CATASTROPHIC HEALTH EXPENDITURE AND IMPOVERISHMENT AMONG HOUSEHOLDS IN CAMBODIA: EVIDENCE FROM CAMBODIAN SOCIO-ECONOMIC SURVEY 2012

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science Program in Health Economics and Health Care Management
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ภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพและความยากจนของครัวเรือนในราชอาณาจักรกัมพูชา: ข้อมูลจากการสำรวจทางด้านสังคมและเศรษฐกิจของราชอาณาจักรกัมพูชาในปี ค.ศ. 2012

นายไม โม

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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Thesis Title	CATASTROPHIC HEALTH EXPENDITURE AND IMPOVERISHMENT AMONG HOUSEHOLDS IN CAMBODIA: EVIDENCE FROM CAMBODIAN SOCIO-ECONOMIC SURVEY 2012
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Field of Study	Health Economics and Health Care Management
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งานศึกษาชิ้นนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่ส่งผลต่อภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพและการถูกทำให้ยากจนของครัวเรือนในราชอาณาจักรกัมพูชาในปี ค.ศ. 2012 และศึกษาระดับการป้องกันจากภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพและการถูกทำให้ยากจนที่ครอบครัวชาวกัมพูชาได้รับจากกองทุนเพื่อความเท่าเทียมกันทางด้านสุขภาพของครัวเรือน

การศึกษานี้เป็นการวิจัยเชิงพรรณนาโดยใช้ข้อมูลจากการสำรวจครัวเรือนทางด้านสังคมและเศรษฐกิจของราชอาณาจักรกัมพูชาแบบภาคตัดขวางในปี ค.ศ. 2012 และใช้ระเบียบวิธีวิจัยที่เป็นที่ยอมรับระดับนานาชาติขององค์การอนามัยโลกในการคำนวณสัดส่วนของครัวเรือนที่เผชิญภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพและถูกทำให้ยากจนเนื่องจากค่าใช้จ่ายทางด้านสุขภาพของราชอาณาจักรกัมพูชา การวิเคราะห์สมการถดถอยแบบโลจิสติคถูกใช้เพื่อศึกษาปัจจัยของปัญหาดังกล่าว

ผลการศึกษานี้พบว่าสัดส่วนของครัวเรือนที่มีปัญหาภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพและถูกทำให้ยากจนหลังจากเผชิญค่าใช้จ่ายทางด้านสุขภาพ และจ่ายค่ารักษาด้วยตนเองมีค่าเท่ากับ ร้อยละ 5.92 และ 3.12 ตามลำดับ ครัวเรือนที่อาศัยในเขตชุมชนเมือง มีจำนวนสมาชิกในครอบครัวมาก มีหัวหน้าครอบครัวเป็นเพศชาย และครอบครัวที่มีหัวหน้าครอบครัวที่มีการศึกษาสูงจะมีโอกาสประสบภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพต่ำลง ปัจจัยหลักที่เพิ่มความเสี่ยงต่อภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพ ได้แก่ ครัวเรือนที่มีสมาชิกเจ็บป่วยเรื้อรัง เจ็บป่วยรุนแรง หรือมีสมาชิกที่เข้ารับการรักษาแบบนอนโรงพยาบาล กลุ่มครัวเรือนที่จัดอยู่ในควอไทล์ที่มีค่าใช้จ่ายสูงจะมีโอกาสประสบปัญหาภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพสูงแต่กลับมีโอกาสที่จะถูกทำให้ยากจนต่ำ และผลการศึกษาที่สำคัญคือครัวเรือนที่เข้าร่วมในกองทุนเพื่อความเท่าเทียมกันทางด้านสุขภาพจะมีโอกาสที่จะประสบปัญหาภาวะวิกฤตทางค่าใช้จ่ายด้านสุขภาพและถูกทำให้ยากจนต่ำ

สาขาวิชา เศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ ลายมือชื่อนิสิต .....

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5785630429 : MAJOR HEALTH ECONOMICS AND HEALTH CARE MANAGEMENT
KEYWORDS: CAMBODIA / CATASTROPHIC HEALTH EXPENDITURE / IMPOVERISHMENT / OUT-OF-POCKET PAYMENT

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This study arms to identify the determinants of catastrophic health expenditure (CHE) and impoverishment among households in Cambodia in 2012, and assess the degree to which Cambodian households who received the health equity fund were protected from CHE and impoverishment.

A descriptive study using cross-sectional household survey data from the nationally representative Cambodian Socio-Economic Survey 2012 was used for this analysis. An internationally recognized and standardized methodology developed by WHO was used to calculate the proportion of CHE and impoverishment and binary logic regression was performed to identify the determinants of CHE and impoverishment.

The results found that the proportion of households suffering CHE and impoverishment after purchasing health care services and paying from out-of-pocket were 5.92% % and 3,12% respectively. Households in urban areas, households with more members, households headed by male and higher education of household head were less likely to incur CHE. The main factors associated with high risk of CHE and impoverishment were the households having chronic illness members or severe illness, and households having any member admitted to hospital. Households grouping into higher expenditure quintiles were more likely to face CHE, but less likely to be impoverished. Importantly, households enrolling into health equity fund were less likely to face CHE and impoverishment.

Field of Study: Health Economics and Health Care Management Student's Signature .....
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CONTENTS

Page

Page

Page

List of Tables

List of Figures

List of Abbreviation

- ADB Asian Development Bank
- CHE Catastrophic Health Expenditure
- CPA Complementary Package of Activity
- CSES Cambodian Socio-Economic Survey
- CTP Capacity to Pay
- GDP Gross Domestic Product
- GIZ The Deutsche Gesellschaft für Internationale Zusammenarbei
- HEF Health Equity Fund
- MoH Ministry of Health
- MoP Ministry of Planning
- MPA Minimum Package of Activity
- NGO Non-Governmental Organization
- NHA National Health Account
- NIS National Institute of Statistic
- OOP Out of Pocket Health Expenditure
- SUBOs Subsidy Operators
- UHC Universal Health Coverage
- USD United State Dollar
- WHO World Health Organization
- hh Household

CHAPTER I
INTRODUCTION

1.1 Problems and Significance

All countries across the globe structure their own different kinds of health system in order to provide health care services in term of preventive and curative cares that able to make a substantial diversity to population health. Health is human right. Basically, people need full stock of health for their daily activities. Healthy nations are of course relied on how good the health care system of those countries designed their services that meet peoples' satisfaction. However, accessing these services can lead to households facing catastrophic spending on health care payments and some become impoverished (Ke Xu, 2004).

Health care systems are obviously structured not only for improving the peoples' health as generality but also attempting to prevent households from catastrophic health expenditure even associated with a small health problem (WHO, 2000). Health care costs that required payments from out-of-pocket can cause households to suffer catastrophic health expenditure and impoverishment (Balarajan Y, Selvaraj S, & Subramania SV, 2011) and (Bredenkamp C, Mendola M, & Gragnolati M, 2011).

Annually, the estimated numbers of households experiencing financial health catastrophe are approximately 44 million over the world , of them around 25 million households become impoverished after using health care services and paying from their out-of-pocket (K. Xu et al., 2007) and (Shahrawat R & Rao K D, 2012). In countries where social health protection are effectively implemented, households are prevented from disastrous health care expenditure. However, many households from low- and middle-income nations encounter excessive OOP payments on health care utilization and they are not covered by any kinds of risk-pooling mechanisms, those households are forcing into asset depletion, debt, reducing basic subsistence needs, and sometimes become financially catastrophic (Yardim, Cilingiroglu, &

Yardim, 2010);(Shiff Clive, Onwujekwe Obinna, Hanson Kara, & Uzochukwu Benjamin, 2012) and (Binnendijk E, Koren R, & Dror DM, 2012).

High health care payment from out-of pocket among poor people in Cambodia is the main financial barrier to access equitability and quality of healthcare services. Like other low-and middle income countries in the region and other particular parts of the world, majority of poor people in Cambodia have decided to be self-prescribed or tried to live with illness until the end of their life. What a tragic event is that many illnesses and deaths occur from the condition that are preventable and treatable (VSO, 2006). Without financial health protection mechanism and unable to access to Health Equity Fund (HEF) with very limited covering, too often they use money borrowing approaches from formal and informal financial institutions and/or selling their assets as a coping strategy to health care expenses.

Health care financing in Cambodia is sustainably relied on out-of-pocket health expenditure (OOP). According to National Health Account of Ministry of Health in 2012, OOP accounted for 60.3% of total health expenditure, while the government spending on health recorded only 19.3%. The government financial allocation to health was relatively small, only 1.3% as a share of GDP (NHA, 2012).

Reliance on OOP to finance health care services keep households be exposure to hazard of incurring a huge medical expense when any member of a household having illness. Consequently, health shocks can drive them into catastrophic health expenditure and become poor resulted from unpredictable costs and lost their income because of unavailability to work (Ke Xu et al., 2003).

Health outcomes must be considerably difficult to measure, but they can be evaluated through government resources allocation to health sector, health educational system, and various factors impact on implementing health policies. It can be clearly seen that less financial resources allocated to health care system results in challenging health outcome. People become untrusted to public services and change their behavior from seeking public health care services to private ones that are much more expensive and induce them face with catastrophe in health care spending.

This study is very important to find out the determinants influence catastrophic health expenditure and impoverishment and may reveal opportunities to reduce poverty due to high cost of health care consumption by proposing some measurements of financial risk pooling in health care seeking and redesigning health system financing in order to protect households from disastrous health care payments. A similar study was conducted on out-of-pocket and catastrophic health expenditure by The Deutsche Gesellschaft für Internationale Zusammenarbei (GIZ) in Cambodia in 2009 by using Socio-Economic Survey data from 2004, 2007, and 2009. This previous analysis could not identify health care spending separately for inpatient and outpatient that are considerably important and some important variables were missing to include in regression analysis such as health insurance, inpatient and outpatient, type of health care providers (public and private) that are also the main factors associated with catastrophic health expenditure. Moreover, health equity fund variable was focused on geographical coverage (operational districts covered by HEF), not based on individual or household coverage. The health equity fund coverage will be identified based on household level in this current study. Another important thing that our study can be differentiated is that this previous study did not identify the determinants of impoverishment due to health care payment among households in Cambodia.

Regarding to expanding the coverage of Health Equity Fund (HEF) by the government and non-government organizations (NGOs) from 21% of poor population in 2009 to 76% in 2012 (MoH, 2014), there might be considerably a big gap of trend of finding from data 2009 to data 2012 that our investigation needs to be done now by using that data 2012 in order to identify various factors associated with households facing catastrophic health expenditure and impoverishment, and assess the level to which HEF, fee exemption, or health insurance that can protect households from catastrophic health expenditure and impoverishment.

1.2 Research Question

- What were the factors associated with catastrophic health expenditure and impoverishment among households in Cambodia in 2012?

- Could Equity card, fee exemption, or health insurance protect households from catastrophic health spending and impoverishment?

1.3 Objectives:

1.3.1 General Objective

The general objective of study is to investigate the factors associated with catastrophic health expenditure and impoverishment among households in Cambodia in 2012 and calculate the extent of catastrophic health expenditures and incidence of impoverishment in Cambodia by using the WHO's standardized approach developed by Ke Xu 2004.

