Why Do the Sick Not Use Health Care? The Case of Thailand's Universal Health Coverage Scheme

Phatta Kirdruang[1]

Abstract

A primary motivation of public health insurance programs is to promote access to, and use of, health care services in order to improve the health of the general population. Yet a frequently occurring puzzle is that the insured often do not utilize those publicly-provided health services, even though they are provided at little or no monetary cost. This study examines the factors that affect the decision of the insured to utilize public health providers in Thailand's Universal Health Coverage (UC) Scheme, compared to two alternatives: using private providers or self-medicating. This paper applies a multinomial logit framework to data from the 2007 Health and Welfare Survey data to analyze health care choices of individuals. Preliminary results suggest that age, health condition, education, income, amount of copayment, and the area in which the individual lives have significant impacts on the decision to use publicly-provided health services.

[1] Phatta Kirdruang is a Ph.D. candidate in the Department of Applied Economics and a research assistant at the Minnesota Population Center, University of Minnesota, 50 Willey Hall, 225 19th Avenue South, Minneapolis, Minnesota 55455. Comments can be sent to kirdr001@umn.edu.

Introduction

A primary objective of public health insurance programs is to improve the health of the general population. Consequently, many governments in both developed and developing countries have implemented public health insurance programs in order to improve access to health care, particularly among the workers in the informal sector or other in low-income groups. However, it is often the case that the insured are reluctant to utilize public health care services even though these services are provided at little or no cost. Instead, they choose other alternatives such as going to private providers, purchasing medicine without a prescription, using traditional medicine, or doing nothing. Low utilization rates of public health care services among the insured could be due to the characteristics of the program itself, such as low quality of health care, or it could reflect the characteristics of individuals, such as perceptions about the quality of care. In order to ensure that health insurance benefits actually reach the targeted population, it is important to understand why the public health services are sometimes not used by the insured. In order to do so, an analysis of individual health care choice is required, particularly why some individuals are more inclined to choose alternatives other than using services provided by the public health insurance program.

This paper investigates the non-use of the health care services provided by the Universal Healthcare Coverage Scheme (hereafter called the UC Scheme) in Thailand. This public health insurance scheme was introduced in 2001 to make health care accessible to previously uninsured people, in order to protect them against health risks and, more generally, to improve their health status. Currently, the UC Scheme covers more than 70 percent of the Thai population, and eligible individuals are automatically entitled to receive UC health cards, which can be used to

obtain health care services at those individuals' registered primary care unit.[2] While the rate of *enrollment* in the UC Scheme has been very high (more than 90 %), the rate of *use* of UC health cards to obtain health insurance benefits appears to be low, particularly for outpatient care. More specifically, the 2007 Health and Welfare Survey data reveal that, when they are sick, only about 40% of all UC beneficiaries use their UC cards to obtain free outpatient care at their registered UC facilities, while about 27% choose to self-medicate (i.e., buy their own medicine without prescription), about 23% pay for the services of private health care providers, and the rest either do nothing or use herbal/traditional medicine. This UC card utilization rate is low when compared to similar public health insurance programs in other countries. For instance, about 66.3% of the Health Care Fund for the Poor (HCFP) enrollees in Vietnam use their card when seeking outpatient care (Sepehri, Sarma, & Serieux, 2009).

To solve this low utilization rate puzzle of the UC Scheme, this paper examines which characteristics of the program and the beneficiaries affect the utilization of the program accounting for the fact that the beneficiaries have other alternatives, including receiving treatment from private health providers, self-medicating, using traditional medicine, or doing nothing. First, the paper develops a theoretical model to explain whether an individual who is eligible for the UC Scheme utilizes the health care services provided by that scheme or the services received from alternative providers. The model incorporates both observed and unobserved characteristics of the beneficiaries as well as observed and unobserved characteristics of the public health insurance program to explain this choice. The implications of

[2] UC facilities are the health care facilities that serve as the primary care unit for UC beneficiaries. The majority of these facilities are public health care facilities such as community health centers and public hospitals, although a small number of UC facilities are private clinics.

the model are tested empirically using the 2007 Thai Health and Welfare Survey, which are the most recent data available on health behavior in Thailand.

The paper is organized as follows. Section 1 describes Thailand's health care system, and Section 2 reviews the literature low utilization of health care services in Thailand and in other countries. Section 3 presents a theoretical model to explain individual health care choices, and an empirical specification based on this model is developed in Section 4. Section 5 describes data, and Section 6 presents the results. Finally, Section 7 concludes and discusses policy implications.

1. Background on Thailand's Health Care System

Prior to 2001, a majority of the Thai population was covered by four public health insurance schemes: the Civil Servant Medical Benefit Scheme (CSMBS), the Social Security Scheme (SSS), the Medical Welfare Scheme (MWS), [3] and the Voluntary Health Card Scheme (VHCS). The first two were for employees in the public and formal private sectors, respectively.[4] The other two schemes were government-subsidized health insurance provided to disadvantaged groups (MWS) and to those who were near poor and not eligible for the other schemes (VHCS).[5] Nevertheless, despite the existence of these four schemes, there still remained a large segment of the population (about 18.5 million, or 30% of the total population) that was still uninsured up until the year 2001 (Sakunphanit, 2006). This last group was people

[3] Medical Welfare Scheme (MWS) later became the Low-income Card Scheme (LIC).
[4] The CSMBS was a benefit provided to all government employees, their dependents (including spouse, parents, and up to three children below age 20), and retirees from the public sector. On the other hand, the Social Security Scheme (SSS) was a compulsory health insurance for employees in the formal private sector
[5] The VHCS required each person to purchase a health card that cost 500 baht per year in order to enroll in the scheme.

who were not eligible for the first three schemes and chose not to purchase a health care card to enroll in the VHCS.

In October 2001, the Thai government launched a Universal Healthcare Coverage Scheme that provided access to healthcare for all individuals who were previously uninsured. With this new scheme in place, Thailand now has three public schemes that are financed from public resources: the Civil Servants Medical Benefit Scheme (CSMBS), the Social Security Scheme (SSS), and the Universal Coverage (UC) program.[6] In 2007, these three health insurance schemes cover approximately 96.7% of Thai citizens: 9.3% are covered by CSMBS, 12.4% are covered by SSS, and 75% are covered by UC (NSO, 2007). The rest of the population is covered by private health insurance or by health insurance provided by private employers. More details about Thailand's health care system can be found in Hanvoravongchai and Hsiao (2007) and Sakunphanit (2006).

