used in studies of the number of grocery purchases per period (Gilbert, 1979); the number of patents applied for (Hausman et al., 1984); the number of food items consumed (Lee, 1987), the relationship
between work productivity and diabetes (Lavigne, 2003), and the demand for medical services (Cameron and Trivedi, 1986; Cameron et al., 1988; Windmeijer and Silva, 1997; Yen et al., 2001).

The present study focuses on the number of visits to doctors and the number of days of hospital stay by households in Taiwan. Let $y_i$ denote the number of visits to doctors (or the number of days stayed in the hospital) during a year by the $i$th household. It is a random variable, and in a given time interval has a Poisson distribution with the probability density

$$
Pr(y_i = n) = e^{-\lambda_i} \frac{\lambda_i^n}{n!}, \quad n = 0, 1, 2, \ldots,
$$

where $n$ is the realized value of the random variable. This is a one-parameter distribution with both the mean and variance of $y_i$ equal to $\lambda_i$. $\lambda_i$ can be expressed as a function of observable household attributes, health characteristics, and health insurance cover which are included in the vector of explanatory variables $x_i$. To ensure that $\lambda_i > 0$, a necessary condition for the Poisson model and its generations, it is customary assumed

$$
\lambda_i = \exp(x_i \beta).
$$

Substituting (7) into (6) yields the log-likelihood function for $\beta$ which is globally concave and readily to be maximized. Given that most econometric models omit some relevant but unobservable characteristics from the explanatory variable vector $x_i$, it is more appropriate to consider $\lambda_i$ as stochastic and to characterize the inter-household heterogeneity. When such heterogeneity is a feature of the data, we expect the count data to exhibit over-dispersion, i.e., $\text{var}(y_i)$ is larger than the mean. Estimation under the Poisson assumption and neglect of over-dispersion will lead to inefficient estimates
(Cameron and Trivedi, 1986). The number of visits to doctors from the survey has a
mean of 40.43 and a variance of 953.49, and the days of hospital confinement have a
mean of 1.81 and a variance of 64.16, indications of potential inadequacy of the basic
Poisson model for the study of the survey results.

One of the ways to relax this restriction of equal mean and variance in \( \lambda_i \) is to
specify (7) as a stochastic equation

\[ \log \lambda_i = x_i \beta + \epsilon_i. \]

This results in a compound Poisson distribution. Let \( g(\epsilon_i) \) denote the probability
density function for \( \epsilon_i \). If \( g(\epsilon_i) \) or equivalently \( f(\lambda_i) \) has a gamma distribution, i.e., \( \lambda_i \) with
parameters \( \nu_i > 0 \) and \( \varphi_i > 0 \), then the density function (7) leads to a negative binomial
distribution function (Hausman et al., 1984; Cameron and Trivedi, 1986; Cameron et al.
1988; Johnson and Kotz, 1972)

\[
\Pr(y_i = n_i) = \frac{\Gamma(n_i + \nu_i)}{\Gamma(n_i + 1)\Gamma(\nu_i)} \left( \frac{\nu_i}{\nu_i + \varphi_i} \right)^{\nu_i} \left( \frac{\varphi_i}{\nu_i + \varphi_i} \right)^{n_i},
\]

with \( E[y_i] = \varphi_i \) and \( \text{var}(y_i) = \varphi_i + \varphi_i^2/\nu_i \). Since \( \nu_i > 0 \) and \( \varphi_i > 0 \), it is clear that the
variance exceeds the mean, so that model allows for overdispersion. The specific
parameterization of the resulting form is determined by the parameterization of the
gamma distribution of the gamma distribution. Cameron and Trivedi (1986) show that a
negative binomial regression model can be generated by linking parameters \( \nu_i \) and \( \varphi_i \) of
the underlying distribution of \( \lambda_i \) to the explanatory variables \( x_i \) in the following way. The
non-negative mean \( E(y_i) = \exp(x_i \beta) \) is obtained by letting \( \varphi_i = \exp(x_i \beta) \). The variance-
mean relationship can be obtained by letting \( \nu_i = (1/\alpha) \) for \( \alpha > 0 \) and
\[ \text{var}(y_i) = \exp(x_i \beta) + \alpha \exp(2x_i \beta) = E(y_i) + \alpha [E(y_i)]^2. \]

The log-likelihood function of this specification is globally concave, the model can be estimated by the maximum likelihood method. Other choices of the probability density function for \( \varepsilon_i \), such as the standard normal density, the uniform distribution, etc. are discussed in Johnson and Kotz (1972, pp. 183-215). The resulting compound Poisson might not have a closed form and, hence, could be computationally cumbersome.