1.3.2 Specific Objective

- Calculate the proportion of households experienced with catastrophic spending and become impoverished because of health care expenditure.
- Identify the determinants of catastrophic health care payments among households in Cambodia in 2012.
- Assess the factors associated with impoverishment due to health care payment among households in Cambodia in 2012.
- Assess the degree to which Cambodian households who receive the HEF benefits were protected from catastrophic spending and impoverishment caused from medical expense.
- Propose the policy guidance towards protecting households from financial health catastrophe and impoverishment.

1.4 Scope of Study

The analysis of catastrophic health care payment and impoverishment using data from the nationally representative Cambodian socio-economic survey (CSES) in 2012 that was conducted annually by National Institute of Statistic (NIS), Ministry of

Planning (MoP), can be an expandable part of this household survey to identify characteristics of households experiencing with catastrophic health expenditure and impoverishment. Therefore, result can be nationally represented because we used households weight in the analysis.

1.5 Expected Benefits

The expected benefits of this study may reveal opportunity for policy-decision makers to get variety of information about the determinants impact on household pushing into catastrophe in health care spending and impoverishment in Cambodia as a whole. The result of this study can be used for reforming the national health financing system and help expanse the limited coverage of recent social health protection program that can prevent households from financial health catastrophe and poverty by increasing the government expenditure on health and reducing out-of-pocket health care payments.

1.6 Hypothesis

The study on catastrophic health expenditure and impoverishment among households in Cambodia can be tested as the following hypothesis:

- The extent of Cambodian households facing with catastrophic spending on health care services and impoverishment is higher for households located in rural areas and households classified into lower expenditure quintile.
- Poor households and those without covering by risk sharing mechanism for coping with health care payments are most vulnerable to catastrophe in health care expenditure and impoverishment.
- Households with any member having illness and getting admission into hospital are more likely to experience catastrophic health expenditure and impoverishment than those just seek for health consultation.
- Households with any member having chronic illness, severe illness that cannot work or do usual daily activities are more likely to face catastrophic

health expenditure and impoverishment than those without this kind if illness.

- Households who seek care at public health care providers are less likely to suffer catastrophic health expenditure and impoverishment than those seeking at private health facilities.
- Location of households, house size, sex, age, and education of household head, and low economic quintile are the determinants of catastrophic health expenditure.

CHAPTER II
BACKGROUND INFORMATION

2.1. General Background of Cambodia

An agriculture based- country located in Southeast Asia, Kingdom of Cambodia is bordered with Thailand from the west to the north with 803 kilometer and a 443-kilometer coastline along the Gulf of Thailand to the southwest, Vietnam from the east to the south with 1,228 kilometer. Cambodia also has boarder with Laos to the north with 541kilometer. It has a total land area of 181,035 square kilometers and it is administratively divided into 24 provinces and one capital city. It consists of 197 districts, 1631 communities, and 14,119 villages. Cambodia has achieved robust and steady growth over the past twenty years. There are an increase in interest of the investments in rural areas where more than 80% of all Cambodians are living there and the population living under the national poverty line declined noticeably (ADB, 2014).

The estimated population of Cambodia from different censuses in year 1998 and 2008 and Cambodia Socio-Economic Surveys (CSES) 2004-2012 concisely illustrated in table 1. There were two population censuses that measured the total of population, but these were not directly comparable to those estimated in CSES. The statistics numbers of census incorporated the aggregate population while the Cambodian Socio-Economic Survey assessed just only population residing in typical families. There was increment of population in urban territories with approximately at annual proportion 2.1%, whereas the proportion of population growth in rural areas was 1.5%. This figure was considerably correct for the period of estimate from two national population censuses in 1998 and 2008, and the period between the early and lastly Cambodian Socio-Economic Survey (NIS, 2012).

Table 1: Numbers of estimated population in thousand from 1998-2012

Doman	Census	CSES	Census	CSES			
	1998	2004	2008	2009	2010	2011	2012
Cambodia	11,438	12,657	13,396	13,729	13,958	14,155	14,376
Urban	1,796	2,388	2,614	2,644	2,704	2,807	3,127
Rural	9,642	10,270	10,782	11,085	11,254	11,348	11,249

Source: CSES 2012

Table 2 shows the numbers of household growth from 1998 to 2012 from two deferent sources of estimate, population censuses and Cambodian Socio-Economic Surveys. During a decade, numbers of households in Cambodia that estimated from population censuses increased from 2162 thousand in 1998 to 2818 thousand in 2008. This growth of households still continued from 2876 thousand based on SCES 2009 to 3082 thousand in 2012. The number of urban households was growing at a yearly rate of more than 3% while the rate for rural households is around 2% (NIS, 2012)

Table 2: Numbers of estimated households in thousand from 1998-2012

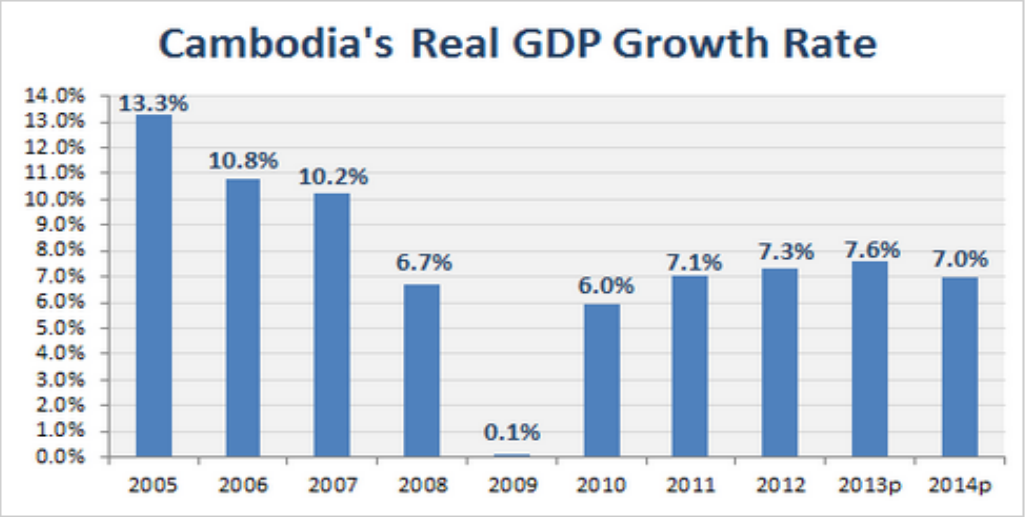
Doman	Census	CSES	Census	CSES	CSES	CSES	CSES
	1998	2004	2008	2009	2010	2011	2012
Cambodia	2162	2570	2818	2876	2917	3044	3082
Urban	315	457	507	530	550	585	689
Rural	1847	2113	2311	2346	2367	2459	2393

Source: CSES 2012

2.2 Socio-Economic Status

According to the Ministry of Economic and Finance (MEF) report in figure 1, Cambodia's Gross Domestic Product (GDP) increasing rate dropped from 13.3% in 2003 to 6.7% in 2008. This increasing rate of GDP was only 0.1% in 2009. The early economic indicators show that the proportion of GDP in Cambodia had increased by 7.6% at constant prices between 2012 and 2013. The GDP in 2013 is estimated to reach 61,525 billion riels or approximately 15,191 million US dollars, which is equivalent to about 1,036 US dollars per capita (MoH, 2014).

Figure 1: GDP growth rate 2005-2014



Source: *http://www.mef.gov.kh/, accessed on March 12, 2015 at 2:00PM*

2.3 National poverty line

The relevant governmental officers established an Inter-ministerial Working Group to redefine a new national poverty line in 2012 that released in April, 2013. They calculated the household consumption expenditures from CSES 2009 that is the biggest survey data with full sample survey. For the latest recommended poverty line, they made an adjustment of the poverty line based on (1) "food poverty line that was defined as the cost of purchasing food equivalent to 2,200 Kilocalories per person per day"(MoP, 2013). (2) an allowance for a non-food component that

was estimated separately by different regions such as city, urban, and rural areas. and (3) an allowance for the expenditure of safe drinking water (ADB, 2014). In Table 3, the new daily poverty line per capita was 3,871 Riels equivalent to 0.93 US dollars in country based on CSES 2009 and was considered comparable and officially accepted for the years 2008 and the years after.

Table 3: New poverty lines by areas based on CSES 2009

Area	Poverty Line/ capita/day (Riels)	Poverty Line/capita/day ($)	Per Capita Monthly Poverty Line ($)
Phnom Penh	6,347	1.53	46.55
Other Urban	4,352	1.05	31.92
Rural	3,503	0.84	25.69
Cambodia	**3,871**	**0.93**	**28.39**

Note: The average exchange rate for 2009 was $1=KR 4,183

Sources: Ministry of Planning 2013. A New Approach of Poverty line

Data from CSES in year 1993 and 1994 was used to generate the first national poverty line with technical support from World Bank in 1997. Regarding to this, it was the aggregate of consuming the minimum food need at 2,100 kilocalories a day and non-food item expenditures as "consumed by those households that total consumption expenditure was equally to the food poverty line" (MoP, 2013). Table 4 illustrates the differences between the first national poverty line produced in 1997 and recent poverty line estimated based on CSES 2009 data using Cambodian official currency (Riel) per day at 2009 expenses (daily expenses).

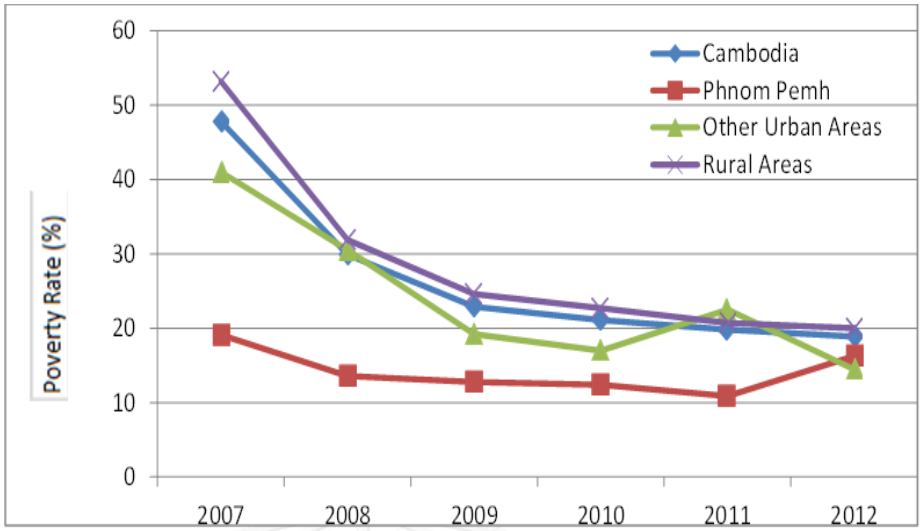
Table 4: Previous poverty line (1997) and recent poverty line comparison

Regions	Early poverty line	New Poverty Line
Phnom Penh city	4,185 riel/day	6,347 riel/pay
urban areas	3,438 riel /pay	4,352 riel/day
Rural areas	3,213 riel /day	3,503 riel /day
Cambodia	**3,332 riel /day**	**3,871 riel/day**

Sources: Ministry of Planning 2013

According to this new poverty line, the country incidence rate of the poverty headcount decreased significantly from 47.8% in 2007 to 18.9% in 2012. Overall proportion of poverty reduction was sharpest between 2007 and 2009 and became a small change during 2010–2012 period of time, although it increased over some periods in urban areas and in Phnom Penh (Figure 2). Even though poverty rate was the highest point in rural areas in 2012, there is only a small fluctuation of the proportion of poverty in urban areas. The poverty rate in urban areas excluding Phnom Penh was greater than before during 2010–2011 and was of course higher than in rural areas before dropping again in 2012. In Phnom Penh, poverty increased remarkably from 2011 to 2012 reaching 16.3%, and in 2007 it shows a big gap of poverty rate comparing to other urban areas (ADB, 2014). In 2012, the poverty rates for all parts of Cambodia came together at the same point to a greater extent than previously.

