6-30-2018

Health-Seeking Behavior of the Uninsured Before and After the Universal Coverage Scheme in Thailand

Natthani Meemon
Mahidol University, Thailand, seungchun.pak@mahidol.ac.th

Seung Chun Paek

Follow this and additional works at: https://animorepository.dlsu.edu.ph/apssr

Health-Seeking Behavior of the Uninsured Before and After the Universal Coverage Scheme in Thailand

Natthani Meemon and Seung Chun Paek
Mahidol University, Thailand
seungchun.pak@mahidol.ac.th

Abstract: Before Thailand implemented the Universal Coverage Scheme (UCS) in 2002, 18 million people were uninsured. Thus, this study assessed the impact of the UCS on healthcare utilization by investigating the changes in health-seeking behavior among the previously uninsured before and after UCS. Using the nationwide Health and Welfare Survey data of 2001 and 2003–2005, multinomial logistic regression and mixed-effects multinomial logistic regression were used to investigate the relationship between health-seeking behavior and individual characteristics, and how the relationship changed over time. The study findings indicated that the UCS significantly increased utilization of public facility care and simultaneously decreased utilization of informal care. The observed changes were more significant in lower income, female, lower educated, and married people. But, there was no significant change in utilization of private facility care after the UCS. The changes in health-seeking behavior among lower income people from informal care requiring fully out-of-pocket (OOP) payment into public facility care requiring no or minimum OOP payment implied that UCS contributed to financial protection and equity in healthcare utilization. It also contributed to safety in healthcare utilization by decreasing the utilization of informal care which had the potential risk from inaccurate self-diagnosis and treatment. However, more than 50% of the beneficiaries still utilized care outside the UCS service boundary, which might be due to insufficient healthcare resources in public sector. Thus, the UCS should continue an effort to improve the infrastructure in public sector and to encourage the involvement of private sector in the scheme.

Keywords: Universal Coverage Scheme, 30-Baht Scheme, health insurance, health-seeking behavior, healthcare utilization, Thailand

In 2002, Thailand achieved universal health coverage by implementing the Universal Coverage Scheme (UCS, also called the 30-Baht Scheme). As the largest public health insurance program in the country, the UCS has provided almost free healthcare for approximately 75% of the entire population (approximately 47 million people). The 75% beneficiaries are people in the informal employment sector who are not in the government or private employment sector (Health Insurance System Research Office [HISRO], 2012).

Before the UCS, four public health insurance programs had been implemented for the entire population. Those are the Civil Servant Medical Benefit Scheme (CSMBS), Social Security Scheme (SSS), Medical Welfare Scheme (MWS, previously

called the Low Income Card Scheme), and Voluntary Health Card Scheme (VHCS; Damrongplasit & Melnick, 2009). The CSMBS is for people in the government employment sector. It covers government employees, their dependents (spouse, parents, and children under the age of 20), and retirees. The SSS is for the private-sector employees.

The MWS was a free health insurance program for socially vulnerable people. It specifically covered the poor, the elderly, the disabled, and children under the age of 12 (Towse, Mills, & Tangcharoensathien, 2004). Lastly, the VHCS was a voluntary health insurance program for people who are not eligible for any of the three programs (the CSMBS, SSS, and MWS). Each household could purchase 1-year VHCS insurance for 500 Baht (approximately US$15; Damrongplasit & Melnick, 2009).

Hypothetically, the four programs had to cover the entire population. However, the MWS and VHCS faced administrative issues, and the issues caused approximately 18 million people (approximately 30% of the entire population) to be uninsured (HISRO, 2012).

The MWS faced a "mistarget" issue. Because of difficulties with assessing the incomes of people in the informal employment sector, the MWS insurance cards tended to distribute to the non-poor rather than the poor (HISRO 2012; NaRanong & NaRanong, 2006; Suraratdecha, Saithanu, & Tangcharoensathien, 2005; Tangcharoensathien, Prakongsai, Limwattananon, Patcharanarumol, & Jongudomsuk, 2007). A household survey in 2000 found that of all MWS beneficiaries, only 35% met the MWS eligibility criteria (Tangcharoensathien et al., 2007). The VHCS faced an "adverse selection" issue. A previous study showed that the presence of illness was positively correlated with the purchase and utilization of the VHCS insurance card (Sakunphanit, 2006; Supakankunti, 2001).

Subsequently, the Thai government decided to establish the UCS by integrating the MWS and VHCS. Eliminating the mistarget and adverse selection issues, the UCS successfully covered the 18 million uninsured. Accordingly, Thailand achieved universal health coverage in 2002 (NaRanong & NaRanong, 2006; Towse et al., 2004). Since then, three public

health insurance programs have covered the entire population, which are the CSMBS (9%), SSS (16%), and UCS (75%; HISRO, 2012).

The UCS provides a comprehensive benefits package which includes not only curative and rehabilitation services but also annual health check-up and health promotion/disease prevention services (Sakunphanit, 2006). For healthcare delivery and copayment, the UCS requires beneficiaries to receive (both outpatient and inpatient) services from a designated facility with only 30 Baht (approximately US$0.9). But, previous MWS beneficiaries (e.g., the poor) were exempted from the copayment.

The 30-Baht copayment policy had been effective from 2002 to 2006 and abolished from 2006 to 2012. Since September 2012, it has been reinstated with exemption conditions, which include (1) emergency services, (2) prevention and promotion activities, (3) services without prescription drugs, and (4) services in any public facilities which are below community hospital (Damrongplasit & Melnick, 2015). The designated facility, which is a primary care facility, acts as the gatekeeper to secondary and tertiary care. When beneficiaries bypass their designated facilities, then they must pay 100% out-of-pocket (OOP) costs (Limwattananon, Tangcharoensathien, & Prakongsai, 2007).