Because of limitations of the data we used in this study, there were no information about detailed charges for doctors’ visits, hospital stays, other medical related expenses, and household’s health status, we were unable to follow the theoretical framework in our empirical estimation. Instead of estimating a cost function and its price derivatives as a system, we could only estimate these three equations separately using the same set of explanatory variables. As a result, the two demand for medical service equations were estimated using the binominal negative regression individually and the medical expenditure equation was estimated by the ordinary least squares method. Results are presented in Table 2.

**Results and Discussion**

The parameter estimates in the first two columns in Table 2 indicate how the explanatory variables affect the expected value of the number of visits to doctors and the days of hospital confinement, respectively; and the parameter estimates presented in the last column in Table 2 show the impacts of explanatory on household’s medical expenditures. Note that

\[ \partial E(n_i) / \partial x_{ik} = \beta_k \exp(x_i \beta). \]
Hence the parameter estimates should be interpreted as the impacts of the $k$th independent variable on the number of visits to doctors (or the days of hospital confinement) and the signs of the parameter estimates indicate the directions of the impacts. Based on the asymptotic $t$-ratios, all parameter estimates are significantly different from zero at $\alpha = 0.05$ level except the estimates of college-educated household head and self-employed dummy variables in the number of visits to doctors equation and the self-employed and military dummy variables in the days of hospital confinement equation. The signs of the parameter estimates are largely consistent with expectations.

All parameter estimates for age-gender composition variables are positive and significant in the two medical service equations. The effect of the addition of a given household member on the demand for medical services, regardless of gender, shows a $U$-shape relationship with the age of household member; an indication that the very young and the very old household members require more medical services to maintain their health than members of other ages in the household. Or, the rate of depreciation for the health capital stock increases with age. As expected, female members of childbearing ages required more medical services. The parameter estimates for the household-size-square variable suggest economies of scale associated with the number of visits to doctors and days of hospital confinement.

Contrary to previous discussion, household income had positive impacts on the number of visits to doctors and days of hospital stay. However, the magnitudes of the impacts of household income are relatively small. The households whose heads had a college education visited their doctors more often than those households whose heads did not have a college education. However, results show that household heads’ college
education had a negative impact on the days of hospital stay. This result may suggest that college education may help households seek doctors’ services more often and thus reduced the days of hospital stay.

Extended families had less number of visits to doctors but more days of hospital stay than those households that had only the parents and their immediate children. This result suggests that the older generation members in the household may provide better care to the younger generation household members than those one- or two-generation households, but the presence of members of old age increased the days of hospital stay. Results also show that the more household members employed the less medical services the household demanded; similarly, the more students were there in the household, the less medical services the household demanded. The negative relationship found between employment, study, and the demand for medical services could be the result that these employed household members or students were more active and healthier than unemployed members, thus required less medical services. Or the employed or students cannot afford to miss work or school, thus they seek less medical attention. Households that had other health related insurance (e.g., accident medical insurance) had higher number of visits to doctors and more days of hospital stay than those households that did not have any additional insurance.

Results also show that households that lived in 1- or 2-story buildings had less number of visits to doctors and less days of hospital stay than those who lived in multi-story buildings. In addition, living space per person had a negative impact on the number of visits to doctors and the days of hospital stay. These results suggest that larger living
space and lower density buildings could mean less personal contacts, less chance to get ill, thus require less medical services.

The estimates of occupational dummy variables indicate that workers in the agricultural sector and military had more visits to doctors than the non-military government workers, and workers in the agricultural sector, military personnel, and unemployed had more days of hospital stay than non-military government workers.

All parameter estimates for age-gender composition variables are positive and significant in the medical expenditure equation. The addition of a household member of ages younger than 18 years, regardless of gender, had similar impacts on medical expenditure, i.e., between NT$20,000 to NT$30,000 a year. However, the addition of female household members of ages older than 18 years had a higher impact on medical expenditures than their male counterparts of the same age group. The higher medical expenditures for females may be attributed to childbearing related medical services and illnesses pertain to females only. The parameter estimates for the household-size-square variable suggest economies of scale associated with medical expenditures. The impact of household income on medical expenditures is positive but the magnitude is relative small. Extended families had a positive impact on medical expenditures than other types of households. This positive impact could be attributed to the medical needs for older household members and possibly a result that extended families had more manpower to transport members to get medical attention. The coefficient estimate for the education of household head had no impact on medical expenditures.

The estimates for the number of household members employed and the number of students in the household show negative impacts on medical expenditures. This seems to
be the result of employed household members and students had less visits to doctors and
days of hospital confinement. Similarly, the estimates living area per person and types of
housing units showed negative impacts on medical expenditures. The estimate for having
additional medical insurances had a positive impact on medical expenditures. The
differences of the impacts of occupation of the household heads on medical expenditures
were insignificant. This result could be an indication that the national health insurance
program provided equitable health benefits to all citizens as it intended to do.