Figure 2: Poverty headcount Ratio by Area 2007-2012 at new poverty line

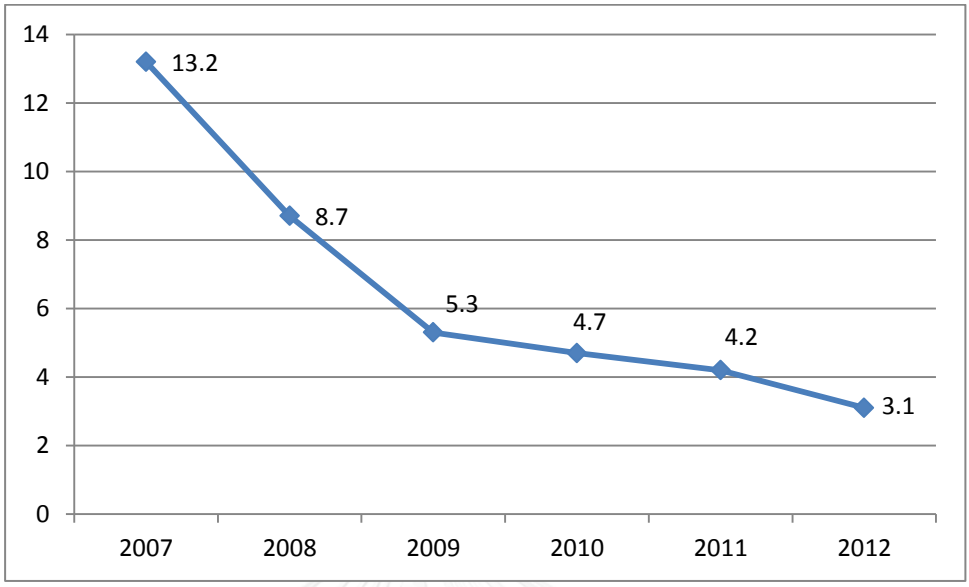


Cambodia	47.8	29.9	22.9	21.1	19.8	18.9
Phnom Penh	19.1	13.6	12.8	12.4	10.9	16.3
Other Urban Areas	41	30.5	19.2	17	22.5	14.5
Rural Areas	53.2	31.9	24.6	22.7	20.7	20

Sources: Ministry of Planning. National Strategic Development Plan 2014–2018.

Based on national poverty line, the proportion of poverty gap in Cambodia had been dramatically decreased from 13.2% in 2007 to 5.3% in 2009. It still continued to drop slightly until 3.1% in 2012 (Figure 3). Ministry of Planning had developed a methodology for poverty estimation through 2011-2012. It had arrived at the following estimates for poverty gap in 2012, Foster-Greer-Thorbecke (FGT) index 2.8%, 2.4%, and 3.58% in Phnom Penh, other urban areas, and rural areas respectively (MoP, 2013). The Gini Coefficient of consumption inequality in 2012 was 0.25.

Figure 3: Poverty gap ratio at national poverty lines (%)



Source: World Bank database

2.4 Household income and consumption

According to Cambodia Socio-Economic Survey in 2012, there were 3.1 million common households with 14.4 million populations were residing in country. The estimated Gross Domestic Product (GDP) per capita in 2012 was 3,918 thousand riels equivalent to 971 US dollars (CSES, 2012). Comparing to the year 2011, GDP increased by 7% and if compare to the last five years in 2008, this increased by 25%. Total household income was estimated as 1,019 thousand riels which increased by 15% in2011 and household's disposable income increased by 16% for the year 2012.

A common source of income in Cambodia especially in other rural areas was relied on the income from agriculture, this type of income increased by 10% in 2012 over the last year. However, the household incomes from agriculture was not the main source of income for households located in Phnom Penh and other urban areas. In 2012, non-agriculture income increased by 11% comparing to 2011 (CSES, 2012).

Wage and salary-base income among Cambodian households also increased from just about one third of total income between 2009 to 2010 comparing to an

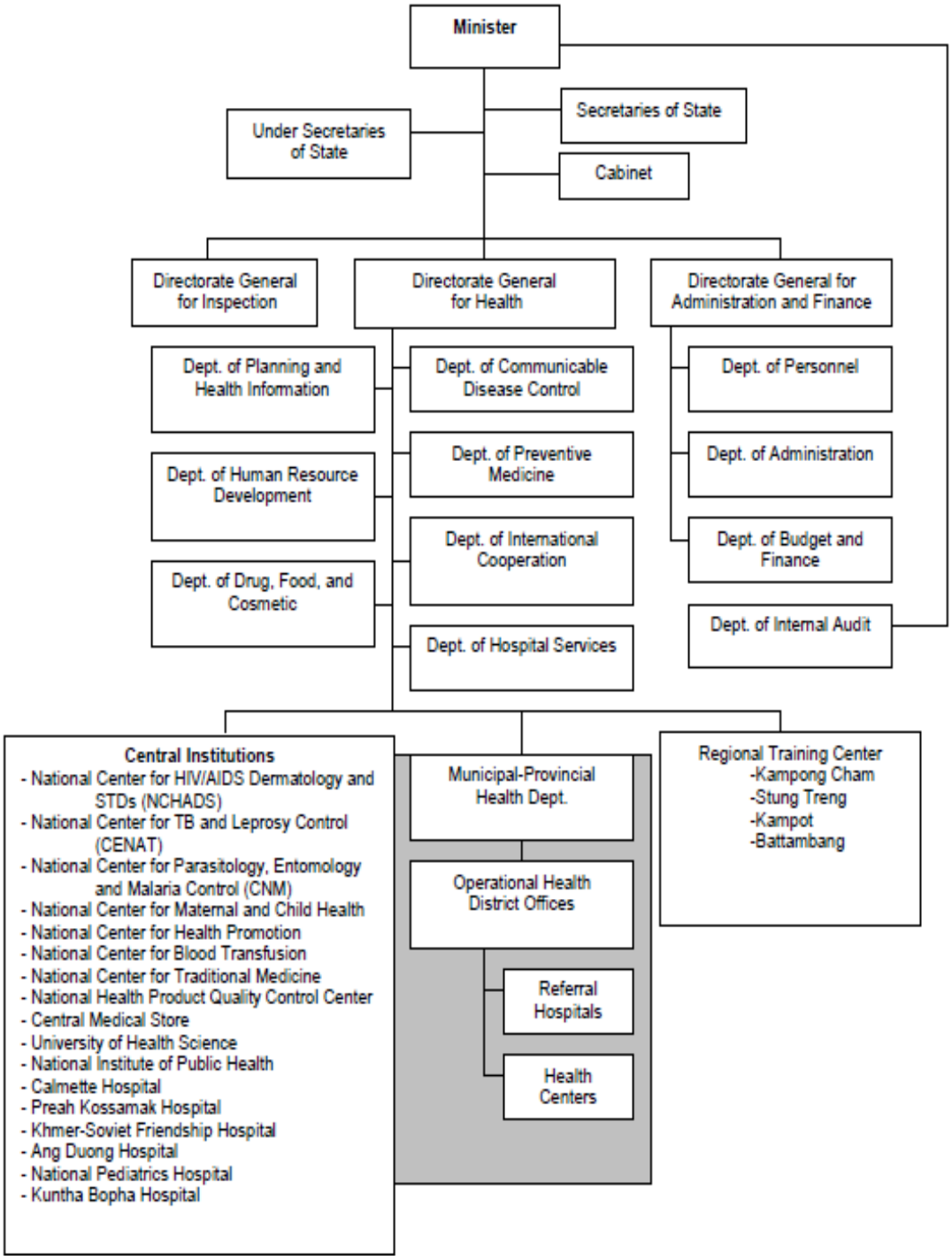
estimated 40% in 2012. However, income earned from self-employment showed a dramatic decrease in its share from two third of total incomes between 2009 to 2011 to an estimated 57% in 2012. Self-employment is also still main sources of Cambodian household income.

2.5 Health Care System in Cambodia

The Ministry of Health of Cambodia consists of three main directorate generals at central level: Directorate General for Inspection, Health, and Administration and Finance (Figure 4). Roles and functions of health care system in Cambodia are being reviewed as part of an influential development and reinforcement process. However, there has been a fast growth of the private health sector since the past decade and they have also been playing an important role in influencing an excessive health expenditure from out-of pocket . Majority of public health care staffs have also created their own private clinic or home care to supplement their low authority government compensations as earning additional income for supporting their living. Additionally, non-for-profit NGO hospitals provider a number of health care services, diagnostic, treatment, and primary health care services. Administrative enforcement of private health provider practicing guidelines is necessities to turn into a more observable part of the Ministry of Health's effort (WHO, 2011).

Health care system in Cambodia comprises a mixed component of public and private health services. There are two different classifications of public health services that are functioning in operational districts, the Minimum Package of Activity (MPA) and the Complementary Package of Activity (CPA). MPA is basically providing

Figure 4: Organizational Structure of Ministry of Health



Sources: WHO Western Pacific Country Health Information Profiles, 2011

primary health care services at the health centres and CPA is operating secondary health care services at the referral hospitals (district and provincial hospitals) .

Private sector, however, does not deliver minimum package activity services. Private medical practitioners, clinics and not-for-profit NGOs are unable to provide a broad range of services in order to meet needs. Tertiary services are basically functioned a variety of health care services through six national hospitals which are located in the main city, Phnom Penh, and they are considered as semi-autonomous hospital (MoH & WHO, 2012).

2.5.1 Health Centres / Health Posts

Health center or health post mainly located in rural areas. As public health provider, it serves primary health care services namely MPA for rural populations in a coverage of around 10,000–20,000 populations. The health center or health post services initially include basic medical consultations and primary diagnosis of illnesses, maternal and child care, including normal delivery, TB detection and treatment, family planning program, vaccines and immunization, health education and referral system. In 2010, only 43% of them provided the full minimum set of MPA services. Unavailable health professionals during duty, lack of basic medication support, and the absence of other operational guideline bases cannot normally provide function that corresponds to basic needs of local communities. NGOs perform their functions towards health promotion and disease prevention programs and activities to support health center's services. Some national level programs to support health center services have been taken into account by the government (MoH & WHO, 2012).

2.5.2 Referral Hospitals

Referral hospital is delivering secondary and tertiary services. It is divided into provincial and district hospitals and classified at three levels of the Complementary Package of Activity (CPA) with a catchment population of 100,000 to 200,000 each. In general, those facilities are fairly well equipped and skilled personnel. However, they are facing a number of resource constrains offering quality health services,

ranking from insufficient funding and inadequate management capacity to low staff remuneration and limited medical clinical skills to some extent.