Significance of the Study Problem

Previous studies investigated the impact of the UCS implementation on healthcare utilization. Some of the studies, using a trend analysis, found that the number of outpatient visits and/or inpatient admissions in designated facilities significantly increased after the UCS. Also, the increase was more significant in lower income people (HISRO, 2012; Tangcharoensathien et al., 2007; 2013).

Other studies, using a before–after comparison analysis of health-seeking behavior (pre-UCS group vs. post-UCS group), showed that after the UCS, service utilization in designated facilities increased, and at the same time, service utilization in non-designated facilities (e.g., private clinics or hospitals) and/or informal care utilization (e.g., over-the-counter [OTC] drugs) decreased significantly. Also, the increase/

decrease was more significant in lower income and/or older people (Gruber, Hendren, & Townsend, 2014; Limwattananon et al., 2015).

In addition, probably because of the increased utilization in designated facilities requiring no or minimal OOP costs (or the decreased utilization of out-of-network services requiring 100% OOP costs), the UCS implementation was found to have the positive impact on individual-level OOP and/or household-level catastrophic expenditures (HISRO, 2012; Limwattananon et al., 2007; 2015; Somkotra & Lagrada, 2009).

Similar findings were also found in other relevant studies conducted in international settings. Some of the studies, examining the relationship between health insurance and health-seeking behavior, showed that people with health insurance depended more on formal care services than informal care services such as self-medication (Escobar, Griffin, & Shaw, 2010; Fenny, Asante, Enemark, & Hansen, 2014; Pagán, Ross, Yau, & Polsky, 2006). Other studies investigated the impact of health insurance on healthcare utilization and/or costs. The studies showed that the policy significantly increased healthcare utilization and/or reduced individual-level OOP/household-level catastrophic expenditures (Galárraga, Sosa-Rubí, Salinas-Rodríguez, & Sesma-Vázquez, 2010; Gotsadze, Zoidez, Rukhadze, Shengelia, & Chkhaidze, 2015; Kondo & Shigeoka, 2013; Xu et al., 2003).

The UCS technically included three different groups, which are the MWS, the VHCS, and the previously uninsured groups. For this reason, the previous studies usually defined the "pre-UCS" group by either combining the three groups or categorizing the three groups into two groups which are the MWS group and a combined group of the VHCS and the previously uninsured groups (Gruber et al., 2014; Limwattananon et al., 2015).

However, since both VHCS and MWS groups already had a free healthcare access before the UCS (though the VHCS group's financial burden changed from 500 Baht for 1 year to 30 Baht per visit to designated facility), their health-seeking behavior, particularly service utilization in designated facilities, might not be much affected by the UCS. Meanwhile, the previously uninsured, especially those with low-income level who generally had less accessibility and affordability of healthcare before the UCS, might be significantly affected by the UCS.

In this light, investigating the health-seeking behavior of only the previously uninsured before and after the UCS and how the behavior is similar to or different from previous findings would provide another meaningful insight on the policy impact. Thus, this study attempted to investigate how health-seeking behavior of the previously uninsured changed before and after the UCS and discuss policy implications.

Methods

Data Source and Study Sample

This study utilized the Health and Welfare Survey (HWS) from the year 2001 and 2003–2005. The HWS, which is a nationwide survey data collected annually/biannually by the National Statistical Office (NSO) of Thailand, included a broad array of demographic and socioeconomic information at individual and/or household levels. Also, information of healthcare utilization such as health insurance status or types of healthcare service utilized was included in the data. Among the four data, the HWS 2001 was collected before the UCS while the other three (the HWS 2003–2005) were collected after the UCS.

The purpose of the study was to investigate how health-seeking behavior of the previously uninsured changed before and after the UCS. But, the HWS was not panel data (Gruber et al., 2014), thus, propensity score matching (PSM) method was used to select the previously uninsured among UCS beneficiaries in the HWS 2003–2005 (Austin, 2011). Specifically, the HWS included two questions regarding the study sample. The questions were (1) "Have you felt sick during the 1 month before the survey date?" and (2) "If yes, then what type of healthcare services did you utilize?" We first selected uninsured people from the HWS 2001 and UCS beneficiaries from the HWS 2003–2005. Among the selected people, those who answered "yes" to the question (1) were again selected.

Then, by using PSM method (1-to-1 matching with a caliper equal to 0.1), the selected cases from the HWS 2001 were used to select matched cases

from the selected cases from the HWS 2003–2005. In addition, we limited the study sample to only adults over the age of 18 because children's health-seeking behaviors, in general, are affected by their parents' socioeconomic factors (Gokhale & Nuvvula, 2016; Isong et al., 2010; Zhang, Zhou, & Si, 2017). Finally, a total of 5,346 matched cases from each data were used for the study analysis.

Variable Selection and Measurement

Health-seeking behavior, which was the dependent variable in this study, was classified into three types: (1) informal care, (2) public facility care, and (3) private facility care. Informal care was defined as the utilization of healthcare services not in any formal healthcare facilities. Specifically, utilization of OTC drugs or traditional medicines/healers were included in the category of informal care.

Public facility care was defined as the utilization of healthcare services in public healthcare facilities. The UCS services were initially provided only in public facilities. Thus, in the HWS 2001, utilization of healthcare services in public facilities was included in the category of public facility care. In the HWS 2003–2005, utilization of services in a facility designated by the UCS insurance was included in that category. Lastly, private facility care was defined as the utilization of healthcare services in private clinics or hospitals.

In addition, the study employed "Andersen's Behavioral Model of Health Service Use" for selecting independent variables. The Andersen's model classified factors associated with healthcare utilization into three categories, which are predisposing, enabling, and need-for-care factors (Aday & Andersen, 1974; Bradley et al., 2002; Lo & Fulda, 2008).

