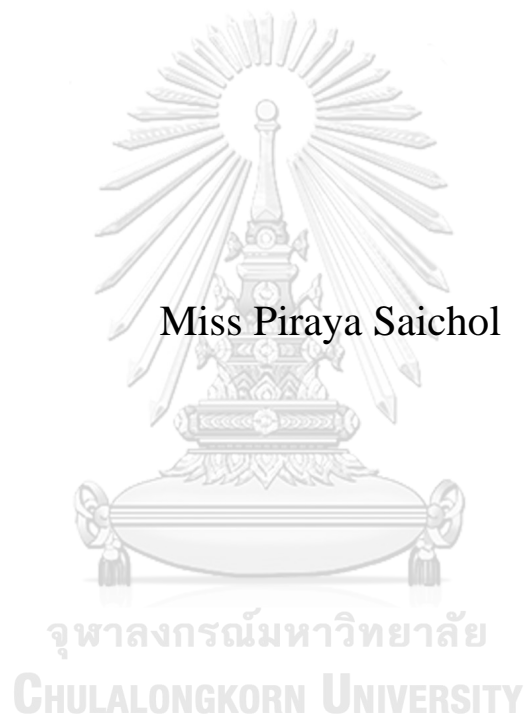


**DETERMINANTS OF HEALTHCARE UTILIZATION AND
OUT – OF – POCKET EXPENDITURE IN THAILAND**



A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Health Economics and Health
Care Management
Common Course
FACULTY OF ECONOMICS
Chulalongkorn University
Academic Year 2019
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ปัจจัยที่ส่งผลต่อการใช้บริการสุขภาพและค่าใช้จ่ายที่ผู้ป่วยจ่ายเองในประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาเศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ ไม่สังกัดภาควิชา/เทียบเท่า

คณะเศรษฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Thesis Title DETERMINANTS OF HEALTHCARE
 UTILIZATION AND OUT – OF – POCKET
 EXPENDITURE IN THAILAND
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Field of Study Health Economics and Health Care Management
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พริณาม์ สายชล : ปัจจัยที่ส่งผลต่อการใช้บริการสุขภาพและค่าใช้จ่ายที่ผู้ป่วยจ่ายเองในประเทศไทย. (DETERMINANTS OF HEALTHCARE UTILIZATION AND OUT – OF – POCKET EXPENDITURE IN THAILAND) อ.ที่ปรึกษาหลัก : รศ. ดร.ชันทาล แฮร์เบอร์โฮลต์

การสร้างระบบประกันสุขภาพถ้วนหน้าในปี 2545 ในประเทศไทยประสบความสำเร็จอย่างมากในการเพิ่มการให้บริการสาธารณสุขและลดค่าใช้จ่ายจากการใช้บริการสุขภาพ การศึกษาส่วนใหญ่ในประเทศไทยนั้นเน้นการศึกษาการเปลี่ยนแปลงของการใช้บริการสุขภาพและค่าใช้จ่ายที่เกิดจากการสร้างระบบประกันสุขภาพถ้วนหน้า แต่ทว่ายังไม่มีการศึกษาใดที่ศึกษาถึงความแตกต่างระหว่างการใช้บริการสุขภาพและค่าใช้จ่ายที่เกิดจากการให้บริการระหว่างระบบประกันสุขภาพหลักของรัฐสามระบบได้แก่ ระบบประกันสุขภาพถ้วนหน้า ระบบประกันสังคม และสิทธิการรักษาข้าราชการ ดังนั้น การศึกษานี้จึงมีจุดมุ่งหมายเพื่อศึกษาความแตกต่างของการใช้บริการสุขภาพและค่าใช้จ่ายที่เกิดจากการให้บริการสุขภาพระหว่างระบบประกันสุขภาพของรัฐสามระบบ โดยมุ่งเน้นการให้บริการผู้ป่วยนอกเป็นหลัก โดยใช้ข้อมูลจากแบบสำรวจอนามัยและสวัสดิการปี 2560 นอกจากนี้ เนื่องจากแต่ละภูมิภาคในประเทศไทยมีความแตกต่างกัน การศึกษานี้จึงได้ศึกษาความแตกต่างของแต่ละภูมิภาคในการใช้บริการสุขภาพและค่าใช้จ่ายที่เกิดขึ้นด้วย การศึกษานี้ใช้ *multinomial logit model* ในการวิเคราะห์การให้บริการสุขภาพ และ *two – part model* ในการวิเคราะห์ค่าใช้จ่ายที่เกิดจากการใช้บริการสุขภาพ ผลที่ได้ค้นพบคือ ผู้ที่มีสิทธิประกันสังคมไปใช้บริการสุขภาพที่สถานพยาบาลมากกว่าผู้ที่มีสิทธิประกันสุขภาพถ้วนหน้า แต่ทว่าผลลัพธ์นี้สามารถพบได้แต่ในเขตกรุงเทพและภาคกลางเท่านั้น การใช้สิทธิการรักษาของรัฐสามารถลดค่าใช้จ่ายโดยรวมและค่าใช้จ่ายทางตรงจากการใช้บริการสุขภาพได้ และผู้ใช้สิทธิประกันสุขภาพมีค่าใช้จ่ายในการเดินทางมากกว่าคนที่ไม่ได้ใช้ ผู้ที่ใช้สิทธิประกันสุขภาพถ้วนหน้ามีค่าใช้จ่ายโดยรวม ค่าใช้จ่ายทางตรง และค่าใช้จ่ายจากการเดินทางไปใช้บริการสุขภาพน้อยที่สุด บุคคลที่อาศัยนอกกรุงเทพมีค่าใช้จ่ายโดยรวมที่เกิดจากการใช้บริการสุขภาพและค่าใช้จ่ายในการเดินทางต่ำกว่าบุคคลที่อาศัยอยู่ในกรุงเทพ โดยรวมแล้ว ผลของการศึกษาชี้ให้เห็นว่า ระบบประกันสุขภาพถ้วนหน้าประสบความสำเร็จเป็นอย่างมากในการลดค่าใช้จ่ายที่เกิดขึ้นจากการใช้บริการสุขภาพ และภูมิภาคที่อยู่อาศัยมีผลต่อการใช้บริการสุขภาพและค่าใช้จ่ายที่เกิดขึ้นกับการใช้บริการสุขภาพ การศึกษานี้ชี้ให้เห็นถึงความแตกต่างระหว่างระบบประกันสุขภาพของรัฐสามระบบหลักและความแตกต่างในการใช้บริการสุขภาพและค่าใช้จ่ายที่เกิดขึ้นระหว่างภูมิภาค ซึ่งควรมีการพัฒนาเพื่อเพิ่มความเท่าเทียมในการใช้บริการสุขภาพให้แก่คนไทยทุกคน

จุฬาลงกรณ์มหาวิทยาลัย
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สาขาวิชา	เศรษฐศาสตร์สาธารณสุขและการจัดการ บริการสุขภาพ	ลายมือชื่อนิสิต
ปีการศึกษา	2562	ลายมือชื่อ อ.ที่ปรึกษาหลัก

6284140629 : MAJOR HEALTH ECONOMICS AND HEALTH CARE
MANAGEMENT

KEYWORD healthcare utilization, out - of - pocket expenditure, health insurance
D: status, outpatient services

Piraya Saichol : DETERMINANTS OF HEALTHCARE UTILIZATION
AND OUT – OF – POCKET EXPENDITURE IN THAILAND. Advisor:
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Thailand launched the Universal Coverage Scheme (UCS) in 2001 and most studies are focusing on the impact of the UCS on healthcare utilization and out-of-pocket (OOP) expenditure. None of the studies, however, examines healthcare utilization and OOP expenditure across the three main public health insurance schemes, i.e. UCS, Social Security Scheme (SSS), and Civil Servant Medical Benefit Scheme (CSMBS). Therefore, this study aims to examine the impact of health insurance status and use of health insurance on outpatient service utilization and healthcare OOP expenditure by using the 2017 Health and Welfare Survey data. Given large income and other disparities across Thailand's regions, regional differences are also explored. The study employed a multinomial logit model for the analysis of healthcare utilization and a two-part model for the analysis of healthcare OOP expenditure. The results reveal that the SSS beneficiaries are more likely to seek care at healthcare facilities than the UCS beneficiaries, but this is only observed in the Bangkok and central region. The use of public health insurance is found to decrease the amount of OOP expenditure, conditional on incurring OOP, in case of total healthcare cost and direct medical cost, while it increases the amount of OOP expenditure in case of transportation cost. Individuals who use the UCS incur the lowest amount of OOP spending in terms of total healthcare cost, direct medical cost and transportation cost. In addition, people who live outside of Bangkok incur lower OOP for total healthcare cost and transportation cost than those living in Bangkok. Overall, the results suggest that the UCS is very successful in creating financial protection for the majority of Thai citizens. The area of residence is found to have an impact on both healthcare utilization, as well as probability of incurring OOP and amount of OOP expenditure. These findings raise some concerns about the inequality across the three public health insurance schemes and the regional disparities in Thailand, which should be solved in order to increase equality in healthcare utilization across the Thai population.

Field of Study:	Health Economics and Health Care Management	Student's Signature
Academic Year:	2019	Advisor's Signature

ACKNOWLEDGEMENTS

First of all, I would like to express my deep gratitude to my advisor, Assoc. Prof. Chantal Herberholz, Ph.D., for her strong support and enthusiastic encouragement throughout the process, with out her patience and precise guidance, my work would not be completed.

I would also like to extend my thanks to the chairperson and committee, Assoc. Prof. Kannika Damrongplisit, Ph.D. and Assoc. Prof. Sauwakon Ratanawijitrasin, Ph.D. for their valuable guidance during the thesis proposal defense process.

Finally, I want to express my thanks to my family and friends for their strong support throughout the study.

Piraya Saichol



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ABBREVIATIONS

ASEAN	The Association of Southeast Asian Nations
CHE	Current Expenditure on Health
CHNS	China Health and Nutrition Survey
CSMBS	Civil Servant Medical Benefits Scheme
DHS	Demographic and Health Survey
DRC	Democratic Republic of Congo
EA	Enumeration Area
EXT	External Health Expenditure
GGHE-D	Domestic General Government Health Expenditure
GLM	Generalized Linear Model
HWS	Health and Welfare Survey
MOPH	Ministry of Public Health
MWS	Medical Welfare Scheme
NLEM	National List of Essential Medicines
NHSO	National Health Security Office
NSO	National Statistical Office
OLS	Ordinary Least Square
OOP	Out – of – Pocket Expenditure
PVT-D	Domestic Private Health Expenditure
SEMB	State Enterprises Medical Benefit Scheme
SES	Socioeconomic Survey
SSO	Social Security Office
SSS	Social Security Scheme
TAM	Traditional and Alternative Medicine
UC	Universal Coverage
UCS	Universal Coverage Scheme
VHCS	Voluntary Health Card Scheme
VHI	Voluntary Health Insurance
WCF	Workmen’s Compensation Fund

CHAPTER 1

INTRODUCTION

1.1 Motivation and Significance

The Thai citizens are covered by three main public health insurance schemes which are created to ensure that people can access to the healthcare they need without exposure to financial burden (Sakunphanit, 2006). The first scheme is the Civil Servant Medical Benefit Schemes (CSMBS) developed in 1978 for the government employee and their dependents. Second is Social Security Scheme (SSS) established in 1990 for the employee in private formal sector. The largest scheme is the Universal Coverage Scheme (UCS) established in 2002 which is for people that do not eligible for the CSMBS, SSS and other state medical benefits. In 2019, CSMBS covered around 8% of the total population, following by SSS 19% and UCS 71% of the total population. The other 2% left include those under other types state benefits, stateless people and qualified non – registered UCS beneficiaries (National Health Security Office [NHSO], 2019; Sakunphanit, 2006)

The three public health insurance schemes have different characteristics. The UCS and CSMBS are financed by the general tax while the SSS is the contribution between employee, employer and the government. They also differ in term of healthcare provider choice and the coverage of the benefit packages, in which these differences can lead to the difference in healthcare utilization and out – of – pocket (OOP) expenditure across the three beneficiaries' group. So, it is very important to understand the impact of different type of health insurance towards the use of health services and OOP spending. However, this kind of literature still not exists in Thailand.

Most of the empirical studies in Thailand on healthcare utilization for both outpatient and inpatient services, and healthcare OOP expenditure focus on the impact of UCS reform in 2002. All the empirical studies have consistent findings, that the UCS reform increased the utilization of outpatient and inpatient services in designated facilities (the healthcare facilities in which the UCS beneficiaries need to register to

use their benefits). Moreover, the UCS created financial protection by reducing healthcare OOP expenditure for each individual and thus reduced number of households facing catastrophic health expenditure. (Damrongplasit & Melnick, 2009; HISRO, 2012; Limwattananon et al., 2013; Limwattananon et al., 2015; Tangcharoensathien et al., 2013; Tangcharoensathien, Prakongsai, Limwattananon, Patcharanarumol, & Jongudomsuk, 2007)

Apart from health insurance status and financial affordability, the availability of services also affects access to healthcare services and healthcare utilization (National Academies of Sciences & Medicine, 2018). There are unequal distribution of healthcare facilities across the regions in Thailand, as Bangkok – the capital city – is highly condensed of healthcare facilities while the other regions especially in the north and northeast has low number of healthcare facilities (National Statistical Office [NSO], 2019b). The other regional disparities are income, in which people living in Bangkok earn the highest income while those living in the north and northeast earn relatively low income (NSO, 2017). Since people are free to opt out from their public health insurance schemes which is mainly tied to public facilities, so high income earners can decide to pay OOP by using private facilities or buy medicines from drug stores, and thus can affect the differences of the level of healthcare OOP expenditure across the regions.

The study from Okunade, Suraratdecha, and Benson (2010) which focus on the income elasticity on household healthcare expenditure during the economic shocks (1994 – 2000) and include the region of residence into the analysis found that households resided outside Bangkok (the central part, north, northeast and south) pay lower healthcare OOP expenditure than the households resided in Bangkok, which indicates that the area of residence also has an impact on the healthcare utilization and thus the OOP expenditure. However, there is still no recent study in Thailand that examines the differences of healthcare utilization and OOP expenditure across the regions.

To fill these gaps in the literature, this study aims to examine the determinants of healthcare utilization and OOP expenditure, focusing on outpatient services across all the three main public health insurance schemes (UCS, SSS, CSMBS) and also

explore the regional differences of outpatient services utilization and OOP expenditure.

1.2 Research questions

The research question for the study is “What are the determinants of healthcare utilization and out – of – pocket expenditure for outpatient services in Thailand?”

1.3 Objectives

The general and specific objectives of the study is as follow

General objectives

To explore the determinants of healthcare utilization and out – of – pocket expenditure for outpatient services in Thailand.

Specific objectives

The specific objectives are:

To examine the association of health insurance status, regions of residence and socio – demographic factors with utilization of outpatient services.

To examine the relationship between use of public health insurances, regions of residence and socio – demographic factors with OOP expenditure conditional on utilization of outpatient services.

1.4 Hypotheses

It is hypothesized that, people who are covered by the CSMBS are more likely to utilize outpatient services from healthcare facilities than people covered by SSS and UCS, and those who use the CSMBS to receive health services incur lower OOP expenditure than people who use UCS and SSS. Since the CSMBS benefit package is the most comprehensive package across the public health insurance schemes.

For the differences across the regions of residence, those living in Bangkok are more likely to utilize health services from healthcare facilities and pay more OOP than those living in other regions (the central, north, northeast, and south). Since Bangkok is the capital city which is highly condensed in public and private healthcare facilities compare with the other regions. In addition, those living in Bangkok earn the highest income and thus they might decide to opt out from their public health insurance and pay OOP to seek care from private facilities or more likely to buy medicines from drug stores.

1.5 Scope of the study

The study used secondary data from Health and Welfare Survey 2017 conducted by National Statistical Office. The number of households covered is 23,411 households with 65,781 total number of respondents. The study includes those who aged 18 years and above, covered by UCS, SSS or CSMBS and reported experiencing non – hospitalized illness in the last 30 days. For the analysis of healthcare utilization, 7,351 observations are used. For the analysis of healthcare OOP expenditure, 6,467 observations who reported seeking care and 5,381 observations who reported seeking care at healthcare facilities due to chronic and congenital diseases, total is 11,759 observations, are included in the analysis.

1.6 Possible benefits

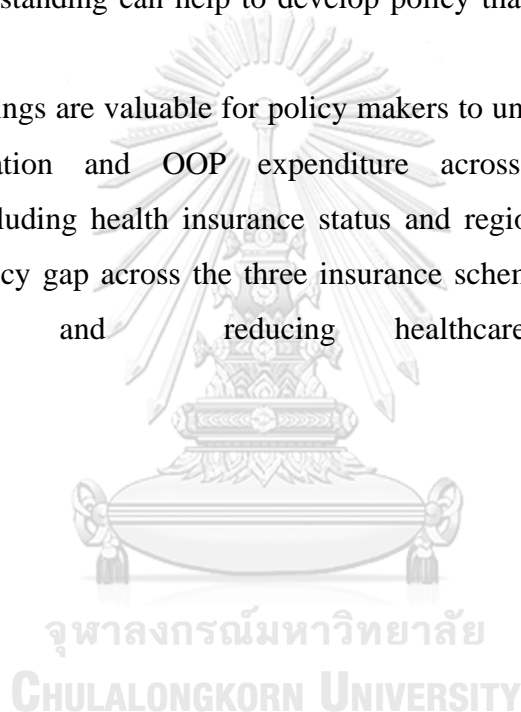
The study provides 3 main benefits for the policy implication.

The first benefit is, if the study finds any differences of healthcare utilization across the UCS, SSS or CSMBS beneficiaries, and the differences of OOP expenditure when using different type of health insurance to cover the health services, this reflects the difference characteristics across the three schemes including the benefit packages and type of healthcare provider. Which can reveal how these differences have an impact on the use of health services and healthcare OOP expenditure.

The second benefit is, if the study finds out that there are differences of healthcare utilization and OOP expenditure across the regions in Thailand, this reflects many dimensions of regional disparities in Thailand, for example, distribution of healthcare facilities, health workforce or income, which have long been an issue for Thailand.

The third benefit is, if any of the socio - demographic factors have an impact on healthcare utilization and out – of – pocket expenditure, this could be used to indicate socially vulnerable group e.g. elderly, poor, or people living in rural area, in which these understanding can help to develop policy that can protect this group of people.

These findings are valuable for policy makers to understand the differences of healthcare utilization and OOP expenditure across people with different characteristics including health insurance status and regions of residence, and thus help reducing policy gap across the three insurance schemes, increase utilization of health services and reducing healthcare OOP expenditure.



CHAPTER 2

BACKGROUND

2.1 Health Insurance System in Thailand

2.1.1 Public health insurance system

2.1.1.1 Development of the health insurance schemes

The Thai health insurance system has a long history beginning at around 1970 with Fee Exemption system designed to covered poor people. Today, there are three main insurance schemes which cover three groups of Thai citizens: Employee in private formal sector, employee in public sector, and those people who work in informal private sector who are not eligible for the 2 previous schemes (Sakunphanit, 2006). The development of each health benefit scheme is briefly provided as follow.

Schemes for employee in private formal sector

The first scheme that was introduce in 1974 was Workmen's Compensation Fund (WCF), manage by Department of Labor under the Ministry of Interior, aimed to cover work related injuries or illnesses. The second scheme introduced in 1990 is Social Security Scheme (SSS) that cover non – work related injuries or illnesses. The SSS fund is a contribution between employee, employer and the government. The government has set up Social security Office (SSO), under Ministry of Labor, to manage the scheme, and then WCF was transferred to be under SSO management (Sakunphanit, 2006).

Schemes for employee in public sector

The public employee schemes were introduced as a fringe benefit for government employee as a compensation for their low – salary level. The main scheme is Civil Servant Medical Benefits Scheme (CSMBS) which introduced in 1978. The scheme is solely financed by the government, managed by Comptroller's

General Department, Ministry of Finance. There are others similar health benefits including State Enterprises Medical Benefit Scheme (SEMB), health insurance for local government employee and public organization employee (Sakunphanit, 2006).

Schemes for informal sector

These include all citizens that do not cover by above mentioned schemes. Nowadays, people in this group which account for 71% of the total population are covered by Universal Coverage Scheme (NHSO, 2019). Before the introduction of UCS in 2002, there were mainly 3 schemes covered people in this group, which are Medical Welfare Scheme (MWS), Type B Fee Exemption Scheme, and Voluntary Health Card Scheme (VHCS). The MWS and Type B Fee Exemption Scheme aimed to cover the poor population in the country. The MWS covered those who were previously low – Income card holders (issued by the government for people who have lower income than the poverty line). The scheme later extended their coverage to socially vulnerable group such as elderly, disabled, and children age under 12. For Type B Fee Exemption Scheme, this cover the poor people who were not the low – income card holders, not covered by other health insurance schemes and request for free care. Those two schemes were highly publicly subsidized, and people could get medical services at free of charge. Another scheme being introduced was VHCS, which tried to cover the non – poor population that did not cover by other health insurance schemes. It was voluntary health insurance which a household could pay 500 baht for one year used of VHCS card. However, those 3 schemes were facing many problems. The MWS faced “mismatching” population because of difficulties in income assessment to define the poor population. Type B Fee Exemption Scheme did not have formal budget allocation, so it created revenue loss to the healthcare facilities. The VHCS faced “adverse selection” problem, since it was found out that the annual cost per card exceeds the revenue of the card (500 Baht). The other significant problems include the appropriateness of the benefit packages, budget allocation and funding, identification of the number of people covered by each scheme and overlapping of each scheme (Pannarunothai, 2002). Moreover, there were still 18 million people or 30% of the entire population being uninsured (HISRO, 2012).

To solve these problems, the government introduced Universal Coverage Scheme. The pilot phase was in 2001 covered 6 provinces in Thailand, then the UCS was implemented nationwide in 2002. National Health Security Office (NHSO) was established to manage the scheme. Since that time, all Thai citizens are covered under 3 main insurance schemes: CSMBS and other public employee benefits, SSS and UCS (HISRO, 2012).

The UCS includes wide range of benefits: curative, preventive, promotion, rehabilitation and annual health - checkup services. The package also includes Thai traditional and alternative (TAM) medicine services. At first UCS beneficiaries needed to pay 30 – baht to receive services at healthcare facilities, except previously MWS that could get free of charge healthcare services. But the 30 – Baht copayment was terminated in 2006, and all the UCS beneficiaries could receive health services free of charge at the point of services (Sakunphanit, 2006).

The UCS beneficiaries need to go to registered healthcare facilities to receive health services, which generally the closest primary care unit that served as a first contact point. If the services that the beneficiaries should receive exceed the capacity of the first contact facilities, the beneficiaries will be transferred to secondary or tertiary care facilities via referral system. If the beneficiaries go to other public facilities than the designated facilities, the beneficiaries need to pay fully OOP, except the case of emergency or accident (Sakunphanit, 2006).

2.1.1.2 Current status for health insurance schemes

Civil Servant Medical Benefits Scheme

The scheme is a very comprehensive package, providing for civil servants, pensioner and their dependents (parents, spouse, and children age under 20). The scheme uses reimbursement model and fully financed by the general tax. The payment method was fee – for service for outpatient services and Drug – Related Diagnosis (DRG) group for inpatient services. However, the scheme always faces with high demand and rapid increase of medical expenditure. In 2018, the budget allocated for the scheme was around 63,000 million Baht, which is very high when

compare with the number of beneficiaries at 5 million people (Comptroller's General Department [CGD], 2018; Sakunphanit, 2006)

The CSMBS beneficiaries can receive services from any public facilities free of charge, and the benefits also include emergency care at private hospitals. Additionally, there are 210 private facilities in contract for specific condition of radiology for cancer treatment and dialysis (CGD, 2017).