- CPA-1 hospitals deliver their services with limited surgery procedures , no specialized doctor in general anaesthesia, there is no service for blood transfusion. However, they also provide a basic obstetric service. In 2011, there were totally 33 hospitals that are operational at this CPA-1 level.

- CPA-2 hospitals: include hospital services in CPA-1 plus intensive care unit services, specialized and generalized surgeries with general anaesthesia, other specialized services in 31 hospitals that classified into this level in 2011.

- CPA-3 hospitals provide broad range of surgery with different specialized surgeons and general anaesthesia. More services, activities, and patients than CPA-2, and also there are different kinds of specialized services available in CPA-3 hospitals. They are normally based at provincial level, up to year 2011 there are 26 hospitals to provide their services at this level. Referral hospitals also provide services to support primary health care with resources and expertise available for district health services. For Cambodian health care system, there are eight national referral hospitals located in the main city and 21 out of total 24 provincial referral hospitals provide their services at CPA 3 level (MoH & WHO, 2012).

According to annual health financing report in 2013, there has been a remarkable improvement of public health infrastructure over the last five years. Within 2013, the total public health facility in Cambodia was comprised of 8 national hospitals in Phnom Penh, 86 referral hospitals located in districts and provinces, and 1088 health centers and 86 health posts in communities (see Table 5)(MoH, 2014).

Table 5: Number of Public Health Facilities 2008-2013

Public Health Facilities	2008	2009	2010	2011	2012	2013
Number of Operational District	77	77	77	77	79	81
Total Hospitals	**87**	**88**	**89**	**90**	**91**	**94**
National Hospitals including MCH &TB	8	8	8	8	8	8
Number of Referral Hospitals	79	80	81	82	83	86
No of Referral Hospitals with CPA1	-	34	34	33	36	39
No of Referral Hospitals with CPA2	-	28	30	31	29	29
No of Referral Hospitals with CPA3	-	17	17	18	18	18
Number of Health Centers	967	984	997	1004	1024	1088
Number of Health Posts	107	111	117	123	124	86

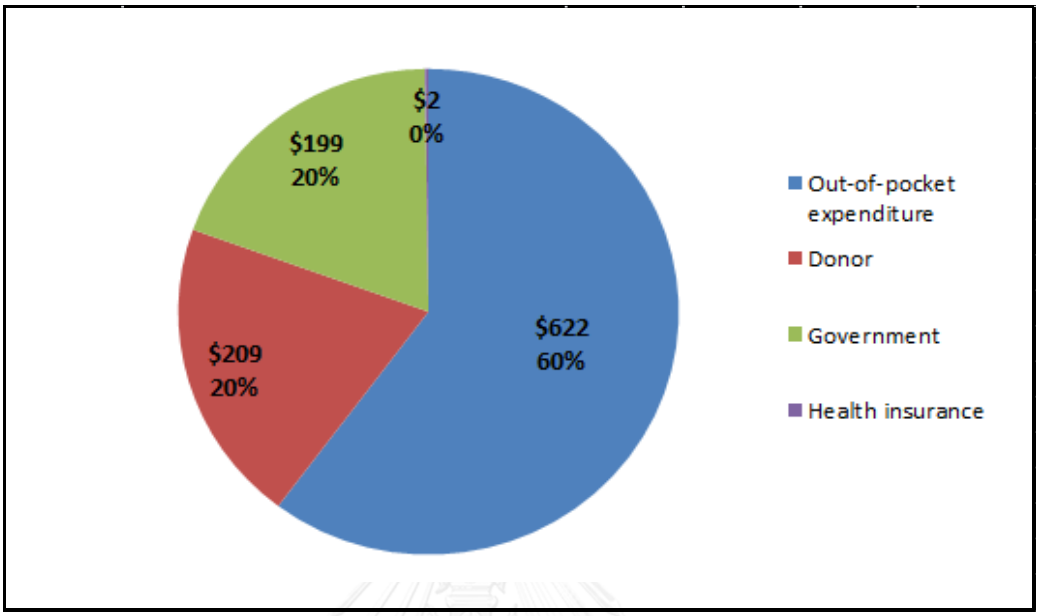
Source: *Bureau of HIS, DPHI, MoH 2013*

2.6 Health Care Financing

The health care system in Cambodia is sustainably financed by a large degree of OOP , approximately 60% of total sources for financing health service system delivery (see figure 5) , which is a major cause of concern (NHA, 2012). First, OOP presents a major obstruction to health care access and it is too frequent to cause indebtedness and impoverishment. Second, OOP does not facilitate risk-sharing among the population to prevent CHE and impoverishment. Third, OOP is not a very efficient way of financing health care. Relying on OOP may delay care-seeking, which makes it more costly to treat the patient when they are hospitalized to the health facility or present at outpatient department.

Another big source of financing health care system is the major donors that the government too often relies on. However, the government health expenditure, source of fund comes from taxation, is considerably low, just 20% of total health funding. This results that quality of health care service is in stage of compromising in order to respond to health needs of general population and attitude towards purchasing health insurance among population is not widely aware.

Figure 5: Sources for Financing Health System in million US dollars in 2012



Source: Cambodia NHA 2012 database

2.7 Household Expenditure on Health

According to National Health Account 2012, Cambodian households spent more on private clinics and practitioners that accounted for the largest share 27% of all health care providers in 2012 followed by the pharmacy (19.5%)(see table 6) Health seeking behavior among illness people frequently used services at private sectors and private pharmacies as a self-prescription as their first option. They were likely to be unaware about the basic public health centers nearby. These resulted for high proportion of out-of-pocket health expenditure that influence great opportunity to face catastrophic health spending and impoverishment. Second option was at public hospitals that accounted for 17.7% which generally became severe illnesses and chronic diseases.

Table 6: Households spending by different providers

Category	Amount (US$ million)	Share
Private clinics and practitioners	275.1	26.60%
Pharmacies	201	19.50%
Public hospitals	181.8	17.70%
Other providers, incl. NGOs	127.2	12.30%
Private hospitals	105.4	10.20%
Management and administration agencies	89.4	8.70%
Public health centers	44	4.30%
Providers of preventive care	7.5	0.70%
Laboratory and other supporting services	1.3	0.10%
Total	**1,032.70**	**100%**

Source: Cambodia NHA database.

2.8 Social Health Protection

Cambodia is still too far from achieving universal health coverage (UHC). Social health protection schemes such as health equity fund, community based health insurance, and private health insurance have been in the early stage of drafting and development processes. Majority of people are likely unaware with insurance benefits by purchasing health insurance even though through a small paid premium. In recent Cambodian situation, a pathway to UHC will demand a combined approaches and more effort. Such approaches include Compulsory Health Insurance for formal sectors to cover civil servants and salaried workers in private sectors, Voluntary Health Insurance for informal sector through improving the community based health insurance schemes, and the government schemes namely Health equity Fund and Subsidy Schemes (MoH, 2014).

2.8.1 Compulsory Health Insurance Scheme

Compulsory health insurance is established for insuring both formal and informal sectors, covering civil servants and salaried workers in private sectors. It has been developed and implemented by Ministry of Labor and Vocational Training (MoLVT) though National Social Security Funds (NSSF). The benefits of this scheme are to support the income security of members in case of any contingency such as old age, invalidity, death, occupation risks, and organize provision of health and social services for the members. Compulsory health insurance scheme has been implemented since 2008. Private enterprises have to register with NSSF and the premium is 0.8% of gross salary (MoH, 2014) . However, the contribution of 0.8% has been made by employers only since 2011. It is reported that the premium varied from a minimum level of 1,600 riels per month to a maximum of 8,000 riels. In 2013, there were 6,107 enterprises registered with NSSF and 89.26 % of those paid the premium for 847,175 employees (see Table 7).

Table 7: Summary of data on compulsory health insurance scheme

	2009	2012	2013
Registered enterprises	983	4,583	6,107
Paid enterprises	884	3,921	4,771
Memberships	387,064	768,134	847,175

Source: Annual Health Financing Report 2013

2.8.2 Community based health insurance (CBHI)

Community based health insurance in Cambodia refers to voluntary health insurance that has been established since 1998 and designed on the principles of risk sharing mechanism and pre-payment for health care utilization. CBHI is non-profit and voluntary health insurance implemented by NGOs and Community Based Organization (CBO) that the premiums are set at very reasonable cost to community members who are willing to register as members of the scheme (MoH, 2014). It provides the benefit package including medical services and other costs such as

transportation cost, allowances for a patient's care-taker, and funeral cost. The insured members or families are legible to use the contracted public health facilities.

In year 2012, there were 19 CBHI schemes have been implemented in 19 operational districts in 11 provinces contracting with 231 health centers, 18 referral hospitals, and 1 national hospital in Phnom Penh. Provider payment mechanism are mixed according to design of each individual scheme and varied from scheme to scheme with no standardized payment mechanism yet. The CBHI reimburses the costs of health services consumed by the insured members. The total membership of CBHI scheme in 2012 was about 166,663 comparing to 79,873 of the first operation in 2008 (MoH, 2014).

2.8.3 Private health insurance

Private health insurance market in Cambodia is considerably still in small size compared to other Asian countries. but it steadily continues to increase from year to year, the development of insurance market is predictable to continue increasing in the future in accordance with the economic growth as well because consumers start to touch confidence with this sector and be aware of the advantage of insurance.

According to the report of Department of Insurance and Pension of Ministry of Economics and Finance (MEF) in 2012, there were six private general insurances that have been operating health care benefit insurance in Cambodia (MEF, 2013). In the past ten years, particularly since 2005, insurance market's premium has remarkably risen from just above 10 million USD to 20 million USD in 2009, and 36 million USD in 2012 (figure 6). Without compulsory health insurance, private insurance companies offer any kind of health benefits to members who can afford to pay the premium and contract with any health facilities with customers' satisfaction and with any kind of provider payment mechanism. Data consumptions of private health are very limited.

Figure 6: The trend of gross premium of private insurances

Source: MEF Report 2012

2.8.4 Government Subsidy for the Poor

Subsidy scheme is operated and managed by public health facilities. They are usually recognized as Subsidy Operators (SUBOs) that are entitled to receive subsidy from the national fund. In term of performance, SUBOs are divided into national hospitals categorized as group I, and operational districts as group II. The main objective of this scheme is to reassure the poor to use health care services for free of charge at only public hospitals. MoH takes account to define mechanism to identify the poor based on eligible criteria and by taking equity, fairness, and transparency. MoH cooperates with other key implementing institutions to work out practical details, including tools and methods for identifying the poor patients, as well as a monitoring mechanism (MoH, 2014) .

Provider-payment technique is basically a fixed case-based payment. Fee level is set according to type of services and of health facilities. For instance, health center is eligible to get refund of 1,000 riel for a consultation and 10,000 riel for an admission. National hospitals receive a reimbursement of 80,000 Riel for a hospitalized patient regardless of what kind of illness and length of stay in hospital. A payment of 40,000 riel will be reimbursed to referral hospital CPA-1, while the

reimbursement of 50,000 riels and 70,000 riels will be funded to referral hospital CPA-2 and CPA-3 respectively, for a hospitalization.