Since the UC Scheme is the focus of this paper, it is worth summarizing the main characteristics of the Scheme. First, the UC Scheme is designated for all members of the population who are not covered by the other two schemes. Thus, it includes those who were previously covered by the MWS and VHSC, as well as those who were previously uninsured. In other words, the UC Scheme includes people who are self-employed, unemployed, disabled, children, and the elderly. Second, UC beneficiaries must use the services from the health care facilities with which they are registered, and referrals are limited to the other facilities that are under the management of the UC Scheme. Third, the UC Scheme provides a comprehensive

[6] The UC Scheme is also known as the 30-baht or the Gold Card (GC) Scheme. The name "30-baht" follows the 30 baht copayment , and the "Gold Card (GC)" refers to the health cards issued to this group of the population. The regular Gold Cards (GC) are issued to beneficiaries who need to pay the 30 baht copayment, and the Gold Cards with exemption (GCE) are issued to those who are exempted from the copayment. In this paper, the term Universal Coverage (UC) will be used instead of the 30-baht Scheme, and it includes both GC and GCE.

package in terms of conditions included. However, not all services are covered by the UC; some expensive procedures such as cosmetic surgery, obstetric delivery beyond two pregnancies, organ transplant, and renal dialysis are not covered. [7] Fourth, the payment mechanism for the UC Scheme is capitation payment, that is a payment method in which a fixed amount of payment per person per year is allocated by the government to the health facility at which the person has registered.[8] Finally, from 2001 to 2006 the UC Scheme required each individual to pay 30 baht[9] per each visit for outpatient or inpatient care, which includes the cost of drugs on the specified list. During this period, the 30-baht copayment was not required for the elderly (age60+), children below age 12, handicapped, Buddhist monks, veterans, community leaders, and individuals whose income was below 3000 baht. In 2007 this exemption was extended to everyone covered by the UC Scheme, and so the 30-baht copayment ceased to exist.[10]

2. Literature review

Previous studies of low utilization of public health insurance programs have attempted to answer two main questions: (i) Why do eligible individuals not participate in the program (the low take-up problem)? and (ii) Why do some individuals give up the benefits to which they are entitled and instead choose alternatives to the program (the non-use problem). Low take-up rates are a common problem in implementing public assistance programs particularly in developed countries. Studies in this area have shown that low participation is usually due not to direct

[7] Note that there have been some changes with the coverage over time, including coverage of ARV drugs for HIV patients.
[8] For the UC Scheme, the capitation payment was 1202, 1309, 1396, 1659, 1900, and 2100 in years 2003, 2004, 2005, 2006, and 2007, respectively. These numbers are determined by the Ministry of Public Health under the government's approval.
[9] Thirty baht is approximately $0.89 (exchange rate 1$ = 33.38 baht, on November 3, 2009).
[10] The 30-baht copayment was eliminated in November 2007. However, the data used in this paper were collected during January-June 2007. Hence, some respondents still needed to pay the copayment at the time they were interviewed.

financial costs, but rather to factors such as the time required to participate, the difficulty of application procedures, and lack of information about eligibility and the enrollment in the program (Currie and Gruber, 1996; Aizer, 2007; Remler, Rachlin, & Glied, 2001; Currie, 2004). In addition, some unobserved characteristics, such as the 'stigma' that is attached to the program, can contribute to low rates of participation in the public programs (Moffit, 1983). Since the UC Scheme has a simple registration system, the enrollment rate in the program has been very high, suggesting that the take-up problem is of less concern for the UC Scheme.

An analysis of the non-use problem of public health insurance requires an understanding of why individuals choose alternatives other than those services publicly provided. In general, individuals often have alternatives to seeking care from professional health care providers. Particularly in developing countries, individuals may choose alternatives such as care from traditional healers, self-medication, or doing nothing. Studies have shown that factors such as the type of illness, distance to health care facilities, ownership of a vehicle, quality of health care, health staff attitudes, and drug availability influence individual demand for, and utilization of, health care (Hjortsberg, 2003; Hanson, McPake, Nakamba, & Archard, 2005; Chang and Trivedi, 2003). Next, once the individuals decide to seek health care, they also have to choose the health care providers from which they will receive the services. Many previous studies have analyzed the influences on individual decisions about health care providers, focusing mainly on the choice between public and private facilities. Price and distance to the facility appear to be the main factors affecting individual choice of a health care provider, but the sensitivity to price of the services and distance to the health facility may vary according to health conditions and the quality of services (Akin & Hutchinson, 1999; Borah, 2006). For instance, Akin and Hutchinson

(1999) found that the phenomenon of "bypassing"[11] is generally not associated with income, but it is more common among those who are severely ill. Thus, the benefits from the lower cost of public service and closer proximity of that facility cannot outweigh the disadvantage of its poor quality.

Another set of studies looks more specifically at the relationship between health insurance and treatment seeking behavior. The general finding is that people who enroll in public health insurance programs are more likely to receive outpatient care from public health facilities, and that this health insurance coverage reduces the use of both private health facilities and self-medication (Jowett, Deolalikar, & Martinsson, 2004; Sosa-Rubi, Omar, & Harris, 2009). Finally, Sepehri *et al.* (2009) examine the factors that determine the insured's decision to use their health insurance card when seeking outpatient and inpatient care in Vietnam. They find that the probability of using insurance benefits varies inversely with income and level of education. Like Sepehri (2009), this paper focuses on the likelihood of benefit utilization among persons who have public health insurance.

Finally, consider the very small literature on Thailand's UC Scheme. This paper builds upon a previous study by Suraratdecha *et al.* (2005), who examined how the UC Scheme affects households' health seeking behavior and their probability of taking up program benefits. The authors use a probit model to estimate the probability that UC beneficiaries decide, for their first treatment choice, to seek care at UC facilities, conditional on the probability that they are ill, using survey data from three low-income provinces in 2002. Their results show that the UC beneficiaries' likelihood of seeking care at UC facilities is lower among those who must pay the

[11] Bypassing is the phenomenon where individuals travel past a free or subsidized local public health facility to obtain health services from a private health facility for which they need to pay.

30-baht copayments, who live in an urban area, and who have a higher level of education. Note, however, that study applies to the early stages of the UC Scheme, and it is based on a survey of 1834 households in only three low-income provinces out of 76 provinces in all of Thailand. Hence, the results may not apply to the current UC Scheme, and may not hold for the entire population of Thailand. This paper will address these issues by building a theoretical model to understand the health care seeking behavior of the UC beneficiaries, and by using a multinomial logit econometric specification to examine their health care choices, based on the most recent data available.

3. Theoretical model

My economic model follows the model of health care provider choice in Borah (2006). However, unlike Borah's model, the individual health care choices include not only choosing different health care providers, but also the choices to self-medicate, to use alternative medicine (herbal or traditional medicine), or to do nothing. Moreover, in the case that the individual chooses to seek health care from a physician, her decision is to decide between seeking free (i.e. no out-of-pocket cost) health care services from UC facilities or paying out-of-pocket to receive faster (and potentially better quality) services from non-UC facilities.