Social Security Scheme

SSS cover non - work related injuries or illnesses for employee in the private formal sector, with the establishments of more than 1 person. The Social Security Fund is the contribution between employee, employer, and the government. So, the monthly payment of the employee will be deducted at 5%, employer at the same rate of 5%, and the government contribution of 2.75%. From this pool of fund 12.75%, 4.5% is for health benefits including disability, death and childbirth, 7% is for children support and financing support when becoming elderly. The last portion 1.25% is for the support during unemployment.

The benefits include free healthcare services at the contracted public or private hospitals (with exclusion lists of 13 diseases), which is generally the nearest facilities in the residence area. If the patient's conditions exceed the capacity of the contracted facilities, patients will be transferred to the higher care facilities via referral system. For the emergency care, the beneficiaries can go to any nearest hospitals and get reimbursement later within a specified limit. The benefits also include payment subsidy in case of maternity, children support, unemployment, disability, elderly and death (Social Security Office [SSO], 2018).

The payment method for outpatient and inpatient services are capitation. The capitation payment is 3,959 baht/person/year beginning in 2020 (hfocus, 2020). In 2019, the total expenses of the Social Security Fund were around 73,000 million Baht (SSO, 2019). In 2020, the number of the main contracted hospitals are 242 hospitals, which comprised of 163 public hospitals and 79 private hospitals. The number of subcontractor is 2,210 facilities (SSO, 2020a).

For Workmen's Compensation Fund. This is the yearly contribution of employee with establishments of more than 1 person, the same as SSS, to cover work

– related injuries or illnesses. The rate of contribution is 0.2 – 1.0% depends on the nature of the risk of each business. The benefits include healthcare service, rehabilitation service, funeral fee and payment subsidy in case of work absenteeism, loss of organs, disability and death, in which the payment is transferred to the dependents. The choice of hospitals is free choice. (SSO, 2020b).

Universal Coverage Scheme

The 30 - Baht copayment scheme was terminated in 2006 and then reinstated in September 2012 with some exception conditions: emergency case, prevention and promotion activity, service without any prescription drug, and patients who visits health-care facilities under community hospital level. However, those who do not want to pay 30 Baht can declare their intention and they can get services free of charge (Damrongplisit & Melnick, 2015). UCS is a comprehensive package, which provide wide range of health services for Thai people at very low price, and fully finance by general tax. The exclusion lists in the benefit package is similar with the SSS. The beneficiaries need to have services at the designated public or private facilities, which generally a primary care unit, and required registration first (Sakunphanit, 2006).

The payment method for healthcare provider is capitation with outpatient services and DRG with global budget for inpatient services (Sakunphanit, 2006). In 2019 the total UCS budget was 181,584 million Baht, and the capitation payment for each beneficiary was 3,464 Baht (NHSO, 2019). The number of main contractors is 1,360 in which the number of private hospitals is 281 hospitals. The number of contracted primary care unit are 11,750 facilities and 310 facilities are private facilities (NHSO, 2019).

For the number of populations covered by public health insurance schemes, table 1 shows that UCS, SSS and CSMBS covered around 98% of the total population, while the other type of public health insurance covered around 1% of the total population. The medical benefits of local administrative officers are under the supervision of Ministry of Interior, while the medical benefits of private school teachers are under the supervision of Ministry of Education.

Table 1: Number of populations under public health insurance schemes in 2019

<i>Type of security scheme</i>	<i>Number of people(million)</i>	<i>Percentage</i>
<i>Universal Coverage Scheme</i>	47.523	71.394
<i>Social Security Scheme</i>	12.584	18.905
<i>Civil Servant and State Enterprise Medical Benefit Scheme</i>	5.149	7.735
<i>Local Administrative Officers</i>	0.626	0.940
<i>Private School Teachers</i>	0.087	0.131
<i>Disability Person in Social Security Schemes</i>	0.017	0.026
<i>Qualified non-registered UCS</i>	0.056	0.084
<i>Stateless people</i>	0.522	0.784
<i>Total</i>	66.564	100

Source: Universal Coverage Scheme Annual Report 2019 (NHSO, 2019).

* The number of SSS beneficiaries reported in “Quarterly Report of Social Security Fund, Third Quarter 2019” is 16,457,941 people

Note: For the migrant workers in Thailand which estimated to be 3.2 million, the legal worker are entitled to the SSS if they are working in private formal sector, but the majority are unskilled worker working in informal sector, those are covered by “Health insurance card scheme for migrants”, but some certain numbers still not being covered, including illegal migrants (Suphanchaimat, Putthasri, Prakongsai, & Tangcharoensathien, 2017).

For the differences in socio – demographic characteristics across the group of beneficiaries. In overall, those who are not UCS beneficiaries are concentrated among the better – off population. Suraratdecha, Saithanu, and Tangcharoensathien (2005) used the data from Socioeconomic Survey (SES) 2002 conducted by the NSO and performed the concentration curves among the Gold Card scheme (GC) group (those entitled to Gold Card scheme) and the non – GC group (those covered by CSMBS, SSS, SEMB, others). The results revealed that the non – GC group are concentrated among the better – of population while the GC group are concentrated among the poor population. The study from Tangcharoensathien et al. (2007) used the data from Health and Welfare Survey (HWS) 2004 conducted by the NSO and found that people entitled to the UCS are mostly the poor, as 25% belongs to the poorest quintiles and 25% belongs to the poor quintile. On the other hand, most of the CSMBS and SSS beneficiaries are among the rich population, as 52% of CSMBS beneficiaries belongs

to the richest quintile and 49% of the SSS beneficiaries belongs to the richest quintiles.

Similar to the findings from Limwattananon et al. (2015) which used the data from SES 2000 and 2004 to estimate the impact of UCS reform in 2002. Since the SES 2000 does not record the individual health insurance status, so the study used employment sector to proxy the health insurance status. The treatment group are the household in which none of the member are public sector employee and not every member is working in private formal sector, so this household should not be fully covered by the CSMBS or SSS. The comparison group is the household which have only public sector employee and their dependents and should be covered by CSMBS. Household which has only those working private formal sector which should be covered by SSS was excluded, since the coverage of SSS is expanded during that time. With this method, in 2004 there are 84% of individuals in the treatment group covered by UCS. The findings from the year 2000 – 2004 have the same pattern, that individual in the comparison group have higher income, concentrated in urban area and have higher education (40% of the adult member in comparison group completed higher than secondary school while only 4% of the treatment group completed higher than secondary school in 2000). Moreover, the comparison group also has higher mean age of household members (33 years vs 29 years in 2000) and higher proportion of female members than the treatment group.

Table 2: Comparison of benefit packages across three public insurance schemes

<i>Characteristics</i>	<i>UCS</i>	<i>CSMBS</i>	<i>SSS</i>
<i>Overview of healthcare services</i>	Comprehensive package, including health promotion and prevention programs, screening programs, medical treatment, rehabilitation	Medical treatment in public facilities and contracted private facilities, annual physical health check - up	Medical treatment in designated facilities, annual physical health check – up and cash benefits.

	services in designated facilities		
<i>Health prevention and promotion</i>	The set of packages differ across the age group - Pregnancy - Child 0 – 5 years - Juvenile 6 – 24 years - Adults 25 – 59 years - Elderly age 60 years and over	Cover basic set of packages entitled for every Thai citizen (manage by NHSO)	Cover basic set of packages entitled for every Thai citizen (manage by NHSO), and the packages announced by Medical Board, SSO.
<i>Annual physical check- up</i>	General health prevention and promotion program categorized based on age group as above. For example, those age over 25 years can receive screening tests for hypertension, diabetes, cardiovascular diseases, cervical cancer.	Yes The packages differ between the age group lower than 35 years and 35 years or higher (only for government employee and retirees, not for their dependents)	Yes The packages differ across the age groups.
<i>Dental services</i>	Yes	Yes	Yes
<i>Emergency services</i>	Any public facilities	Contracted facilities	
	Any nearest facilities	Any nearest facilities	Any nearest facilities
	Non – contracted private facilities: used benefits of emergency health services agreed by 3 schemes		

<i>Traditional and alternative medicine services</i>	Covered herbal medicines, Thai massage and Thai midwifery under physician directions	As directed by physicians	As directed by physicians
<i>Organs transplantation</i>	Covered only kidney, heart and liver transplant during childbirth	Yes	Only covered for kidney, corneal, liver, heart and pancreas transplant, and the combination of those organs transplant
<i>Stem cell transplantation</i>	Covered for corneal transplantation	Yes	Covered for indicated cancer treatment
<i>Pharmaceutical benefits</i>	Based on NLEM. The use of drug not listed on NLEM is based on physician requests, and patients need to pay OOP.	Based on NLEM. The use of drug not listed on NLEM needs to be approved by medical board	According to physician requests, covered not less than NLEM.
<i>Services not covered</i>	Infertility treatment, artificial insemination, gender transformation, cosmetic surgery		

NLEM: National List of Essential Medicines

Sources: Things to know for Universal Healthcare Coverage (NHSO, 2017)

2.1.2 Private health insurance system

The private health insurance in Thailand is on voluntary basis. The history of voluntary private health insurance market can be traced back to 1929, since the time which the Division of Insurance Company Control was established under the Ministry of Commerce. In 2007, the regulation department for insurance company is transformed into an independent organization called “Office of Insurance Commission” (Office of Insurance Commission, 2020; Tangcharoensathien et al., 2010).

In general, voluntary health insurance (VHI) is mostly provided for high - income earners, which the benefit is to provide faster access of healthcare services in private facilities and thus providing more choices of healthcare utilization for the membership. There is an exclusion list for the membership, generally people age over 60 years old and those with some existing conditions can not apply for the VHI. Prior getting the membership, the applicants must pass the physical examination. There are various types of insurance exist in the market. The health insurance can be a part of life insurance or as health insurance alone, and the insurance can be a group or individual insurance. For the health insurance, the membership status is renewed annually, and the premium is deducted monthly or annually depends on the insurance policies or the choice of the member. There is an incentive that the deducted premium for both life and health insurance can be used for tax relief. The premium rate of health insurance is often adjusted yearly by the risk and previous year reimbursement (Tangcharoensathien et al., 2010).

In Thailand, VHI seems as “supplementary” since all Thai citizens are covered by the public health insurance. There are around 2.2 % of the population covered by VHI (Tangcharoensathien et al., 2010).

2.2 Healthcare financing in Thailand

This part provides the healthcare financing profile of Thailand and the comparison of healthcare financing profile with the other countries. Table 3 shows the macroeconomic and the healthcare financing profile in the country with the latest data available. In 2017, the current health expenditure (CHE) as a % of GDP in Thailand is 3.75% while CHE per capita is 247.04 current US\$. The government finance contributes to the main part of the CHE, 76.13%, and the OOP expenditure is only 12.11% of CHE.

Table 3: Macroeconomic situation and healthcare financing in Thailand

<i>Population</i>	2018	69,428,924
<i>General financing</i>		
<i>GDP (billion current US\$)</i>	2018	504.99
<i>GDP per capita (current US\$)</i>	2018	7273.56
<i>GDP annual growth (%)</i>	2018	4.13
<i>Poverty headcount ratio at \$5.50 a day (2011 PPP) (% of population)</i>	2018	8.6
<i>Health financing</i>		
<i>CHE as % of GDP</i>	2017	3.75
<i>CHE per capita (current US\$)</i>	2017	247.04
<i>GGHE-D as % of CHE</i>	2017	76.13
<i>GGHE-D per capita (current US\$)</i>	2017	188.06
<i>PVT-D as % of CHE</i>	2017	23.64
<i>OOP as % of CHE</i>	2017	11.15

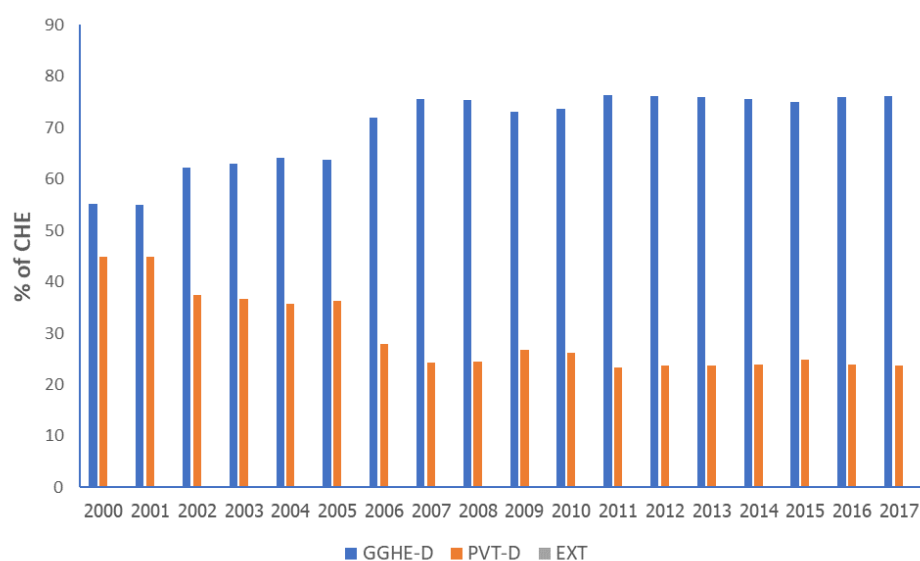
CHE: current health expenditure; GDP: gross domestic product;

GGHE-D: domestic general government health expenditure (total taxes and other revenue received by the government, excluding grants); PVT-D: domestic private health expenditure (spending on health includes voluntary health insurance schemes, enterprise financing schemes and household OOP expenditure)

Source: World Bank's Development Data Group (2020) and World Health Organization (2017)

Figure 1 shows the shares of revenues of the CHE from the year 2000 - 2017. The main part of the CHE is from the government finance (GGHE - D), and the government subsidy for healthcare increased year by year while the domestic contribution (PVT-D) reduced through the years.

Figure 1: Shares of revenues as a percentage of current health expenditure

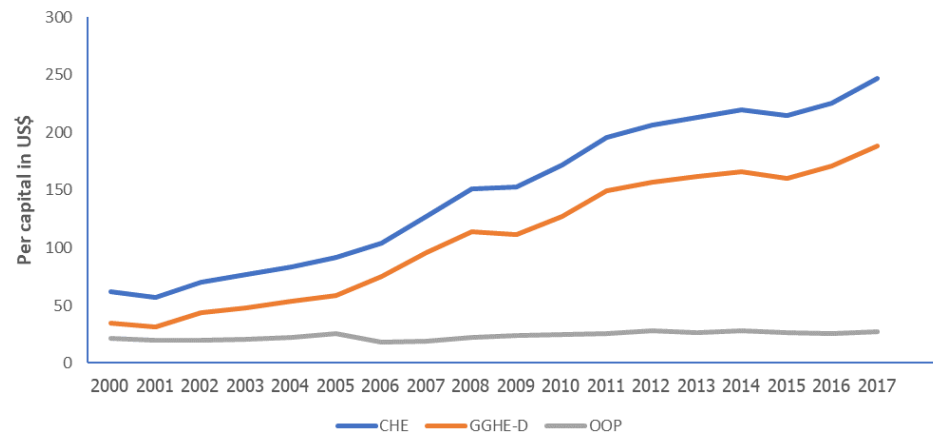


CHE: current health expenditure; GGHE-D: domestic general government health expenditure; PVT-D: domestic private health expenditure; EXT: external health expenditure (foreign inflows to the national health system)

Source: World Bank's Development Data Group (2020) and World Health Organization (2017)

Figure 2 also shows that the CHE per capita and GGHE – D per capita drastically increased over the years while the OOP per capita remains stable.

Figure 2: Current health expenditure (CHE), domestic general government health expenditure (GGHE-D), out-of-pocket (OOP) payment, per capita US\$



Source: World Bank's Development Data Group (2020) and World Health Organization (2017)

All the information indicates the high subsidization of government for healthcare expenditure in Thailand especially after the UCS reform in 2002. When compare prior and after the UCS reform (2000 and 2003), the GGHE-D increased from 57.92% of CHE to 65.63% of CHE in 2003. On the other hand, the number of PVT-D dropped from 42% of CHE to 34% of CHE in 2003, and OOP expenditure reduced from 34.19% of CHE to 27.17% of CHE in 2003 (World Bank's Development Data Group, 2020).

Table 4 presents the healthcare financing profile in other countries. The numbers indicate that among the high – income countries, the CHE as a % of GDP and the government subsidization for health expenditure is higher than the middle - income countries. In case of Thailand which is among the middle – income country, the CHE as a % of GDP is similar to the other middle – income countries while the government subsidization for healthcare in Thailand is much higher, 76.13%, which is similar to those high – income countries. This means that, the public health insurance

schemes, especially the UCS which covers majority of Thai citizens, can create high financial protection to the Thai citizens.

Table 4: Healthcare financing profile in other countries 2017

<i>Regions</i>	<i>Countries</i>	<i>CHE as a % of GDP</i>	<i>GGHE-D as % of CHE</i>
<i>European Union</i>	Average	9.87	75.17
	France	11.31*	77.09
	Romania	5.16**	78.59
	Luxemburg	5.48	84.86*
	Cyprus	6.68	42.41%**
	Germany	11.25	77.66
<i>America</i>	USA	17.06	50.16
<i>ASEAN</i>	Philippines	4.45	31.91
	Malaysia	3.86	50.59
	Indonesia	3.0	48.37
<i>Asia</i>	China	5.15	56.17
	Japan	10.93	84.09

* denote that the number is highest in the group

** denote that the number is lowest in the group

Source: World Bank's Development Data Group (2020)

2.3 Overview of regional characteristics in Thailand

In this section, the regional differences including population characteristics and healthcare resources distribution which related to the study will be presented. Firstly, Thailand has 4 main regions. central, north, north – east and south. The central region is located at the central plain along with the Chao Phraya basin. The central region also includes the eastern sub – region which located along the eastern side of the Gulf of Thailand and are settlement of commercial ports. The central part is highly condensed of industry, and it is the political and economic center of the country. Bangkok which is the capital city is in the central area. Next is the northern region, in which the upper part is the mountainous area and occupied by several minority groups. This part is dominant of rural population and mainly engaging in plantation. The northeast is the home of many rural population, in which their main jobs is in agricultural sector. The south is located along the southern peninsula of the country, brace by Andaman sea and the Pacific Ocean. Southern part is also home to many rural populations, in which their jobs are fishery or plantation (Keyes, Keyes, & Hafner, 2020).

There are total 76 provinces in Thailand plus Bangkok which is special administrative area. The total number of the population is 67.9 million in 2019, which are living in Bangkok 8.8 million, central region (exclude Bangkok) 19.9 million, northern region 11.3 million, northeastern region 18.6 million and southern region 9.3 million. The percentage of population living in urban area (municipality area) is 44.8% (NSO, 2019a). Since the study used the Health and Welfare Survey 2017 for the analysis, the information presenting further will be in the year of 2017. The table 5 below presents the average household income and expenditure across the regions, including the household expenditure for healthcare.

Table 5: Average household income and expenditure in Thailand 2019

	<i>Average household income per month (Baht)</i>	<i>Average household consumption per month (Baht)</i>	<i>Household consumption relative to average household income (%)</i>	<i>Average household healthcare expenditure per month (Baht)</i>	<i>Household healthcare expenditure relative to household consumption per month (%)</i>
<i>Overall</i>	26,946	21,437	79.56	332	1.55
<i>Bangkok and three provinces*</i>	41,897	33,126	79.07	619	1.87
<i>Central**</i>	27,042	21,120	78.10	323	1.53
<i>North</i>	19,046	15,329	80.48	250	1.63
<i>Northeast</i>	20,271	16,513	81.46	171	1.04
<i>South</i>	26,913	21,381	79.44	319	1.49

* The three provinces are Nonthaburi, Pathum Thani and Samut Prakarn, which is the main urban settlement and has the fastest economic growth in the country.

** Exclude Bangkok and the three provinces

Source: Household Socio – Economic Survey 2017 (NSO, 2017)

From the table 5, households in Bangkok and the three provinces have the highest income and the highest consumption expenditure including healthcare expenditure. Households in the north have the lowest average income and the lowest consumption expenditure, but household in the northeast has the lowest healthcare expenditure in term of amount and percentage of healthcare expenditure per consumption per month. The healthcare resources distribution throughout the regions in 2017 is presented in table 6 as follow.

Table 6: Distribution of healthcare resources in Thailand 2017

	<i>Number of healthcare facilities with overnight beds</i>	<i>Number of beds</i>	<i>Population per bed ratios</i>	<i>Number of drugstores (both conventional and traditional drug stores)</i>
<i>Overall</i>	1,354	150,094	432	21,902
<i>Bangkok</i>	128	27,212	205	5,696
<i>Central</i>	365	41,144	429	6,437
<i>North</i>	264	26,145	448	2,742
<i>Northeast</i>	385	37,184	590	3,666
<i>South</i>	216	18,409	506	3,361

Source: (NSO, 2019b)

Table 6 shows that the number of health resources are concentrated in Bangkok. Bangkok has the lowest population per bed ratio, and the central region has the highest number of drugstores. The region which has the highest bed per population is the northeast.

Overall, people in Bangkok which is the most economically developed area earn the highest income and has the highest consumption per month including the healthcare expenditure. The healthcare resources are mostly concentrated in Bangkok and the central regions. In addition, people living in the northeast pay the lowest healthcare expenditure per month and has the highest number of populations per bed ratio. This might point out the low healthcare resources distribution in this region which lead to lower utilization of health services.

The healthcare resources maldistribution has been discussed for decades, since most of the healthcare resources are concentrating in the better – off provinces, and it still remains a challenge for development of healthcare system in the country (Pinprateep, 2019).

CHAPTER 3

LITERATURE REVIEW

The literature review will be constructed into 4 main parts. First part explains factors determining healthcare utilization and healthcare expenditure. Since these factors are similar, thus the factors associate with these two dependent variables will be describing altogether. The factors will be classified according to Anderson – Newman behavioral model: predisposing factors, enabling factors and need factors.

Second part is the literature that examine the impact of UCS reform in Thailand for healthcare utilization and healthcare expenditure. Since majority of literature for healthcare utilization and expenditure in Thailand are focusing on changes after UCS reform in 2002.

The third part is the literature focusing on healthcare utilization and expenditure using only the data after Thailand's UCS reform.

The last part summarizes the key points from the literature review, following by the gaps in these literatures.

3.1 Determinants of healthcare utilization of OOP expenditure

There are many factors that determine the use of health services. To incorporate all the factors under a framework, Andersen – Newman behavioral model for health services utilization is widely used (Andersen & Newman, 2005). Based on the model, individual use of health services are the function of three components which are; predisposing factors, enabling factors and need factors. Predisposing factors include socio – demographic characteristics for example age, gender, marital status. It can include health beliefs and social characteristics such as culture norms or organizational values. For enabling factors, these are financing or organizational factors that enable the utilization of health services. The examples for financing factors at individual level are income, wealth, health insurance status. The organizational factors include distant to healthcare facilities, travel time, structure of healthcare facilities, density of health professionals in the community and waiting

time. The last factor is need factors, which can be categorized as perceived need factors and evaluate need factors. Perceived need factor is individual experiences on their illness and how they rate their health status. Evaluate need factor is assessment of individual health status by healthcare professionals.