In this study, three demographic variables (age, gender, and marital status) were used as predisposing factors. For enabling factors, three socioeconomic variables (income, education, and employment) were used as the individual-level resource, and a variable region (urban and rural areas) was used as a community-level resource. But this study did not use any need-for-care variables due to its unavailability in the HWS data. Some relevant variables such as chronic disease status (e.g., diabetes or hypertension

status) were available in the HWS 2003–2005 but not available in the HWS 2001.

Regarding measurement for income, the HWS 2001 provided individual income in the form of an ordinal variable ranging from 1–15, while the HWS 2003–2005 provided that in the form of a continuous variable which specifies a monetary value in Thai Baht unit. For comparability, this study first changed individual monetary income in HWS 2003–2005 to ordinal variable ranging from 1–15. Then, the ordinal incomes were summed up by each household, and then the summed-up income was divided by the square root of the number of household members in order to obtain a standardized income per single-person household (Organisation for Economic Co-operation and Development, 2009).

Age, which is an individual's age, was treated as a continuous variable. Gender was treated as a binary variable (male and female), and marital status was measured as a categorical variable with three levels (single, married, and divorced/widow/separated). Employment was treated as a binary variable (yes and no), and education was measured as an ordinal variable with three levels (primary school or below, middle or high school, and college or above). Lastly for region, this study measured it as a binary variable (urban and rural). By following the definition of the Thai NSO, we defined municipal areas as urban areas and non-municipal areas as rural areas.

Statistical Analysis

This study employed two statistical analyses, which are multinomial logistic regression (MLR) analysis and mixed-effects multinomial logistic regression (MEMLR) analysis. First of all, four separate MLR analyses for each year (2001, 2003, 2004, and 2005) were first conducted to investigate the relationship between the dependent and independent variables and explore how the relationship changed over time before and after the UCS. The category of informal care was set as a reference effect in the MLR analyses (Hosmer & Lemeshow, 2000).

Then, the study additionally performed MEMLR analysis to investigate whether or not any observed changes from the MLR analyses were significant. While MLR model includes only a fixed effect model

estimating coefficients from the population as a whole, MEMLR model includes not only a fixed effect but also a random effect model estimating coefficients varying across subgroups of the sample (Hedeker, 2003; 2007). In this study, each year (2001, 2003, 2004, and 2005) was used as each subgroup of the sample. By setting the year 2001 as a reference effect, MEMLR analysis was conducted to estimate each year's coefficient. The statistical significance level was fixed at 0.05, and all analyses were performed by using SAS software.

Results

Descriptive Statistics

Descriptive statistics for the study variables are presented in Table 1. For health-seeking behavior, before the UCS, 43.00% of the previously uninsured utilized informal care when they needed care. And 33.84% and 23.16% of them utilized public and private facility care, respectively. After the UCS, we found a decreasing pattern in utilization of informal

Table 1

Descriptive Statistics for the Study Variables (n = 5,346)

Variables	Year 2001		Year 2003		Year 2004		Year 2005	
	M or %	SD	M or %	SD	M or %	SD	M or %	SD
Health-seeking behavior								
Informal care	43.00%		35.84%		32.96%		32.5%	
Public facility care	33.84%		46.82%		45.02%		48.80%	
Private facility care	23.16%		17.34%		22.02%		18.65%	
Income	5.87	3.98	5.33	3.60	5.20	3.52	5.28	3.61
Age	45.42	15.52	47.03	16.23	46.95	16.19	48.00	15.69
Gender								
Male	37.50%		37.04%		37.28%		37.41%	
Female	62.50%		62.96%		62.72%		62.59%	
Marital Status								
Single	17.32%		14.14%		14.55%		13.22%	
Married	64.46%		67.08%		66.33%		67.34%	
Divorced/Widowed/Separated	18.22%		18.78%		19.12%		19.44%	
Education								
Primary school or below	75.07%		79.97%		78.81%		80.17%	
Middle or high school	21.89%		18.20%		19.15%		17.92%	
College or above	3.05%		1.83%		2.04%		1.91%	
Employment								
Yes	67.85%		68.44%		68.95%		69.81%	
No	32.15%		31.56%		31.05%		30.19%	
Region								
Urban	69.02%		67.30%		65.62%		61.95%	
Rural	30.98%		32.70%		34.38%		38.05%	

Note: M = mean; SD = standard deviation.

care and an increasing pattern in that of public facility care. Specifically, utilization of informal care was 35.84% in 2003, 32.96% in 2004, and 32.55% in 2005. Meanwhile, utilization of public facility care was 46.82% in 2003, 45.02% in 2004, and 48.80% in 2005.

It indicated that the UCS implementation increased utilization of public facility care and simultaneously decreased utilization of informal care (i.e., the increased utilization of public facility care by the UCS significantly decreased utilization of informal care). For utilization of private facility care, however, we did not clearly observe any significant change after the UCS. Specifically, the utilization was 23.16% in 2001, 17.34% in 2003, 22.02% in 2004, and 18.65% in 2005.

For independent variables, relatively stable statistics were observed across the four years because of the PSM method. For the year 2001 as an example, individual income and age on average were 5.87 and 45.42, respectively. For gender, 37.50% were male, and 62.50% were female. For marital status, 17.32%, 64.46%, and 18.22% were single, married, and divorced/widowed/separated, respectively. For education, 75.07% had completed primary school or below, 21.89% had completed middle or high school, and 3.05% had completed college or above. For employment, 67.85% were employed while 32.15% were unemployed. Lastly, for region, 69.02% and 30.98% lived in urban and rural areas, respectively.

Results of Multinomial Logistic Regression Analysis

Table 2 presents the results of the MLR analysis. In the model for public facility care (vs. informal care), an interesting pattern was found in three variables, which are income, gender, and education. For income, before the UCS, income was not significantly related to utilization of public facility care, but after the UCS, it became negatively related to the utilization. The odds ratios (0.935 in 2003, 0.951 in 2004, and 0.973 in 2005) meant that before the UCS, income level of the previously uninsured who utilized either informal care or public facility care was not significantly different. But after the UCS, lower income people were more likely to utilize public facility care.