2.8.5 Health Equity Fund (HEF)

A social transfer mechanism was designed to eliminate financial barrier of poor households that live under the poverty line to access the contracted public health facilities by paying fees for services via a third party payer, mainly local NGOs. Pre-identification and post-identification are normally used to identify the poor, who are entitled to get health services free of charge when they seek care at the contracted providers. The third party then reimburses directly the cost of such services used at facilities on a monthly basis. In 2012, there were 45 HEF schemes have been implemented in 45 Operational Districts in 23 provinces through contract arrangements with 47 referral hospitals out of 89 in total, and with 313 health centers out of 1,024 in total. Of those, 44 referral hospitals and 281 health centers are financed by combined funds, which include government counterpart fund, under Health Sector Strengthening Program 2, and other 3 referral hospitals and 32 health centers are financially supported by UNICEF, URC and Swiss Red Cross (MoH, 2014).

Up to year 2012, HEFs protected an estimated 2.45 million identified poor. In other words, the percentage of the poor people living under the national poverty line supported by HEFs has increased significantly from 21% in 2009 up to 76% in 2012. The Ministry of Health has planned to expand HEFs program to reach its full coverage in 2015 (MoH, 2014). It is noted that HEFs have increased the utilization of health services in both OPD and IPD by the poor over the period from 2008 to 2012. The total OPD cases had increased dramatically from 8,972 for year 2008 to 68,183 cases in year 2011 and up to 1,176,116 cases in 2012. The level of health services utilization is higher at HC up to 72% against 28% at referral hospitals. Table 8 illustrates the key characteristics of the various health insurances and welfare schemes.

Table 8: key characteristics of the health insurances and welfare schemes

Insurance/Scheme	Implementer	Fund	Coverage change	Target group
Compulsory health insurance	NSSF	Premium	387,064 employees in 2009 to 768,134 in 2012	Formal sector workers and civil servants
CBHI	NGOs	Premium	79,873 members in 2008 to 166,663 in 2012	Mainly informal sector people living above poverty line
Private health Insurance	Private companies	Premium	$20 million in 2009 to $36 million in 2012	All who can afford to pay premium
Government Subsidy schemes (SUBO)	MoH	National Fund	Health service utilization was 42,792 cases in 2012.	The eligible poor (those under the national poverty line)
Vouchers	MOH/ NGOs	*MoH, KfW* Development Bank.	Implemented in 2011, contracted with 9 ODs in three provinces	Poor pregnant women
HEF	NGOs	MoH/Donors	21% of poor people in 2009 up to 76% in 2012.	The eligible poor (those under the national poverty line)

Source: Annual Health Financing Report 2013

2.8.6 Voucher Scheme for Reproductive Health Services

The ministry of health, to reduce maternal mortality in Cambodia , presents a number of policy and strategic planning for intervention including the National Strategy for reproductive and sexual health to reduce maternal and child mortality rate. This scheme is a financial component of Social Health Protection under Cambodian-German cooperation (MoH, 2014) .

Identified poor women through pre-ID poor are the beneficial recipients of the voucher project. Vouchers are distributed to those poor women by voucher promoters. The vouchers entitle them to use reproductive health care services at

contracted public and private health institutions. Beside the reproductive health service benefit packages, the vouchers also reimburse transportation cost and hospital services at referral hospitals, where HEFs are not available. The voucher schemes have been implemented since 2011 financed by KFW as a grant and managed by Voucher Management Agency (VMA) via contractual arrangements with MoH. These has contracted with only five referral hospitals and 121 health centers in 9 operational districts (OD) in three different provinces such as Kampong Thom, Kampot, and Prey Veng, with four private clinics for providing safe abortion services.

CHAPTER III
LITERATURE REVIEW

3.1 Catastrophic Health Expenditure

Catastrophic health expenditure is not always defined as an identification to high health-care cost (Wyszewianski, 1986). A great need for payments for treatment, or special procedures, for example, may not be disastrous if even one family does not tolerate all of the cost, because the service is offered for free or at a price subsidy of services, or covered by insurance charges. On the other hand, even for a small cost for common illnesses can be a financial disaster for poor families without insurance or subsidies. (Ke Xu, 2004) defined that households experience catastrophe in health care payments when their total out-of-pocket health expenditure equals or exceeds 40% of their capacity to pay. The capacity to pay among households is regarding to their effective income being left over after payments on basic subsistence needs have been encountered.

Using the definition of catastrophic expenditure on health overspending by 40% of households' capacity to pay, WHO estimated a survey from 56 countries in 2003 and found that Cambodia had a relatively high proportion of households experienced CHE, 5.02% (Ke Xu et al., 2003). They analyzed the data from CSES 1999, if we compare to a recent study, It showed the similar trend of CHE occurring in rural areas. However, this study recorded that Vietnamese households facing with CHE just more than doubled, 10.45%, compare with Cambodia.

The source identifications of variations across households from different six Asian countries such as Bangladesh, Sri Lanka, India, Thailand, Hong Kong, and Vietnam were different in income levels. The degree of their reliance on out-of-pocket health expenditure and the incidence of catastrophic health spending varied. O' Donnell, et al defined catastrophic health expenditure as oop payment on health exceed a given share of households budget and used 10% threshold (O'Donnell, et al. 2005). The percentage of households facing catastrophic health expenditure

according this threshold was 3% in Sri Lanka, 3.5% in Thailand, 6% in Hong Kong, nearly 11% in India, and more than 15% in Bangladesh and Vietnam.

A result of previous study conducted in Cambodia in 2009 using threshold 40% of households' capacity to pay shows that the proportion of CHE incidence was 0.9% in Phnom Penh. This incidence rate of CHE is relatively small comparing to 4.9% in rural areas in the country (GIZ, 2012). The incidence of impoverishment was calculated from total expenditure of non-poor households subtracted by out of pocket health expenditure become less than national poverty line. The table 9 illustrates the comparison of the incidents of catastrophic health expenditure and impoverishment from health care spending between 2004, 2007, and 2009.

Table 9: CHE and Impoverishment incidence between 2004, 2007, and 2009

	2004			2007			2009		
	Phnom Penh	Urban	Rural	Phnom Penh	Urban	Rural	Phnom Penh	Urban	Rural
Catastrophic incidence	2.9%	3.8%	6.6%	1.1%	2.7%	4.7%	0.9%	1.6%	4.9%
Impoverishment Incidence	0.1%	1.1%	2.8%	0.0%	1.5%	2.6%	0.3%	0.9%	1.9%

Source: GIZ 2009, Data analysis from CSES 2004, 2007, 2009.

High proportions of catastrophic health care spending exist in Nigeria. A finding of study conducted using the same method, showed that 14,8% of a total of 167 households encountered CHE at threshold 40% of non-food expenditure from 22.6% of the poorest household expenditure quintile to 7.6% of the richest (Onoka, Onwujekwe, Hanson, & Uzochukwu, 2011).

Factors associated with catastrophic health expenditure in a study conducted in Georgia were inpatients with higher proportion than outpatients, household with any members having chronic illness and the family's poverty status were more likely to suffer from catastrophic health expenditure (Gotsadze, Zoidze, & Rukhadze, 2009). Additionally, Zhonghua Wang et al (2015) estimated that incidence and intensity of catastrophe related illness were considerably high among families with older people

who have chronic disease. The main determinants of catastrophic health payments were household size, households having elderly members, households having members with chronic diseases, and households with low income. However, health insurance did not significantly protect families from the high risk of catastrophic health expenditure (Wang, Li, & Chen, 2015).

An investigation of determinants of catastrophic health expenditure among households in Iranian based on large data collected in 2010 and using Bayesian logit model found that the main factors associated CHE are rural households that face with a lot constrains to access public health care services, households with elderly members more than 65 years , illiterate and unemployment household heads, and households with larger equivalent household size (Ali Akbar Fazaeli et al., 2015) . These factors are significantly affected on CHE that is similar to the Zhonghua Wang et al' s results.

3.2 Impoverishment after spending on health care

There are many different definitions and concepts of poverty. One of those is that it is significantly associated with inadequate income that unable to meet daily needs for their living. The aspect of this concept is based on the comparison of households' income, consumptions, education or other characteristics with some defined threshold below to which they are considered as being poor in that characteristics (World Bank Institute, 2005). This institution also stated that poverty is also linked with unsatisfactory outcomes regarding to health, nutrition and literacy, lacking social interaction, to insecurity, and to low self-reliance and incapacity.

However, in our study we are focusing on impoverishment after purchasing health care services that is defined as a non-poor household became poor after using health care services and paying from out-of-pocket. According to this definition, a study from China in 2012 figured that the rate of impoverished households due to health care utilization was 7.5%. This proportion was higher among households with hospitalized member, elderly and chronic illness, and households in rural areas (Li et al., 2012).

There have been many studies to identify the determinants of impoverishment, a previous research conducted in Thailand in 2010 shows that the independent variables such as urban/rural, income, household size, Age, disability, education, health service utilization, type of health care service, are most significant to affect on poverty, in particular part of Thailand, especially in Northeast (Bussabawalai, 2010). It also includes that household heads leading by male are more likely to be poor in Central and North in pre universal health coverage in 2001 and in North and Northeast after universal health coverage in 2009. This contradicts the finding in Cambodia that male as a household head was less likely to be impoverishment than households headed by female (GIZ, 2012).

According to Chuma and Maina (2005), poor Kenyan households were falling into impoverishment after purchasing health care services. There was a highest burden of out-of-pocket health care payment among poor households, the households grouping into poorest quintile spent one third of their total incomes on health care utilization annually compared to only 8% spent by richest quintile. They also indicated that 1.48 million Kenyan people are estimated as below the country poverty line because of health care payments (Jane Chuma & Maina, 2012). However, investigation done by GIZ in Cambodia shows that there is still a substantial gap between the poorer and richer sub-groups. Poor and near poor sub-groups had the large increase in percentage of ill people seeking medical care.

WHO proposed the method to measure the poverty by using a food share based poverty line for estimating household subsistence expenditure. This poverty line is defined as " the average food expenditures of households whose food expenditure share of total household expenditure is within the 45th and 55th percentile of the total sample " (Ke Xu, 2004).

A household is considered as poor when its total income or household consumption expenditure is less than its national poverty line. The poverty may result from ill-health, while poor health outcomes resulted in diminishing household incomes caused by variety of factors.

3.3 Risk Pooling Mechanism

Moving toward universal health coverage (UHC) and prevent household from the disaster of health care payments are a long journey and compromising for Cambodia. Social health insurance is yet at a very early stage of development (MoH, 2014) . In Cambodian context, pathway to UHC will reach through multiple approaches. Such approaches include Social Assistant Schemes for the poor and vulnerable, Compulsory Health Insurance for formal sector, and voluntary insurance for informal sector through the development of community based health insurance schemes.