In the national and international literature reviewed, predisposing factors mainly comprised of age, gender, marital status, household head characteristics and household characteristics. Enabling factors typically include education, income, residence, health insurance status, while need factors are proxied by presence of chronic illness. The details for each literature in this section are provided in table 7. The findings of the literature review on the association of each factor for healthcare utilization and OOP expenditure will be described altogether in this section, and the organization is based on the outcome variable, healthcare utilization and OOP expenditure.

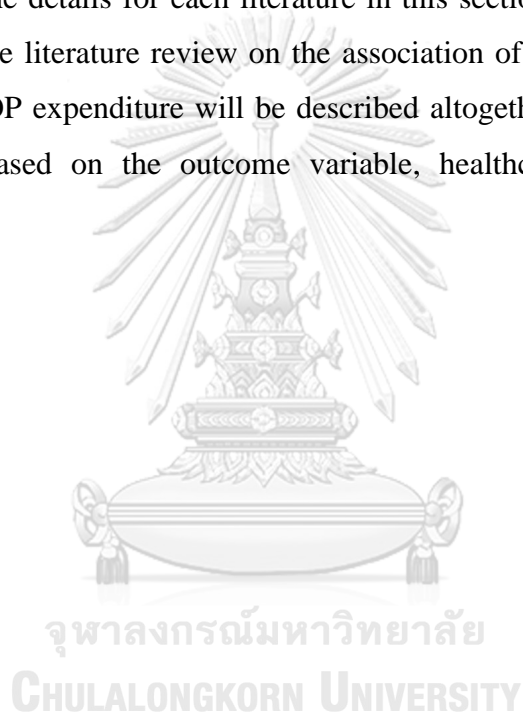


Table 7: Characteristics of each literature in this section

No	Title and authors	Data	Dependent variable	Estimation Model
1	Is universal coverage a solution for disparities in health care?: Findings from three low-income provinces of Thailand (Suraratdecha et al., 2005)	SES 2002 and primary data from Narathiwat, Tak, Sakon Nakorn)	Outpatient services Y ₁ = feeling ill Y ₂ = seeking care (two group analysis: 1. all sample 2. UCS beneficiaries) Reference period is 4 weeks	Maximum likelihood probit model with sample selection
2	Determinants of Thailand household healthcare expenditure: the relevance of permanent resources and other correlates (Okunade et al., 2010)	SES 1994, 1996, 1998, 2000	Y ₁ = log of household healthcare expenditure Reference period is 4 weeks (Household level analysis)	Double hurdle model with dependent errors: probit following by tobit model
3	Thailand UCS and its impact on health-seeking behavior (Paek, Meemon, & Wan, 2016)	HWS 2013 Sample selection: age 18 and above; only those reported perceived illness in last 4 weeks is included for outpatient care analysis	Y ₁ = use of outpatient services: categorize into No care, Informal care (self – medication and traditional healers), non - designated facilities care, designated facilities care (registered facilities for the UCS beneficiaries; reference group) Reference period is 4 weeks	Y ₁ = multinomial logit model Y ₂ = logit model

			<p>Y_2^* = use of inpatient services, categorize into Non - designated facilities care, designated facilities care (reference group) Reference period 1 year</p>	
4	<p>What determines healthcare utilization and related out-of-pocket expenditures in Tajikistan? Lessons from a national survey (Habibov, 2009)</p>	<p>Tajikistan Living Standards Surveys 2003</p>	<p>Y_1 = use of healthcare services Y_2 = individual healthcare expenditure (including transportation and gifts to personnel) Reference period is 4 weeks</p>	<p>Two-stage sequential model: logit following by tobit model</p>
5	<p>Determinants of out-of-pocket health expenditure in China (You & Kobayashi, 2011)</p>	<p>China Health and Nutrition Survey (CHNS) 2004 Sample selection: age 18 years and above</p>	<p>Y_1 = use of healthcare services Y_2 = individual healthcare expenditure as a net reimbursement from health insurance Reference period 4 weeks</p>	<p>Maximum – likelihood Heckman selection model.</p>
6	<p>Does health insurance decrease health expenditure risk in developing countries? The case of China (Jung & Liu Streeter, 2015)</p>	<p>CHNS 1989, 1991, 1993, 1997, 2000, 2004, and 2006 Sample selection: age 16 – 69 years</p>	<p>Y_1 = positive healthcare expenditure (costs from all treatment facilities) Y_2 = log of level of OOP expenditure (net of reimbursement from health insurance) Reference period 4 weeks</p>	<p>Two – part model to examine the probability of incurring OOP expenditure and, conditional on positive OOP, the amount of OOP expenditure</p>

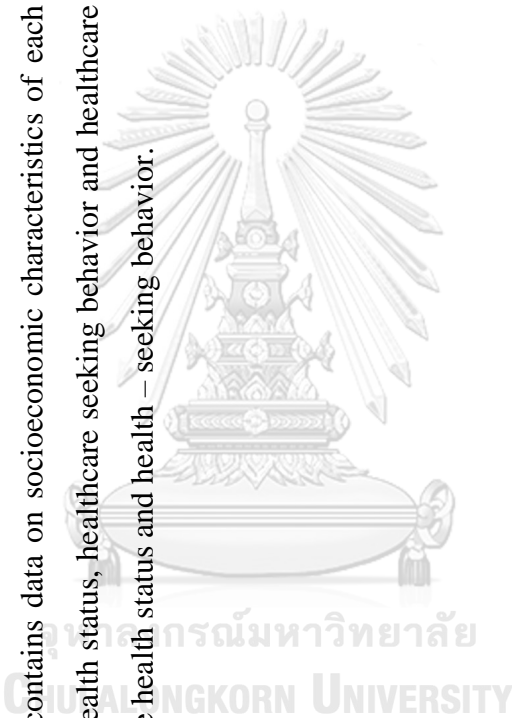
				(probit following by linear regression) and Heckman's two step estimator with exclusions restriction. For comparison purpose. (Also use IV approach to reduce endogeneity between health insurance status and level of OOP spending)
7	Patterns and determinants of out-of-pocket health care expenditure in Sri Lanka: evidence from household surveys (Kumara & Samaratunge, 2016)	Sri Lanka Household Income and Expenditure Survey (2006/2007-2009/2010)	Y ₁ = per capita healthcare OOP expenditure per month	Probit model (to define likelihood of incurring any OOP expenditure) following by tobit model
8	Levels and determinants of out-of-pocket health expenditures in the Democratic Republic of the Congo, Liberia, Namibia, and Rwanda	Demographic and Health Survey (DHS) from Democratic Republic of Congo in 2013-2014), Rwanda	Y ₁ = use of outpatient services Reference period is 4 weeks Y ₂ * = use of inpatient services Reference period is 6 months Y ₃ = healthcare OOP expenditure in last visit	Y ₁ and Y ₂ = logit model Y ₃ = two - part model (logit following by Generalized Linear Model (GLM) with log

	(Wang, Tamsah, & Carter, 2016)	(2010), Namibia (2013) and Liberia (2013)		link function and gamma distribution)
9	Utilization of health care and burden of out-of-pocket health Expenditure in Zimbabwe: Results from a National Household Survey (Zeng, Lannes, & Mutasa, 2018)	National household survey 2016	<p>Y_1 = use of outpatient services Reference period is 4 weeks</p> <p>Y_2^* = use of inpatient services Reference period is 1 year</p> <p>Y_3 = total annual household OOP expenditure (including transportation cost; extrapolated from OOP per visit for both outpatient and inpatient services)</p> <p>Y_4^* = Catastrophic health expenditure (healthcare expenditure >25% of total household annual consumption)</p>	<p>Y_1 and Y_2 = F - test across age group and income quintile</p> <p>Y_3 = two – part model (logit following by regression model)</p> <p>Y_4 = logit model</p>
10	Annual Review: Modeling health care expenditures and use (Deb & Norton, 2018)	Medical Expenditure Panel Survey from 2008-2010 and 2011-2014	<p>Y_1 = total annual healthcare expenditure (OOP and third – party payment) at individual level</p> <p>Y_2^* = Number of office – based medical practitioner visits</p> <p>Y_3^* = Number of emergency department visits Reference period is 1 year</p>	<p>Y_1 = two – part model (logit following by GLM with log link function and gamma distribution) compare with OLS</p> <p>Y_2 and Y_3 = poisson regression, negative binomial model, double</p>

			– hurdle model (logit following by truncated negative binomial) For comparison purpose.
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* denote that the analysis of these dependent variables is not included in the review

Note: Socioeconomic Survey (SES) contains data on socioeconomic characteristics of each respondent, while the Health and Welfare Survey (HWS) contains the data on health status, healthcare seeking behavior and healthcare OOP expenditure. However, the SES 2002 contains the supplementary part on the health status and health – seeking behavior.



3.3.1 Predisposing factors

3.3.1.1 Gender

Healthcare utilization

Between female and male, most of the international studies revealed that female use health services more frequently than male (Habibov, 2009; Wang et al., 2016; Zeng et al., 2018). The study in China from You and Kobayashi (2011) found no significant different of healthcare utilization between male and female. However, the other study in China from Jung and Liu Streeter (2015) which used probability of having “positive total medical expenditure” to be a proxy of the use of health services, revealed that female is more likely to incur positive medical expenditure than men, or the same meaning is female is more likely to use health services than men.

The study in Thailand from Suraratdecha et al. (2005) revealed that female are more likely to report having illness than male (Suraratdecha et al., 2005). Another study from Paek et al. (2016) used the data from HWS 2013 to examine health – seeking behavior among the UCS beneficiaries and found out that female tend to utilize outpatient services in non - designated facilities rather than designated facilities (registered facilities for the UCS beneficiaries) when compare to male.

Out – of – pocket expenditure

Studies from the USA and Tajikistan found that female spend more OOP for healthcare than male (Deb & Norton, 2018; Habibov, 2009). The other studies in China, Zimbabwe, Democratic Republic of Congo (DRC), Namibia, and Liberia found no different of healthcare OOP expenditure between male and female (Jung & Liu Streeter, 2015; Wang et al., 2016; You & Kobayashi, 2011; Zeng et al., 2018). However, Wang et al. (2016) also found that in Rwanda female is less likely to incur healthcare OOP expenditure and the level of spending is less than male. So, the results for the impact of gender on the healthcare OOP expenditure across the studies are varied.

3.3.1.2 Age

Healthcare utilization

Age is either treated as continuous variable or categorical variable. Study in China from You and Kobayashi (2011) and in Tajikistan from Habibov (2009) found positive impact of age and healthcare utilization. Another study in China from Jung and Liu Streeter (2015) found a slight negative impact of age in the Heckman selection model but not in the two – part model. Wang et al. (2016) revealed that people in the age group between 5 – 14 years and more than 65 years use outpatient services more than the age group 0 – 4 years (reference group).

The study in Thailand from Suraratdecha et al. (2005) revealed that the probability of reporting illness increases with age, and thus related to the increase probability of health services utilization. The study from Paek et al. (2016) revealed that, among UCS beneficiaries, people with older age tend to seek care from designated facilities rather than informal care (self – medication and traditional healers) for outpatient services, which can implies that, the condition of illness in older age are more severe and thus older people relies their treatment more on the designated – facilities. Overall, the impact of age on healthcare utilization is varied across the studies.

Out – of – pocket expenditure

Studies in China, DRC, Namibia, Liberia and Rwanda found that age is positively correlated with the level of OOP expenditure (Jung & Liu Streeter, 2015; Wang et al., 2016; You & Kobayashi, 2011). However, the other studies in Tajikistan and Zimbabwe found no significant relationship with age and level of healthcare OOP expenditure (Habibov, 2009; Zeng et al., 2018). The study from Okunade et al. (2010) which assessed the factors associate with healthcare expenditure in Thailand at household level demonstrated that increase in median household age associate with the increase probability of incurring household healthcare expenditure, but did not associate with the level of expenditure. So, most of the studies found the positive impact of age on healthcare OOP expenditure.

3.3.1.3 Marital status

Healthcare utilization

Most studies categorized marital status into married and non – married people. In international settings, the study from China by Jung and Liu Streeter (2015) found no significant relationship between marital status and healthcare utilization. In Thailand one study from Paek et al. (2016) examined the relationship between marital status and healthcare utilization among UCS beneficiaries. For use of outpatient services, the group of divorced, widowed, or living separately are likely to seek informal care (self – medication and traditional healers) more than designated facility care, and single people tend to seek no care when compare with designated facilities care. So, marital status was found to have impact on healthcare utilization only in the study in Thailand from Paek et al. (2016).

Out – of – pocket expenditure

Deb and Norton (2018) which conducted the study in the USA found that married people tend to pay for healthcare more than nonmarried people, while the study in China and Zimbabwe found no significant relationship between marital status and level of healthcare OOP expenditure (Jung & Liu Streeter, 2015; Zeng et al., 2018). Overall, marital status found to have positive and no impact on healthcare spending.

3.3.1.4 Household head characteristics

Healthcare utilization

Household head characteristics comprised of age, gender and education of household head. According to the study from You and Kobayashi (2011), no significant relationship between household head characteristics (age, gender, education) and individual healthcare utilization were found. However, the study conducted by Wang et al. (2016) found the significant relationship of household head characteristics and use of outpatient services, as gender has no significant impact but age shows positive impact in DRC and Namibia. In Liberia and Rwanda, the

household head with primary or secondary education is a positive influencer for the utilization of outpatient services of their household member. So, gender of household head was found to have no impact, but age and level of education of household head found to have positive impact on healthcare utilization.

Out – of – pocket expenditure

All the studies in Thailand and international settings revealed that level of education of household head is positively correlated with the level of healthcare spending (Okunade et al., 2010; Wang et al., 2016; You & Kobayashi, 2011). Gender of household head generally has no impact on both the probability of incurring OOP expenditure and level of OOP expenditure (Kumara & Samaratunge, 2016; Wang et al., 2016; You & Kobayashi, 2011). However, Okunade et al. (2010) found out even though gender of household head does not affect the probability of household healthcare spending, but male head does negatively affects the level of spending. Wang et al. (2016) showed that age of household head has positive impact to the probability of individual spending for healthcare in DRC and Namibia, but no significant relationship was established with the level of spending in all the countries used in the analysis. The study in China from You and Kobayashi (2011) found no significant impact of age with the level of individual healthcare expenditure. According to Kumara and Samaratunge (2016), all the household head characteristics including age, gender, employment status and having chronic illness do not affect per capita of healthcare expenditure.

Overall, the impact of household head characteristics on healthcare OOP expenditure is similar with the healthcare utilization, as most studies found that gender of household head has no impact, but age and level of education of household head found to have positive impact on healthcare utilization.

3.3.1.5 Household characteristics

Healthcare utilization

Household characteristics comprised of household size, presence of children, elderly, and member with chronic illness. According to Wang et al. (2016), household size found to have positive effect to the use of individual outpatient services in DRC and Namibia. The study in China from Jung and Liu Streeter (2015) found a no significant relationship of household size and the presence of children in the household on the use of health services. So, household size can have positive impact to the individual healthcare utilization but not the presence of children in the household.

Out – of – pocket expenditure

The study in Thailand from Okunade et al. (2010) demonstrated that number of household member is positively correlated with the probability of incurring household healthcare OOP expenditure, but not the level of OOP expenditure. Another variable that has an impact on the level of expenditure is “proximity to death”, which calculated by life expectancy minus age of the oldest household member, which could be the respondents or the household head. The results showed that the “proximity to death” has positive impact to level of expenditure, but no impact on probability of incurring OOP expenditure. The study from Sri Lanka used number of elderly (age > 60), pre – school children (age 0 - 5), and schooling age children (age 6 - 14) to determine the per capita healthcare OOP. The results showed that household with more than one elderly member, one or greater number of pre – school and schooling age children, associate with high level of healthcare burden, and the level of OOP expenditure is most sensitive with the number of pre – school children. This study also showed that household which having member with chronic illness are more likely to incur high level of OOP expenditure (Kumara & Samaratunge, 2016).

The study from Zeng et al. (2018) in Zimbabwe revealed that larger household size is associated with both the higher probability of incurring individual healthcare OOP expenditure and the higher level of OOP expenditure. However, Jung and Liu

Streeter (2015) found no relationship between household size and the presence of children in the family on the level of individual healthcare spending.

Therefore, household size, presence of children and elderly member, and member with chronic illness can have positive impact on household healthcare expenditure, and household size can also have impact on individual healthcare expenditure.

3.3.2 Enabling factors

3.3.2.1 Education

Healthcare utilization

Education can either be treated as continuous variable or categorical variable. The studies in China and Tajikistan which used years of education for analysis found slight positive impact with the healthcare utilization (Habibov, 2009; Jung & Liu Streeter, 2015). However, the studies in Thailand, Liberia, Namibia which treated educational level as categorical variable revealed that those completed primary education are more likely to use health services than those with no education (Suraratdecha et al., 2005; Wang et al., 2016). Another study in China from You and Kobayashi (2011) showed that those completed education and secondary education are more likely to use health services than those with no education.

For study of health – seeking behavior in Thailand, Paek et al. (2016) revealed that people with college education or above are likely to seek outpatient care from non – designated facilities rather than designated facilities when compare with people with primary education. Overall, the impact of educational level is varied across the studies.

Out – of – pocket expenditure

Years of education found to have slight positive impact on the level of healthcare OOP expenditure in the USA and China (Deb & Norton, 2018; Jung & Liu Streeter, 2015). According to You and Kobayashi (2011), people who completed primary education are likely pay more for healthcare than those with no education.

Several studies found no impact of education with the level of healthcare spending (Habibov, 2009; Wang et al., 2016; Zeng et al., 2018). Which means that impact of education on healthcare OOP expenditure are varied across the studies.

3.3.2.2 Income

Healthcare utilization

Income can be adjusted in the form of household income, per – capita household income or household consumption level. Many studies found that level of income has positive impact to the healthcare utilization (Habibov, 2009; Jung & Liu Streeter, 2015; Wang et al., 2016). According to Wang et al. (2016), people living in household with higher wealth quintile are likely use health services more than people in lower quintile household, but this pattern can be observed only in Namibia and Rwanda but not in DRC and Liberia. The study from Zimbabwe conducted the analysis of the number of outpatient services used across the household consumption level at different age groups and found out that there is no consistent pattern observed across the consumption quintile. However, among the oldest age group (age 65 years or above), a consistent pattern for the use of outpatient services can be observed, as those living in the poorest quintile utilized outpatient services in the highest rate. In addition, across all the age group, people in the lowest quintile utilized the services in the highest rate. The study suggested that the outpatient services is pro – poor based on this observation. Another study from You and Kobayashi (2011) conducted in China found no significant relationship between per capita household income and the utilization of the health services.

The study in Thailand from Paek et al. (2016) examined the impact of per capita household income with the use of outpatient services. The results show that people with higher per capita household income are more likely to use informal care (self – medication and traditional healers) and non – designated facilities care rather than designated facilities care.

Therefore, the impact of income found to have positive impact on the healthcare utilization.

Out – of – pocket expenditure

Most studies found that income level is positively correlated with level of healthcare OOP expenditure (Habibov, 2009; Kumara & Samaratunge, 2016; Okunade et al., 2010; Wang et al., 2016; You & Kobayashi, 2011; Zeng et al., 2018). Those studies use different measurement of income including ability to pay, measured as household total expenditure adjusted by household size (Habibov, 2009), household per capita expenditure (Kumara & Samaratunge, 2016), wealth index calculated as the summation of income and liquidated assets (Okunade et al., 2010), household wealth status (Wang et al., 2016), and household consumption level (Zeng et al., 2018), and household per capita income (You & Kobayashi, 2011). However, You and Kobayashi (2011) revealed that the positive significant relationship of income and level of healthcare spending only observed when compare between the richest and the poorest quintile.

On the other hand, the study from Jung and Liu Streeter (2015) found no significant relationship between the annual income per capita and the level of healthcare expenditure, both in the Heckman selection model and two – part model. Overall, income generally has positive impact to the healthcare OOP expenditure.

3.3.2.3 Area of residence

Healthcare utilization

Area of residence can be classified as urban/rural area, or regions across the countries. For comparison between people living in rural and urban area, many studies suggested that those living in urban area have higher probability to use health services more than those living in rural area (Jung & Liu Streeter, 2015; Suraratdecha et al., 2005; Wang et al., 2016; You & Kobayashi, 2011). However, Wang et al. (2016) found this positive relationship between living in urban area and use of outpatient services only in DRC, while other countries of study (Liberia, Namibia and Rwanda) found no significant relationship. The study in Sri Lanka from Kumara and Samaratunge (2016) used distant to healthcare facilities as the measurement of the residence and found out that long distance of the resident from health facilities is associated with lower utilization of health services.

The evidence in Thailand from Paek et al. (2016) revealed that the UCS beneficiaries who live in rural area more likely to seek no care rather than designated facilities care when they experienced non – hospitalized illness. This also reflects the differences of healthcare facilities distribution across rural and urban area.

For comparison across the country regions. Overall, people living in the most economically developed region are more likely to utilize health services than those living in the less economically developed region. According to You and Kobayashi (2011) which categorize regions in China into east, middle, and west. Those living in eastern region which is the most economically developed utilize health services more than those living in western region, which is the least economically developed. The study from Wang et al. (2016) across the 4 countries (DRC, Liberia, Namibia, Rwanda) showed the use of outpatient services differ across the regions in all the countries of the study. The findings in In DRC revealed that those living in the capital city of the country (Kinshasa) are likely to use outpatient services more than those living in other regions of the country. The study from Jung and Liu Streeter (2015) in China also included the dummy of the nine provinces to control for the location effects, but the results in the regression analysis were not showed.

In summary, living in urban area and the economically developed regions are positively correlated with the healthcare utilization.

Out – of – pocket expenditure

For comparison among those living in rural or urban area, the studies in China and Zimbabwe have consistent findings that people living in urban area pay higher for healthcare than those living in rural area (Jung & Liu Streeter, 2015; You & Kobayashi, 2011; Zeng et al., 2018). However, the evidence from Sri Lanka showed the opposite findings, that those living in rural area and estate sector leads incur higher healthcare expenditure than those living in urban area. The possible explanations are, those people seek care when their disease is more developed, so they need to spend more for their treatment. Also the living environment is not hygiene such as unhygienic toilet or poor quality drinking water, so they are more likely to develop some diseases more than those living in urban area with more hygienic environment (Kumara & Samaratunge, 2016).

The findings from Wang et al. (2016) are different from the above, as the study found no significant relationship between living in urban/rural area with the healthcare expenditure in all the four countries (DRC, Liberia, Namibia, Rwanda).

For the difference of OOP expenditure across the regions, You and Kobayashi (2011) found that people living in eastern and middle region of China spend more on healthcare than those living in western region. The study from Wang et al. (2016) has similar findings, that those people living in capital city of DRC (Kinshasa) and Rwanda (Kigali) pay higher OOP for healthcare than those living in other regions. Possible explanation is that those higher economically developed area might have higher cost for health services than the area with less economically developed (You & Kobayashi, 2011).

For the study in Thailand, Okunade et al. (2010) analyzed the regional effects by categorize living regions into Bangkok (reference group), central, north, north – east and south, and found out that those living outside Bangkok has less probability to incur positive healthcare OOP expenditure, and when they incur OOP expenditure, they spend less than those living in Bangkok.