To start, consider a representative consumer *i* whose utility depends on consumption and health, and health depends on the medical care she receives. Suppose that this consumer is covered by the UC Scheme, so she has six medical care options when she becomes sick: (i) use the free health care services that are paid for by the UC Scheme; (ii) visit a private non-UC health facility and pay for its services; (iii) visit a public non-UC health facility and pay for its

services; [12] (iv) self-medicate by buying her own medicine; (v) use herbal medicine or visit a traditional healer; or (vi) do nothing. To maximize her utility, the consumer chooses her level of consumption and decides which type of medical care she will choose from the six alternatives. Denote j as the medical care choice where $j=1$ if she uses the services provided by the UC Scheme; $j=2$ if she goes to a private non-UC health care provider; $j=3$ if she goes to a public non-UC health care provider; $j=4$ if she self-medicates; $j=5$ if she uses herbal medicine or visits a traditional healer; and j=6 if she does nothing. Assume that the medical care that individual i receives from health care choice j (m_{ij}) depends on the unobserved characteristics of the health care choice ($\boldsymbol{\theta}_j$) and the observed interaction between the individual and the attributes of the health care choice ($\boldsymbol{Z}_{ij}$). Examples of unobserved characteristics of the health care choice are the reputation of the health care facility or the consumer's perceptions about the health care providers; and examples of the observed interaction between the individual characteristics and the health care choice are the distance from the individual's house to the health care facility (or drug store) and the individual's medical knowledge. Then the medical care obtained, together with the observed characteristics of the consumer ($\boldsymbol{X}_i$), will produce a health outcome (H_{ij}). For simplicity, assume that this consumer spends her income only on consumption goods and health. Accordingly, consumer i's utility maximization problem can be written as:

$$\max_{C_{ij},\, j\in\{1,2,3,4,5\}} U(C_{ij}, H_{ij}) \tag{1}$$

Subject to:

$$C_{ij} + P_{ij} = Y_i \qquad \text{where} \qquad P_{ij} = p_{ij} + w_i * d_{ij} \tag{2}$$

[12] This could be the case in which public hospitals provide health care outside the regular office hours with some small extra charges, or the patients choose to visit well-known public hospitals or university hospitals for better quality of care. Even though there are a small number of observations in this category, it is worth separating it from private non-UC facilities, because people who go to public non-UC facilities may have different characteristics.

$$m_{ij} = m_{ij}(\boldsymbol{\theta}_j, \boldsymbol{Z}_{ij}; \varepsilon_{ij}) \quad (3)$$

$$H_{ij} = H_{ij}\left(m_{ij}, \boldsymbol{X}_i; \eta_{ij}\right) = H_{ij}\left(m_{ij}(\boldsymbol{\theta}_j, \boldsymbol{Z}_{ij}; \varepsilon_{ij}), \boldsymbol{X}_i; \eta_{ij}\right) \quad (4)$$

where P_{ij} is the total costs of obtaining medical care (m_{ij}) under the choice j, C_{ij} is the amount of money that individual i spends on all consumption goods other than health if she chooses health care choice j, and Y_i is individual i 's income. Note that P_{ij} is equal to the sum of the direct of medical care (P_{ij}) and the indirect cost of obtain medical care that is measured by individual i's forgone wages ($w_i * d_{ij}$), where w_i is the hourly wage rate and d_{ij} is the time spent on travelling to the provider j. Also, denote ε_{ij} and η_{ij} as the error terms associated with the medical care and health, respectively. These error terms capture any uncertainty that can occur from receiving health care services. They also include unobserved individual characteristics, such as "innate healthiness". For example, if the consumer chooses to self-medicate, then it is likely that the health outcome, when compared to the outcome of visiting a physician, will be subject to greater uncertainty due to greater chance of misdiagnosis, incorrect treatment, or misuse of medicine.

From the above model, one can rewrite the utility maximization problem as:

$$\max_{j \in \{1,2,3,4,5\}} U\left[Y_i - p_{ij} - w_i * d_{ij}; H_{ij}\left(m_{ij}\left(\boldsymbol{\theta}_j, \boldsymbol{Z}_{ij}; \varepsilon_{ij}\right), \boldsymbol{X}_i; \eta_{ij}\right)\right] \quad (5)$$

The consumer is assumed to select the medical care choice j that gives her the highest expected utility. That is, the consumer will choose the choice j if the following condition is satisfied: $U_{ij}^* > U_{ik}^*, \forall k \neq j \in \{1,2,3,4,5,6\}$, where U_{ij}^* is the utility obtained from medical choice j. According to this model, the probability that individual i chooses health care choice j depends on the following set of observable factors: the individual's income; the costs of using that health

care choice (both direct and indirect); the characteristics of health care choice that do not vary across individuals (e.g. the size of the health care facility, the health care provider's training and experience; the number of physicians); the characteristics of individuals that do not vary across health care choice (e.g. age, education, gender); and the interaction between the characteristic of the health care choice and individual characteristics. Based on this utility maximization problem, one explicit prediction is that the utility of individual *i* from choosing choice *j* will be lower as the wage or the distance to provider *j* (or both) increases. However, the extent to which each factor affects the individual's health care choice must be investigated empirically.

4. Empirical specification

To investigate the above model empirically, I will use a multinomial model based on McFadden's random utility model. First, I will assume that the disturbance of unobserved variables is logistic, and hence the Irrelevance of Independent Alternatives (IIA)[13] is assumed. This assumption will be relaxed later if the IIA assumption is prove to be invalid. Accordingly, from equation (5), individual *i*'s utility from choosing alternative *j* can be written as:

$$U_{ij} = V_{ij}\left(\boldsymbol{X}_i, \boldsymbol{Z}_{ij}, u_{ij}\right) \quad (6)$$

Or, assuming a linear form:

$$U_{ij} = \boldsymbol{X}_i\boldsymbol{\alpha}_j + \boldsymbol{Z}_{ij}\boldsymbol{\beta} + u_{ij} \quad (7),$$

where $\boldsymbol{X}$ are characteristics that vary across individuals but not across choices, $\boldsymbol{Z}$ are characteristics that vary across choices, and u_{ij} represents the unobserved characteristics of both the individual and the facility. In making a decision, the individual chooses the alternative that

[13] The IIA assumes that if one of individual *i*'s choices is introduced or removed, the relative probabilities assigned to each of the other choices will not change.

gives the highest utility. However, in practice, U_{ij} is a latent function, so a set of binary variables must be defined. Denote y_{ij} as an indicator function where: $y_{ij} = 1$ if $U_{ij} > U_{ik}, \forall k \neq j \in \{1,2,3,4,5,6\}$, and $y_{ij} = 0$ otherwise. Then, the associated probabilities can be written as:

$$P_{ij} = P\left(j|\boldsymbol{X}_i, \boldsymbol{Z}_{ij}\right) = P\left(y_{ij} = 1|\boldsymbol{X}_i, \boldsymbol{Z}_{ij}\right) = P\left(U_{ij} > U_{ik}, \forall k \neq j \in \{1,2,3,4,5,6\}\right). \quad (8)$$

Assuming that the IIA holds and that the error term, u_{ij}, follows a type I extreme value (or Weibull) distribution, a multinomial logit model can be derived from the random utility model, assuming that the disturbances are independent across choices and across individuals. Hence, the probability that individual *i* chooses health care provider *j* can be written as:

$$P_{ij} = \frac{\exp(\boldsymbol{X}_i\boldsymbol{\alpha}_j + \boldsymbol{Z}_{ij}\boldsymbol{\beta})}{\sum_{k=1}^{5}\exp(\boldsymbol{X}_i\boldsymbol{\alpha}_k + \boldsymbol{Z}_{ik}\boldsymbol{\beta})} \quad (9).$$

Equation (11) is a logit model. If β =0, it is a multinomial logit model, whereas if α_j=0, it is a conditional logit model, and if both β and α_j are not zeros, it is a mixed logit model. The decision of which model to use will depend on the nature of the data and the coefficients. For the first part of this analysis, I assume that β = 0 because the data currently available are specific to individuals, rather than choices. Later, this restriction will be relaxed by using imputed prices as characteristics of health care choices.