A group of policy makers designed health care financing system to minimize excessive health care spending by proposing three factors associated with catastrophic health payments. These are because of the accessibility of health services structured requiring high payments from out-of-pocket, household's capacity to pay for health services is still low, and absence of prepayment mechanisms for medical expenses (Ke Xu, David B, Guy Carrin, & Aguilar-Rivera, 2005). In order to cope with these, flexible temporary responses will be needed, which will rely on the phase of economic improvement of the country and on the social and political situations. They suggested that policy decision-makers will have to consider how to pull out population coverage through prepayment mechanisms, protect the poor and underprivileged, design a benefits package, and decide the level of cost sharing by the patients

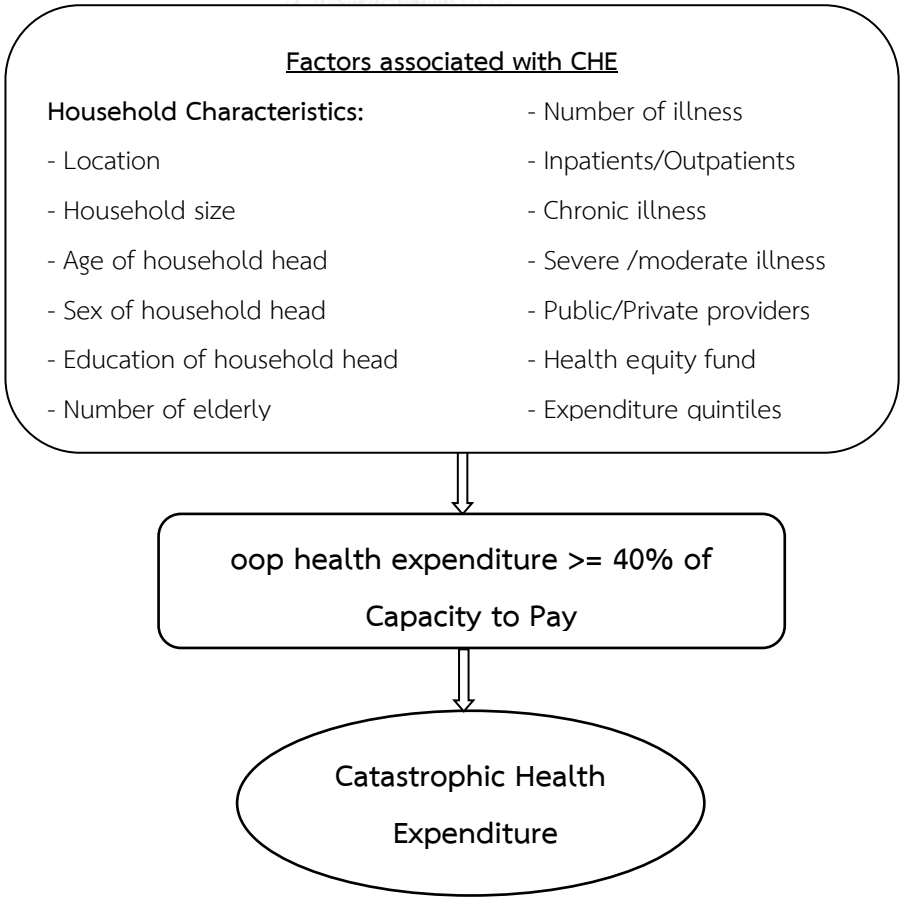
However, Morduch indicated that financial coping strategies refer to procedures anticipated to prevent current expenditure from an economic shock because of illness (Morduch, 1995). Drawing from particular income savings, borrowing and transfers from friends and relatives, and depletion of assets are examples of these strategies among poor households for paying health care services. Similarly, a study of 566 rural households in Burkina Faso, showed that health care payments were drawn from savings, selling assets, borrowing and labor exchange (Sauerborn R, Adams A, & Hien M, 1996).

National health system financing should be constructed in the ways that can prevent families from disastrous expenditure and impoverishment, and provide more accessible in order to meet their health needs. The most effective strategy is to reduce out-of-pocket for health spending by introducing the development of social health protection schemes or financing health system through general taxations and tying to maximize UHC. Thailand, for instance, is the one among Southeast Asian countries which has achieved its goal towards UHC and the proportion of households facing with CHE has also reduced dramatically after implementing this policy.

CHAPTER IV
CONCEPTUAL FRAMEWORK

In the first part, we define catastrophic health expenditure regarding to out-of-pocket health care payments that equals or higher than 40% of the capacity to pay, or when health payments for one or more members of a household are high related to their effective income remaining after spending on basic needs, thus the household has to give up other essential expenditures (Ke Xu, 2004). Problems that are related to catastrophic health expenditure force households to borrow money with or without interest rate or sell their assets at lower price in order to finance their health care costs, some households will earn less money or completely lose their income due to worsened health condition, and other households are impoverished after paying for health services.

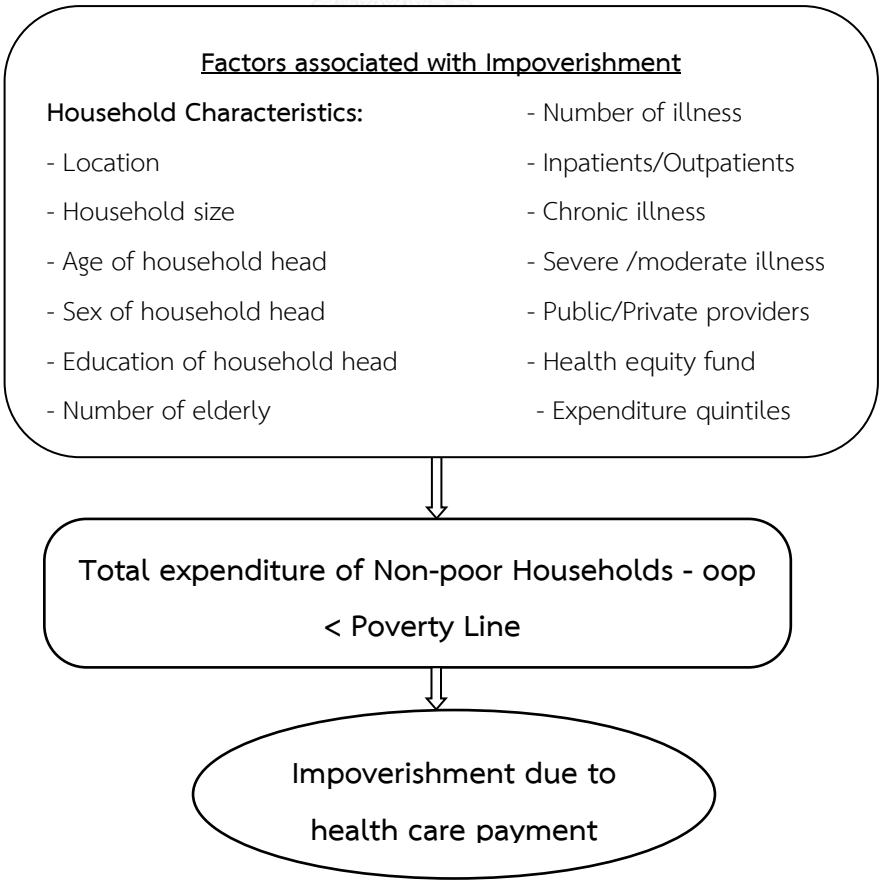
Figure 7: Catastrophic health expenditure definition and its determinant:



The second part indicates how to define the impoverishment after paying from out-of-pocket on health care utilization. In the data of CSES survey we can calculate the monthly total household consumption expenditure, we can capture monthly health expenditure and subsistence expenditures. Therefore, non-poor households became impoverished when their total consumption expenditure subtracted by oop becomes less than poverty line or subsistence expenditure.

There are various explanatory variables that influence households facing with CHE, and push households into impoverishment. These variables are then assessed by using logit regression model to examine the likelihood towards CHE and impoverishment as dependent variables. Factors associated with catastrophic health care payments and impoverishment include household expenditure quintiles raking from the poorest to richest quintiles, and household characteristics such as household location, sex and age of household head, number of members in each household, education of household head, number of illnesses, chronic illness, severe illness, health care providers, inpatients/outpatients, and health equity fund.

Figure 8: Impoverishment definition and its determinant:



CHAPTER V
RESEARCH METHODOLOGY

5.1 Study Design

A descriptive study using cross-sectional household survey data from the nationally representative Cambodian Socio-Economic Survey 2012 (CSES), annually implemented by National Institute of Statistics (NIS), Ministry of Planning (MoP). An internationally recognized and standardized methodology developed by a researcher from WHO " distribution of health care payment and catastrophic expenditure " (Ke Xu, 2004) will be used in this analysis to identify the subsistence expenditure for each household, households' capacity to pay for health care, extent of catastrophic health expenditures and impoverishment due to health spending in Cambodia and Logistic regression (Logit model) will be performed to identify the determinants the catastrophic health expenditure and impoverishment.

5.2 Population and Sample Size

The Cambodia Socio-Economic Survey 2012 was conducted a data collection from 17,644 individuals in 3,840 households that starting from January to December in 2012, the number of households are quite smaller than CSES 2009 (12,000 households). This survey contained a variety of questionnaires about health insurance membership, illnesses during the past 30 days but did not specify kind of diseases they faced during that period of time. It also included the information on how many visits to health care providers that ill person made with type of health care facility. Household consumption on health was also accounted as overall spending in the past month without breakdown by disease or health provider type. However, characteristics of households, income, all kinds expenditure, and transportation costs related health care reported in the survey.

5.3 Sampling Design

The CSES 2012 survey designed random sampling in a three-stage procedure. First stage a sample of villages is selected, a random sample of primary sampling

units (PSUs) was selected from each stratum. The sampling method was systematic sampling with probability proportional to size (PPS). The size measure used was the number of households in the PSUs according to the sampling frame. In second stage, an Enumeration Area (Bigdeli & Annear) was selected from each village that selected in the first stage, it was selected by using Simple Random Sampling (SRS). The third stage, a sample of households was selected from each EA that selected in the second stage. In each selected EA, a sample of 10 households was selected for interview. All households in selected EAs were enumerated. Then the sample of households was selected from the list by systematic random sampling (NIS, 2012) .

5.4 Households

Sometimes, there are two or three families are residing in one household in Cambodia. Households are usually headed by parents, and mostly by father. After their daughters get married, for instant, their son-in-law will come to live with them until they can afford to buy or build a new house. Even though they live together, income and family consumption expenditures are sometimes separate. The CSES 2012 was interviewing each household head, spouse of household head, or other adult household member if both of household head and spouse were not presented and asking all information on all members residing in this household. So that, we can define the number of households through household head or household id in the dataset.

5.5 Variables and Constructions

The Cambodia Socio-Economic Survey is an annual household survey that interview a nationwide sample of households and household members about housing conditions, education, economic activities, household production and income, household level and structure of consumption, health, disability, health insurance, victimization, and there are also questions related to people in labor force participation (CSES, 2012). However, there is no information about poverty line, subsistence expenditure for each household, households' capacity to pay for health care, extent of catastrophic health expenditures and impoverishment due to health

spending in the survey. Therefore, we use the WHO standardized method for calculating the occurrence of CHE in this study based on the following definition of these variables:

- Out-Of-Pocket Health Expenditure (*oop*): when ill-individuals seek for health care at public or private health care providers where the services are not free for everyone, or they are not covered by health insurance, they have to pay money from their pocket for that used services. In other words, this refers to the expenditures on health care services by households when they get sick and receive health care services. Basically, these payments include medical consultant fees, consumption of medication and hospital service fees. Spending on alternative and/or traditional medicines are included in out-of pocket and payment on transportation-related health and nutrition are also included. It is important to note that out-of -pocket payments are net of any insurance reimbursement and as comparing the outpatient-care expenses to inpatient-care expenses, CSES captured the health expenditures by using the same time period of measurement in over month , not based on expenditures per visit.