In summary, those living in urban area and the economically developed regions pay more OOP for healthcare than those living in rural area or less economically developed regions.

3.3.2.4 Health insurance status

Healthcare utilization

Most studies compare the differences of healthcare utilization between people with and without insurance coverage, and only the study from You and Kobayashi (2011) in China examined the impact of each type of health insurance. According to You and Kobayashi (2011) which used the data from CHNS 2004 and categorized type of health insurance into 5 groups: no insurance (reference group), government insurance coverage, labor insurance (insurance for non – government worker), cooperative medical schemes (community – based insurance provided in rural areas, and unified planning medical services (only for catastrophic expenditure). First is the comparison between people with and without health insurance, in which the results

revealed that those with health insurance are more likely to seek care more than those without insurance. Moreover, the study found that as income increase, the effect of health insurance does not change. When comparing between each type of health insurance, people who covered by labor insurance and cooperative medical schemes are more likely to seek care than those without health insurance. Another study in China from Jung and Liu Streeter (2015) which used data from CHNS 1991 - 2006, the type of health insurance in the analysis is the same with the previous study excepts this study adds 'urban worker scheme' into the analysis, as this scheme just presented in the CHNS 2006. As the schemes change by the year, so the study only examined the impact of the health insurance between those who have and do not have any insurance. The study found out that those having health insurance have higher probability to incur health spending, or another word has higher probability of utilizing health services more than those who do not. The study pointed out four main reasons to support this result: adverse selection, risk aversion, moral hazard, and insured people use health services more to justify the insurance premium.

The study from Wang et al. (2016) showed that people with health insurance scheme in Namibia and Rwanda are likely to utilize outpatient services more than those who are not covered by health insurance. In Thailand, Paek et al. (2016) revealed that the UCS beneficiaries who have private health insurance tend to use outpatient services from informal care and non – designated facilities rather than designated facilities, which is the results from the fact that private insurance normally have contracts with private facilities, which is non – designated facilities for UCS beneficiaries.

To summarize, people with health insurance are more likely to use health services than those without health insurance, and different type of health insurance can have different impact to the healthcare utilization of individuals.

Out – of – pocket expenditure

For comparison between people with and without insurance, The study by Wang et al. (2016) revealed the varied results across the countries of study. In DRC, people with health insurance are less likely to incur positive OOP expenditure, and when they incur the expenditure, they spend less than those who do not have health

insurance. In Rwanda, those with health insurance have higher probability to incur positive OOP expenditure than those who do not, but when they pay OOP, they pay less than those without insurance coverage. In Namibia, those with health insurance have the same probability to incur healthcare expenditure with those who do not, and they pay higher OOP. No effect of health insurance was found in Liberia.

For the studies in China, You and Kobayashi (2011) revealed that those with labor insurance pay higher OOP for healthcare than those without any insurance, while people under other insurance schemes did not pay OOP differently from those without any insurance. Possible explanation is, moral hazard is more common among people covered by labor insurance scheme, and the situation of over - prescription and overuse of advanced medical technology in China raises the problem of moral hazard. When compare between people with and without health insurance, people with health insurance pay more OOP than those without insurance. So, this study concludes that health insurance in China cannot protect the insurers, on the contrary, it increases the financial burden to the insurers. The study from Jung and Liu Streeter (2015) concluded differently, as actually those with health insurance pay less than those without any insurance. The unconditional marginal effect (calculated using the entire sample) calculated from the Heckman selection model showed that the health insurance can reduce the OOP expenditure by 16.91%. The effect is stronger in the calculation for conditional marginal effect (calculated for those with positive healthcare expenditure), as health insurance can reduce the OOP expenditure by 44.38%, suggesting that health insurance provides more benefits for those who actually utilize healthcare.

Overall, health insurance can create financial protection for the insurers, and type of health insurance can also have an effect to the level of OOP expenditure.

3.3.3 Need factors

3.3.3.1 Presence of chronic illness

Healthcare utilization

The presence of chronic illness is categorized as those who have and do not have chronic illness. The studies in Tajikistan and China have consistent findings that people with chronic illness are more likely to use health services (Habibov, 2009; You & Kobayashi, 2011). In Thailand, the study from Paek et al. (2016) revealed that among UCS beneficiaries who experienced non – hospitalized illness, those with chronic illness are more likely to seek care from designated facilities care rather than seeking no care, informal care and non – designated facilities care. Which means that people with chronic illness relies more on designated – facilities. In summarize, presence of chronic illness has positive impact towards healthcare utilization.

Out – of – pocket expenditure

Only study from China found positive correlation between presence of chronic illness and healthcare expenditure (You & Kobayashi, 2011). As the study from Tajikistan found positive impact with presence of chronic illness and utilization of health services, but the relationship with healthcare expenditure was not observed (Habibov, 2009). So, presence of chronic illness can have positive impact to the level of OOP healthcare expenditure.

3.2 Literature on the impact of UCS reform

3.2.1 Impact of UCS in healthcare utilization

There are many studies conducted to compare the utilization of outpatient and inpatient services prior and after the UCS implementation. These studies have same conclusion that the implementation of UCS increased the healthcare utilization of designated facilities, both out – patient services and in – patients services, and the increase is significantly higher among elderly and low – income group (Damrongplasit & Melnick, 2009; HISRO, 2012; Limwattananon et al., 2013; Limwattananon et al., 2015; Tangcharoensathien et al., 2013; Tangcharoensathien et al., 2007).

An example of study is from Limwattananon et al. (2013) which conducted an analysis in changes of healthcare utilization and healthcare expenditure. For the part of examining changes in healthcare utilization, the study used secondary data from Health and Welfare Survey (HWS) 2001, 2003, 2004, 2005 conducted by NHSO. The study divided the observations into two groups. The treatment group, which are those not covered by CSMBS and SSSS and thus should be covered by UCS after the reform. The control group are those covered by CSMBS. The SSS beneficiaries do not include in the control group since there was an expansion of SSS coverage at that time. The study includes both outpatient and inpatient services, in which the reference period is 4 weeks and 1 year respectively. The study first comparing the differences of healthcare utilization among treatment and control group, prior and after the reform. Then used econometric model to find the magnitude of effects for healthcare utilization after the reform.

For outpatient care analysis, there are two sets of categories for analysis. The first set is comparing between no formal care (foregone care, self – medication, TAM healers) with private facilities and public facilities care. The second set is type of public health facilities: health centers, district hospitals and provincial hospitals. The study used multinomial logit model for analysis for both parts. The main findings revealed that the treatment group reports using no informal care higher than the control group, both prior and after UCS reform. But the proportion dropped

significantly after UCS reform in the treatment group. Prior reform, the treatment group using health centers and district hospitals less than the control group, while the control group use provincial hospitals more. After the reform the proportion of using health centers and district hospitals increases for both groups, and significantly higher among treatment group. For the analysis using multinomial logit model, after the reform the probability of receiving no formal care reduced by 11%. There is also a shift from no formal care to public facilities care, especially in the elderly group (13%). When compare among urban and rural population, the UCS reduced probability of receiving no formal care among rural population by 17%, and much less for urban population. Across poor and non – poor group, the UCS reduced the probability of the poor receiving no formal care by 25%, while the effect on non – poor group is only one – third. The utilization of outpatient services also shifted from health centers and provincial hospitals to district hospitals (38% increase in the district hospitals used), indicated the price reduction in the district hospitals and shift of resources under the reform system.

The analysis of inpatient care includes admission rate, comparing between public and private hospitals, and separate analysis for the use of district hospitals. After the reform, the probability of admission increases for the treatment group, but not for the control group. The use of district hospitals increased for both groups, with much higher proportion in the treatment group. When estimate the magnitude of impact by binary logit model between public and private hospitals. After the reform, the probability of receiving inpatient services increased by 18% on average, with much higher among elderly group when compare with children. The impact of inpatient services than the outpatient services after UCS reform indicated the greater reduction of financial barriers for receiving inpatient services. When compare among the rural and urban population, the UCS increased the probability of receiving inpatient care among urban population by 21% while no impact in the rural area. This pointed out the greater geographical barriers for receiving inpatient services among rural population. The probability of receiving public inpatient care is also greater for the poor and non - poor group after the UCS reform, and this effect is higher among the non – poor group.

Another studies from Limwattananon et al. (2015) use difference – in – differences analysis by comparing individual utilization of outpatient and inpatient analysis before and after the UCS reform, and also compare between treatment group (covered by UCS) and comparison group (covered by other schemes). Damrongplisit and Melnick (2009) calculated the OPD contact rate (ratio of people who reported having illness and seeking formal outpatient services) prior and after the UCS reform. Tangcharoensathien et al. (2007) calculated the total number of outpatient and inpatient visits in overall population, and other studies used number of outpatient and inpatient visits per capita to capture the changes after the UCS reform (HISRO, 2012; Tangcharoensathien et al., 2013).

The results from those studies are consistent, that UCS reform greatly increased the utilization of inpatient services, especially the elderly population, and increased outpatient services among poor and rural population. The use of health facilities also shifted to the district hospital level from higher level of hospitals, indicated the strong gatekeeper system.

3.2.2 Impact of UCS in healthcare expenditure

Many studies found positive impact of UCS in reduction of OOP expenditure and catastrophic health expenditure. According to Limwattananon et al. (2013), the impact of UCS on household OOP expenditure was examined by the data derived from Socioeconomic Survey (SES) 2002 and 2004 conducted by NSO. As in 2000 survey, there is no record of health insurance status, so the study used employment sector to proxy the health insurance status. The treatment group is the households which have no public sector employee and not every member is private formal sector employee, so the households are not fully covered by the CSMBS or SSS. The comparison group is the household which have only public sector employee and their dependents and should be covered by CSMBS. Household which has only those working private formal sector which should be covered by SSS was excluded, since the coverage of SSS is expanded during that time. Using this method, there are 84% of the UCS beneficiaries in the treatment group, while the similar proportion in the comparison group is the CSMBS/SSS beneficiaries. The healthcare OOP expenditure

in this study is defined as household OOP medical expenditure per capita within the last 4 weeks. For the first part of analysis using descriptive statistics for comparison, the results showed that the mean household OOP medical expenditure per capita for both outpatient and inpatient services reduced significantly after UCS reform among the treatment group. Next step, the study used modified two – part model to determine the probability of incurring any OOP expenditure (as one third of the households did not incur health expenditure), and then estimate the impact of UCS by using Generalized linear model (GLM) with log link function and gamma distribution. The results revealed that there is no significant impact of UCS to the probability of incurring OOP expenditure, since the effect of reduction in OOP expenditure cancelled with the increase in utilization of outpatient and inpatient services with 30 Baht copayment. For those household incurring positive expenditure, the mean total medical expenditure per capita by all types of care (outpatient care, inpatient care, and the medical expenditure) reduced by 52 Baht (31%), and similar results observed in each category of care. The study also examined the impact of UCS in reduction of household spending more than 10% of their budget for healthcare using binary logit model. The results showed that the probability decreased by 2 percentage points which is relatively high when compare with the 5.7% prevalence of household in treatment group who faced catastrophic health expenditure.

Other studies also have the same findings, in which the number of households facing catastrophic health expenditure (measured as 10% of total household consumption expenditure) reduced from 5.4 % in 2000 to 3.3 – 2.8% in 2002 – 2004 (Tangcharoensathien et al., 2007). If looking in the reduction between the household level of income, there were 77.5% of reduction in proportion of household facing catastrophic health expenditure for the poorest quintile while the richest household (fifth quintile) faced 41% of reduction (Limwattananon et al., 2011). Moreover, the number of poverty headcount due to OOP expenditure for healthcare reduced from 2.1% in 2000 to 0.8 – 0.5% after UCS implementation (Tangcharoensathien et al., 2007). On average, the OOP expenditure was reduced by 28% after UCS implementation, and the calculated welfare gain from financial protection is 80 – 200% from the deadweight loss caused by the financing reform from the UCS implementation (Limwattananon et al., 2015).

So, the UCS reform have great positive impact in reduction of OOP expenditure, household facing catastrophic expenditure, and thus household impoverishment due to healthcare expenditure.

3.3 Healthcare utilization and catastrophic expenditure in recent years

This section contains the relevant studies in Thailand on healthcare utilization and OOP expenditure using only the data after the UCS reform.

3.3.1 Healthcare utilization

This part includes the study from Yiengprugsawan, Seubsman, Lim, Sleigh, and Thai Cohort Study (2009) which conducted a study in 2005 to determine frequency and foregone health services use among 87,134 students Sukothai Thammathirat Open University using mainly descriptive statistics. The results revealed that among 78.5% respondents who reported using health services during last 12 months, provincial/government hospitals were the most visited healthcare facilities (33.4%), following by private clinics (24.1%), private hospitals (21.8%) and community hospitals and health centers (25%). For payment for health services, the most reported method was self – payment (31.6%), following by using private sector employee’s schemes (26.7%) and CSMBS or SEMB for 24.8%. The lowest report is UCS, only 13.6% which is much below the percentage of the UCS coverage of the nationwide population. Report of using UCS is most popular among low – income group (41.4% of usage among low – income group) and people living in rural area (20% of usage among rural residents). For forgone health services, 4.1% of the respondents reported experienced forgone health services in the last 12 months. The major reasons were “long waiting time” and “could not get time off work”. When compare across the regions, between residing in Bangkok or other regions, the other regions have more report of health services used and more report of foregone health services.

3.3.2 Catastrophic healthcare expenditure

The study from Weraphong, Pannarunothai, Luxananun, Junsri, and Deesawatsripetch (2013) which examined the situation of catastrophic health expenditure and the relationship between health insurance status will be discussed in this part.

Weraphong et al. (2013) conducted an analysis of household burden on the healthcare OOP expenditure in Nakhon Sawan municipality using cross-sectional survey in 2008. Two-stage random sampling was used to select representative of poor and non-poor household from each community. The questionnaires include health-seeking behavior when experienced illness in last one month, and the amount of OOP expenditure for medical and non-medical costs (include transportation, food, income loss for patient and care giver, and others). The study used Mantel-Haenszel chi-square test to determine the relationship between household catastrophic expenditure (household healthcare expenditure exceeds 10% of overall household expenditure in one month) and socio-demographic factors. The results revealed that most households pay OOP for medical care at the drug stores, following by private clinics and public healthcare facilities. For non-medical costs, the transportation cost contributed to the largest part, which is 62% of total non-medical cost for the poor and 72.4% for the non-poor, and both groups have the same median costs at 40 Baht per month. The incidence for the catastrophic expenditure for medical cost is 12.5% for the poor and 7.1% for the non-poor households. Among the three insurance scheme beneficiaries, CSMBS beneficiaries are most likely to face catastrophic expenditure, with 3.74 times higher than other scheme beneficiaries. Utilization of private hospitals is 24.07 times higher to incur catastrophic expenditure more than other type of hospitals, following by public hospital with 14.81 times and private clinics 3.70 times higher to face catastrophic expenditure. The association of catastrophic expenditure with the use of public hospitals might revealed that people tend to bypass the referral system and thus pay OOP to receive healthcare services in the higher level of hospitals. This signals that people do not trust the quality of health services in the closest primary healthcare facilities.

3.4 Conclusion

Based on Andersen – Newman model, healthcare utilization is a function of three factors: predisposing factor, enabling factor and need factor. In the literature review, predisposing factors are gender, age, marital status, household head characteristics and household characteristics. Enabling factors are education, income, area of residence and health insurance status. Need factors are presence of chronic illness. The same factors also used in the analysis for determinants of healthcare OOP expenditure. This part mainly include international studies since the studies in Thailand are limited.

For predisposing factors, generally female and older age have positive impact towards healthcare utilization and OOP expenditure. Marital status found to have no impact in healthcare utilization but have positive impact on healthcare expenditure. Most studies found the positive impact of age and education of household head on the healthcare utilization and OOP expenditure, while gender of household head found to have no impact. Household size found to have positive impact on individual healthcare utilization and individual and household healthcare expenditure. Presence of children and elderly member, and member with chronic illness can have positive impact on household healthcare expenditure.

For enabling factors, the impact of level of education for healthcare utilization and OOP expenditure varied across the studies. Income are positively correlated with the healthcare utilization and OOP expenditure. For area of residence, people living in urban area and living in the more economically developed region of the country are more likely to use health services and pay more OOP than those living in rural area and less economically developed regions. For health insurance, those having health insurance are more likely to use health services and pay less than those without health insurance, and the study in China also found that different type of health insurance also has different impact towards healthcare utilization and OOP expenditure. For the need factors, those with chronic illness are more likely to use health services and pay more OOP for healthcare (Deb & Norton, 2018; Habibov, 2009; Jung & Liu Streeter, 2015; Kumara & Samaratunge, 2016; Okunade et al., 2010; Paek et al., 2016;

Suraratdecha et al., 2005; Wang et al., 2016; You & Kobayashi, 2011; Zeng et al., 2018).

For the studies in Thailand, the empirical studies in healthcare utilization and OOP expenditure mainly focus on the impact of UCS reform in 2002, in which all the studies have consistent findings the UCS successfully increase healthcare utilization for both outpatient and inpatient services. Meanwhile, the UCS also reduced healthcare OOP expenditure and number of households facing catastrophic health expenditure (Damrongplisit & Melnick, 2009; HISRO, 2012; Limwattananon et al., 2013; Limwattananon et al., 2015; Tangcharoensathien et al., 2013; Tangcharoensathien et al., 2007). The regional differences is only explored by the study from Okunade et al. (2010) which examined the determinants of household healthcare expenditure in Thailand and found out that those living outside Bangkok pay lower healthcare OOP expenditure than those living in Bangkok.

Different economic models are used to estimate the impact of each factor on healthcare utilization and OOP expenditure. Some studies examined the healthcare utilization and expenditure in the same model. Habibov (2009) used two – stage sequential model, which the first stage is logit model to determine the probability of healthcare utilization and then tobit model to determine the level of OOP expenditure. Another study from You and Kobayashi (2011) used Heckman selection with maximum - likelihood estimation model. Several studies determine the healthcare utilization and expenditure in the separate model (Deb & Norton, 2018; Limwattananon et al., 2013; Wang et al., 2016; Zeng et al., 2018). For example, Limwattananon et al. (2013) used multinomial logit to determine the use of outpatient services, and then used two – part model to determine healthcare OOP expenditure. Similar to Wang et al. (2016) which used logit model to determine the use of outpatient services and then two- part model for healthcare OOP expenditure. For the study that focus only the analysis of healthcare expenditure, several models are used which are double – hurdle model (Okunade et al., 2010), probit and tobit model, as first is to determine likelihood of incurring positive OOP expenditure following by determination of the level of OOP expenditure (Kumara & Samaratunge, 2016), and two – part model and Heckman selection model with exclusion restriction (Jung &

Liu Streeter, 2015). Which means that there are several approaches for modelling healthcare utilization and expenditure.

In summary, the literature review particularly in international settings revealed that several factors are associated with the use of health services and OOP expenditure. However, most studies in Thailand are mainly focus on the impact of UCS reform, and none of them have explored the differences of healthcare utilization and OOP expenditure across the three main public health insurance schemes (UCS, SSS, CSMBS) and regional differences.

3.5 Gap in the literature

From the literature review, two main gaps can be drawn.

First, there is no literature in Thailand that examine the determinants of healthcare utilization and OOP expenditure across all the three health beneficiaries' schemes (UCS, SSS, CSMBS), since most studies focus on the impact of UCS reform (Damrongplasit & Melnick, 2009; HISRO, 2012; Limwattananon et al., 2013; Limwattananon et al., 2015; Tangcharoensathien et al., 2013; Tangcharoensathien et al., 2007), and the most recent study from Paek et al. (2016) examined the health – seeking behavior among the UCS beneficiaries.

Second, none of the literature explore the difference of healthcare utilization and individual OOP expenditure across the regions in Thailand using individual level data in recent years, as only the study from Okunade et al. (2010) examined the regional differences of the household healthcare expenditure using the data from the year 1994 – 2000.

CHAPTER 4

RESEARCH METHODOLOGY

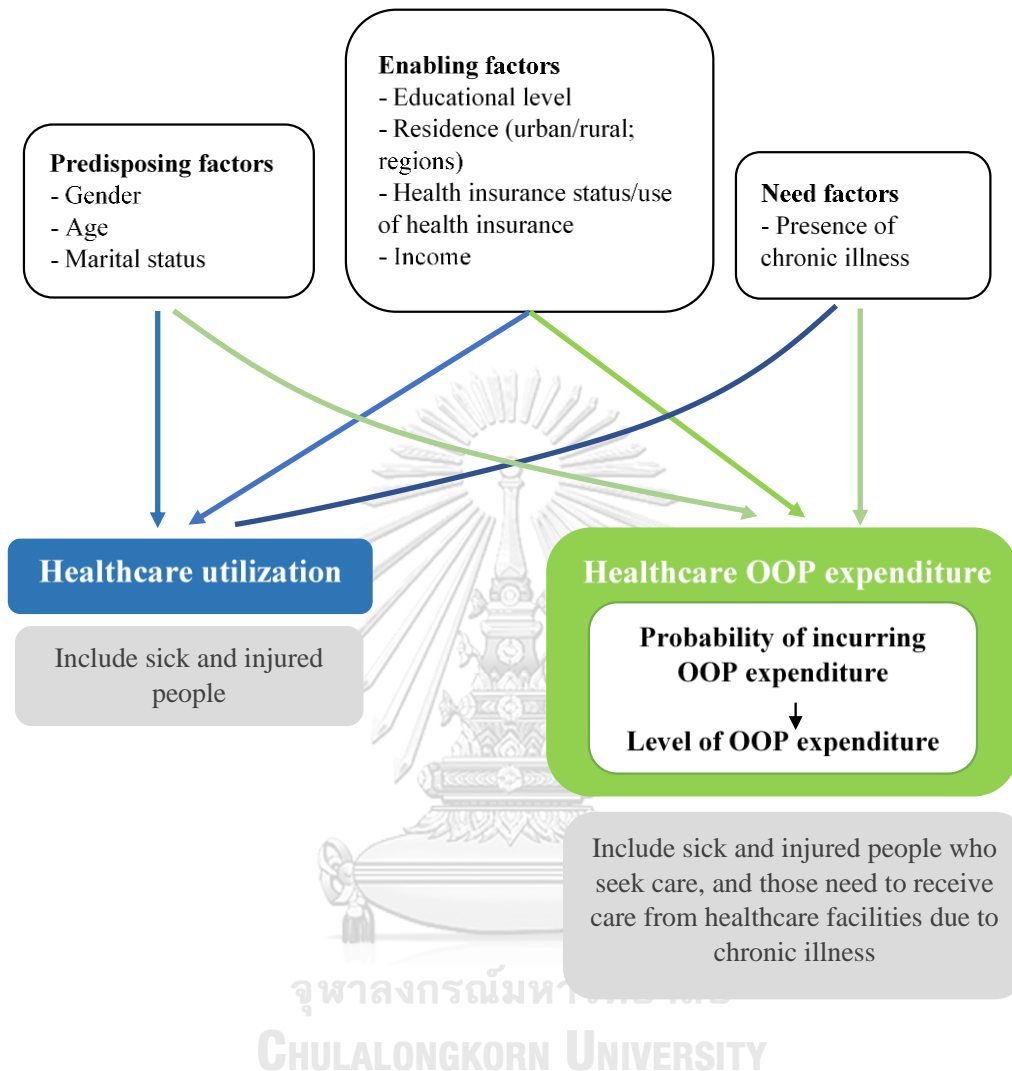
4.1 Conceptual framework

The utilization of healthcare services can be explained by Andersen-Newman Model. This model specifies 3 factors that explain the use of healthcare services as follows:

1. Predisposing factors: demographic and socio-cultural characteristics
2. Enabling factors: financing and organizational factors
3. Need factors: health conditions that result in immediate use of healthcare services which could be divided into two categories:
Perceive need: experiences and views of individual towards their health status
Evaluate need: Assessment of health status from healthcare professionals.