Likewise, gender was not significantly related to utilization of public facility care before the UCS, but it

became negatively related after the UCS. Specifically, the odds ratios for male utilizing public facility care were 0.854, 0.764, and 0.799 in 2003, 2004, and 2005, respectively. It indicated that before the UCS, utilization of public facility care was not significantly different between male and female. But, after the UCS, the female was more likely to utilize services from public facilities (i.e., designated facilities).

For education, it was also not significant before the UCS, but it became significant after the UCS. People with lower education level (both the primary school or below and the middle or high school groups) were found to be more likely to utilize public facility care more than those with higher education level (the college or above group) after the UCS. In addition, the results showed that older people and unemployed people tended to utilize public facility care regardless of the UCS implementation. For marital status, it was not significant before and after the UCS.

In the model for private facility care (vs. informal care), an interesting pattern was found in two variables, which are employment and region. For employment, before the UCS, unemployed people tended to utilize private facility care, while employed people tended to utilize informal care. But after the UCS, utilization of private facility care (or utilization of informal care) was not significantly different between unemployed and employed people.

Similarly, people in rural areas tended to utilize informal care, while those in urban areas tended to utilize private facility care before the UCS. But after the UCS (particularly in 2004 and 2005), utilization of private facility care (or utilization of informal care) was not significantly different between people in rural and urban areas. For both employment and region, it may be partly because some of the employed people or people in the urban area, who utilized informal care before the UCS, changed to public facility care after the UCS.

In addition, the results showed that higher income, older, and female people were more likely to utilize private facility care regardless of the UCS implementation. For marital status and education, a clear pattern was not observed before and after the UCS.

Table 2

Results of Mutinomial Logistic Regression Analysis

Variables	Public facility care (vs. Informal care)							
	Year 2001		Year 2003		Year 2004		Year 2005	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Income	0.986	(0.970, 1.003)	0.935	(0.918, 0.952)*	0.951	(0.933, 0.969)*	0.973	(0.956, 0.991)*
Age	1.012	(1.007, 1.017)*	1.010	(1.005, 1.015)*	1.015	(1.010, 1.021)*	1.012	(1.007, 1.018)*
Gender Male (ref. Female)	0.949	(0.830, 1.085)	0.854	(0.750, 0.972)*	0.764	(0.668, 0.874)*	0.799	(0.701, 0.910)*
Marital status (ref. Single)								
Married	1.105	(0.916, 1.334)	1.057	(0.869, 1.286)	1.047	(0.857, 1.279)	1.206	(0.983, 1.479)
Divorced/Widowed/Separated	0.906	(0.707, 1.160)	0.903	(0.700, 1.163)	0.782	(0.604, 1.013)	1.033	(0.799, 1.336)
Education (ref. College or above)								
Primary school or below	1.307	(0.852, 1.041)	2.415	(1.388, 4.201)*	2.013	(1.166, 3.477)*	2.382	(1.420, 3.994)*
Middle or high school	1.262	(0.817, 1.949)	1.873	(1.069, 3.281)*	2.009	(1.159, 3.484)*	2.139	(1.269, 3.607)*
Employment No. (ref. Yes)	1.637	(1.414, 1.894)*	1.167	(1.009, 1.351)*	1.669	(1.432, 1.946)*	1.399	(1.200, 1.632)*
Region Rural (ref. Urban)	1.437	(1.253, 1.648)*	1.371	(1.202, 1.564)*	1.502	(1.311, 1.721)*	1.443	(1.262, 1.650)*

Variables	Private facility care (vs. Informal care)							
Income	1.023	(1.005, 1.041)*	1.036	(1.014, 1.058)*	1.038	(1.017, 1.060)*	1.037	(1.014, 1.059)*
Age	1.024	(1.018, 1.029)*	1.002	(0.996, 1.009)	1.010	(1.004, 1.014)*	1.013	(1.006, 1.020)*
Male (ref. Female)	0.780	(0.670, 0.908)*	0.724	(0.610, 0.860)*	0.723	(0.617, 0.848)*	0.658	(0.555, 0.779)*
Marital status (ref. Single)								
Married	1.020	(0.831, 1.252)	1.130	(0.881, 1.450)	1.095	(0.868, 1.381)	1.091	(0.850, 1.401)
Divorced/Widowed/Separated	0.775	(0.590, 0.017)	0.931	(0.669, 1.296)	0.908	(0.670, 1.230)	0.973	(0.707, 1.338)
Education (ref. College or above)								
Primary school or below	0.552	(0.379, 0.805)*	0.715	(0.443, 1.155)	0.575	(0.366, 0.902)*	0.839	(0.509, 1.383)
Middle or high school	0.795	(0.543, 1.165)	0.770	(0.473, 1.252)	0.740	(0.470, 1.164)	1.392	(0.845, 2.293)
Employment No. (ref. Yes)	1.308	(1.110, 1.541)*	1.118	(0.925, 1.351)	1.092	(0.907, 1.316)	1.147	(0.944, 1.393)
Region Rural (ref. Urban)	0.741	(0.626, 0.877)*	0.761	(0.633, 0.913)*	0.967	(0.819, 1.141)	1.026	(0.863, 1.221)

Pearson Goodness-of-Fit (chi-square/df)	1.000		1.998		1.005		1.005	
p-value	0.501		0.564		0.350		0.365	

Note: * = statistically significant at 0.05; OR = odds ratio; CI = confidence interval; ref = reference; df = degree of freedom.