Based on the theoretical model discussed earlier, the main factors that affect the individual's health care choice include income, health condition, and the costs of obtaining health care. In addition, the health care choice depends on both individual and household characteristics. Thus, the latent utility for alternative *j* can be written in a linear function as:

$$U_{ij} = \alpha_0 + \alpha_1 X_i + \alpha_2 d_{ij} + u_{ij} \quad (10)$$

where X_i are individual and household characteristics, including are age, sex, diseases, marital status, years of schooling, and whether the person is required to pay the 30-baht copayment, household income, and the location of the household (i.e. region and municipal area). In addition, d_{ij} is the distance that the individual *i* travels to receive medical care from the provider *j*. Since there is no information on waiting time or travel distance to health care facilities, the number of UC facilities per squared kilometer in each province will be used as a proxy for the distance that the UC beneficiaries travel to their registered UC facilities. The rationale here is that if there are more UC facilities per squared kilometer in the province in which the household is located, then the individual's travel distance to the registered UC facilities will be shorter. Similarly, the number of non-UC facilities per squared kilometer will be used as a proxy for the distance that the individual travels to a non-UC facility.

This paper specifically examines whether the individual chooses not to visit UC facilities because of an 'access' problem or because of a 'quality of health care' problem. If the individual has a problem with getting access to health care, the sign of the coefficient of the density of UC facilities is expected to be positive for those who visit UC facilities, and negative for those who choose other alternatives. This is because, if the access is a problem, then one would expect that the individuals who live in the residential area in which there are fewer UC facilities to be less likely to visit UC facilities and more likely to do nothing or to self-medicate. However, if poor quality is a main problem, then one expects the coefficients of education and income among people who choose to visit non-UC facilities to have positive signs because they are more likely to be able to afford more expensive health care services. In other words, if the health care services provided at UC facilities are viewed as inferior goods, then the individuals with higher income will be less likely to consume them. It is important to note that this statement is true only

under the assumption that the quality of health care services at non-UC facilities is at least as good as the quality of health care services provided at UC facilities, and the notion of quality in this context includes other elements such as waiting time and convenience in receiving the services.

5. Data and descriptive statistics

5.1 Data

The main data used in this analysis is from the 2007 Thai Health and Welfare Survey (HWS), which was obtained from Thailand's National Statistics Office. The HWS data included repeated cross-sectional and nationally representative samples, and they were collected every 5 years during 1981-2001 and have been collected yearly starting in 2003. In 2007, the total numbers of households and individuals interviewed in this survey were 21,539 and 69,679, respectively. The HWS includes information on individual's health status (e.g. being sick or not, which disease the person has), their health care utilization, choice of medical providers, out-of-pocket health care expenditure, health insurance status, and whether the person takes up the benefits from the health insurance scheme for which he or she is eligible. Moreover, the 2007 HWS is a subset of the 2007 Socio-Economic Survey (SES), so the data contain some broad socioeconomic and demographic variables such as geographical area, age, gender, education, marital status, occupation, and earnings.

In addition to the HWS data, another dataset is a list of all health care facilities under the UC Scheme and a list of all private hospitals available in each province, which are collected by the Ministry of Public Health. Based on these two lists, the number of UC facilities and the number of private hospitals available is calculated for each province. Then, the number of UC

facilities and private hospitals are divided by the land area within each province to obtain the density of each type of health care facilities. Consequently, the density of UC facilities (i.e. number of UC facilities per squared kilometer) in the province is used as a proxy for distance (or access) to health care at UC facilities, and the density of private hospitals (i.e. number of private hospitals per squared kilometer) is used as a proxy for access to alternative professional health care providers. Finally, these two variables are then merged with the HWS data to generate additional characteristics of the household based on province of residence.

It is important to note that using the number of private hospitals existing in each proving as a proxy for the number of non-UC facilities has several limitations. First, among the UC beneficiaries who visit non-UC facilities for out-patient care, at least 80 percent of them visit private clinics[14] but not private hospitals. Second, the number of private hospitals available in the province may or may not be positive correlated with the number of private clinics available in the same area. This is because these private clinics could be either complements of or substitutes to private hospitals, depending on the nature of medical care provided at each place. Unfortunately, to my knowledge, the information on number of private clinics in each province is not available. To solve the problem, I use the number of doctors living in each province as a proxy for the number of private clinics, based on the anecdotal evidence that doctors in developing countries not only work in public or private hospitals but also own or work for private clinics outside the regular office hours. Nevertheless, whether the number of doctors available in the province is a suitable proxy for the number of private clinics in the province still needs to be explored further.

[14] "Private clinics" in this context refer to physician offices that are operated privately. In most cases, private clinics have connection with neither public hospitals nor private hospitals, although it is often the case that the doctors refer the patients who seek care at their private clinics to the hospitals at which they also work.

5.2 Descriptive Statistics

The statistics in Table 1 describe some characteristics of the survey respondents, including geographic location of the household, sex, whether they have been sick, and the choice of treatment if they have been sick. Since this analysis focuses on the individual's health care choice for outpatient care, the sample is restricted to persons who reported that they had been sick in the past month before the interview but did not require inpatient care. Table 2 presents the health care choices of the UC beneficiaries who reported that they had been sick in the past month. These health care choices are computed based on two questions: (i) whether the person used their UC card to obtain health care; and (ii) what was the first health care services for which they sought to treat the reported illness. In this context, "traditional treatment" refers to the cases where the respondents used traditional/herbal medicine or go to traditional healers, and "self-medicate" refers to the cases where the respondents bought "modern" medicine without a prescription. Public health facilities refer to community health centers, general hospitals, teaching/university hospitals, and other publicly owned hospitals, while private health facilities include private clinics and hospitals. This information together with the characteristics of the respondents in Table 1 will be used to predict the likelihood that the UC beneficiaries will choose each health care choice, and the characteristics of individuals and households that affect their decisions.

Table 3 shows some descriptive statistics of UC beneficiaries who were sick in the past month before the interview day from HWS 2007. The average age is the highest among the UC beneficiaries who use herbal or traditional medicine followed by those who visit UC facilities, whereas the average age of those who choose to visit private non-UC facilities and self-medicate are the lowest. Moreover, sex and marital status do not vary much across different choices of

health care, and neither do region dummy variables. More years of schooling, higher income, having to pay the 30-baht copayment, and living in municipality area are all positively associated with visiting non-UC facilities or self-medicating.

Besides the demographic variables, the individual's disease/symptoms and the out-of-pocket expenditure were also reported in the HWS survey. The most common four disease groups are respiratory, musculoskeletal, digestive, and cardiovascular diseases. All other diseases are grouped together and called 'other'. The statistics from Table 3 suggest that individuals who choose not to visit UC facilities tend to have more common or minor illnesses, such as respiratory and digestive diseases, which could be treated by oneself or are less likely to require a follow-up visit. In contrast, individuals who visit UC facilities tend to have more serious illnesses, such as cardiovascular disease, that could incur higher cost or require a follow-up. Finally, the out-of-pocket expenditure is the expense that the individuals have to pay when receiving health care services. In the case of those who visit UC facilities, they may be charged the 30-baht copayment and/or the additional expense for the services not covered by the UC Scheme. Nevertheless, when compared with other methods of seeking health care, visiting UC facilities incurs the least cost, followed by self-medicating and using herbal/traditional medicine, respectively. It is important to note that the out-of-pocket expenditure for those who visit public non-UC facilities is higher than that for those who visit private non-UC facilities. This could be due to the fact that the public non-UC facilities provide some extra services (such as for visits outside office hours), and these services are not necessarily cheaper than those obtained from private facilities. More importantly, the out-of-pocket expenditure not only reflects the type of health care services, but it also reflects the type of sickness and the treatment required.