Concluding Remarks

We presented a version of the household production theory to explain the demand
for health. Because of limitations on the data used in the analysis, we are unable to
obtain measurements of health status, such as the restricted activity days and the work-
loss days used in Grossman’s study (1972a, 1972b) and detailed information of
household’s medical expenses. As a result, we were unable to use the theoretical
framework we presented to study the demand for health and medical services. With
detailed medical expense information and properly defined health status variables, one
should be able to estimate and analyze the demand for health using the theoretical
framework presented in this study.

In this study we have explored the factors that influence the demand for medical
services and medical expenditures. We found that the demand for medical services and
medical expenditures are related to household composition (or the general health status of
the population), household income, family size, occupation of the household head, and
living environments. In addition, we found higher usage of medical services on average
for those households with medical insurances other than the national health insurance.
Study results show that the younger and older household members demanded more medical services than the middle-age household members. In addition, childbearing age and older female household members demanded more medical services and spent more in medical services. The life expectancies in Taiwan have increased from 74.3 years in 1991 to 75.6 years in 2001. Females had a life expectancy of 78.8 years in 2001, i.e., about 6 years longer than the life expectancy of 72.9 years for males (Ministry of Interior). It is expected that the life expectancies would increase in the future. As population grows older, especially females, the demand for medical services would increase. It is unlikely that payroll deduction and employer contribution can entirely finance the national health insurance program. Either additional revenue becomes available, or the national health insurance program will face financial difficulties.
Table 1. Sample statistics (13,601 observations)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit of Measurement</th>
<th>Mean</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visits to Doctors</td>
<td>Number of Visits/Year</td>
<td>40.437</td>
<td>30.879</td>
</tr>
<tr>
<td>Hospital Confinement</td>
<td>Days/Year</td>
<td>1.812</td>
<td>8.072</td>
</tr>
<tr>
<td>Medical Expenditures</td>
<td>NT$1,000</td>
<td>77.442</td>
<td>83.538</td>
</tr>
<tr>
<td>No. of Male Member Age</td>
<td>Number of Persons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 6 Years</td>
<td></td>
<td>0.165</td>
<td>0.436</td>
</tr>
<tr>
<td>7-12 Years</td>
<td></td>
<td>0.165</td>
<td>0.439</td>
</tr>
<tr>
<td>13-18 Years</td>
<td></td>
<td>0.167</td>
<td>0.441</td>
</tr>
<tr>
<td>19-35 Years</td>
<td></td>
<td>0.420</td>
<td>0.635</td>
</tr>
<tr>
<td>36-50 Years</td>
<td></td>
<td>0.429</td>
<td>0.516</td>
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<tr>
<td>51-65 Years</td>
<td></td>
<td>0.242</td>
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<tr>
<td>65+ Years</td>
<td></td>
<td>0.194</td>
<td>0.397</td>
</tr>
<tr>
<td>No. of Female Member Age</td>
<td>Number of Persons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 6 Years</td>
<td></td>
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<td>0.431</td>
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<tr>
<td>7-12 Years</td>
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<td>19-35 Years</td>
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<td>0.446</td>
<td>0.633</td>
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<td>36-50 Years</td>
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<td>0.427</td>
<td>0.505</td>
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<tr>
<td>51-65 Years</td>
<td></td>
<td>0.263</td>
<td>0.441</td>
</tr>
<tr>
<td>65+ Years</td>
<td></td>
<td>0.174</td>
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<td>Household Income</td>
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<td>1-2-Story Building</td>
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<tr>
<td>Living Area/person</td>
<td>Pens(^a)</td>
<td>14.211</td>
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<tr>
<td>Occupation</td>
<td>Percent</td>
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<td>Agriculture</td>
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\(^a\)Each Pen is equivalent to 6 square feet.
Table 2. Estimates for parameters of the medical services and expenditure equations

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of Doctor Visits</th>
<th>Days of Hospital Stay</th>
<th>Medical Expenditures</th>
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<td></td>
<td>Coefficient</td>
<td>St. Error</td>
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<tr>
<td>No. of Male Member Age</td>
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<td>&lt;= 6 Years</td>
<td>0.6361</td>
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<td>0.9026</td>
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<tr>
<td>7-12 Years</td>
<td>0.5114</td>
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<tr>
<td>13-18 Years</td>
<td>0.4061</td>
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<tr>
<td>19-35 Years</td>
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<td>0.0147</td>
<td>0.9551</td>
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<td>36-50 Years</td>
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<tr>
<td>51-65 Years</td>
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<td>65+ Years</td>
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<tr>
<td>No. of Female Member Age</td>
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<td>19-35 Years</td>
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<td>36-50 Years</td>
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<td>0.0041</td>
<td>22.9841</td>
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R$^2$ 0.1392
References


Ministry of Interior, Government of Taiwan. Life Expectancy Table 47, http://www.dgbas.gov.tw/dgbas03/bs2/91chy/table%5Cs047.xls