Results of Mixed-Effect Multinomial Logistic Regression Analysis

From the previous MLR analyses, we noticed that lower income, female, and lower educated people were more likely to utilize public facility care after the UCS. Meanwhile, higher income people tended to utilize private facility care regardless of the UCS implementation. To examine whether or not the patterns observed from the previous MLR analyses were significant, MEMLR analysis was additionally conducted. It could also capture long-term effects that the previous MLR analyses could not detect.

Table 3 presents the results of the MEMLR analysis. In the model for public facility care (vs. informal care), the variable t1 year 2003, t2 year 2004, and t3 year 2005 were positively related to utilization of public facility care with the coefficient equal to 0.720, 0.724, and 0.694, respectively. It indicated that utilization of public facility care in 2003–2005 was significantly higher than that in 2001. As consistent with the results of the descriptive statistics, it meant that after the UCS, utilization of public facility care significantly increased (or utilization of informal care significantly decreased).

For income, the coefficient of income by t1 and t2 was -0.044 and -0.038, respectively. The negative coefficients meant that income level of people who utilized public facility care was significantly lower than that in 2001. Like the results of the previous MLR analyses, it indicated that lower income people are more likely to utilize public facility care after the UCS. However, the coefficient of income by t3 was negative but not significant.

For gender, the coefficient of the male by t1–t3 were negative but not significant. It meant that female depended more on public facility care after the UCS like the previous MLR results but the increase of the dependency was not significant as compared to that in 2001. For education, all coefficients, primary school or below by t1-t3, were positive, but only a coefficient by time interaction at t1 was significant. It indicated that lower educated people (particularly, the primary school or below group) depended more on public facility care after the UCS. Worth noting is that the increase of the

dependency was significant only at the year 2003 as compared to that in 2001.

Unlike the previous MLR results, marital status was significantly related to utilization of public facility care. The positive coefficient of married (0.231) indicated that married people depended more on public facility care, regardless of the UCS implementation. Furthermore, the positive coefficients by time interaction, married by t1 (0.332), t2 (0.351), and t3 (0.383), showed that the dependency significantly increased after the UCS when it was compared to that in 2001.

In the model for private facility care (vs. informal care), the variable t1 year 2003, t2 year 2004, and t3 year 2005 were not significant. It meant that like the results of the descriptive statistics, utilization of private facility care did not significantly change after the UCS. For income, the positive coefficient of income (0.026) showed that higher income people depended more on private facility care regardless of the UCS implementation. But the coefficients by time interaction (income by t1–t3) were positive but not significant. It indicated that increase of the dependency was not significant as compared to that in 2001.

In addition, this model showed an interesting pattern in three variables, which are age, employment, and region. For age, the coefficient of age (0.019) was positive, while the coefficients by time interaction, age by t1 (-0.016), t2 (-0.013), and t3 (-0.012), were negative. The positive coefficient meant that as consistent with the previous MLR results, older people depended more on private facility care regardless of the UCS implementation. But, the negative coefficients showed that the dependency significantly decreased after the UCS (i.e., people who utilized private facility care became younger after the UCS).

Likewise, unemployed people depended more on private facility care regardless of the UCS implementation, but the dependency significantly decreased after the UCS. For region, people in urban areas depended more on private facility care regardless of the UCS implementation, but the dependency significantly decreased after the UCS.

Table 3

Results of Mixed-Effects Multinomial Logistic Regression Analysis

Variables	Public facility care (vs. Informal care)		Private facility care (vs. Informal care)	
	Coefficient	Se	Coefficient	Se
Intercept	-0.041	0.056	-0.783*	0.065
t1 year 2003 (ref. Year 2001)	0.720*	0.079	-0.175	0.099
t2 year 2004 (ref. Year 2001)	0.724*	0.089	0.165	0.095
t3 year 2005 (ref. Year 2001)	0.694*	0.079	0.013	0.097
Income	-0.036*	0.008	0.026*	0.009
Income by t1	-0.044*	0.012	0.012	0.014
Income by t2	-0.038*	0.012	0.010	0.013
Income by t3	-0.012	0.012	0.010	0.014
Age	0.015*	0.002	0.019*	0.002
Age by t1	-0.002	0.003	-0.016*	0.003
Age by t2	0.003	0.003	-0.013*	0.003
Age by t3	0.001	0.003	-0.012*	0.004
Male (ref. Female)	-0.120	0.066	-0.213*	0.073
Male by t1	-0.065	0.092	-0.106	0.112
Male by t2	-0.197	0.094	-0.074	0.107
Male by t3	-0.144	0.093	-0.180	0.111
Married (ref. Others[a])	0.231*	0.041	0.045	0.049
Married by t1	0.332*	0.085	0.004	0.113
Married by t2	0.351*	0.087	0.053	0.106
Married by t3	0.383*	0.086	0.150	0.110
Primary school or below (ref. Others[b])	0.294*	0.075	-0.141	0.079
Primary school or below by t1	0.242*	0.108	0.066	0.122
Primary school or below by t2	0.108	0.108	0.004	0.118
Primary school or below by t3	0.210	0.109	-0.119	0.121
Employment Yes (ref. No)	-0.543*	0.068	-0.459*	0.077
Employment Yes by t1	0.223*	0.095	0.342*	0.117
Employment Yes by t2	-0.155	0.098	0.323*	0.116
Employment Yes by t3	0.081	0.097	0.218	0.118
Urban (ref. Rural)	-0.346*	0.067	0.432*	0.082
Urban by t1	0.078	0.094	-0.121	0.123
Urban by t2	0.032	0.095	-0.323*	0.116
Urban by t3	0.064	0.093	-0.339*	0.118

Note: * = statistical significant at 0.05; [a] = single and divorced/widowed separated; [b] = middle or high school and college or above; Se = standard error; ref = reference.