6. Results

Table 4 presents results of the multinomial logit model. In this model, the base group is comprised of single females who have other disease and who live in non-municipal area (or rural) in Central region (including Bangkok).[15] Since the number of observations in the group of people who use herbal medicine or visit traditional healer is small, this group has been combined with the group of people who self-medicate. Similarly, the number of observations in the group of people who visit public non-UC facilities is also small, so that group is combined with the group of people who visit private non-UC facilities; this group is called 'visit non-UC facilities'. Accordingly, this multinomial logit model will have four choices: do nothing, self-medicate, visit UC facilities, and visit non-UC facilities. The visit UC facilities choice is used as the base outcome.

In Table 4, both the coefficients and the marginal effects of all regressors for each health care choice are reported. Note that it is possible that a coefficient can be statistically significant, but its marginal effect may not be statistically significant, or vice versa. In some cases the signs of the coefficients are even opposite from the signs of the marginal effects. For instance, for people who choose to self-medicate, the coefficient of log-household income has a positive sign, but the sign of its marginal effect is negative. This is possible because the coefficient in a multinomial logit model indicates the relative likelihood of choosing this choice compared to the base choice, but the marginal effect indicates the effect of that variable on the probability of choosing that choice compared to all other choices. In this particular case, the UC beneficiaries whose household income is higher are more likely to self-medicate than to visit UC-facilities.

[15] Since the number of doctors in Bangkok is missing, I need to include the individuals who live in Bangkok together with those who live in Central region in the base group to avoid multicollinearity problem.

However, people who have higher income have lower probability of self-medicating because they are able to afford more expensive professional health care and thus have higher probability of visiting non-UC facilities when compared to all other choices. Nevertheless, the marginal effects are more useful in terms of interpretation, because they reveal the impact of each factor on the probability of choosing each health care choice. Thus, the results discussed below will be based on the marginal effects of the regressors in the model, and they are reported in the second column of each health care choice.

Among the individual characteristics, the marginal effect of age is significantly positive for people who self-medicate and is significantly negative for people who visit UC facilities. This result can be explained by the fact that people who are older (and presumably are in labor force) are more likely to self-medicate. This is not only because they have some knowledge in treating themselves, but also because waiting for health care services at UC facilities can result in higher opportunity cost in terms of their foregone wage. In contrast, people who are at younger ages, or children in particular, are more likely to visit UC facilities because the UC Scheme provides preventive care services, and the opportunity cost from waiting at the UC facilities for this group is relatively lower. In addition to age, the marginal effect of male is significantly positive for visiting UC-facilities, but it is significantly negative for visiting non-UC facilities. This suggests a gender role in making health care decision. In general, one would expect women to have more complicated health problems than men. Thus, it is probable that men require basic care that can be obtained at UC facilities, while women need more complex procedures that may not be available at UC facilities.

In addition to age and gender, the marginal effect of education (years of schooling) is significantly negative for people who visit UC facilities, and it is significantly positive for people

who visit non-UC facilities. This result suggests that people who have higher levels of education are more likely to visit non-UC facilities and less likely to visit UC facilities, when compared to all other choices. There are at least two possible explanations. First, people who are more educated are more likely to have higher wages. Hence, their cost of waiting to receive free health care at UC facilities could be higher than the cost of health care services purchased from private providers. Second, the level of education can be associated with how the person perceives health care quality at UC facilities. Thus, from this finding, it is possible that people with higher levels of education are reluctant to use health care services at UC facilities because they are not confident about the quality of health care. The latter argument, however, can be questionable, as the perception about quality of health care is not observable.

Beside demographic variables, the marginal effects of the disease dummy variables are mostly statistically significant. In particular, the probabilities of self-medicating and visiting non-UC facilities are higher for individuals who have respiratory and digestive diseases. Moreover, having cardiovascular disease increases the probabilities of visiting UC and non-UC facilities, when compared to all other choices. Interestingly, the marginal effect of having cardiovascular disease on visiting UC facilities is much higher than the marginal effect on visiting non-UC facilities. This result indicates that the quality of care at UC facilities may not be inferior to the health care that is provided at non-UC facilities. In addition, it also suggests that when more expensive treatment is required, the sick UC beneficiaries are more willing to give up convenience for reduction in the cost of treatment.

For household characteristics, the marginal effect of log-household income is significantly positive for those who visit non-UC facilities, but it is significantly negative for those who self-medicate and who visit UC-facilities. This is plausible because the cost of visiting non-UC

facilities is obviously more than the cost of visiting UC beneficiaries and self-medication, and hence it is more affordable to people who have higher income. In addition, people with higher income tend to have higher opportunity cost from waiting to receive free health care services. Thus, their forgone wages could be higher than the out-of-pocket spending on medical care provided by non-UC facilities.

Regarding geographic characteristics, the marginal effect of municipality is significantly positive for those who self-medicate and who visit non-UC facilities, but they are significantly negative for those who visit UC facilities. This result indicates that living in a municipal area decrease the probability of visiting UC facilities. One explanation is that non-UC facilities and pharmacies are more available in municipal area than in non-municipal area due to higher population density. An alternative explanation is that people who live in municipal area are more likely to have higher income and education, which have negative impacts on visiting UC facilities as explained above. Nevertheless, when comparing across these three factors (education, income, and living in municipal area), the impact of income is the largest, particularly on the probability of visiting non-UC facilities. In addition, the individuals who live in North, Northeast, and South regions are more likely to visit UC facilities than their counterparts who live in Central region and Bangkok. The magnitude of impact is the largest for those who live in Northeast region, which is presumably the poorest area of the country, suggesting that UC facilities are actually accessible to people living in a more remote area.

As for the density of health care facilities, the marginal impact of the number of UC facilities per squared kilometer is positive on both visiting UC facilities and visiting non-UC facilities, and it is negative on the other two choices. This pattern also applies to the marginal impact of the number of private hospitals per squared kilometer. These results cast doubt on the

supposition that 'access' is a problem for the UC Scheme, because if it is the case then one would expect the density of UC facilities to have a negative impact on visiting non-UC facilities. Moreover, the densities of private hospitals and private clinics have significantly positive impact on visiting UC facilities. This finding also does not support the argument that the availability of alternative choices will reduce the number of people using free services provided at UC facilities. Overall, the findings on the density of health care facilities only imply that, as there are more professional health care providers available in the area, individuals will prefer to receive medical care from professional providers, regardless of the type of facilities (i.e. public vs. private). More interestingly, the number of private clinic, for which the number of doctors is used as a proxy, has positive marginal impact on visiting UC facilities and has insignificant impact on visiting UC-facilities. This last result suggests that the number of doctors may not be a good proxy for the number of private clinics available in the province.