- Household Expenditures (*hhexp*): consists of all monthly spending on all goods and services in term of money value of the consumption of home-made products. Instead of using household reported income, we consider households expenditure as better proxy for household income as done in may studies. In Cambodia context, majority of population are living in rural areas their income are based on agricultural harvesting one or two times per year that is very difficult to estimate their income. Moreover, households usually report their income less than the actual income.

- Food Expenditure (*foodexp*): refers to the amount of consumptions on all food and drinks by households and including the value of family's own food production consumed within the household. However, it does not include expenditure on alcohol, tobacco, and food consumption outside the home or in restaurants.

- Household Subsistence expenditure (se): the household subsistence spending is the least amount of requirement to sustain basic life. Poverty line (pl) is used to calculate for subsistence expenditure. According to Ke Xu's method, this poverty line is defined as " the average basic food expenditures of households whose food expenditure share of total household expenditures between the 45th and 55th percentile of the total sample will be used to identify poverty line " (Ke Xu, 2004). However, in this study we are going to use the national poverty line to calculate the subsistence expenditure by multiplying with equivalent household size (*eqsize*).

$$se = pl * eqsize$$

Where household size needs to be adjusted into economy scale of household consumption, this is called household equivalence scale or **equivalent household size** ($eqsize_h$). Generate **equivalent household size** for each household as:

$$eqsize_h = hhsize_h^{\beta}$$

Where $\boldsymbol{hhsize_h}$ is the household size. The value of the parameter β has been assessed from a WHO's previous study collected household survey data from 59 different countries, it equals 0.56 (Ke Xu, 2004).

5.5.1 Poor and Non-poor households

A household is regarded as **poor** (*poor*) when its total household expenditure (hhexp) is less than national poverty line. Non-poor household is defined as total household expenditures equal to or are larger than national poverty line.

Poor = 1 , if hhexp < pl

Nonpoor = 0 , if hhexp >= pl

5.5.2 Household's Capacity to Pay (*CTP*)

Household's capacity to pay for health care services when one of members in a household getting sick is defined as the effective income remaining after spending on basic subsistence needs (Ke Xu, 2004). There have been two ways to calculate household's capacity to pay. First, if subsistence expenditure is less than or equal to household food expenditure, CTP equals to household expenditure subtracted by subsistence expenditure. Second, if subsistence expenditure is larger than household food expenditure, CTP equals to household expenditure subtracted by food expenditure.

$$CTP = hhexp - min\ [se, foodexp]^{1}$$

5.5.3 Catastrophic health expenditure:

Incidence of catastrophic heath expenditure can be measured only after purchasing health care services and costs of services are paid. A household suffers from catastrophic health spending when his/her payments from out-of-pocket are more than 40% of their capacity to pay. The threshold could be changed according to countries' specific situation, for Cambodian context, threshold 40 % is used because it may be adapted and enables to compare with other countries where this threshold is mostly used as per WHO methodology (Ke Xu, 2004). However, we are trying to use 20%, 30% and 30% that show up in the result part. The variable on catastrophic health expenditure is constructed as a dummy variable with value 1 indicating a household facing with catastrophic health expenditure, and 0 without catastrophic expenditure.

$$CHE = 1,\ if\ \frac{OOP}{CTP} \geq 0.4\quad ,\ CHE = 0\ otherwise$$

[1] If subsistence expenditure is less than household food expenditure, CTP equals to household expenditure subtracted by subsistence expenditure. If household food expenditure is less than subsistence expenditure, CTP equals to household expenditure subtracted by food expenditure.

5.5.4 Impoverishment (impov) due to out-of-pocket health expenditure

Impoverishment is defined as a non-poor household became poor because of the health care spending when they sought for health services (Ke Xu, 2004). The variable created to reflect on poverty impact of health payments (impov) is defined as 1 when total household expenditure of non-poor household subtracted by oop becomes less than poverty line. We define non-poor households when total household expenditure is larger than poverty line.

$$Impov = 1, if\ hhexp \geq pl \ \ and\ hhexp - oop < pl$$

$$Non\text{-}impov = 0, if\ hhexp \geq pl \ \ and\ hhexp - oop > pl$$

5.5.5 Expenditure quintiles (quintile)

In this analysis, we group household expenditure variable into five different quintiles known as household expenditure quintiles. It is important to note that the household expenditure quintiles are ranked by from the lowest to highest expend, in another word from the poorest to richest.

5.6 Determinants of catastrophic health expenditure

Statistical software Stata version 12 is used for this analysis and Logit regression is applied in order to explore the determinants of households facing CHE that is a dummy dependent variable defined as 1 when a household's health expenditure is equal to or higher than 40% of its capacity to pay or non- subsistence expenditure and 0 otherwise. According to (Gujarati, 2009), logit model constructs the following form:

$$\boldsymbol{Y = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots\cdots + \beta_n X_n + \varepsilon}$$

Where *y* is the binary dependent variable indicating the probability of households with CHE occurrence equals 1 and 0 without CHE , in this case, β_0 is the constant, X1…Xn are independent variables, $\beta_1 \ldots \beta_n$ are coefficient of independent

variables, p is the probability of a household facing catastrophic expenditure, and ε is the error term. The independent variables are explained in table 10.

Table 10: Independent Variable Explanation

Variable	Description	Unit of Measurement	Sign	Expectation
X_1	Location	1= urban , 0= rural	-	Urban households are less likely to face with CHE than rural households because they have more incomes and more easy to access health care services.
X_2	Household size	Number of people in household	+	Households with more members are more likely to encounter CHE according to (Ali Akbar Fazaeli et al., 2015)
X_3	Age	Age of household head (Year)	+	Elderly member are more likely to experience with CHE than younger because they have no income and more illness.
X_4	Sex of hhhead	1= male, 0= female	-	hh headed by male is less likely to face CHE than those leaded by female because normally female in Cambodia stays at home and look after family and children (GIZ, 2012).
X_5	Education of hhhead	Number of years of education	-	High educated people are less likely to experience with CHE that lower because high education normally get higher paid job than low education.
X_6	Number of elderly	Number of elderly people in households	+	Households with more elderly people are more likely to face CHE.
X_7	Inpatient	Proportion of inpatient in a household	+	Increasing the percentage hospitalized people in a household is more likely to incur CHE.
X_8	Outpatient	Proportion of outpatient in a household	+	High proportion of outpatient in a household are more likely to face CHE.
X_9	Chronic illness	1=yes, 0= elsewhere	+	Chronic illness is likely to face CHE than other illnesses.
X_{10}	Severe illness	1=yes. 0= elsewhere	+	Severe illness is likely to face CHE than other illnesses because he/she cannot do the work or usual activities.
X_{11}	Health care	1= public ,	-	Individual who seek care at public health

	providers	0= private		care providers are less likely to experience CHE.
X_{12}	Health equity card	1= yes, 0 = no	-	Households holding equity card, or document to access free health care are not likely to face with CHE
X_{13}	quintile 2	1 = quintile2 0 = otherwise	-	The second poorest hh are less likely to face with CHE than the first poorest hh.
X_{14}	quintile 3	1 = quintile 3 0 = otherwise	-	The third expenditure quintile hh are less likely to face with CHE than the first poorest hh.
X_{15}	quintile 4	1 = quintile 4 0 = otherwise	-	The second richest hh are less likely to face with CHE than the poorest hh.
X_{16}	quintile 5	1 = quintile 5 0 = otherwise	-	The first poorest hh are less likely to face with CHE than the poorest hh.

Independent Variable Explanation:

- Location: it is a dummy variable that value 1 is urban households, 0 is rural households. Region of resident especially in rural areas usually has shortage of health facility and health staffs. Additionally, people generally work as farmer and earn small income from their agricultural crops there. When they are sick, they have to spend more, besides medical payments, not only travelling cost but also the opportunity cost. Therefore, households in rural areas more likely to face catastrophic health expenditure and impoverishment.

- Household size: this includes all members such as number of elderly, number of children in a household. Household size variable is important to include in the analysis to identify whether or not it is associated with catastrophic health expenditure and impoverishment.

- Characteristics of household head: household head information contains variables of sex of household head, age, and education. In term of gender heading household in Cambodia, majority of household heads are male. Male is the main source for generating income while female just stays at home doing housework and look after their children. This can be said that households headed by male are less

likely to suffer catastrophic health expenditure than those headed by female. Age of households head, on the other hand, can influence to probability of households experience with catastrophic health expenditure and impoverishment. Moreover, education of household is also important variable to include into model, the value is number of years that head attended school. The increasing year of schooling of household head is less likely to face catastrophic health spending and impoverished.

- Number of elderly member: it is a continuous variable indicating the number of old people in a household. Households having elderly people are more likely to suffer catastrophic health expenditure and impoverishment than those without old members.

- Number of illness: it is also continuous variable, it shows the number of ill people in a household. Number of illness in households can also be a determinant of catastrophic health expenditure and impoverishment, so that it can be explained that households with more ill members are likely to experience catastrophic health expenditure and impoverishment than those having less ill or without illness.

- Inpatient and outpatient: According to individual data, a household can have members sought care as both inpatient and outpatient. In this case we use proportion of individual who was hospitalized and outpatient regarding household size. The value of inpatient and outpatient variables indicate the proportion, so that households with higher proportion of inpatient and outpatient are more likely to increase the probability of catastrophic health expenditure and impoverishment.

- Chronic illness: it is a dummy variable that value 1 is indicating household having any chronic ill member and 0 is elsewhere. According to the survey questionnaire, chronic illness was not specified what kind of chronic disease that people head during the interview but it said that households with any ill member more than year. It is the main determinant of catastrophic health expenditure and impoverishment. Households having any chronic illness are more likely to incur catastrophic health expenditure and impoverishment than those with other illnesses.

- Severe illness: similar with chronic illness variable, severe illness is a dummy variable that value 1 is indicating household having any severe ill member that they could not work or do usual activities or stopped working because of serious illness and 0 is elsewhere. It is also the main factor associated with catastrophic health expenditure and impoverishment. Households having any severe illness are more likely to incur catastrophic health expenditure and impoverishment than those with common illnesses.

- Type of provider: it is a dummy variable that value 1 is public health care provider and 0 is private health provider. Public provider comprises with national, provincial, and district hospitals, health centers, health posts, provincial rehabilitation centers, and other public providers. Private health provider includes private hospitals, private clinics, and private pharmacies, home/office of trained health workers or nurses, shops selling drugs/ market, magicians, religious healers, traditional birth attendants, and other private providers. Type of health provider is also significant determinant of catastrophic health expenditure and impoverishment. Household with their members seek care at the public health provider are less likely to suffer catastrophic health expenditure and impoverishment than those seek at private providers.

- Health equity card: it is one of the government social health protection schemes to remove the barrier of poor population to access the contracted public health providers for free of charge. It is also a dummy variable indicating value 1 is households having health equity card and 0 is not. Households having this card can be protected from catastrophic health expenditure and impoverishment.

- Household consumption expenditure: total household expenditures are grouped into five different expenditure quintiles from the lowest expenditure to the highest expenditure. Quintile variable contains four dummies from the second quintile to the fifth quintile(richest quintile). We keep the first quintile (poorest quintile) as a referent group to compare with other richer quintiles. Households are

grouped into higher expenditure quintiles are less likely to face catastrophic health expenditure and impoverishment.