In this study, predisposing factors comprised of age, gender, marital status. Enabling factors are education, income, area of residence and health insurance status (UCS, SSS or CSMBS, private insurance). Need factor is presence of chronic illness. For the part of determinants of OOP expenditure, the factor “use of health insurance” will be used instead of health insurance status, since some people choose not to use their own health benefits when utilize healthcare, as people are free to opt out from their health insurance schemes and pay OOP for service of their choices (NHSO, 2019). Thus, the health insurance status cannot fully determine the OOP expenditure related with healthcare utilization. The conceptual framework is presented according to figure 3.

Figure 3: Conceptual framework



4.2 Survey data

This study used nationally representative Health and Welfare Survey (HWS) 2017, which is the 20th version of HWS survey conducted biannually by National Statistical Office. The survey was conducted in March 2017. The aim of this survey is to gathering data on health insurance status, occurrence of illness, healthcare utilization and socio – demographic factors. The number of covered households is 23,411 households.

4.3 Sampling method

The survey used stratified two – stage sampling method, in which all the provinces and Bangkok are the stratum, so in total there are 77 strata. For each stratum except Bangkok, the sub stratum was created which are municipality and non – municipality area. The enumeration area (EA) is the primary sampling unit, and the secondary sampling unit is household level. For the secondary sampling unit, the size of sample in sub stratum of municipality area is 16 households per EA, and non – municipality area is 12 households per EA. Then the representative households were selected randomly.

4.3 Data cleaning process

The total number of households in the dataset is 23,411 households with 65,781 respondents. At first stage, exclude all the respondents with age less than 18 years old, since the health – seeking behavior of the child can be influenced by their parents, in which will created potential bias (Case & Paxson, 2002). Next, select only people whose primary health insurance scheme is UCS, SSS, or CSMBS. Since some of the respondents are covered by SEMB, medical benefit scheme for local administrative officers and other types of state medical benefits. The data also exclude respondents who reported having no health insurance and those reported having more than one type of public health insurance schemes, for example, those reported covering by UCS and SSS which seems to be an erroneous data. At this point, the number of observations left is 48,798 people. After dropping those with non – valid response of socio – demographic factors and people responded seeking other type of healthcare facilities which is not specified in the list, the sample size left is 48,453 observations which will be used to represent the whole Thai population.

According to the HWS 2017 questionnaire regarding non – hospitalized illness in the last one month, the respondents are categorized into 4 groups: (1) Not sick (2) Sick (3) Getting injury (4) Seeking care at healthcare facilities due to chronic or congenital diseases. The following question is regarding health – seeking behavior (no

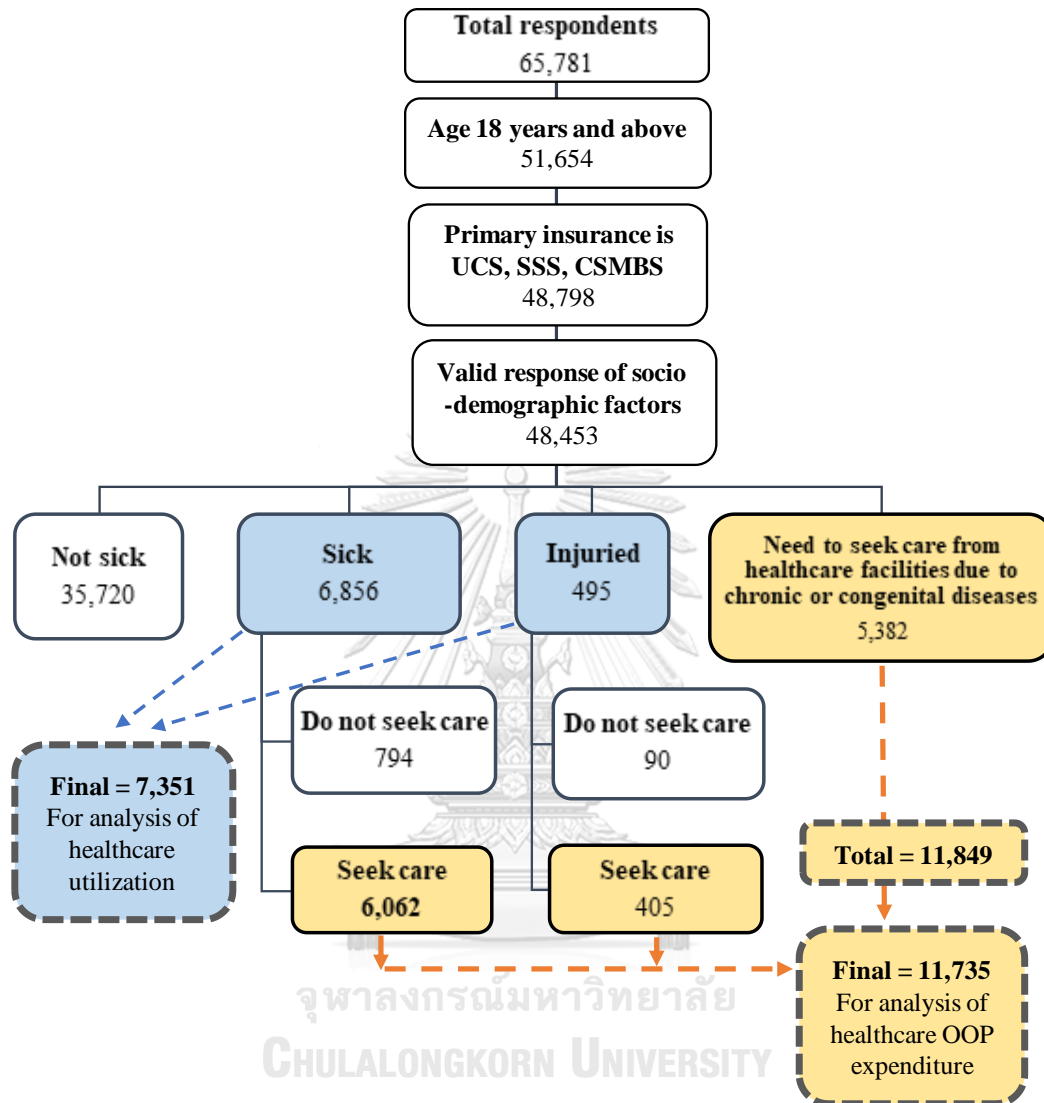
care, self – medication, traditional healers, types of healthcare facilities) and OOP expenditure including medical and transportation cost.

For the analysis of healthcare utilization, only those who experienced illness and getting injury (those answered (2) and (3)) are included in the analysis. Respondents who answered (4) are not included in the analysis since they all went to seek care at healthcare facilities. The sample size left at this point is 7,351 people.

For the analysis of healthcare OOP expenditure, people who reported seeking healthcare among those answered (2), (3) and those answered (4) are included in the analysis. The respondents who answered (4) are included since the study aims to analyze healthcare OOP expenditure related to use of outpatient services for any purposes. The total sample size for the analysis is 11,849 people. Respondents who reported using CSMBS to cover their treatment at private facilities are excluded from the analysis (15 respondents seeking care at private hospitals and 9 respondents seeking care at private clinics). As the benefit of CSMBS cannot be used at private clinics and can only be used at private hospitals for (1) Emergency case (2) Surgery with appointment (3) Dialysis and radiology for cancer treatment (CGD, 2017; NHSO, 2017), there may be data entry errors. However, the data are insufficient to investigate this further. Moreover, the average OOP for this group is very high, 2,753 Baht, even though they used the CSMBS benefits. After further data cleaning, the final sample size is 11,735 observations.

The subsample analysis for those who seek care due to sickness or injury will also be conducted. The total sample size for this group is 6,467 people. After excluding erroneous data, the final sample size for the subgroup analysis is 6,433 people. The schematic presentation of data cleaning process is presented in figure 4.

Figure 4: Schematic presentation for data cleaning process



4.5 Variable description

4.5.1 Dependent variables

For the analysis of healthcare utilization, the healthcare utilization of those experienced illness and injury is classified into 3 categories: (1) No care (2) Informal care (self – medication and traditional/local healers) (3) Formal healthcare facilities, which include all type of healthcare facilities.

The analysis of healthcare OOP expenditure is the OOP expenditure related to the last visits. The analysis include total, direct and indirect healthcare (transportation) expenditure. The distribution of direct medical expenditure and transportation expenditure is highly skewed with large cluster of zero. For direct medical OOP expenditure, 63% of people included in the analysis have zero expenditure and there are 102 people with the expenditure exceeds 2,000 Baht (1% outliers). Similar to the transportation expenditure, 16% of those included in the analysis have zero expenditure while there are 79 people with the expenditure exceeds 1,000 Baht (1% outliers). If topcoding the number at 1% outliers, the number of people seems to be too high to be topcoded, thus the outliers were detected by means of visual examination of box plots. So, 23 people who have medical expenditure exceeds 6,000 Baht were topcoded at 6,000 and the 8 people who have transportation expenditure exceeds 3,000 Baht were topcoded 3,000.

4.5.2 Independent variables

There are total 11 independent variables, categorized based on Andersen – Newman Model. Predisposing factors comprise of gender, age and marital status. Gender is treated as binary variable (male and female). Age is treated as continuous variable. Marital status is treated as binary variable, married and non – married people. For enabling factors, education is categorized into 3 groups: primary level or below, secondary level and college or above. Income is classified as monthly household income divided by the square root of household size, so the household income is adjusted by the household size (Foster, 2009). This standardized income for single person per household is transformed to log form since it is right – skewed. For the residence, first factor is living in urban and rural area, treated as dummy variable

(urban/rural). Urban area is defined as living in municipality area, and rural area is living in non – municipality area. The factors for regions are classified into 5 categories: living in Bangkok, and central, northern, north – eastern and southern part of the country. For health insurance status, first is the “type of primary health insurance”, which is defined as the 3 types of the main public health protection schemes: UCS, SSS, CSMBS. Second is “dual coverage” which is treated as binary variable (yes/no), as those having private insurance (including the employer insurance) will be categorized in the “yes” group. The “use of health insurance” is the use of health insurance schemes in the last treatment, categorized as: not using any insurance, use of UCS, SSS, CSMBS, private insurance. The health insurance status which includes “type of primary insurance” and “dual coverage” will be used for the first part of the analysis, determinants of healthcare utilization. While the “use of health insurance” will be used in the second part of the analysis, determinants of healthcare OOP expenditure. The other factors are taken into both part of the analysis. For the need factor which is presence of chronic illness, this factor is treated as binary variable, have or do not have chronic illness.

4.6 Data analysis

4.6.1 Determinants of healthcare utilization

The dependent variable used in this model is

HU (Healthcare utilization): 0 = no care, 1 = informal care, 2 = healthcare facilities. Since the dependent variable is categorical variable, the multinomial logit model is chosen.

The probability of the outcomes can be written as the following equation (Veerbek, 2008)

$$\Pr(Y = j) = \frac{\exp^{x\beta_j}}{1 + \sum_{r=1}^j \exp^{x\beta_r}} \text{ for } j > 0$$

$$\Pr(Y = j) = \frac{1}{1 + \sum_{r=1}^j \exp^{x\beta_r}} \text{ for } j = 0$$

Where Y is the dependent variable, j and r is the category of the dependent variable, x is the vector of explanatory variable, β is the coefficient matrix.

4.6.2 Determinants of out – of – pocket expenditure

Healthcare expenditure contains a large set of zero, highly right – skewed and may be heteroskedastic (Deb & Norton, 2018). Several economic models are presented to deal with mass zero and skewness, in which the choice of the model depends on the data (Humphreys, 2013).

Heckman selection model is appropriate when zero in the data is the censored value, which means it represents missing or non – response data. In the case of genuine zero, tobit model, double – hurdle model and two – part model can be used. Tobit model only applies for the analysis of consumption, while the double – hurdle model and two – part model can apply for the analysis of both consumption and participation. Double – hurdle model (joint decision model) is appropriated when participation and consumption occur simultaneously, while two – part model (sequential decision model) is used when participation and consumption occur in

sequential order. In this case, meaning that people use health services first then pay OOP (Humphreys, 2013).

In this study, where zero expenditure is the genuine zero and the participation and consumption occur in sequential order, the two – part model is appropriated for the analysis. The two – part model consists of two stages. The first part is to determine the probability of a person to incur positive healthcare OOP expenditure. The second stage is to model the subset of those incur positive healthcare OOP expenditure. The explanatory for the two stages of analysis is the same. In the first stage, logit model will be used. In the second stage, GLM with log link function and gamma distribution is used for the analysis. Since GLM is appropriate with the highly – skewed data and it also models explicitly for the heteroscedasticity. Log link and gamma distribution fit the best with expenditure data (Deb & Norton, 2018).

The model is expressed as follows (Zeng et al., 2018)

$$\text{Part 1:} \quad \ln\left(\frac{P_{OOP}}{1-P_{OOP}}\right) = YX$$

$$\text{Part 2:} \quad \ln((OOP)|OOP > 0) = \Lambda X$$

Where P_{OOP} is the probability of individual incurring OOP expenditure, X is the vector of the explanatory variables. Y and Λ are coefficient matrices.

All of the analysis is taken sampling weight into account, thus the results represent the whole Thai population.

Table 8: Independent variables and expected impacts

No	Variables	Description	Expected impacts			
			Signs		Reasons	
			Model 1	Model 2	Model 1	Model 2
1	Gender	1 = female, 0 = male	+	+	Female tend to utilize health services more than male (Habibov, 2009; Jung & Liu Streeter, 2015; Wang et al., 2016; Zeng et al., 2018)	Female pay OOP for healthcare more than male (Deb & Norton, 2018; Habibov, 2009)
2	Age	Continuous variable	+	+	Older people utilize health services more than younger people (Habibov, 2009; You & Kobayashi, 2011)	Older people pay OOP for healthcare more than younger people (Jung & Liu Streeter, 2015; Wang et al., 2016; You & Kobayashi, 2011)
3	Married	1 = married, 0 = else	No effect	+	No relationship between marital status and use of health services (Jung & Liu Streeter, 2015; You & Kobayashi, 2011)	Married people pay more OOP for healthcare (Deb & Norton, 2018)

4	<i>Education</i>								
	Primary education	reference							The results varied across the studies. (Deb & Norton, 2018; Habibov, 2009; Jung & Liu Streeter, 2015; Wang et al., 2016; You & Kobayashi, 2011; Zeng et al., 2018)
	Secondary education	1 = highest education is secondary level, 0 = else	+/-	+/-	+/-				The results varied across the studies. (Habibov, 2009; Jung & Liu Streeter, 2015; Suraratdecha et al., 2005; Wang et al., 2016; You & Kobayashi, 2011)
	College or above	1 = highest education is college or above, 0 = else	+/-	+/-	+/-				Income is positively correlated with the level of OOP expenditure (Habibov, 2009; Kumara & Samaratunge, 2016; Okunade et al., 2010; Wang et al., 2016; You & Kobayashi, 2011; Zeng et al., 2018)
5	Standardize d income – per single – person household (logged)	Monthly household income divided by square root of number of members, transformed to log form							Income has positive impact to the healthcare utilization (Habibov, 2009; Jung & Liu Streeter, 2015; Wang et al., 2016)
6	Urban/rural	1 = municipality area, 0 = non – municipality area							People living in urban area pay higher OOP for health services (Jung & Liu Streeter, 2015; You & Kobayashi, 2011; Zeng et al., 2018)

7	<i>Regions</i>								
	Bangkok	reference							
	Central	1 = central region, 0 = else	+/-	-					
	North	1 = Northern region, 0 = else	+/-	-					
	Northeast	1 = North - eastern region, 0 = else	+/-	-					
	South	1 = Southern region, 0 = else	+/-	-					
8	Type of primary health insurance								
	UCS	reference							
	SSS	1 = SSS beneficiaries, 0 = else	+/-	n.a.					No studies
	CSMBS	1 = UCS beneficiaries, 0 = else	+/-						No studies
9	Dual coverage	1 = have private insurance, 0 = do not have private insurance	+	n.a.					No studies

People living in Bangkok might utilize health services more than those living in other regions, based on the study in China from You and Kobayashi (2011), that people in the most economically developed region (the east) utilize health services more on those living in the least economically developed region (the west)

People living outside Bangkok pay lower OOP expenditure for healthcare (Okunade et al., 2010)

No studies support the findings

No studies support the findings. But the assumption is, as people have dual coverage, so they tend to

							seek care more than those with only one coverage scheme.	
<i>10</i>	<i>Use of health insurance</i>							
	Not use	Reference						
	Use UCS	1 = use UCS for the last treatment, 0 = not use				-		
	Use SSS	1 = use SSS for the last treatment, 0 = not use				-		No studies support the findings. But the assumption is, since health insurance's aim is to create financial protection, thus those using their own insurance should pay less OOP.
	Use CSMBs	1 = use CSMBs for the last treatment, 0 = not use				-		
	Use private insurance	1 = use private insurance for the last treatment, 0 = not use				+/-		
<i>11</i>	Chronic illness	1 = have chronic illness, 0 = do not have chronic illness				+		People with chronic illness pay higher OOP for healthcare (You & Kobayashi, 2011)
						+		People with chronic illness utilize health services more (Habibov, 2009; Paek et al., 2016; You & Kobayashi, 2011)

n.a not applicable

CHAPTER 5

RESULTS

5.1 Descriptive statistics

In this part, the descriptive statistics of all the study variables will be shown. First the table 9 presents the descriptive statistics of all the respondents aged 18 years and above covered by UCS, SSS or CSMBS and compare with the two subgroups for analysis of healthcare utilization and OOP expenditure. The statistical test was also performed to show the differences of each subgroup to the population not included in the subgroup. Next, table 10 presents the characteristics of UCS, SSS, and CSMBS beneficiaries. All the descriptive statistics and analysis take sampling weight into account to be a representative of the national population.

Table 9: Descriptive statistics of the study variables

<i>Variables</i>	<i>All respondents aged 18 and above who covered by UCS, SSS, or CSMBS (n=48,453)</i>	<i>Subgroup for analysis of healthcare utilization (n= 7,351)</i>	<i>Subgroup for analysis of healthcare OOP expenditure (n = 11,735)</i>
	<i>Mean (SE) or percent</i>	<i>Mean (SE) or percent</i>	<i>Mean (SE) or percent</i>
<i>Dependent variables</i>			
<i>No care</i>		11.12%	
<i>Informal care</i>		36.95%	
<i>Healthcare facilities</i>		51.94%	
<i>Total healthcare OOP expenditure</i>			236.06 (7.51)
<i>Direct medical OOP expenditure</i>			119.79 (6.35)
<i>Indirect medical OOP expenditure</i>			116.27 (2.81)
<i>Explanatory variables</i>			
<i>Gender</i>			
<i>Male</i>	48.16%	42.58%	41.10%
<i>Female</i>	51.84%	57.42%	58.90%

<i>Age</i>	45.18 (0.113)	50.41 (0.293)	54.47 (0.223)
<i>Marital status</i>			
<i>Married</i>	63.43%	63.55%	64.16%
<i>Non - married</i>	36.57%	36.45%	35.84%
<i>Education</i>			
<i>Primary education</i>	65.94%	72.30%	76.30%
<i>Secondary education</i>	17.22%	14.47%	12.40%
<i>College or above</i>	16.84%	13.23%	11.30%
<i>Standardized income per single – person household</i>	12,978.31 (100.22)	11,711 (231.33)	11,635.65 (181.26)
<i>Standardized income per single – person household (logged)</i>	9.09 (0.007)	8.96 (0.018)	8.94 (0.015)
<i>Area</i>			
<i>Urban area</i>	44.88%	40.42%	42.76%
<i>Rural area</i>	55.12%	59.58%	57.24%
<i>Regions</i>			
<i>Bangkok</i>	13.43%	11.99%	13.10%
<i>Central</i>	29.45%	27.38%	26.80%
<i>North</i>	17.03%	21.22%	21.21%
<i>Northeast</i>	27.09%	26.56%	26.23%
<i>South</i>	13.00%	12.85%	12.66%
<i>Type of primary health insurance</i>			
<i>UCS</i>	72.01%	75.48%	77.06%
<i>SSS</i>	20.91%	17.12%	14.15%
<i>CSMBS</i>	7.07%	7.40%	8.79%
<i>Dual coverage</i>	8.01%	8.27%	6.97%
<i>Use of health insurance</i>			
<i>Not use</i>			34.31%
<i>Use UCS</i>			49.83%
<i>Use SSS</i>			8.12%
<i>Use CSMBS</i>			6.59%
<i>Use private insurance</i>			1.15%
<i>Chronic illness</i>	22.86%	34.94%	61.89%

The results from t – test and chi – square test show that both two subgroups similarly differ from the population that do not included in each subgroup, and the differences exist in most of the explanatory variables. As the two subgroups which contains people who experienced illness have higher proportion of female and older people. No difference of marital status between the two subgroups and the population

not included in the subgroups. The proportion of those having primary education is higher in the two subgroups. People in the two subgroups have lower income and concentrated more in rural area and northern region. The proportion of UCS beneficiaries in the subgroups is higher, while the proportion of SSS beneficiaries is lower and CSMBS beneficiaries is similar to the group not included in the analysis.

The proportion of people who have dual coverage is similar between the subgroup for analysis of healthcare utilization and the group not included in the analysis, but lower in the subgroup for analysis of OOP expenditure. Proportion of people with chronic illness is higher in the two subgroups, and much higher in the subgroup for the analysis of OOP expenditure since this group include those who utilize healthcare due to chronic or congenital diseases.

Overall, the two subgroups used for analysis contains higher proportion of female, older people, primary education, lower income, living in rural area and northern region, UCS beneficiaries and people with chronic illness. This results are consistent with the study from Paek et al. (2016) which used data from HWS 2013 and found out that the UCS beneficiaries in the sick group (experienced only sickness, not injury) contains higher proportion of female, older age, completed only primary education, having lower income and chronic illness than the non – sick group. However, Paek et al. (2016) found that the sick group contains higher proportion of widowed/separated/divorced people than the non – sick group, but in this study no significant differences between marital status (married and non – married) are found.

This is also similar with the study from Suraratdecha et al. (2005) which used data from SES 2002 and found out that female and older people have higher probability of feeling ill or reporting sickness. However, the study found that consumption per capita has positive impact to the probability of feeling ill, while this study and the study from Paek et al. (2016) which used more recent data found that those experiencing sickness having lower income than those without experiencing sickness.