Relaxing IIA assumption

One major concern about using a multinomial logit model in this analysis is the assumption of the Irrelevance of Independent Alternatives (IIA). To verify whether this IIA assumption holds, one health care choice is excluded from the model to test against the null hypothesis that the relative probabilities assigned to each of the other choices will not change by using the Hausman test. However, when excluding different choices from the model, the result is not consistent. For example, the chi-square test is 0.26 with a p-value equal to 1when excluding self-medicating, but it is -2496.24 with a p-value equal to 1 when excluding visiting UC facilities. These results suggest that the IIA assumption does not always hold, or that the Hausman test did not work. As a result, I explore the use of nested logit models as an alternative to the multinomial logit model.

To use a nested logit model, the information at least on the characteristic of each choice is needed. Since there is no information on distance in this survey, the only choice attributes is price. Nevertheless, the respondents reported only the out-of-pocket payment to the health care services from which they actually sought care. Therefore, the prices of other health care choices that the individual did not choose and could have chosen are missing. To deal with this problem, these missing prices were imputed from the available information by using a regression imputation based on the method done in Gertler *et al.* (1987). First, one can set the price for doing nothing to be zero, and set the price for visiting UC-facilities to be 30-baht for everyone except for those who are exempted from the 30-baht copayment, the price is set to zero. For self-medication prices and visits to non-UC facilities prices, I use the available information, including the household and individual characteristics and type of disease, to estimate hedonic price equations, and then imputed prices for all individuals. In terms of the structure of the nested logit model, I separate the types of health care choices into two categories: informal and formal health care. Informal health care includes doing nothing and self-medicating, and formal health care including visiting UC facilities and visiting non-UC facilities. The explanatory variables include the same variables that were used in the multinomial logit model with an addition of the imputed price.

Table 5 displays the result of the nested logit model described above. In essence, the coefficient of price is negative and statistically significant at the 10% level. For other variables, the results are similar to those from the multinomial model. For instance, people who are older and required the 30-baht copayment are more likely to self-medicate than to visit UC-facilities. In addition, people with more education, whose household incomes are higher, and who live in municipal area are more likely to self-medicate or to visit non-UC facilities than to visit UC

facilities. However, not all results are consistent with the findings from the multinomial model. In particular, the coefficient of digestive disease dummy is significantly positive for people who self-medicate and who visit non-UC facilities, which are opposite to the results found earlier. Moreover, the coefficients of the density of UC facilities and the density of private hospitals are not statistically significant, suggesting that 'distance' does not have impacts on the health care choice. Regardless of these discrepancies, the overall result from the nested logit model still suggests that types of disease, education, copayment, household income, and living in a municipal area are the main determinants of health care choices for the UC beneficiaries.

7. Conclusion and discussion

This paper has explored why the insured, when they are sick, do not use their health insurance benefits to obtain health care services in the context of the Universal Coverage (UC) Scheme in Thailand. In doing so, it has examined the factors that affect individual choice between using the UC card to obtain the free (or almost free) health care and choosing other alternatives, including seeking care from non-UC facilities, purchasing their own medicine, or doing nothing.

Using data from the 2007 Health and Welfare Survey, the empirical results show that the type of disease, education, household income, copayment, and the location of the household are important determinants of individual health care choice. More specifically, individuals with minor illnesses such as respiratory diseases are more likely to self-medicate or to visit non-UC facilities than to visit UC-facilities, whereas those with a more serious problem such as cardiovascular disease are more likely to visit UC-facilities. The rationale behind this finding is that, with a minor illness, the cost of obtaining health care services from private facilities may

not be very high, and it can be outweighed by the benefits from having convenience received from private health care services.

Moreover, income and education also play an important role. Those with higher education levels and higher household income are more likely to self-medicate and to visit non-UC facilities. Possible explanations are the following. First, more educated people are more knowledgeable, or at least more confident, in treating themselves when they sick. Second, for people with higher income, their opportunity cost of obtaining free health care at UC facilities, such as the forgone time spent on waiting, could be higher than the out-of-pocket payment for private health care services. This evidence supports the supposition that UC health care services are 'perceived' as 'inferior goods' for individuals in higher income groups. Nevertheless, it is still not clear whether the services provided at UC facilities are actually of inferior quality because, when having a more serious or chronic conditions, the insured still prefer to obtain health care services at UC facilities.

Finally, the individuals who live in municipality areas (urban areas) are more likely to self-medicate and to visit non-UC facilities, and the individuals who live in other regions outside Bangkok and Central region are more likely to visit UC facilities. These results suggest that health insurance benefits under the UC Scheme actually reach the population who live in a more remote part of the country. Moreover, the result based on the density of UC facilities (as a proxy for distance) reveals that, as there are more UC facilities available, UC beneficiaries are more likely to receive medical care not only at UC facilities but also at other professional health care providers, suggesting that distance is also not a main concern. Thus, the hypothesis that the access problem is the reason why the UC beneficiaries did not use the health care services provided by the scheme can be rejected.

In conclusion, the reason why some UC beneficiaries choose not to receive the free or almost free health care services depends on who these UC beneficiaries are. If the UC beneficiaries are from higher income groups and/or have higher levels of education, then they are less responsive to the price of health care services, and hence are more likely to give up the 'free-lunch' that could have been obtained at the UC facilities. However, if the UC beneficiaries are from lower income groups and live in the area in which fewer alternatives are available, then they are more sensitive to price and are more likely to use health care services provided at UC facilities. Based on these findings, even though a direct policy implication may not be explicitly drawn, the fact that there are differences in socioeconomic statuses of those who use and do not use health services at UC facilities suggest that the UC Scheme may have ignored to serve a certain group of the population, namely the middle-class group. If the UC Scheme is targeted to serve only the poorer population and is viewed as a redistribution of resources in the economy, then this scheme may already have achieved its goal. However, without enough support from the middle-class population, who also contributes to the general taxes used to finance the UC Scheme, the popularity or sustainability of the scheme may be in doubt.

The analysis in this paper is subject to a number of caveats. First, the 'access' problem may not be properly assessed mainly due to the lack of data on distances to health care facilities and the number of private clinics. Second, since the only available data on health conditions are the type of disease, this paper does not address the different levels of health care services (i.e. primary, secondary, or tertiary level) needed, which in turn determine the choice of health care providers. Finally, the lack information on past uses of health care hinders the ability to observe the perceived quality of health care, which could be another important factor in determining health care choices. These caveats need to be accounted for when interpreting the results.

References

Aizer. (2007). Public health insurance, program take-up, and child health. *The Review of Economics and Statistics* , 400-415.

Akin, J., & Hutchinson, P. (1999). Health-care facility choice and the phenomenon of bypassing. *Health Policy and Planning , 14* (2), 135-151.

Borah, B. (2006). A mixed logit model of health care provider choice: analysis of NSS data from rural India. *Health Economics , 15* (9), 915-932.

Chang and Trivedi. (2003). Economics of self-medication: theory and evidence. *Health economics* , 721-739.

Chou, S.-Y., Liu, J.-T., & Hammit, J. (2003). National health insurance and precautionary savings: evidence from Taiwan. *Journal of Public Economics , 87*, 1873-1894.