Discussion

Thailand achieved universal health coverage by implementing the UCS in 2002. The UCS, successfully covering approximately 18 million uninsured people (approximately 30% of the entire population), has provided almost free healthcare access for approximately 47 million people (approximately 75% of the entire population). Thus, this study, using the nationwide HWS data from the year 2001 and 2003–2005, investigated how health-seeking behavior of the previously uninsured changed before and after the UCS.

The study found that before the UCS, people depended mostly on informal care (43.00%), followed by public facility care (33.84%) and private facility care (23.16%). After the UCS, the dependency on informal care significantly decreased (35.84% in 2003, 32.96% in 2004, and 32.55% in 2005), and at the same time, the dependency on public facility care significantly increased (46.82% in 2003, 45.02% in 2004, and 48.80% in 2005). Furthermore, the increase/decrease was more significant in lower income, female, lower educated, and married people.

Although we found time-interaction effects of the significant variables, further investigation in detail in detail. The study findings clearly showed that particularly for lower-income people, the UCS implementation significantly increased utilization of public facility care and simultaneously decreased utilization of informal care. However, for utilization of private facility care, any significant change was not clearly found. Regardless of the UCS implementation, private facility care was utilized by relatively high-income people. As consistent with the previous findings (Limwattananon et al., 2015), this study also showed that the increased utilization of public facility care by the UCS decreased utilization of informal care but did not influence utilization of private facility care.

The study findings imply that the UCS implementation could positively contribute to financial protection and equity as well as safety in healthcare access and utilization. For financial protection and equity, healthcare access and utilization are greatly influenced by OOP costs, thus, excessive OOP costs have been cited as one of the major threatening factors for equity in healthcare access and utilization. When a healthcare system becomes more dependent on OOP costs, it can cause people, especially low income or socially vulnerable people, to incur catastrophic healthcare expenditures which can drive them back into poverty (World Health Organization, 2013).

The UCS significantly increased utilization of public facility care requiring no or very minimal OOP costs for uninsured people, especially those with lower income level who previously had less accessibility and affordability of healthcare before the UCS in general. In this sense, the policy implementation could strengthen financial protection and accordingly improve equity in healthcare access and utilization.

In addition, the shift from informal care to public facility care may improve safety in healthcare utilization. Before the UCS, people depended mostly on informal care, in which a considerable proportion of informal care might include self-medication (e.g., OTC drugs and traditional/herbal medicine). Such self-medication is often done without a doctor's prescription and supervision, thus, inaccurate self-diagnosis, dosage, and treatment choices may include a serious safety issue which can cause a harmful effect on health (Ruiz, 2010). In this sense, the UCS could have a positive effect on such safety issue in healthcare utilization.

Nevertheless, the study also found that a substantial proportion of UCS beneficiaries (more than 50%) still utilized healthcare outside the UCS services boundary after the UCS. Specifically, approximately 20% of beneficiaries utilized private facility care regardless of the UCS implementation. For informal care, despite the significant decrease by the UCS, a substantial proportion of beneficiaries (approximately 35% of beneficiaries) still depended on informal care after the UCS.

In fact, there may be two different opinions regarding the high dependency on out-of-network services (or low utilization of the UCS services). On the one hand, the high utilization of out-of-network services could be considered an appropriate utilization if people utilized the services by their preferences and choices. If the out-of-network services were relatively affordable and accessible for people, especially those

with higher income level, then the high dependency cannot be a concern.

On the other hand, the high dependency includes a possibility that people did not want to but were obliged to utilize out-of-network services due to other access problems of the UCS services (rather than cost problems) such as transportation or no designated facilities in the area. If so, the high dependency implies that the UCS has a policy gap between beneficiaries' needs and services available to them (Paek, Meemon, & Wan, 2016).

Indeed, several previous studies have found high dependency on out-of-network services and cited insufficient healthcare resources in the public sector as one of the significant causes. Unequal distribution of public healthcare facilities between rural and urban areas still exists. As well, low private sector involvement in the UCS program partly due to low profit margins of the UCS capitation rate has been a policy concern about limited access to and utilization of the UCS services for beneficiaries (Kirdruang, 2011; Paek et al., 2016; Sakunphanit & Suwanrada, 2011; World Bank, 2007).

Some of the beneficiaries living in rural areas, which does not have or limited healthcare facilities, might have to depend on traditional medicines or healers, while others might be obliged to utilize OTC drugs or private clinics because of long wait-times or transportation. Thus, the UCS should continue an effort for increasing the public sector infrastructure and private sector involvement in order to alleviate the high dependency on out-of-network services.

Lastly, several limitations found in the study provide motivation for future study. First, the simplistic categorization of health-seeking behavior might not precisely capture the policy impact. Especially, the study combined OTC drugs and traditional medicines/ healers in the category of informal care. However, certain types of traditional medicine are widely available in public and private healthcare facilities. Also, traditional medicines and healers are provided by licensed traditional medicine clinics, which can be considered "private facility care" according to the definition of the study.

Since the HWS did not provide such information in detail (i.e., survey respondents could only select either traditional medicines/healers or health facilities), this study employed a similar categorization that the previous study employed (Limwattananon et al., 2015). Thus, a more precise categorization of health-seeking behavior is necessary for better understanding of the policy impact.

Second, health-seeking behavior differs by the severity of illness in general. Since the HWS is a survey data that include comprehensive demographic and socio-economic information but not a clinical one, the policy impact which was estimated without adjusting the severity of illness may be overestimated or underestimated. If future study can merge the HWS with clinical information (e.g., hospital administration data or medical claims data), it would provide a more accurate estimation of the policy impact.

Third, because the HWS is not a panel data, this study used PSM method to select uninsured people among UCS beneficiaries in the HWS 2003–2005. Even though the PSM method is a tool for reducing a selection bias and accordingly improving a comparability across the HWS data, the study findings may inevitably include undetected errors. Fourth, the study focused mostly on health-seeking behavior. However, cost analysis such as OOP cost analysis would provide an understanding of the policy impact in efficiency perspective. Also, health outcome evaluation (e.g., life expectancy or infant mortality rate) before and after the UCS would provide another meaningful insight on the policy impact.