Table 10: Characteristics of the UCS, SSS, CSMBS beneficiaries

Variables	UCS (n=37,165, 72.01%)	SSS (n= 6,469, 20.91%)	CSMBS (n = 4,819, 7.07%)
	Mean (SE) or percent	Mean (SE) or percent	Mean (SE) or percent
<i>Gender</i>			
<i>Male</i>	48.13%	49.70%	43.96%
<i>Female</i>	51.87%	50.30%	56.04%
<i>Age</i>	46.71 (0.134)	36.59 (0.188)	54.92 (0.344)
<i>Marital status</i>			
<i>Married</i>	63.69%	59.82%	71.45%
<i>Non - married</i>	36.31%	40.18%	28.55%
<i>Education</i>			
<i>Primary education</i>	76.61%	39.73%	34.90%
<i>Secondary education</i>	15.82%	22.76%	15.01%
<i>College or above</i>	7.57%	37.51%	50.08%
<i>Standardized income per single – person household</i>	10,053.17 (86.29)	19,036.65 (287.49)	24,845.9 (537.41)
<i>Standardized income per single – person household (logged)</i>	8.85 (0.008)	9.65 (0.012)	9.79 (0.021)
<i>Area</i>			
<i>Urban area</i>	37.94%	64.07%	58.76%
<i>Rural area</i>	62.06%	35.93%	41.24%
<i>Regions</i>			
<i>Bangkok</i>	8.62%	29.30%	15.57%
<i>Central</i>	24.82%	45.47%	29.18%
<i>North</i>	19.41%	8.44%	18.15%
<i>Northeast</i>	32.52%	9.78%	23.05%
<i>South</i>	14.64%	7.01%	14.05%
<i>Dual coverage</i>	5.42%	15.80%	11.34%
<i>Chronic illness</i>	25.11%	10.37%	36.89%

Table 10 reveals the socio – demographic characteristics between the three groups of beneficiaries, and the t – test and chi – square test was also performed to indicate the differences between each group of beneficiaries and the other two groups.

The results reveal that each group of beneficiaries are different in all the characteristics. First, the gender difference, the CSMBS group has highest proportion of female while the SSS group has the lowest proportion of female than the other groups. For the age, SSS group is among the youngest people, in contrast, the CSMBS group is concentrated among the oldest people. The SSS group has the highest

proportion of non – married people, which is consistent with the results that most of them are among the young age group. In contrast, the CSMBS group has the highest proportion of married people.

For education, the UCS group has the highest proportion of those completed only primary education while the CSMBS group that has the highest proportion of those completed college level or above. The UCS group also has the lowest income while the CSMBS group has the highest income. For area of residences, the SSS group is mostly concentrated in urban area while the UCS is mostly concentrated in rural area. In consistent with the regions, the SSS group are mostly concentrated in Bangkok and central region, while the UCS and CSMBS group are disseminated all around the country. The SSS group mostly concentrated in urban and Bangkok or central region because they are working in private formal sector, which is normally located in the economic development area. The proportion of the UCS beneficiaries living in Bangkok is the lowest while living in the north, northeast and south is the highest. The proportion of those having dual coverage is highest in the SSS group and lowest in the UCS group. Notably, the percentage of those having private insurance is similar between the SSS and CSMBS group. Lastly, the CSMBS group contains the highest proportion of people having chronic illness while the SSS group contains the lowest proportion, which is in accordance with the proportion of old and young people in the CSMBS and SSS group.

So, people in the three beneficiaries' group have different characteristics, and people covered by UCS seems to be the worse – off population since they mostly completed primary education, earn the lowest income and mostly living in rural area. While the SSS and CSMBS group is more educated, living in urban area and earn higher income. The results is consistent with the findings from the other studies (Limwattananon et al., 2015; Suraratdecha et al., 2005; Tangcharoensathien et al., 2007). Moreover, the higher proportion of female and the older people among the CSMBS beneficiaries is similar with the findings from Limwattananon et al. (2015).

5.2 Healthcare utilization

This section firstly introduces the descriptive statistics to compare the healthcare utilization for those experiencing non – hospitalized illness among the UCS, SSS, and CSMBS beneficiaries. The second part of this section is using multinomial logit model to examine the determinants of healthcare utilization for out – patient services.

5.2.1 Comparison across the UCS, SSS and CSMBS beneficiaries

For the descriptive statistics part, table 11 presents the healthcare utilization of out – patient services for the most recent sickness or injury in the last 30 day across the three public health insurance schemes (n = 7,351).

Table 11: Use of health services for non – hospitalized illness

	<i>UCS</i> (n = 5,864, 79.77%)	<i>SSS</i> (n = 773, 10.52%)	<i>CSMBS</i> (n = 714, 9.71%)
<i>No care</i>	11.35%	9.37%	12.83%
<i>Self – medication</i>	36.61%	38.08%	29.74%
<i>Traditional healers</i>	0.66%	0.36%	0.44%
<i>Health centers</i>	13.59%	3.08%	6.35%
<i>District hospitals</i>	11.18%	3.66%	9.33%
<i>General/Regional hospitals</i>	10.05%	10.01%	17.80%
<i>University hospitals</i>	0.44%	0.00%	2.74%
<i>Other type of government hospitals</i>	2.55%	2.71%	10.32%
<i>Private hospitals</i>	2.78%	24.29%	2.03%
<i>Private clinics</i>	10.80%	8.43%	8.43%

Note: other type of government hospitals includes the hospitals that are not under MOPH and Ministry of Education (which supervise the university hospitals). For example, those under Ministry of Defense, Bangkok Metropolitan Administration, Ministry of Interior, Ministry of Justice, State enterprise hospitals, hospitals of independent organization, hospitals under Prime Minister’s Office, hospitals under local government, or public organization hospitals.

Table 11 shows that the major choice for healthcare utilization in the three beneficiaries' groups is self – medication. The UCS beneficiaries utilized care at the health centers and district hospitals the second most, while for the SSS beneficiaries, they preferred choice is at the private hospitals. For CSMBS beneficiaries, they second preferred choice seems to be the general/regional hospitals following by the other type of government facilities.

The UCS is designed to have a gatekeeper system, which means that the designated facilities for the UCS beneficiaries are designed to be the primary care facilities, and when the conditions of the patients exceeds the capacity of the designated facilities, the patients will be transferred to the higher facilities care via referral system (Sakunphanit, 2006). The studies from Limwattananon et al. (2013) and Tangcharoensathien et al. (2007) revealed that, after the UCS reform, the healthcare utilization for both outpatient and inpatient services shifted from tertiary care hospitals to the primary care facilities and district hospitals, which means that the gatekeeper system works well. The evidence from this study also showed that, after several years passed, the major healthcare providers for the UCS beneficiaries is still primary care facilities and district hospitals, which means the gatekeeper system still works well as it was designed since the establishments of the UCS.

For the type of healthcare provider usage among the SSS beneficiaries, there are high proportion of healthcare utilization at private hospitals. The reasons are, around 30% of the main contracted hospitals for the SSS is the private hospitals. As in 2017, 80 hospitals out of the total 239 main contractors are the private facilities (SSO, 2020a). Moreover, 15% of the SSS beneficiaries have private insurance (as shown in table 9) which is the highest proportion when compare across the other two schemes. Therefore, most of the SSS beneficiaries seek care at private hospitals to utilize their own benefits. The low utilization rate of SSS beneficiaries at health centers and district hospital is because SSS beneficiaries are mostly concentrated in urban area and central region (as shown in table 10), which is a cluster of high level government hospitals and private hospitals and they are the main contractors for the SSS,

employer/private insurance. Thus, seeking care at health centers or district hospitals is not their main options.

The CSMBS beneficiaries has the highest proportion of utilizing care at general/ regional hospitals, university hospitals and other type of government hospitals. According to Limwattananon et al. (2013), before the UCS reform the CSMBS beneficiaries are more likely to use outpatient services at provincial/university hospitals than the UCS beneficiaries while the UCS beneficiaries mostly used health centers and provincial hospitals. After the reform, both of the UCS and CSMBS beneficiaries group shifted their healthcare utilization to district hospitals. However, the CSMBS beneficiaries still utilized care at provincial/university hospitals more than the UCS beneficiaries. This study shows that this pattern still observed in the recent year.

5.2.2 Multinomial logit model

The results of multinomial logit model for out – patient services utilization is presented in table 12, where the base outcome is no care and informal care are presented in order to explore more dimensions of healthcare utilization. Then table 13 presents the marginal effects of each factor to the probability of using each type of outpatient services. The sample size included in the analysis is 7.351 people.

Table 12: Results from multinomial logit model

Variables	Informal care (base outcome: no care)		Healthcare facilities (base outcome: no care)		Healthcare facilities (base outcome: informal care)	
	Coef.	SE	Coef.	SE	Coef.	SE
Gender	0.039	0.111	0.252**	0.107	0.213***	0.075
Age	-0.020***	0.004	-0.008**	0.004	0.012***	0.003
Married	-0.001	0.116	0.014	0.111	0.015	0.081
Primary school	Reference					
Secondary school	-0.238	0.186	-0.215	0.181	0.023	0.129
College or higher	-0.365*	0.214	-0.127	0.207	0.238*	0.142
log(income)	0.056	0.048	-0.004	0.044	-0.060*	0.036
Urban area	0.230*	0.122	-0.056	0.117	-0.285***	0.078
Bangkok	Reference					

<i>Central</i>	-0.420*	0.251	-0.688***	0.247	-0.268*	0.157
<i>North</i>	-0.066	0.281	-0.337	0.277	-0.271*	0.161
<i>Northeast</i>	-0.540**	0.262	-0.071	0.254	0.468***	0.164
<i>South</i>	-0.428	0.264	-0.186	0.256	0.242	0.168
<i>UCS</i>	Reference					
<i>SSS</i>	-0.063	0.211	0.422**	0.201	0.485***	0.129
<i>CSMBS</i>	-0.158	0.210	0.054	0.199	0.213	0.146
<i>Dual coverage</i>	-0.479*	0.252	-0.190	0.241	0.289*	0.167
<i>Chronic illness</i>	-0.264**	0.131	0.701***	0.123	0.965***	0.081
<i>Wald chi – square (df)</i>	350.19 (36)					
<i>Prob > chi2</i>	<0.01					
<i>Sample size</i>	7,351					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: the results of no care (base outcome: informal care) are not reported.

Table 13: Marginal effects from multinomial logit model in Table 12

<i>Variables</i>	<i>No care</i>		<i>Informal care</i>		<i>Healthcare facilities</i>	
	ME	SE	ME	SE	ME	SE
<i>Gender</i>	-0.016	0.010	-0.036**	0.015	0.052***	0.016
<i>Age</i>	0.001***	0.000	-0.003***	0.001	0.002***	0.001
<i>Married</i>	-0.001	0.010	-0.003	0.017	0.003	0.017
<i>Primary school</i>	Reference					
<i>Secondary school</i>	0.022	0.017	-0.014	0.026	-0.008	0.028
<i>College or higher</i>	0.022	0.019	-0.057*	0.029	0.034	0.030
<i>log(income)</i>	-0.002	0.004	0.013*	0.007	-0.011	0.007
<i>Urban area</i>	-0.006	0.011	0.059***	0.016	-0.053***	0.017
<i>Bangkok</i>	Reference					
<i>Central</i>	0.056**	0.023	0.029	0.032	-0.086**	0.034
<i>North</i>	0.022	0.026	0.045	0.034	-0.066*	0.035
<i>Northeast</i>	0.026	0.024	-0.104***	0.034	0.078**	0.035
<i>South</i>	0.028	0.024	-0.060*	0.035	0.032	0.036
<i>UCS</i>	Reference					
<i>SSS</i>	-0.021	0.019	-0.087***	0.027	0.109***	0.027
<i>CSMBS</i>	0.003	0.019	-0.044	0.030	0.040	0.031
<i>Dual coverage</i>	0.030	0.023	-0.070**	0.034	0.040	0.036
<i>Chronic illness</i>	-0.029**	0.011	-0.179***	0.016	0.208***	0.016

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Differences across the health insurance schemes

The results from multinomial logit model reveals that the SSS beneficiaries are more likely to seek care from healthcare facilities than the UCS beneficiaries (when base outcome is no care and informal care), and they have higher probability use seek care from healthcare facilities by 10.9 percentage points. However, there is no significant differences of the health – seeking behavior between the CSMBS beneficiaries and UCS beneficiaries. The multinomial logit model in which the CSMBS group is a base category was also performed (results not shown) and no significant differences across the health insurance status was observed, which means that the outpatient services utilization of the SSS and UCS group are not significantly differences from the CSMBS.

There are many possible explanations why SSS beneficiaries are more likely to seek care than the UCS beneficiaries. The first one is, the SSS beneficiaries might have stronger feeling of the scheme entitlement more than the UCS beneficiaries since they directly contribute to the SSS funds, as the 5% of their monthly salary are deducted to the fund, while the UCS is financed by the general tax. So, the SSS beneficiaries are more likely to seek care at healthcare facilities than the UCS beneficiaries. The second possible explanation lies on the differences in responsiveness between private and government hospitals. As around 30% of contracted facilities for SSS is the private hospitals (SSO, 2020a), in which the service delivery time is generally faster and the waiting time is shorter than the government hospitals. In contrast, only 21% of the contracted UCS facilities is private hospitals and only 2.6% of primary care unit is private facilities. Therefore, SSS beneficiaries are more likely to seek care at healthcare facilities particularly at private hospitals (as shown in table 11). The third possible explanation is, the SSS beneficiaries are mostly located in the urban area whereas the UCS beneficiaries are mostly located in rural area (as shown in table 10). So, it is easier for the SSS beneficiaries to access healthcare. However, the data are insufficient to investigate this in more detail.

For people who have dual coverage, they are less likely to use informal care (base outcome is no care) and more likely to seek care at healthcare facilities (base outcome is informal care). However, the coefficients are statistically significant at

only 10% level, which is less strong than the effects of the public health insurance schemes (when comparing between SSS and UCS). This might reveal that the public health insurance has higher impact on the decision to seek care than the private insurance.

Area of residences

For the comparison between urban and rural area, those living in urban area are more likely to use informal care (base outcome is no care) and less likely to seek care from healthcare facilities (base outcome is informal care). Which means, they are more likely to use informal care than people living in rural area, with the probability of 5.9 percentage points higher than those living in rural area. This can be explained by, first, drug stores are highly concentrated in the urban area more than the rural area. Second, people working in public/private formal sectors are mostly concentrated in the urban area (as shown in table 11), in which it is more convenient to them to seek care outside their working hours. So, seeking care at drug stores is more convenient than visiting healthcare facilities.

The out – patient services utilization differs across the regions. Those living in central region are less likely to seek informal care (base outcome is no care) and less likely to seek care at healthcare facilities (when base outcome is no care and informal care) than those living in Bangkok. When compare the results across each region, those living in central region are less likely to seek care when they are sick, and they are more likely to seek no care by 5.6 percentage points and less likely to seek care at healthcare facilities by 8.6% percentage points than people living in Bangkok.

People living in the north are less likely to seek care at healthcare facilities (base outcome is informal care) and they are 6.6 percentage points less likely to seek care at healthcare facilities when compare with those living in Bangkok. Those living in the northeast are less likely to use informal care (base outcome is no care) and more likely to seek care at healthcare facilities (base outcome is informal care) than those living in Bangkok. People living in the northeast are 10.4 percentage points less likely to use informal care and 7.8 percentage points more likely to seek care at healthcare facilities. Even though, the number of healthcare facilities in the northeast is much lower than in the Bangkok (as shown in table 5). For people living in the southern

region, their outpatient service utilization are not significantly different from those living in Bangkok as observed in table 12, however, the marginal effect reveals that they are less likely to use informal care by 6.0 percentage points when compare with those living in Bangkok.

The level of economic development which found to be the determinant of healthcare utilization according to the study from China and DRC (Wang et al., 2016; You & Kobayashi, 2011) can only explains the findings that people living in central and northern regions are less likely to seek care and using healthcare facilities than those living in Bangkok. However, it cannot explain why people living in the northeast are more likely to seek care at healthcare facilities even though the number of populations per bed ratio is the highest and their income is relatively low across the regions (as shown in table 5). This is also similar to Wang et al. (2016), that other countries in the analysis including Namibia, Liberia and Rwanda found the differences of outpatient services utilization across the regions, but the patterns cannot be identified.

Impact of health insurance status based on regions (subsample analysis)

To explore more on the impact of public health insurance across the regions, the subsample analysis of people living in each region using multinomial logit model is conducted. Table 14 below presents the marginal effects of public health insurance from the subsample analysis based on region of residence, where the UCS is the base outcome, and the results from other variables are not shown here (Full results are shown in the appendix)

Table 14: Marginal effects of public health insurance status based on regions (from Tables 1 – 10 in the appendix)

The Regions	Health insurance status	No care		Informal care		Healthcare facilities	
		ME	SE	ME	SE	ME	SE
BKK (n=361)	SSS	0.014	0.038	-0.198***	0.064	0.184***	0.068
	CSMBS	-0.069	0.051	-0.063	0.101	0.132	0.104
Central (n=2,091)	SSS	-0.070**	0.031	-0.051	0.042	0.121***	0.042
	CSMBS	-0.033	0.039	-0.064	0.056	0.097*	0.053
North (n=1,826)	SSS	0.085**	0.040	-0.190**	0.074	0.105	0.071
	CSMBS	0.029	0.036	-0.054	0.065	0.025	0.063
NE (n=1,847)	SSS	-0.018	0.041	-0.043	0.067	0.061	0.072
	CSMBS	0.021	0.046	-0.070	0.066	0.049	0.071
South (n= 1,226)	SSS	-0.082*	0.047	0.038	0.056	0.044	0.063
	CSMBS	0.089***	0.034	0.026	0.061	-0.115*	0.065

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 14 reveals that impact of public health insurance status varied across the regions. Only the SSS beneficiaries living in Bangkok and central region are more likely to seek care at healthcare facilities than the UCS beneficiaries, which is according to the fact that they are mostly concentrated in the Bangkok and central region (as shown in table 10). Only the CSMBS beneficiaries that are living in central region are more likely to seek care at healthcare facilities than the UCS beneficiaries. For the people living in the north, the SSS beneficiaries are less likely to seek care and more likely to visit healthcare facilities than the UCS beneficiaries. Health insurance status does not have an impact on the outpatient services utilization only among those living in the northeast. Among people living in the south, the results show that the CSMBS beneficiaries are less likely to seek care and visit healthcare facilities.

According to the full sample results, people living in the northeast are more likely to visit healthcare facilities than people in Bangkok (as shown in table 12 and 13), and the subsample analysis reveals that health insurance status does not have an impact on their healthcare utilization. On the other hand, people living in the central are less likely seek care and visit healthcare facilities than those living in Bangkok (as shown in table 12 and 13), and the SSS beneficiaries living in central region are more

likely to visit healthcare facilities than the UCS beneficiaries (as shown in table 12 and 13).

Socio – demographic factors

Table 12 and 13 reveals that female is more likely to seek care from healthcare facilities than male (base outcome is no care and informal care), with the higher probability of 5.2 percentage points. Age found to have slight negative impact for the healthcare utilization, as increases in one year of age raises the probability of seeking no care by 0.1 percentage points. This finding is similar to the study in China from Jung and Liu Streeter (2015). However, older people are more likely to seek care at healthcare facilities rather than using informal care, as the probability of using informal care reduces by 0.3 percentage points and the probability of seeking care at healthcare facilities increases by 0.2 percentage points when the age increases by one year.

Marital status has no impact to the healthcare utilization. This contradicts to the study in Thailand from Paek et al. (2016) which found that the non – married people are more likely to seek no care and informal care rather than designated facilities care. People completed college level or higher are more likely to seek care at healthcare facilities rather than informal care, and they are less likely to use informal care by 5.7 percentage points when compare with those completed primary education.

Income has negative impact towards utilization at healthcare facilities (base outcome is informal care). As increase in per capita household income by 1% raised the probability of using informal care by 1.3 percentage points. This finding is consistent with the study from Paek et al. (2016) which reveals that the UCS beneficiaries who have higher income are more likely to seek informal care rather than designated – facilities care. This finding points out that, people with high income, no matter of their health insurance status, are more likely to seek informal care than people with low income.

For the presence of chronic illness, people with chronic illness are less likely to use informal care (base outcome is no care) but more likely to seek care at healthcare facilities (base outcome is no care and informal care). The coefficient for chronic illness is the strongest when compare with the other factors. People with

chronic illness are more likely to seek care at healthcare facilities by 20.8 percentage points, less likely to seek no care by 2.9 percentage points and less likely to use informal care by 17.9 percentage points. This is consistent with the studies from Tajikistan and China (Habibov, 2009; You & Kobayashi, 2011). Moreover, the results are similar to Paek et al. (2016) which found out that the UCS beneficiaries who have chronic illness are more likely to seek care at designated – facilities rather than no care, informal care and non – designated facilities.

Summary

To summarize, SSS beneficiaries are more likely to seek care at healthcare facilities than the UCS beneficiaries, and this impact can be observed only in the Bangkok and central region, which are the area that the SSS beneficiaries are mostly resided in. People living in central region are less likely to seek care and visit healthcare facilities than those in Bangkok. Health insurance found to have no impact for the people living in the northeast, where they are more likely to visit healthcare facilities than those living in Bangkok. The differences in healthcare utilization across the regions can partially be explained by the distribution of healthcare facilities and the income.

Between living in urban and rural area, people living in urban area are more likely to use informal care rather than healthcare facilities. For the impact of socio – demographic factors, female is more likely to seek care from healthcare facilities than male, while age has slight negative impact on the healthcare utilization. However, older people are more likely to seek care at healthcare facilities rather than informal care. Marital status has no impact on healthcare utilization, and education only has positive impact on the use of healthcare facilities. People with higher income are more likely to seek informal care rather than healthcare facilities, and people with chronic illness are more likely to seek care at healthcare facilities.

5.3 Healthcare OOP expenditure

The analysis of this part including those seeking care due to sickness, injury, and chronic illness (n = 11,759). The first part begins with the descriptive statistics of the use of health insurance for the most recent outpatient services utilization across the three group of beneficiaries, following by the average direct medical expenditure based on type of health insurance use. The second part is the results from two – part model in which the subsample analysis among the group who seek care due to sickness or injury is also performed (n = 6,433).

5.3.1 Use of health insurance

In this part, table 15 presents the use of health insurance across the three group of beneficiaries. Following by the table 16 which shows the type of healthcare provider categorized based on the type of health insurance used. Then table 17 shows the average direct medical OOP expenditure categorized by type of health insurance use and type of healthcare providers.

Table 15: Use of health insurance for outpatient services utilization

Type of health insurance use	Type of health insurance status (%)			Total (n=11,735) (%)
	UCS (n = 9,450)	SSS (n = 992)	CSMBS (n = 1,293)	
Not use	34.75	37.89	24.73	34.31
Use UCS	64.66			49.83
Use SSS		57.41		8.12
Use CSMBS			74.97	6.59
Use private insurance	0.06	4.70	0.30	1.15
Total	100	100	100	100

Table 15 reveals that, more than half of people choose to use their own public health insurance schemes to cover their treatment, in which the CSMBS beneficiaries has the highest proportion of utilizing their own public health insurance scheme. Across the three beneficiaries' group, the proportion of those not using their own health insurance scheme is highest in the SSS group, and they also have the highest

proportion of utilizing private insurance, which is consistent to the fact that this group has the highest proportion of having private insurance (as shown in table 10).

This also reflects the different of benefit coverage across the three public health insurance schemes. As the CSMBS is the most comprehensive benefit package, so they are more likely to use their own public health insurance to cover their treatment.