Chou, S.-Y., Liu, J.-T., & Huang, C. (2004). Health insurance and savings over the life cycle: a semiparametric smooth coefficient estimation. *Journal of Applied Econometrics , 19*, 295-322.

Currie and Gruber. (1996). Health insurance eligibility, utilization of medical care and child health. *Quarterly Journal of Economics* , 431-466.

Currie. (2004). The take up of social benefits. *NBER Working Paper 10488* .

Deaton, A. (1985). Panel data from times series of cross sections. *Journal of Econometrics , 30*, 109-126.

Gertler, P. L. (1987). Are user fees regressive? The welfare implications of health care financing proposals in Peru. *Journal of Econometrics* , 67-88.

Gruber, J., & Yelowitz, A. (1999). Public health insurance and private savings. *Journal of Politcal Economy , 107* (6), 1249-1275.

Guariglia, A., & Rossi, M. (2004). Private medical insurance and saving: evidence from the British Household Panel Survey. *Journal of Health Economics , 23* (4), 761-783.

Hanson, K., McPake, B., Nakamba, P., & Archard, L. (2005). Preferences for hospital quality in Zambia: results from a discrete choice experiment. *Health Economics* , 687-701.

Hanvoravongchai, P., & Hsiao, W. (2007). Thailand: Achieving Universal Coverage with Social Health Insurance. In W. C. Hsiao, & R. P. Shaw, *Social Health Insurance for Developing Nations* (pp. 133-154). The World Bank.

Hjortsberg, C. (2003). Why do the sick not utilise health care? The case of Zambia. *Health Economics* , 755-770.

Jones, A. (2000). Health econometrics. In A. Culyer, & J. Newhouse, *Handbook of Health Economics* (1 ed., Vol. 1, pp. 265-344). Elsevier.

Jowett, M., Deolalikar, A., & Martinsson, P. (2004). Health insurance and treatment seeking behaviour: evidence from a low-income country. *Health Economics , 13*, 845-857.

Kimball, M. (1990). Precautionary savings: a panel study. *Review of Economics and Statistics , 79* (2), 241-247.

Kotlikoff, L. (1989). Health expenditures and precautionary savings. In L. Kotlikoff, *What determines savings?* (pp. 141-62). Cambridge: MIT Press.

Maynard, A., & Qiu, J. (2009). Public insurance and private savings: who is affected and by how much? *Journal of Applied Econometrics , 24* (2), 282-308.

McKenzie, D. (2001, May). Consumption Growth in a Booming Economy: Taiwan 1976-96. *Yale Economic Growth Center Discussion Paper No. 823.*

Moffit, R. (1983). An economic model of welfare stigma. *The American Economic Review* , 1023-1034.

Na Ranong, V., Na Ranong, A., & Wongmonta, S. (2005). *Impact of the 30-baht program on healthcare expenditures among different income groups.* Bangkok, Thailand: Thailand Development Research Institute.

NESDB. (2003). *The 30-baht Program.* Bangkok, Thailand: National Economic and Social Development Board.

Nguyen, T.-H. (2008). The economics of not-using health insurance: a case study of Vietnam.

NHA 2006-2007 Working Group. (2009). *Thai National Health Accounts: sustainable updatets of 2006 and 2007 and diversification.* Technical Report, WHO.

NSO. (2007). *Summary Statistics of Health and Welfare Survey.* Bangkok, Thailand: National Statitics Office.

Panpiemrat, J., Sampantaruk, K., Puttitanun, T., & Piyanirun, T. (2007). *Evaluating and Analyzing Impacts of the Universal Health Care Coverage.* Bangkok, Thailand: Thailand Development Research Institute.

Puenpatom, R. (2006). Effects of Thai healthcare policy on household demand, hospital efficiency and household earnings. *Ph.D. Dissertation* . Washington State University.

Remler, D., Rachlin, J., & Glied, S. (2001). What can the take-up of other programs teach us about how to improve take-up of health insurance programs? *American Journal of Public Health* .

Sakunphanit, T. (2006). *Thailand: Universal Health Care Coverage Through Pluralistic Approaches.* ILO Subregrional Office for East Asia.

Sepehri, A., Sarma, S., & Serieux, J. (2009). Who is giving up the free lunch? The insured patients' decision to access health insurance benefits and its determinants: Evidence from a low-income country. *Health Policy* , 250-258.

Sinha, T., Ranson, M., Chatterjee, M., Acharya, A., & Mills, A. (2006). Barriers to accessing benefits in a community-based insurance scheme: lesson learnt from SEWA Insurance, Gujarat. *Health Policy and Planning , 21* (2), 132-142.

Sosa-Rubi, S., Omar, G., & Harris, J. (2009). Heterogenous impacts of the "Seguro Popular" program on the utilization of obstetrical services in Mexico, 2001-2006: a multinomial probit model with a discrete endogenous variable. *Journal of Health Economics , 28,* 20-34.

Starr-McCluer, M. (1996). Health insurance and saving. *American Economic Review , 86,* 285-295.

Suraratdecha, C., Saithanu, S., & Tangcharoensathien, V. (2005). Is universal coverage a solution for disparities in health care? Findings from three low-income provinces of Thailand. *Health Policy , 73,* 272-284.

Table 1 Summary statistics from Health and Welfare Survey in 2007

Variables	Mean	s.d.
Region:		
Bangkok	0.105	0.018
Central	0.244	0.014
North	0.178	0.008
Northeast	0.336	0.022
South	0.137	0.015
Live in municipality area	0.304	0.027
Sex (Male=1)	0.491	0.002
Ever been sick (not require hospital stay)	0.191	0.393
Need to stop working due to sickness	0.236	0.008
Total number of households	21539	
Total number of individuals	69679	

Source: calculated from Health and Welfare Survey, 2007.

Table 2 Percentage of sick UC beneficiaries across different treatment choices in 2007[16]

Health care choice	Type of UC beneficiaries		All UC beneficiaries
	Exempt 30 baht	Pay 30 baht	
Do nothing	5.63	4.78	5.34
Use herbal medicine or visit traditional healer	1.18	1.08	1.15
Self-medication	22.89	36.17	27.38
Visit UC facilities	45.73	32.94	41.4
Visit public non-UC facilities	1.13	1.87	1.38
Visit private non-UC facilities	23.44	23.16	23.35
Total	100	100	100
No. of observations	6,178	3,160	9,338

Source: calculated from Health and Welfare Survey, 2007.

[16] These choices are computed based on two questions from Health and Welfare Survey 2007: (1) whether the individual used their entitled health insurance in treating the last sickness that occurred during two weeks before the interview, and (2) what treatment choice the individual used to treat the last sickness.