Lastly, the study findings were found to be consistent with previous findings in general, in which the UCS (or health insurance program) significantly increased utilization of public facility care and simultaneously decreased utilization of informal care (Escobar et al., 2010; Fenny et al., 2014; Limwattananon et al., 2015; Pagán et al., 2006). Furthermore, we noticed that the policy impact found in this study (approximately 15% point increase) was much larger than that found in the previous study conducted in Thailand (approximately 3% point increase; Limwattananon et al., 2015). It may imply that the UCS impact might be more significant on the uninsured group than the MWS and VHCS groups, as mentioned, partly because the groups already had a free healthcare access before the UCS. Nevertheless, analytical methods, as well as a significance of

independent variables, differ across the studies. Thus, systematic investigation to examine the difference of the policy effects across the studies needs to be further performed to better understand the policy impact.

Conclusion

Although the UCS has remarkably improved equity and financial protection that resulted in increased healthcare access and utilization in public healthcare facilities, the adequacy and stability of the policy's financing are still major concerns for future success. On the supply side, brain drain (i.e., skilled healthcare workers moving from public to private sectors and from rural to urban areas) due to disparities in compensation and living conditions have long been documented as potential factors threatening future improvement of equity in healthcare access and utilization.

On the demand side, in the context of aging society together with economic development, healthcare needs are likely to increase and become more diversified. The shift in emphasis toward treating non-communicable diseases (NCDs), especially chronic diseases, in association with aging population creates new financial pressures to the policy. The low utilization of designated facility care and insignificant change in the utilization of private healthcare services among the UCS beneficiaries, as found in this study, reflect that the policy's financing might not be sufficient enough to cover the wide array of current and future healthcare needs. Therefore, the adequacy and stability of the policy's financing are critical for the future success of the UCS. In addition, the UCS should put more focus on long-term and elderly care as well as effective primary and secondary prevention of NCDs.

Acknowlegement

References

Aday, L. A., & Andersen, R. M. (1974). A framework for the study of access to medical care. *Health Services Research*, *9*(3), 208–220.

Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research*, *46*(3), 399–424. doi: 10.1080/00273171.2011.568786

Bradley, E. H., McGraw, S. A., Curry, L., Buckser, A., King, K. L., Kasl, S. V., & Andersen, R. (2002). Expanding the Andersen model: The role of psychosocial factors in long-term care use. *Health Services Research*, *37*(5), 1221–1242. doi: 10.1111/1475-6773.01053

Damrongplasit, K., & Melnick, G. A. (2009). Early results from Thailand's 30 Baht health reform: Something to smile about. *Health Affairs (Millwood)*, *28*(3), w457–w466. doi: 10.1377/hlthaff.28.3.w457

Damrongplasit, K., & Melnick, G. (2015). Funding, coverage, and access under Thailand's universal health insurance program: An update after ten years. *Applied Health Economics and Health Policy*, *13*(2), 157–166. doi: 10.1007/s40258-014-0148-z

Escobar, M. L., Griffin, C., & Shaw, R. P. (2010). *Impact of health insurance in low- and middle-income countries*. Washington, DC: Brookings Institution Press. Retrieved from https://www.brookings.edu/wp-content/uploads/2016/07/theimpactofhealthinsurance_fulltext.pdf

Fenny, A. P., Asante, F. A., Enemark, U., & Hansen, K. S. (2014). Treatment-seeking behaviour and social health insurance in Africa: The case of Ghana under the National Health Insurance Scheme. *Global Journal of Health Science*, *7*(1), 296–314. doi: 10.5539/gjhs.v7n1p296

Galárraga, O., Sosa-Rubí, S. G., Salinas-Rodríguez, A., & Sesma-Vázquez, S. (2010). Health insurance for the poor: Impact on catastrophic and out-of-pocket health expenditures in Mexico. *The European Journal of Health Economics*, *11*(5), 439–447.

Gokhale, N., & Nuvvula, S. (2016). Influence of socioeconomic and working status of the parents on the incidence of their children's dental caries. *Journal of Natural Science, Biology, and Medicine*, *7*(2), 127–129. doi: 10.4103/0976-9668.184697

Gotsadze, G., Zoidze, A., Rukhadze, N., Shengelia, N., & Chkhaidze, N. (2015). An impact evaluation of medical insurance for poor in Georgia: Preliminary results and policy implications. *Health Policy and Planning*, *30*(suppl 1), i2–i13. doi: 10.1093/heapol/czu095

Gruber, J., Hendren, N., & Townsend, R. M. (2014). The great equalizer: Health care access and infant mortality in Thailand. *American Economic Journal: Applied Economics*, *6*(1), 91–107. doi: 10.1257/app.6.1.91

Hedeker, D. (2003). A mixed-effects multinomial logistic regression model. *Statistics in Medicine*, *22*(9), 1433–1446. doi: 10.1002/sim.1522

Hedeker, D. (2007). Multilevel models for ordinal and nominal variables. In J. de Leeuw & E. Meijer (Eds.), *Handbook of multilevel analysis* (pp. 237–274). New York, NY: Springer. Retrieved from https://link.springer.com/content/pdf/10.1007%2F978-0-387-73186-5.pdf

Health Insurance System Research Office. (2012). *Thailand's universal coverage scheme: Achievements and challenges. An independent assessment of the first 10 years (2001-2010)*. Nonthaburi, Thailand: HISRO. Retrieved from http://www.social-protection.org/gimi/gess/ShowRessource.action?ressource.ressourceId=28441

Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression* (2nd ed.). New York, NY: Wiley.