Table 16: Type of healthcare provider based on type of health insurance used

<i>Type of healthcare provider</i>	<i>Type of health insurance used (%)</i>					
	Not use (n=3,691)	UCS (n=6,415)	SSS (n=577)	CSMBS (n=966)	Private insurance (n=86)	Total (n=11,735)
<i>Self – medication</i>	70.60%					24.23%
<i>Traditional healers</i>	1.15%					0.39%
<i>Health centers</i>	0.69%	29.90%	5.54%	9.37%		16.20%
<i>District hospitals</i>	0.57%	28.84%	8.54%	18.81%	3.70%	16.50%
<i>General/Regional hospitals</i>	0.83%	29.06%	27.23%	41.50%	16.03%	19.89%
<i>University hospitals</i>	0.19%	1.21%	0.45%	6.76%	0.00%	1.15%
<i>Other type of government hospitals</i>	0.87%	8.21%	9.99%	23.57%	3.79%	6.80%
<i>Private hospitals</i>	3.63%	2.47%	43.70%		66.23%	6.79%
<i>Private clinics</i>	21.47%	0.32%	4.56%		10.25%	8.01%
<i>Total</i>	100.00	100.00	100.00	100.00	100.00	100.00

Table 16 reveals that most people who did not use health insurance to cover their treatment utilizing services at drug stores and following by private clinics. For people who use health insurance schemes. People who used UCS mostly utilized care at general/regional hospitals, district hospitals and health centers with similar proportion. For people who used SSS, they mostly utilized care at private hospitals following by general/regional hospitals. A large proportion of people who used CSMBS utilized care at general/ regional hospitals. For those using private insurance, 66% of them utilized care at private hospitals.

Table 17: Average direct medical OOP expenditure based on type of health insurance used and type of healthcare provider

<i>Type of healthcare provider</i>	<i>Average OOP expenditure (Baht)</i>				
	<i>Not use (n=3,694)</i>	<i>UCS (n=6,424)</i>	<i>SSS (n=580)</i>	<i>CSMBS (n=591)</i>	<i>Private insurance (n=86)</i>
<i>Self – medication</i>	87.27				
<i>Traditional healers</i>	255.50				
<i>Health centers</i>	135.09	4.37	2.76	0.00	
<i>District hospitals</i>	453.22	20.52	3.82	9.93	
<i>General/Regional hospitals</i>	1,581.93	28.78	44.61	38.80	344.64
<i>University hospitals</i>	715.33	345.81	0.00	87.61	813.94
<i>Other type of government hospitals</i>	1,408.20	45.70	12.54	50.16	71.72
<i>Private hospitals</i>	1,924.41	73.03	47.69		1,031.16
<i>Private clinics</i>	475.59	349.42	20.34		209.29
<i>Average OOP expenditure</i>	266.78	26.48	35.95	35.71	850.27

Table 17 shows that people who used public health insurance schemes spend OOP lower than those who did not use any type of health insurance schemes, and they also spent lower OOP than those using private insurance. People who used private insurance spent OOP higher on average than people who did not use any insurance. However, when comparing the OOP expenditure by type of healthcare provider, people who used private insurance incurred lower OOP expenditure in all facilities than those who did not use any insurance. So, this is because all people who used private insurance utilized care at healthcare facilities while most people who did not use any insurance seeking care from drug stores (as shown in table 16), which generally spend lower OOP than using services from healthcare facilities. It should be noted that people who used UCS spent the least healthcare OOP expenditure.

5.3.2 Two – part model

For the analysis of healthcare OOP expenditure using two – part model, the first section is the results from the analysis of total healthcare expenditure and direct healthcare expenditure described altogether. The second section is the explanation on the analysis of transportation expenditure. The third section is the subgroup analysis among those who seek care due to chronic or congenital diseases, in which the analysis of total healthcare expenditure, direct medical expenditure and transportation expenditure is performed.

5.3.2.1 Analysis for total and direct healthcare expenditure

The results of two – part model for the analysis of total healthcare expenditure is presented in table 18, and the results for the analysis of direct medical expenditure is presented in table 19 as follow.

Table 18: Results of two – part model for analysis of total healthcare expenditure

Variables	Logit		GLM		ME	SE
	Coef.	SE	Coef.	SE		
Gender	-0.008	0.098	-0.084	0.058	-19.773	14.002
Age	-0.012***	0.003	-0.002	0.002	-0.598	0.453
Married	0.079	0.096	-0.070	0.060	-15.143	14.261
Primary school	Reference					
Secondary school	0.364*	0.190	0.120	0.086	34.502*	20.359
College or higher	-0.162	0.182	0.340**	0.139	77.081**	34.104
log(income)	0.068*	0.041	0.076***	0.014	18.963***	3.531
Urban area	-0.050	0.098	-0.073	0.054	-18.041	12.835
Bangkok	Reference					
Central	-0.634***	0.236	-0.258***	0.088	-71.433***	21.581
North	-0.552**	0.242	-0.547***	0.101	-137.866***	25.151
Northeast	-0.695***	0.241	-0.170*	0.101	-51.850**	23.920
South	-0.145	0.256	-0.217**	0.096	-53.372**	23.479
Not use insurance	Reference					
Use UCS	0.003	0.119	-0.866***	0.074	-203.077***	18.033
Use SSS	-0.006	0.248	-0.851***	0.107	-199.681***	27.313
Use CSMBS	0.029	0.209	-0.587***	0.088	-137.297***	22.058
Use private insurance	-0.047	0.946	0.912***	0.196	213.064***	50.873

<i>Chronic illness</i>	0.303***	0.112	0.514***	0.068	125.771***	16.639
<i>Sample size</i>	11,735					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 19: Results of two – part model for analysis of direct medical expenditure

<i>Variables</i>	<i>Logit</i>		<i>GLM</i>		<i>ME</i>	<i>SE</i>
	<i>Coef.</i>	<i>SE</i>	<i>Coef.</i>	<i>SE</i>		
<i>Gender</i>	-0.002	0.083	0.002	0.091	0.124	11.368
<i>Age</i>	-0.026***	0.003	0.003	0.003	-0.500	0.341
<i>Married</i>	-0.037	0.084	-0.168*	0.094	-21.174*	12.032
<i>Primary school</i>	Reference					
<i>Secondary school</i>	-0.119	0.164	0.191	0.131	18.809	16.448
<i>College or higher</i>	-0.290	0.184	0.348**	0.166	31.876	22.571
<i>log(income)</i>	0.019	0.041	0.134***	0.027	16.579***	3.594
<i>Urban area</i>	0.014	0.083	0.045	0.096	5.765	11.810
<i>Bangkok</i>	Reference					
<i>Central</i>	-0.023	0.172	-0.314**	0.155	-38.103**	19.986
<i>North</i>	0.001	0.183	-0.614***	0.189	-73.010***	24.266
<i>Northeast</i>	0.044	0.177	-0.252	0.182	-28.603	22.945
<i>South</i>	0.294*	0.178	-0.168	0.168	-10.320	21.087
<i>Not use insurance</i>	Reference					
<i>Use UCS</i>	-3.790***	0.098	-0.714***	0.176	-209.183***	19.406
<i>Use SSS</i>	-5.557***	0.265	0.584**	0.258	-112.601***	30.134
<i>Use CSMBS</i>	-4.900***	0.249	0.329	0.310	-121.447***	35.716
<i>Use private insurance</i>	-2.959***	0.406	1.720***	0.131	107.700***	19.618
<i>Chronic illness</i>	-0.024	0.096	0.819***	0.107	96.73***1	15.767
<i>Sample size</i>	11,735					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Use of health insurance

The results from the analysis of total healthcare expenditure (table 18) reveals that the use of health insurance does not have an impact on the probability of incurring positive total healthcare OOP expenditure, but conditional on incurring positive OOP expenditure, using public health insurance can decrease the level of OOP spending, in which using UCS and SSS can reduce the OOP payment by 200 Baht and using CSMBS can reduce by 137 Baht compare with those not using any insurance. The use of private insurance rather increases the level of OOP payment by 213 Baht.

Table 19 reveals that the use of health insurance significantly reduces the probability of incurring positive direct medical OOP expenditure, in which the coefficient is strongest when using SSS. Conditional on incurring positive OOP expenditure, using UCS can reduce the level of expenditure while using SSS rather increase the level of OOP expenditure and the use of CSMBS does not significantly reduce the level of OOP expenditure. The marginal effects reveal that the use of UCS, SSS and CSMBS and can significantly reduce the level of OOP payment by 209 Baht, 113 Baht and 121 Baht, respectively. The use of private insurance increases the level of OOP expenditure by 108 Baht. This observation is consistent with the results from table 17 in which the explanation is as previously mentioned, that most people that do not use health insurance pay for self – medication which generally has lower price than visiting healthcare facilities. It should be noted that individual who used UCS incurred the lowest amount for both of the total and direct healthcare OOP expenditure.

These findings seems to contradict the study from Weraphong et al. (2013) which found out that CMBS beneficiaries are 3.79 times more likely to face catastrophic household healthcare expenditure more than the SSS and UCS beneficiaries (household healthcare expenditure exceeds 10% of overall household expenditure in one month). Since the findings reveal that the SSS beneficiaries incur the highest amount of total healthcare OOP expenditure, however, the amount of expenditure being reduced is similar to the use of CSMBS.

There are large differences between the funds allocated to the UCS, SSS and CSMBS which can be observed from the healthcare expenditure per capita across the three groups of beneficiaries. The capitation payment for the UCS was 3,464 Baht in 2019, while for the SSS was 3,959 Baht in 2020. For the CSMBS, the number was around 12,676 Baht in 2018 (CGD, 2018; hfocus, 2020; NHSO, 2019). The CSMBS always faces the problems of cost escalation and the overuse of health resources due to the use of fee – for - service for outpatient services (Tangcharoensathien, Witthayapipopsakul, Panichkriangkrai, Patcharanarumol, & Mills, 2018). The study found out that, despite the high government subsidization for the CSMBS, those using CSMBS still pay higher direct medical OOP expenditure for outpatient services than those using UCS. So, these findings also indicate that the high government

subsidization may not lead to financial protection but rather the overuse of health resources for the CSMBS

There are many possible reasons why CSMBS and SSS beneficiaries incur higher healthcare OOP expenditure than the UCS beneficiaries. The CSMBS and SSS beneficiaries might be more likely to request for additional medicines that do not include in their benefit packages and thus they need to pay more OOP, or they seeking care at special clinic or receive services outside the working hours which requires OOP payment. However, there are no studies to support these reasons as mentioned.

Area of residence

Living in urban or rural area does not have an impact on both total and direct medical OOP expenditure which is similar to the studies from Wang et al. (2016)

Across the regions of residence, table 18 reveals that people living outside Bangkok, excluding those living in southern region, are less likely to incur positive OOP total healthcare expenditure than those living in Bangkok. Conditional on having positive OOP expenditure, people living outside Bangkok in every region spend OOP less than those in Bangkok, in which people living in the north has the lowest amount of OOP spending (less than people in Bangkok by 137 Baht). Table 19 shows that the region of residence does not have an impact on the probability of incurring positive OOP expenditure for direct medical cost. Conditional on incurring positive OOP expenditure, people living in central and northern region spend OOP less than those living in Bangkok, and people living in the northern regions still spend the lowest amount for direct medical cost (73 baht less than people living in Bangkok).

One possible explanation for this observation is, people living in central and northern region might use their health insurance more than people living in Bangkok when they want to seek outpatient care. But, this statement is not true, since the percentage of people who do not use health insurance for their healthcare utilization is 32.76% in Bangkok, while the percentage is higher in the central, north and south (35.89%, 39.36% and 35.72%, respectively), and for the northeast is 28.72%. So, the lower direct medical expenditure in the central and north is not due to the higher rate of health insurance utilization.

The results are not consistent with the study from Okunade et al. (2010), which used the data from SES 1994, 1996, 1998 and 2000. The results showed that household outside Bangkok (residing in central, north, northeast and south) have lower probability to incur positive OOP expenditure, and when they spend, they spend less OOP than those living in Bangkok, and the household in the northeast spend the least. However, the inconsistent of the results might be because the timeline of the analysis, since the data used is before the implementation of the UCS in 2002.

The results also seem to contradict the Household Socio – Economic Survey 2017 report, that people living in Bangkok spend the highest OOP for healthcare following by people living in central region. This report also shows that people living in the northeast pay the lowest healthcare OOP expenditure. The possible explanation is, the covariates is adjusted in the econometric model, so the results presented is different from the report.

Socio – demographic factors

Gender has no impact towards healthcare spending for both in the analysis of total healthcare OOP expenditure and direct medical cost, which is similar to many international studies (Jung & Liu Streeter, 2015; Wang et al., 2016; You & Kobayashi, 2011; Zeng et al., 2018). Age found to have slight negative impact on the probability of incurring positive total healthcare expenditure and direct medical expenditure, but the marginal effects found to be insignificant. This result contradicts many studies which found that age has positive impact towards healthcare expenditure (Jung & Liu Streeter, 2015; Wang et al., 2016; You & Kobayashi, 2011). Married people spend OOP less than non – married people for direct medical cost by 21 Baht, which contradicts the results from many studies that found positive or no impact of married people towards healthcare spending (Deb & Norton, 2018; Jung & Liu Streeter, 2015; You & Kobayashi, 2011)

Education found to have positive impact only for the total healthcare OOP expenditure, in which those completed primary education and college level or higher pay more OOP by 34 Baht and 77 Baht than those completed primary education, respectively. The no impact of education on direct medical OOP expenditure is consistent with the study from Wang et al. (2016). Income has positive impact to the

level of OOP spending for both total healthcare cost and direct medical cost. The increase in per capita household income by 1% raises the OOP spending for total healthcare cost by 19 Baht and direct medical cost by 17 Baht. This positive impact of income is consistent with many of the international studies (Habibov, 2009; Jung & Liu Streeter, 2015; Wang et al., 2016).

Lastly, the presence of chronic illness has strong positive impact towards healthcare OOP expenditure. As people with chronic illness are more likely to incur positive OOP total healthcare expenditure, and when they spend, they spend more than those without chronic illness by 126 baht. For direct medical cost, people with chronic illness spend OOP higher than those without chronic illness by 97 Baht. The positive impact of chronic illness is consistent with the from You and Kobayashi (2011).

5.3.2.2 Analysis for indirect healthcare expenditure

The results of two – part model for the analysis of indirect (transportation) expenditure is presented in table 20 as follow.

Table 20: Results of two – part model for analysis of transportation expenditure

Variables	Logit		GLM		ME	SE
	Coef.	SE	Coef.	SE		
Gender	0.025	0.077	-0.121***	0.044	-13.712**	5.439
Age	-0.009***	0.003	0.001	0.001	-0.038	0.167
Married	0.138*	0.079	-0.038	0.046	-2.411	5.551
Primary school	Reference					
Secondary school	0.205	0.138	0.044	0.061	8.192	7.342
College or higher	0.152	0.145	0.321	0.105***	39.597***	12.818
log(income)	0.123***	0.033	0.047	0.014***	7.315***	1.797
Urban area	-0.062	0.081	-0.186	0.039***	-22.626***	4.843
Bangkok	Reference					
Central	0.191	0.152	-0.204	0.060***	-20.928***	7.246
North	0.325**	0.154	-0.511	0.061***	-54.641***	7.446
Northeast	0.100	0.154	-0.091	0.071	-9.139	8.402
South	1.043***	0.176	-0.260	0.065***	-14.807*	7.943
Not use insurance	Reference					
Use UCS	1.602***	0.089	0.258	0.062***	53.740***	7.876
Use SSS	1.944***	0.236	0.342	0.087***	68.559***	10.963
Use CSMBS	1.652***	0.186	0.629	0.075***	97.737***	9.831

<i>Use private insurance</i>	1.930**	0.937	0.897	0.133***	133.021***	20.335
<i>Chronic illness</i>	0.569***	0.083	0.335	0.058***	47.393***	6.611
<i>Sample size</i>	11,735					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Use of health insurance

Table 20 reveals that the impact of the use of health insurance is the strongest for determining transportation expenditure. As the use of health insurance increases the probability of incurring positive OOP expenditure and, conditional on positive OOP expenditure, increase the level of spending. The pattern can be observed, as using UCS increases the expenditure by 54 Baht, following by using SSS, CSMBS and private insurance. This can be explained by the table 16 that most people who do not use any health insurance are more likely to buy medication from drug stores, which is normally close to their living area, so they do not need to pay for transportation cost. But for those using their health insurance, they need to travel to healthcare facilities in order to use their benefits. As people who use UCS spend the lowest amount of OOP expenditure on transportation because most of them seek care at health centers and district hospitals (as shown in table 16), which generally located near their living area. People who used SSS spend lower OOP than the CSMBS might be because the designated facilities for the SSS beneficiaries are designed to be the closest facilities to the living area, while the CSMBS beneficiaries can use their benefits at any public facilities, so they can seek care from their preferred facilities which does not need to be close to their living area. As table 16 shows that most of them prefer general/regional hospitals. People who use private insurance incur the highest level of transportation expenditure because they are mostly concentrated in the Bangkok and central region, which normally have higher living expenses than the other regions including the transportation cost.

Area of residences

People living in urban area spend less for transportation by 23 Baht than people living in rural area. This is because the healthcare facilities including drug stores are mostly concentrated in urban area. People living in the north and south are more likely to spend for transportation cost than those living in Bangkok, but when

they spend, they spend less by 55 Baht and 15 Baht, respectively. For those living in the central region, they spend for transportation less than those in Bangkok by 21 Baht. So, this reveals that people living outside Bangkok except northeast spend lower OOP for transportation cost in order to seek care.

Socio - demographic factors

Female spend OOP for transportation than male by 14 Baht. Age only have a slight negative impact on the probability of spending, but the marginal effects reveal that age does not have an impact on the level of spending. People with college education or higher spend more OOP for transportation than those completed primary education by 40 Baht. Income has positive impact towards the probability of spending and level of spending for transportation. As 1% increases income can raises the amount of OOP spending by 7 Baht. Those with chronic illness are more likely to incur positive OOP expenditure for transportation and spend more than those without chronic illness by 47 Baht. This can be explained by table 13, that people with chronic illness are more likely to seek care at healthcare facilities and less likely to use informal care. Thus, they spend higher OOP for transportation for than those without chronic illness.

5.3.3.3 Subgroup analysis

This part will present the results from two – part model for the analysis of the subgroup containing only those who seek care due to sickness or injury (n = 6,418). The table 21 presents the results from two – part model for analysis of total healthcare expenditure, following by table 22 which presents the results from analysis of direct medical expenditure and table 23 which presents the results from analysis of transportation expenditure. The results discussed below will focus on the differences from the analysis of the total sample (table 18 – 20).

Table 21: Results of two – part model for analysis of total healthcare expenditure (subgroup analysis)

Variables	Logit		GLM		ME	SE
	Coef.	SE	Coef.	SE		
Gender	0.151	0.122	-0.002	0.067	2.451	15.993
Age	-0.011***	0.004	-0.004*	0.002	-1.105**	0.557
Married	0.150	0.124	-0.089	0.074	-18.201	17.770
Primary school	Reference					
Secondary school	0.244	0.217	0.076	0.099	22.497	23.529
College or higher	-0.197	0.210	0.290**	0.147	64.575*	36.119
log(income)	0.017	0.052	0.110***	0.019	26.212***	4.984
Urban area	-0.041	0.124	-0.196***	0.065	-46.922***	16.006
Bangkok	Reference					
Central	-0.302	0.295	-0.330**	0.131	-83.536***	32.402
North	-0.504*	0.292	-0.547***	0.138	-138.537***	35.054
Northeast	-0.559*	0.298	-0.157	0.148	-47.782	35.280
South	0.071	0.308	-0.223	0.140	-51.053	34.297
Not use insurance	Reference					
Use UCS	0.153	0.136	-0.459***	0.092	-105.099***	21.252
Use SSS	-0.088	0.299	-0.656***	0.126	-156.238***	32.301
Use CSMBS	-0.102	0.266	-0.441***	0.106	-105.782***	26.622
Use private insurance	-0.129	0.954	1.332***	0.205	311.171***	55.851
Chronic illness	0.104	0.131	0.428***	0.078	102.793***	19.512
Sample size	6,418					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 22: Results of two – part model for analysis of direct medical expenditure (subgroup analysis)

Variables	Logit		GLM		ME	SE
	Coef.	SE	Coef.	SE		
Gender	0.097	0.108	0.114	0.084	19.158	12.520
Age	-0.022***	0.004	-0.001	0.003	-0.796*	0.408
Married	-0.090	0.111	-0.143	0.091	-23.015*	13.683
Primary school	Reference					
Secondary school	-0.137	0.194	0.119	0.125	12.376	18.534
College or higher	-0.275	0.218	0.284**	0.140	31.102	22.421
log(income)	0.008	0.052	0.158***	0.029	22.523***	4.763
Urban area	-0.006	0.112	-0.111	0.081	-15.739	12.117
Bangkok	Reference					
Central	-0.081	0.230	-0.376**	0.187	-55.524*	28.775
North	-0.052	0.243	-0.651***	0.198	-93.247***	31.323
Northeast	-0.035	0.237	-0.243	0.200	-35.370	29.875

<i>South</i>	0.362	0.237	-0.177	0.199	-13.240	29.282
<i>Not use insurance</i>	Reference					
<i>Use UCS</i>	-3.567***	0.109	-0.185	0.225	-140.065***	25.659
<i>Use SSS</i>	-5.581***	0.352	0.474	0.311	-111.814**	44.076
<i>Use CSMBS</i>	-4.795***	0.433	0.190	0.353	-126.618***	48.479
<i>Use private insurance</i>	-2.512***	0.452	1.945***	0.148	193.326***	24.940
<i>Chronic illness</i>	-0.044	0.111	0.530***	0.113	73.172***	17.957
<i>Sample size</i>	6,418					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 23: Results of two – part model for analysis of transportation expenditure
(subgroup analysis)

<i>Variables</i>	<i>Logit</i>		<i>GLM</i>		<i>ME</i>	<i>SE</i>
	<i>Coef.</i>	<i>SE</i>	<i>Coef.</i>	<i>SE</i>		
<i>Gender</i>	0.083	0.090	-0.114*	0.059	-9.414	0.083
<i>Age</i>	-0.010***	0.003	0.000	0.002	-0.158	-0.010
<i>Married</i>	0.138	0.095	-0.035	0.063	-1.059	0.138
<i>Primary school</i>	Reference					
<i>Secondary school</i>	0.128	0.155	0.034	0.082	5.299	0.128
<i>College or higher</i>	0.152	0.164	0.229*	0.128	23.935*	0.152
<i>log(income)</i>	0.122***	0.038	0.061**	0.024	7.668***	0.122
<i>Urban area</i>	-0.055	0.095	-0.324***	0.057	-31.345***	-0.055
<i>Bangkok</i>	Reference					
<i>Central</i>	0.553***	0.186	-0.349***	0.095	-23.852***	0.553
<i>North</i>	0.592***	0.183	-0.537***	0.096	-40.834***	0.592
<i>Northeast</i>	0.321*	0.188	-0.104	0.117	-4.529	0.321
<i>South</i>	1.427***	0.207	-0.401***	0.094	-14.636	1.427
<i>Not use insurance</i>	Reference					
<i>Use UCS</i>	1.844***	0.113	0.457***	0.080	72.766***	1.844
<i>Use SSS</i>	1.937***	0.297	0.527***	0.125	80.800***	1.937
<i>Use CSMBS</i>	1.623***	0.252	0.681***	0.094	90.206***	1.623
<i>Use private insurance</i>	1.869**	0.946	1.058***	0.158	129.527***	1.869
<i>Chronic illness</i>	0.336***	0.097	0.293***	0.061	32.956***	0.336
<i>Sample size</i>	6,418					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Use of health insurance

The impact of the use of health insurance in subgroup analysis is similar to the total sample analysis. The main difference is that, the use of public health insurance only reduces the probability of incurring positive direct medical OOP expenditure but not the level of the expenditure in the subgroup analysis (table 22). While, in total sample analysis the use of public health insurance reduces both the probability and the level of OOP expenditure (table 19). Use of UCS still has the strongest reduction effect while SSS is the least. Another point is, the reduction effect of the public health insurance on total and direct healthcare expenditure is stronger in the total sample analysis. Only the use of CSMBS that the reduction effect is stronger in the subgroup analysis.