Table3 Descriptive Statistics for UC beneficiaries who have been sick in the past month

Variable	Do nothing	Use herbal/ traditional medicine	Self-medicate	Visit UC facilities	Visit public non-UC facilities	Visit private non-UC facilities	All
Individual characteristics:							
Age	37.74	42.17	36.44	38.69	37.74	36.16	37.46
Sex (Male=1)	0.45	0.44	0.47	0.46	0.42	0.43	0.46
Years of school	6.88	6.45	7.17	6.56	8.41	7.37	6.96
Pay copayment	0.3	0.32	0.45	0.27	0.46	0.34	0.34
Disease groups:							
Respiratory	0.18	0.12	0.52	0.33	0.20	0.47	0.40
Digestive	0.03	0.09	0.08	0.09	0.09	0.10	0.09
Cardiovascular	0.02	0.06	0.01	0.13	0.11	0.07	0.08
Musculoskeletal	0.26	0.37	0.14	0.10	0.10	0.12	0.13
Other	0.51	0.36	0.25	0.35	0.50	0.25	0.31
Out-of-pocket payment (baht)	0.00	155.86	73.02	16.08	720.06	405.41	133.03
Marital Status:							
Single	0.15	0.16	0.16	0.14	0.22	0.14	0.15
Married	0.51	0.49	0.5	0.49	0.52	0.51	0.5
Widowed	0.09	0.16	0.08	0.11	0.09	0.09	0.1
Divorced	0.02	0.05	0.02	0.01	0.02	0.01	0.02
Separated	0.02	0.03	0.02	0.02	0.02	0.01	0.02
Household characteristics:							
Log(income)/capita	9.23	9.1	9.3	9.13	9.59	9.49	9.28
Municipality Area	0.49	0.42	0.57	0.46	0.67	0.56	0.52
Region:							
Central	0.24	0.33	0.29	0.23	0.3	0.25	0.25
North	0.44	0.29	0.32	0.31	0.26	0.31	0.32
Northeast	0.17	0.23	0.22	0.32	0.11	0.28	0.27
South	0.1	0.15	0.12	0.11	0.17	0.13	0.12
Bangkok	0.05	0	0.04	0.02	0.16	0.03	0.03
#UC facilities/ 100 persons[a]	195.81	168.34	158.34	164.91	127.17	151.84	161.53
#Private hospitals/ 100 persons	1.69	2.39	2.45	2.50	2.50	2.38	2.40
No. of observations	499	107	2557	3866	129	2180	9338

Source: calculated from Health and Welfare Survey, 2007.

[a] The number of UC facilities is obtained from the National Health Security Office (NHSO).

[b] The number of private hospitals is obtained from the Ministry of Public Health.

Table 4 Multinomial Logit Results (Visit UC-facilities as base group)

Variable	Do nothing		Self-medicate		Visit UC-facilities (base group)		Visit Non-UC facilities	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Individual characteristics:								
Age	-0.011	-0.001*	0.013***	0.003***	0.000	-0.002*	0.002	-0.001
Age2	0.000	0.000	0.000***	0.000***	0.000	0.000*	0.000	0.000
Male	-0.029	0.001	-0.030	0.006	0.000	0.022**	-0.166***	-0.029***
Married	0.040	0.002	0.000	0.000	0.000	0.000	-0.010	-0.002
Widowed	-0.076	-0.003	-0.031	-0.006	0.000	0.004	0.006	0.004
Divorced	0.264	0.010	0.067	0.009	0.000	-0.015	0.015	-0.005
Separated	-0.195	-0.003	-0.061	0.013	0.000	0.049	-0.363	-0.058*
Years of school	0.010	0.000	0.010	0.000	0.000	-0.004***	0.021***	0.003***
Copayment	-0.030	-0.012***	0.722***	0.128***	0.000	-0.116***	0.284***	0.000
Disease groups:								
Respiratory	-1.020***	-0.051***	0.806***	0.125***	0.000	-0.147***	0.640***	0.073***
Digestive	-1.554***	-0.038***	0.208**	0.015	0.000	-0.062***	0.451***	0.086***
Cardiovascular	-2.054***	-0.036***	-2.046***	-0.238***	0.000	0.232***	-0.293***	0.042*
Musculoskeletol	0.656***	0.008	0.866***	0.124***	0.000	-0.171***	0.619***	0.040**
Household characteristics:								
Log(hh_income)	0.147**	-0.001	0.084**	-0.021***	0.000	-0.070***	0.522***	0.092***
Municipality	0.117	-0.003	0.405***	0.060***	0.000	-0.080***	0.275***	0.023**
Access variables:								
# UC facilities/km2	-0.173***	-0.006**	-0.086***	-0.017***	0.000	0.011*	0.020	0.012**
# private hospitals/km2	-3.914***	-0.146***	-0.773**	-0.132*	0.000	0.124*	0.313	0.154***
Private clinics[a]	-0.353***	-0.012***	-0.173***	-0.030***	0.000	0.028**	-0.010***	0.014
Population density	4.809***	0.178***	1.363**	0.264**	0.000	-0.168	-0.679	-0.274***

Table 4 Multinomial Logit Results (continued)

Region:								
North	0.038	0.007	-0.447***	-0.080***	0.000	0.060***	-0.084	0.013
Northeast	-0.816***	-0.021***	-0.637***	-0.101***	0.000	0.104***	-0.163	0.017
South	-0.461**	-0.013**	-0.336***	-0.058***	0.000	0.045**	-0.005	0.026
Constant	-2.221***		-1.532***		0.000		-5.926***	
Predicted probabilities	0.040		0.271		0.432		0.257	
No. of observations	9008							
Log likelihood	-10231.629							
Pseudo R-squared	0.0704							

* Statistically significant at 10% level
** Statistically significant at 5% level
***Statistically significant at 1% level
[a] Number of private clinics (or physician offices) as proxied by the number of doctors available in the province.

Table 5 Nested Logit Model Results (Visit UC-facilities as the base group)

Variable	Informal care		Formal care
	Do nothing	Self-medicate	Visit non-UC facilities
Price	-0.001*	-0.001*	-0.001*
Individual characteristics:			
Age	-0.064***	0.025***	0.003
Age2	0.001**	0.000***	0.000
Male	-0.120	-0.061	-0.287**
Married	0.347	-0.074	-0.010
Widowed	0.006	-0.033	0.052
Divorced	0.491	0.008	-0.120
Separated	0.312	-0.238	-0.639
Years of school	-0.056	0.030***	0.040***
Copayment	-1.818***	1.131***	0.494***
Disease groups:			
Respiratory	-6.167***	1.848***	0.920***
Digestive	-6.550***	1.161***	0.674***
Cardiovascular	-1.751	-2.046***	-0.425
Musculoskeletol	0.541	1.049***	0.954***
Household characteristics:			
Log(hh_income)	0.415	0.177	0.837***
Municipality	-0.558*	0.634***	0.461***
Access variables:			
No.of UC facilities/km2	-0.250	-0.068	0.039
No.of private hospitals/km2	-10.687***	0.026	0.591
Private clinics	-0.413	-0.170**	-0.001
Pop density	10.481**	0.487	-1.228
Region:			
North	0.746	-0.650***	-0.194
Northeast	-1.449***	-0.586***	-0.303
South	-0.973*	-0.267*	0.053
Constant	-7.304***	-3.764***	-9.328***
Dissimilarity parameters:			
Informal_tau	4.7267		
Formal_tau	1.6372		
LR test for IIA (tau=1)	chi2 = 37.86 (p-value=0.000)		
Number of observations	36032		
Number of cases	9008		
Log likelihood	-10206.07		

* Statistically significant at 10% level
** Statistically significant at 5% level
***Statistically significant at 1% level