Isong, I. A., Zuckerman, K. E., Rao, S. R., Kuhlthau, K. A., Winickoff, J. P., & Perrin, J. M. (2010). Association between parents' and children's use of oral health services. *Pediatrics*, *125*(3), 502–508. doi: 10.1542/peds.2009-1417

Kirdruang, P. (2011). *Essays in economics of public health insurance in developing countries: Evidence from Thailand and Vietnam* (Unpublished doctoral dissertation). Retrieved from the University of Minnesota Digital Conservancy, http://hdl.handle.net/11299/119863

Kondo, A. & Shigeoka, H. (2013). Effects of universal health insurance on health care utilization, and supply-side responses: Evidence from Japan. *Journal of Public Economics*, *99*, 1–23. Retrieved from https://doi.org/10.1016/j.jpubeco.2012.12.004

Limwattananon, S., Neelsen, S., O'Donnell, O., Prakongsai, P., Tangcharoensathien, V., Doorslaer, E. V., & Vongmongkol, V. (2015). Universal coverage with supply-side reform: The impact on medical expenditure risk and utilization in Thailand. *Journal of Public Economics*, *121*, 79–94. Retrieved from https://doi.org/10.1016/j.jpubeco.2014.11.012

Limwattananon, S., Tangcharoensathien, V., & Prakongsai, P. (2007). Catastrophic and poverty impacts of health payments: Results from national household surveys in Thailand. *Bulletin of the World Health Organization*, *85*(8), 600–606. doi: 10.2471/BLT.06.033720

Lo, K. M., & Fulda, K. G. (2008). Impact of predisposing, enabling, and need factors in accessing preventive medical care among U.S. children: Results of the national survey of children's health. *Osteopathic Medicine and Primary Care*, *2*, 12. doi: 10.1186/1750-4732-2-12

NaRanong, V., & NaRanong, A. (2006). Universal health care coverage: Impacts of the 30-baht health-care scheme on the poor in Thailand. *Thailand Development Research Institute (TDRI) Quarterly Review*, *21*(3), 3–10. Retrieved from http://tdri.or.th/wp-content/uploads/2012/09/t5s2006.pdf

Organisation for Economic Co-operation and Development. (2009). *What are equivalence scales*? OECD Publishing. Retrieved from http://www.oecd.org/eco/growth/OECD-Note-EquivalenceScales.pdf

Paek, S. C., Meemon, N., & Wan, T. T. (2016). Thailand's universal coverage scheme and its impact on health-seeking behavior. *Springerplus*, *5*(1), 1952. doi: 10.1186/s40064-016-3665-4

Pagán, J. A., Ross, S., Yau, J., & Polsky, D. (2006). Self-medication and health insurance coverage in Mexico. *Health Policy*, *75*(2), 170–177.

Ruiz, M. E. (2010). Risks of self-medication practices. *Current Drug Safety*, *5*(4), 315–323.

Sakunphanit, T. (2006). *Thailand: Universal health care coverage through pluralistic approaches*. ILO Subregional Office for East Asia. Retrieved from http://www.ilo.org/secsoc/information-resources/publications-and-tools/Workingpapers/WCMS_SECSOC_6612/lang--en/index.htm

Sakunphanit, T., & Suwanrada, W. (2011). The universal coverage scheme. In ILO, SU/SSC, & UNDP (Eds.), *Sharing innovative experiences: Successful social protection floor experiences* (pp. 385–400). New York, NY: UNDP. Retrieved from http://www.ilo.org/secsoc/information-resources/publications-and-tools/books-and-reports/WCMS_SECSOC_20840/lang--en/index.htm

Somkotra T., & Lagrada, L. P. (2009). Which households are at risk of catastrophic health spending: Experience in Thailand after universal coverage. *Health Affairs (Millwood)*, *28*(3), w467–w478. doi: 10.1377/hlthaff.28.3.w467

Supakankunti, S. (2001). *Determinants of demand for health card in Thailand* (HNP discussion paper series). Washington, DC: World Bank. Retrieved from http://documents.worldbank.org/curated/en/186631468760538021/Determinants-of-demand-for-health-card-in-Thailand

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*(3), 272–284. doi: 10.1016/j.healthpol.2004.11.019

Tangcharoensathien, V., Pitayarangsarit, S., Patcharanarumol, W., Prakongsai, P., Sumalee, H., Tosanguan, J., & Mills, A. (2013). Promoting universal financial protection: How the Thai universal coverage scheme was designed to ensure equity. *Health Research Policy and Systems*, *11*, 25. doi: 10.1186/1478-4505-11-25

Tangcharoensathien, V., Prakongsai, P., Limwattananon, S., Patcharanarumol, W., & Jongudomsuk, P. (2007). *Achieving universal coverage in Thailand: What lessons*

do we learn? Health System Knowledge Network, WHO Commission on Social Determinants of Health. http://dx.doi.org/10.2139/ssrn.1111870

Towse, A., Mills, A., & Tangcharoensathien, V. (2004). Learning from Thailand's health reforms. *BMJ, 328*, 103–105. doi: https://doi.org/10.1136/bmj.328.7431.103

World Bank. (2007). *Health care financing in Thailand: Modeling and sustainability*. Washington, DC: World Bank. Retrieved from http://documents.worldbank.org/curated/en/875351468305329741/Health-care-financing-in-Thailand-modeling-and-sustainability

World Health Organization. (2013). *The world health report 2013: Research for universal health coverage*. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/whr/2013/report/en/

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray. C. J. (2003). Household catastrophic health expenditure: A multicountry analysis. *The Lancet, 362*(9378), 111–117.

Zhang, Y., Zhou, Z., & Si, Y. (2017). The role of parental health care utilization in children's unnecessary utilization in China: Evidence from Shaanxi province. *International Journal for Equity in Health. 16*(1), 47. doi: 10.1186/s12939-017-0544-8