For the use of private insurance, the incremental effect is higher in the subgroup analysis (increase by 193 Baht in the subgroup analysis while for the total sample analysis increase by 108 Baht), which means that people who use private insurance due to sickness and injury pay much higher OOP than people who do not use any insurance when compare with the group of people who seek care due to chronic illness. This can point out the different level of financial protection of the private insurance between people who come to seek care due to chronic illness (which might have an appointment first) and people who come to seek care due to sickness or injury. Overall, the results indicate that people who need to seek care due to chronic or congenital diseases needs to pay OOP more than those seeking care due to sickness or injury.

For the transportation expenditure (table 23), using any type of health insurance increases the level of OOP expenditure, but the marginal effects of UCS and SSS is higher in the subgroup analysis while the marginal effects for the use of CSMBS and private insurance is higher in the total sample analysis. This might indicate the change of healthcare provider, since seeking care due to chronic illness normally requires higher level of care, so those using UCS needs to shift they healthcare provider from primary care unit to secondary or tertiary care unit.

Area of residence

Table 23 reveals that the marginal effect for transportation expenditure is stronger in the subgroup analysis than the total sample analysis. Another different point is, living in urban area found to have a negative impact on the total healthcare expenditure in the subgroup analysis but no impact in the total sample analysis (table 21 and 18). The explanation is, among the subgroup of people who experienced sickness or injury, most of them pay OOP for self – medication (as show in table 11) in which the drug stores in clustered in the urban area, so people in the subgroup spend lower OOP for transportation than the total sample which includes those who seek care due to chronic and congenital diseases and more likely to seek care at healthcare facilities (as shown in table 13)

Across the region of residence, table 20 shows that only people living in central and northern region spend lower OOP expenditure for total healthcare cost than those living in Bangkok, while the results from table 17 for the total sample analysis reveals that people living in every region outside Bangkok spend lower OOP expenditure for total healthcare cost than those living in Bangkok. This also indicates that people who seek care due to chronic illness needs to pay higher OOP than those seeking care due to sickness or injury.

Socio – demographic factors

Gender found to have no impact on transportation expenditure in the subgroup analysis (table 23) while in the total sample analysis it shows that female pay lower OOP for transportation than male (table 20). The marginal effect of age found to be slightly negative for total healthcare expenditure and direct medical expenditure (table 21 – 22), while the marginal effect of age in the total sample analysis found to be insignificant (table 18 – 20). The impact of marital status is similar between the subgroup and total sample analysis, as married people spend less OOP for direct medical cost than non – married people (table 19 and 22). For education, the main difference is the positive impact of having primary education on the total healthcare expenditure disappear in the subgroup analysis (table 18 and table 21). The marginal effects of income in the subgroup (table 21 – 23) is higher than the total sample analysis (table 18 – 20). The marginal effects of chronic illness for the

total sample analysis is higher for all of the models than in the subgroup analysis, which also confirmed that those who need to seek care due to chronic illness or congenital diseases needs to pay higher OOP than those who seek care due to sickness or injury.

Overall, the marginal effects of each factor, for both of the reduction effects and incremental effects, are generally higher in total sample analysis than in the subgroup analysis, which is the results from higher expenditure in the group of seeking care due to chronic illness.

Summary for two – part model

Overall, the use of public health insurance can decrease the level of total and direct healthcare OOP expenditure, and the impact is strongest for the use of UCS. While, the use of private insurance has positive impact towards total and direct healthcare expenditure. The use of all health insurance schemes increases the level of OOP spending for transportation, in which the UCS has the lowest incremental effect while the use of private insurance has the highest incremental effect.

For the impact of area of residences, people living in urban area incur lower total healthcare OOP expenditure, which is the result from the lower spending for transportation than those living in rural area. People living outside Bangkok generally spend lower OOP for total healthcare cost and transportation cost. In addition, only those living in central and northern region spend less for direct medical cost.

For socio – demographic factors, gender only has an impact on the level of spending for transportation cost, as female pay OOP lower for transportation than male. Age found to have slight negative impact on the probability of incurring OOP expenditure for total healthcare cost, direct medical cost and transportation cost, but overall age has no significant impact on the level of OOP expenditure. Married people spend less for direct medical cost than non – married people. People completed college education or higher spend higher OOP for the total healthcare cost and transportation costs than those completed primary education. Income found to have positive impact on the total healthcare expenditure, direct medical expenditure and transportation expenditure. Lastly, people with chronic illness spend OOP higher for total healthcare, direct medical, and transportation costs. The subgroup analysis also

reveals that people who seek care due to chronic or congenital diseases incur higher healthcare OOP expenditure than those seeking care due to sickness or injury.



CONCLUSION

Thai citizens are covered by three main public health insurance schemes, UCS, SSS and CSMBS, but most of the empirical studies in Thailand on healthcare utilization and healthcare OOP expenditure are focusing on the impact of the UCS reform in 2002. Therefore, this study aims to assess the differences in healthcare – utilization and OOP expenditure across the three schemes, focusing on outpatient services. Due to large income and other regional disparities in Thailand, the regional differences are also explored.

The results reveal that health insurance status has an impact on the outpatient services utilization. The SSS beneficiaries are more likely to seek care at healthcare facilities than the UCS beneficiaries, in which the possible explanations are the differences in choice of the healthcare provider, the direct contribution to the SSS scheme and the area of residence. For those using health services, the use of public health insurance has a strong negative impact on the amount of total healthcare OOP expenditure, conditional on incurring positive OOP expenditure. For the direct medical expenditure, use of public health insurance can decrease both the probability of incurring OOP expenditure and the amount of OOP expenditure. In term of transportation expenditure, the use of health insurance rather increases both the probability of incurring positive OOP expenditure and the amount of OOP expenditure. People who used UCS incurred the lowest amount of healthcare OOP expenditure. This results strongly support that the UCS are very successful to create financial protection for healthcare services utilization.

There are differences of healthcare utilization and OOP expenditure across the regions. People living outside Bangkok spend lower OOP for total healthcare costs than those living in Bangkok. For those living in central and northern region, they are less likely to seek care and visit healthcare facilities than those in Bangkok, and when they seek healthcare, they also incur lower OOP for direct and indirect healthcare expenditure than those living in Bangkok. The subsample analysis based on region of residence reveals that the impact of health insurance status, in which the SSS are more likely to seek care at healthcare facilities than the UCS beneficiaries,

are only observed in the Bangkok and central region which are the area that the SSS beneficiaries are mostly resided in. In contrast, people living in northeastern region are more likely to seek care at healthcare facilities than those living in Bangkok, and when they seek care, the level of OOP spending for direct medical cost and transportation is not significantly differences from people in Bangkok. The subsample analysis also reveal that the impact of health insurance is not observed in the northeast. These findings might point out that the regional disparities including healthcare resources distribution and income only have an impact on the healthcare utilization and OOP expenditure in the central and northern region but not in the northeastern and southern region, in which they might be other important factors that are still not explored.

As the study can reflect the difference of healthcare utilization and OOP expenditure across the UCS, SSS, CSMBS, which can be the results from various reasons e.g. the difference of benefit packages or the healthcare provider choice. More studies are needed to explore what are the causes that lead to different healthcare utilization or the OOP expenditure across the beneficiaries' group, and how to ensure that the equity in healthcare utilization is achieved across the Thai population. Moreover, this study found that individual who used CSMBS incur higher OOP for outpatient care than individual who used UCS even though the CSMBS has the highest government subsidization. This raises the policy concern on the level of government subsidization across the three schemes, that the high government subsidization may not lead to higher financial protection, and it might rather lead to overuse of health resources. With limited healthcare resources, this means some group of people overuse the resources while the other group might not have enough resources to meet their needs.

This study also reveals the different in healthcare utilization and OOP expenditure across the regions in Thailand. In which the healthcare facilities distribution and different in income across the regions might partially explain the results. There might be more important factors that should be studied further in order to explain the differences across the regions in Thailand and then further increase equitable healthcare utilization across the regions. However, investment in healthcare

facilities in term of quantity and quality are needed, to ensure that all the Thai citizens can access to health services their need without exposure to financial burden.

Another point for policy concern is, the study shows that individual who used private insurance incur much higher OOP than individuals who used public health insurance. Which means, even though the private insurers pay for their insurance premium, they still incur high healthcare OOP expenditure at the private facilities. So, the government can prevent financial burden for individuals by increase the quality of the public facilities or enact the rules or regulations that can create financial protection for the individuals using private facilities.

Lastly, the study found that people with chronic illness incur higher OOP for health services than those without chronic illness, so the policy maker should concern on creating financial protection for people with chronic illness.

Overall, there is a difference between the public health insurance schemes and the region of residence that leads to the differences of healthcare utilization and healthcare OOP expenditure of individuals, and more studies are needed in order to explore the gap across the three schemes and regional disparities that has an impact on healthcare utilization and OOP expenditure.

LIMITATIONS

The study has some limitations as follows

First, the study only captures the outpatient services utilization in one-month period and only use one-year data for analysis. So, the impact of different type of health insurance and area of residences are not observed across the years.

Second, the study includes traditional healers and self – medication in the same category – informal care. Which might not be able to accurately identify the impact of type of health insurance and area of residences on outpatient services utilization. Moreover, some Thai traditional medicine services also available in healthcare facilities, for both public and private facilities. The study combines the use of traditional healers and self – medication in the same category because of they are only minor group of people seeking care from traditional healers (only 1.39% from the total of 7,351 people who experienced illness or injury). So, this small sample size cannot provide the good estimation, and there are no valid reasons to exclude this group of respondents from the analysis.

Third, evaluated health status which is a need factor found to have very strong impact on the healthcare utilization and OOP expenditure in many international studies (Deb & Norton, 2018; Jung & Liu Streeter, 2015; You & Kobayashi, 2011). Due to the limitation of the data, the study did not include this factor into the analysis.

Fourth, the healthcare OOP expenditure does not only depend on the individual factors, but it also depends on the perception of healthcare professionals towards their patients. For example, the physicians working in healthcare facilities or the pharmacists working in drug stores might prescribe expensive medicine or even more medicines if patients seem to be supply – side factors high income person. So, the OOP expenditure of individual also determined by the choice of healthcare provider.

Lastly, supply – side factors also have an impact on the healthcare utilization and OOP expenditure. As number of healthcare facilities or number of doctors available in the area associate with the utilization of health services of people in the area and thus the OOP expenditure. The study from Kumara and Samaratunge (2016)

included the number of beds, doctors and dentists into the analysis and found out that these three factors has significant impact on the level of OOP expenditure. However, the study does not include the supply – side factor into the analysis.



APPENDICES

The results from multinomial logit model for the subgroup analysis of people living in each region are presented in this section.

Table 1: The results from multinomial logit model (subgroup: Bangkok)

<i>Variables</i>	<i>Informal care (base outcome: no care)</i>		<i>Healthcare facilities (base outcome: no care)</i>		<i>Healthcare facilities (base outcome: informal care)</i>	
	Coef.	SE	Coef.	SE	Coef.	SE
<i>Gender</i>	-0.696	0.498	-0.128	0.478	0.569**	0.286
<i>Age</i>	-0.033**	0.016	-0.028*	0.015	0.005	0.010
<i>Married</i>	0.020	0.421	0.200	0.396	0.180	0.283
<i>Primary school</i>	Reference					
<i>Secondary school</i>	0.883	0.701	0.460	0.673	-0.422	0.387
<i>College or higher</i>	-0.452	0.564	-0.462	0.521	-0.010	0.387
<i>log(income)</i>	-0.544*	0.286	-0.339	0.272	0.205*	0.212
<i>Urban area</i>	(omitted)		(omitted)		(omitted)	
<i>UCS</i>	Reference					
<i>SSS</i>	-0.884	0.603	0.153	0.564	1.037***	0.357
<i>CSMBS</i>	0.688	0.790	1.154	0.721	0.466	0.537
<i>Dual coverage</i>	-0.515	0.676	0.335	0.606	0.850*	0.437
<i>Chronic illness</i>	-1.710***	0.577	0.050	0.546	1.760***	0.333
<i>Wald chi – square (df)</i>	64.48 (20)					
<i>Prob > chi2</i>	<0.01					
<i>Sample size</i>	361					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: the variable urban area is omitted since all people living in Bangkok are considered living in urban area

Table 2: Marginal effects from the multinomial logit model (subgroup: Bangkok)

Variables	No care		Informal care		Healthcare facilities	
	ME	SE	ME	SE	ME	SE
Gender	0.022	0.032	-0.114**	0.052	0.091	0.057
Age	0.002**	0.001	-0.002	0.002	-0.001	0.002
Married	-0.010	0.027	-0.030	0.053	0.040	0.056
Primary school	Reference					
Secondary school	-0.042	0.048	0.093	0.073	-0.051	0.079
College or higher	0.032	0.036	-0.009	0.073	-0.023	0.076
log(income)	0.028	0.018	-0.048	0.039	0.019	0.042
Urban area	(omitted)		(omitted)		(omitted)	
UCS	Reference					
SSS	0.014	0.038	-0.198***	0.064	0.184***	0.068
CSMBS	-0.069	0.051	-0.063	0.101	0.132	0.104
Dual coverage	-0.003	0.041	-0.157	0.082*	0.161*	0.083
Chronic illness	0.038	0.034	-0.341	0.053***	0.303***	0.059
Sample size	361					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 3: The results from multinomial logit model (subgroup: central region)

Variables	Informal care (base outcome: no care)		Healthcare facilities (base outcome: no care)		Healthcare facilities (base outcome: informal care)	
	Coef.	SE	Coef.	SE	Coef.	SE
Gender	-0.016	0.191	0.167	0.190	0.183	0.141
Age	-0.020**	0.007	-0.004	0.007	0.015***	0.005
Married	0.209	0.201	-0.303	0.198	-0.512***	0.145
Primary school	Reference					
Secondary school	-0.554**	0.280	-0.330	0.276	0.224	0.222
College or higher	-0.475	0.374	-0.490	0.379	-0.015	0.259
log(income)	0.023	0.071	0.030	0.068	0.007	0.065
Urban area	0.459**	0.198	0.100	0.195	-0.359**	0.142
UCS	Reference					
SSS	0.390	0.291	0.817***	0.286	0.427**	0.198
CSMBS	0.081	0.375	0.483	0.350	0.402	0.254
Dual coverage	0.294	0.420	0.373	0.410	0.079	0.288
Chronic illness	-0.030	0.221	0.832***	0.213	0.861***	0.146
Wald chi – square (df)	121.25 (22)					
Prob > chi2	<0.01					
Sample size	2,091					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 4: Marginal effects from the multinomial logit model (subgroup: central region)

Variables	No care		Informal care		Healthcare facilities	
	ME	SE	ME	SE	ME	SE
Gender	-0.009	0.020	-0.032	0.030	0.041	0.030
Age	0.001*	0.001	-0.004***	0.001	0.002**	0.001
Married	0.006	0.021	0.099***	0.030	-0.105***	0.030
Primary school	Reference					
Secondary school	0.050*	0.029	-0.069	0.046	0.019	0.047
College or higher	0.055	0.041	-0.024	0.055	-0.032	0.056
log(income)	-0.003	0.007	0.000	0.013	0.003	0.013
Urban area	-0.031	0.021	0.087***	0.030	-0.055*	0.030
UCS	Reference					
SSS	-0.070**	0.031	-0.051	0.042	0.121***	0.042
CSMBS	-0.033	0.039	-0.064	0.056	0.097*	0.053
Dual coverage	-0.038	0.044	0.003	0.062	0.036	0.061
Chronic illness	-0.048**	0.022	-0.149***	0.030	0.197***	0.029
Sample size	2,091					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 5: The results from multinomial logit model (subgroup: northern region)

Variables	Informal care (base outcome: no care)		Healthcare facilities (base outcome: no care)		Healthcare facilities (base outcome: informal care)	
	Coef.	SE	Coef.	SE	Coef.	SE
Gender	0.345	0.245	0.500**	0.243	0.155	0.142
Age	-0.014	0.009	-0.003	0.008	0.011**	0.005
Married	-0.034	0.261	-0.045	0.256	-0.079	0.155
Primary school	Reference					
Secondary school	-0.016	0.423	-0.234	0.423	-0.218	0.284
College or higher	0.154	0.493	0.304	0.480	0.150	0.288
log(income)	-0.008	0.101	-0.049	0.096	-0.041	0.068
Urban area	0.271	0.266	-0.025	0.263	-0.296**	0.148
UCS	Reference					
SSS	-1.320***	0.486	-0.610	0.446	0.710**	0.338
CSMBS	-0.427	0.440	-0.237	0.416	0.191	0.292
Dual coverage	-1.317***	0.514	-0.894*	0.505	0.423	0.338
Chronic illness	0.012	0.274	0.745***	0.266	0.734***	0.157
Wald chi – square (df)	78.93 (22)					
Prob > chi2	<0.01					
Sample size	1,826					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 6: Marginal effects from the multinomial logit model (subgroup: northern region)

Variables	No care		Informal care		Healthcare facilities	
	ME	SE	ME	SE	ME	SE
Gender	-0.038*	0.021	-0.014	0.032	0.053*	0.032
Age	0.001	0.001	-0.003**	0.001	0.002*	0.001
Married	0.001	0.022	0.016	0.035	-0.017	0.034
Primary school	Reference					
Secondary school	0.012	0.036	0.040	0.062	-0.052	0.063
College or higher	-0.021	0.042	-0.022	0.064	0.043	0.064
log(income)	0.003	0.008	0.007	0.015	-0.010	0.015
Urban area	-0.010	0.023	0.067**	0.033	-0.057*	0.033
UCS	Reference					
SSS	0.085**	0.040	-0.190**	0.074	0.105	0.071
CSMBS	0.029	0.036	-0.054	0.065	0.025	0.063
Dual coverage	0.098**	0.045	-0.136*	0.073	0.037	0.075
Chronic illness	-0.036	0.022	-0.137***	0.034	0.173***	0.033
Sample size	1,826					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 7: The results from multinomial logit model (subgroup: northeastern region)

Variables	Informal care (base outcome: no care)		Healthcare facilities (base outcome: no care)		Healthcare facilities (base outcome: informal care)	
	Coef.	SE	Coef.	SE	Coef.	SE
Gender	0.109	0.216	0.378*	0.202	0.268*	0.158
Age	-0.023***	0.008	-0.013*	0.007	0.010*	0.006
Married	-0.381	0.232	0.211	0.215	0.592***	0.171
Primary school	Reference					
Secondary school	-0.168	0.457	0.185	0.436	0.353	0.325
College or higher	-0.636	0.453	0.236	0.436	0.872**	0.369
log(income)	0.178*	0.093	-0.011	0.074	-0.190***	0.071
Urban area	-0.110	0.212	-0.419**	0.199	-0.309**	0.146
UCS	Reference					
SSS	0.002	0.483	0.280	0.443	0.278	0.375
CSMBS	-0.459	0.538	-0.100	0.496	0.359	0.363
Dual coverage	-0.794	0.545	-0.971**	0.489	-0.177	0.473
Chronic illness	-0.409	0.291	0.873***	0.258	1.281***	0.185
Wald chi – square (df)	95.70 (22)					
Prob > chi2	<0.01					
Sample size	1,847					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 8: Marginal effects from the multinomial logit model (subgroup: northeastern region)

Variables	No care		Informal care		Healthcare facilities	
	ME	SE	ME	SE	ME	SE
Gender	-0.028	0.018	-0.038	0.028	0.066***	0.031
Age	0.002**	0.001	-0.002**	0.001	0.001	0.001
Married	-0.001	0.019	-0.104***	0.030	0.105***	0.032
Primary school	Reference					
Secondary school	-0.006	0.040	-0.060	0.058	0.067	0.064
College or higher	0.005	0.039	-0.155**	0.064	0.150**	0.072
log(income)	-0.005	0.007	0.035***	0.013	-0.030***	0.013
Urban area	0.030*	0.017	0.044*	0.026	-0.075***	0.028
UCS	Reference					
SSS	-0.018	0.041	-0.043	0.067	0.061	0.072
CSMBS	0.021	0.046	-0.070	0.066	0.049	0.071
Dual coverage	0.087	0.043	0.002	0.084	-0.090	0.089
Chronic illness	-0.043*	0.023	-0.212*	0.032	0.254***	0.032
Sample size	1,847					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 9: The results from multinomial logit model (subgroup: southern region)

Variables	Informal care (base outcome: no care)		Healthcare facilities (base outcome: no care)		Healthcare facilities (base outcome: informal care)	
	Coef.	SE	Coef.	SE	Coef.	SE
Gender	0.035	0.243	0.001	0.228	-0.034	0.172
Age	-0.011	0.008	0.003	0.008	0.015**	0.006
Married	-0.092	0.263	0.104	0.246	0.196	0.183
Primary school	Reference					
Secondary school	-0.394	0.365	-0.458	0.354	-0.064	0.264
College or higher	0.466	0.563	0.334	0.569	-0.132	0.317
log(income)	0.384*	0.198	0.292	0.192	-0.091	0.137
Urban area	0.053	0.280	0.108	0.261	0.055	0.183
UCS	Reference					
SSS	0.915*	0.523	0.875*	0.518	-0.040	0.274
CSMBS	-0.779**	0.402	-1.074***	0.381	-0.294	0.306
Dual coverage	0.299	0.562	0.194	0.573	-0.106	0.319
Chronic illness	-0.244	0.288	0.491*	0.254	0.735***	0.202
Wald chi – square (df)	63.75 (22)					
Prob > chi2	<0.01					
Sample size	1,226					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Table 10: Marginal effects from the multinomial logit model (subgroup: southern region)

Variables	No care		Informal care		Healthcare facilities	
	ME	SE	ME	SE	ME	SE
Gender	-0.001	0.020	0.007	0.035	-0.006	0.036
Age	0.000	0.001	-0.003**	0.001	0.003**	0.001
Married	-0.003	0.022	-0.038	0.037	0.041	0.039
Primary school	Reference					
Secondary school	0.040	0.031	-0.002	0.053	-0.038	0.057
College or higher	-0.035	0.050	0.039	0.063	-0.004	0.073
log(income)	-0.030*	0.017	0.029	0.027	0.001	0.029
Urban area	-0.008	0.023	-0.008	0.037	0.016	0.039
UCS	Reference					
SSS	-0.082*	0.047	0.038	0.056	0.044	0.063
CSMBS	0.089***	0.034	0.026	0.061	-0.115*	0.065
Dual coverage	-0.021	0.051	0.029	0.063	-0.007	0.074
Chronic illness	-0.020	0.023	-0.138***	0.040	0.158***	0.040
Sample size	1,226					

*** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

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AWARD RECEIVED

- Silver medal award from Math and Science Genius Development Project, held by The Institute for the Promotion of Teaching Science and Technology (IPST), 2003
- Final round (26 teams) in Singha English Challenge 2016

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