5.7 Determinants of impoverishment due to health care payment

The same logistic regression and explanatory variables in (table 10) will also be used to identify the determinants linked with impoverished households from health care payment. Impoverishment is dummy dependent variable where 1 indicates that non-household becomes impoverished after out-of-pocket payment on health care utilization, and 0 is not.

$$\boldsymbol{Y = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots\cdots + \beta_n X_n + \varepsilon}$$

It is very interested to see the characteristics of non-poor households became poor and the level of which households are protected from impoverishment by health insurance and the government schemes as well as Health Equity Fund.

CHAPTER VI
RESULT AND DISCUSSION

6.1 Descriptive statistics

Table 11 provides the results of household characteristics classified by three different regions such as the main city Phnom Penh, urban, and rural area. Majority of households (77.63%) were headed by male, mean age of household head was 47.28 years (SD =13.77), and 83.80% of household heads completed secondary school, or lower. This proportion of lower education of household head was considerably high among households which resided in rural area. This finding seems to be true in term of Cambodian household perception toward education in rural areas.

Table 11: Household heads and education

% of household head	Region			
	Phnom Penh	Urban area	Rural area	All
Households headed by male	74.74	75.00	79.36	77.63
Households headed by female	25.26	25.00	20.64	22.37
Education of household head (%)	**100%**	**100%**	**100%**	**100%**
Secondary school or lower	67.95	74.14	91.91	83.80
High school or university	32.05	25.86	8.09	16.20

According to table 12, there were more than one third of households having children aged five years old or under. Of all households in the study, 27.60% had elderly member and 16.51% with disability.

Table 12: Household status

Indicator	Frequency	Percentage
Households with children <=5 years	1,494	38.91
Households with elderly>=60 years	1,060	27.60
Households with disable member	634	16.51

Table 13 indicates the distribution of household spending across the regions, average expenditure per household capita varies differently. It was more than doubled (1,925,133 riels or $ 476.51*) for household expenditure in the city comparing to those in rural area (891,050 riels or $220.55), because the basic needs of people who live in the city much more higher than those living in other area and living in the city was more expensive. The average household expenditure per capita across the country was 1,206,482 riels. Out-of-pocket expenditure on health per household among urban households was much more higher (159,111 riels) than other rural areas and Phnom Penh, while households resided in the rural area accounted for the lowest oop. Average oop across the regions was 119,580 riels ($29.59) per month.

The average of household capacity to pay for health care utilization was also much more different among households in all regions, households resided in Phnom Penh and other urban areas had higher capacity to pay for health consumption than those located in other rural areas. An average capacity to pay per household was 1,488,634 riels ($368.47) in Phnom Penh, while 1,167,780 riels and 645,009 riels in urban and rural areas respectively. The average household capacity to pay across the country was 911,667 riels ($225.66).

The result of this analysis also suggests that average spending of households with hospitalized member was 624,138 riels more than those with outpatient care 92,752 riels. Households in urban area spent more on inpatient care than those in other region, while rural households accounted for high expenditure on outpatient care.

According this descriptive analysis, the proportion of households living under the national poverty line was 9.24%, this figure decreased comparing to 12.2% reported in CSES analysis in 2009. Urban households and those who live in the main city had the similar rates of poverty, 6.14% and 5.13% respectively, whereas the poverty rate among households in rural areas was almost doubled 11.53% compared to households in urban areas and Phnom Penh.

Table 13: Distribution of household expenditure across region

Indicators	Region (monthly in riel)			
	Phnom Penh	Urban	Rural	All
Average household expenditure	1,925,133	1,469,156	891,050	1,206,482
Average health spending	115,078	159,111	111,247	119,580
Average capacity to pay	1,488,634	1,167,780	645,009	911,667
Average inpatient care	783,687	1,238,708	479,950	624,138
Average outpatient care	79,681	87,710	96,465	92,752
% of poor households	5.13	6.14	11.53	9.24

*Annual exchange rate in 2012: $1 = 4,040 riels (Source: National Bank)

The distribution of average monthly household expenditures across quintiles also illustrate in table 14. All different types of spending varied much more different from the poorest to the richest households. Average household expenditure from the first quintile to the fourth quintile consistently increased from 490,427 to 731,027 to 969,685 to 1,328,018 riels respectively. However, average household expenditure of the richest households was much higher compared to other lower quintile groups. Household health expenditures, on other hand, show the similar pattern with the average total expenditures. The poorest households spent as an average of only 26,701riels from out-of-pocket on health care, while the second poor households and middle group spent 42,987 riels and 72,595 riels respectively and the second and richest households were 134,499 riels and 362,337 riels. Moreover, the average capacity to pay among households in the first quintile group was 279,683 riels and increased to 688,675 riels for the middle household classification, while the highest quintile group reported more than double compared to the fourth quintile.

The average of household expenditures on inpatient and outpatient services show very much different for the highest quintile compared to other lower quintile groups. The poorest household spent 123,500 riels for inpatient and only 34,624 riels

for outpatient services, while the richest household accounted for 1,488,094 riels and 205,143 riels for inpatient and outpatient services respectively.

Table 14: Average monthly expenditures across quintiles (in riel)

Indicators	Average monthly expenditures across quintiles (in riel)					
	1	2	3	4	5	All
Household expenditure	490,427	731,027	969,685	1,328,018	2,513,254	1,206,482
Health expenditure	26,701	42,987	72,595	134,499	362,337	119,580
Capacity to pay	279,683	478,590	688,675	993,347	2,118,042	911,667
Inpatient care	123,500	187,700	323,545	311,557	1,488,094	624,138
Outpatient care	34,624	47,883	81,465	117,877	205,143	92,752

Table 15 shows information about households who are entitled the priority card, equity card, health care staffs provided them for free care with or without filling form, and households who enrolled in community based health insurance and private health insurance. Of all the households studied, 10.39% are holding the equity card that can access health care for free, while the analysis of data in 2009 found that approximately 5.6% of households had health equity card member, and received free care from health providers, there was no insurance information available in that year.

The percentage of poorest quintile group (21.22%) received health equity card more than other quintile groups, it is very interested that the richest households also had card (3.01%) of the total households in this study. Furthermore, the proportion of households who received free care from health care providers by filling the form or without filling the form is 0.29% that accounted 11 households. Health insurance status in Cambodia is still challenging, people are not aware the benefit package of

CBHI or private insurance. There were only 3 households (0.08%) enrolled in private health insurance.

Health care behavior among households having equity card and health insurance regarding to type of health care providers were 58.36% and 50% sought care at private health providers. This finding could be proved regarding to the quality of contracted health care providers and other factors associated with health seeker behavior. Moreover, private sector is the main source of health provider in Cambodia.

However, majority of households (80%) who received free care from health staff by filling the form or without filling the form sought care at public providers.

Table 15: Proportion of households with social health protection scheme across health providers and quintiles

Indicators	Social health schemes		
	Equity card	Free from providers	insurance
Private providers	58.36	20.00	50.00
Public providers	41.64	80.00	50.00
Both health providers	**100%**	**100%**	**100%**
Quintile1	21.22	0.26	0.26
Quintile2	15.49	0.78	0.00
Quintile3	10.03	0.13	0.00
Quintile4	3.65	0.26	0.13
Quintile5	3.01	0.00	0.00
All Quintiles	**10.39**	**0.29**	**0.08**

6.2 Self-report illness and health care utilization

The analysis of health care utilization indicates that 18.47% of individuals had reported their illnesses during the last 30 days prior to the interview. Table 16 shows people living in rural area had more illnesses than those who live in urban and main city. The majority of ill people (92.14%) reported that they sought care.

Among households having ill member and sought care, only 7.76% of them were hospitalized. Health seeking behavior among households with illness people were 79.98% at private health providers.

Table 16: Self-report illness and health care utilization

Indicators	Region			
	Phnom Penh	Urban area	Rural area	All
Incidence of self-report of illness (Individual level)	**100%**		**100%**	**100%**
Percentage of illnesses	12.19	15.74	21.26	18.47
Percentage of no illnesses	87.81	84.26	78.74	81.53
Incidence of sought care (Individual level)		**100%**	**100%**	**100%**
Percentage of sought care	89.67	93.59	92.29	92.14
Percentage of non sought care	10.33	6.41	7.71	7.86
Type of health care services (household level)		**100%**	**100%**	**100%**
Percentage of inpatient	5.52	7.30	8.29	7.76
Percentage of outpatient	94.48	92.70	91.71	92.24
Type health care providers (household level)		**100%**	**100%**	**100%**
Public health care providers	8.28	12.36	24.02	20.02
Private health care providers	91.72	87.64	75.98	79.98

6.3 Incidence of Catastrophic Health Expenditure and impoverishment

The incidence and intensity of financial catastrophe in health care spending are shown in Table 17. Among total of 3840 households that took part in the cross-sectional survey, illnesses in the 30 days preceding the survey were reported by 56.72%. The proportion of households experienced with catastrophic health expenditure in rural area was much higher than those in Phnom Penh and other urban areas in all different thresholds. Country level of incidence of catastrophic health expenditure was 5.92% at threshold 40% of a household's capacity to pay. Reducing threshold to 30%, 20%, and 10% increased the rates to 10.74 %, 17.95%,

33.52% respectively. It can be evidences that the increase in health care utilization particularly among the households in rural area, and rising out-of-pocket health expenditure leaded to increase the proportion of CHE. According to NHA report 2012, high out-of-pocket health spending accounted for 60% of total health expenditure in Cambodia.

The proportion of non-poor households became impoverished because of spending on health care utilization. The households resided in the main city and other urban areas had almost the same incidence rate of impoverishment, 1.50% and 1.51% respectively and 3.81% of non-poor households in rural areas became impoverished after purchasing health care services. Overall, the country level of impoverishment accounted for 3.12%, this proportion is higher than the previous study (1.6%) that conducted in 2009.

Table 17: Pattern of catastrophic health expenditure and impoverishment

Catastrophic Spending	Region			
	Phnom Penh	Urban	Rural	All
40% cut off	2.41	3.09	7.25	5.92
30% cut off	4.48	8.71	12.40	10.74
20% cut off	6.90	14.33	20.89	17.95
10% cut off	18.97	26.69	37.86	33.52
Impoverishment (%)	1.50	1.51	3.81	3.12

According to an additional analysis, the proportion of households suffering catastrophic health expenditure were inversely related to household's expenditure quintile. The incidence rates rose steadily with rising expenditure quintile from 2.66% to 11.90% for catastrophic health expenditure at threshold 40%, the households grouping into the poorest , second poorest, and middle quintile groups accounted for 2.66%, 2.87%, 3.98% respectively and consistently to previous finding in 2009, whereas the richest and second richest households resulted much more higher,

9.46% and 11.90% respectively. The incidence rate of households experiencing catastrophic health expenditure at the country level was 5.92%, that was higher than the figure found in 2009, 4.27%. The reason can be that the highest quintile group was rarely to deny admission to hospitals and therefore they were more likely to face catastrophic health spending when any member hospitalized compared with other lower quintile groups. A study from china also found that percentage of households experienced with catastrophic health expenditure increased from 28.4% for the lowest quintile to 41.3% for highest quintile when any member got admission to hospital (Li et al., 2014) .

Unlike the proportion of catastrophic health expenditure across quintile, the percentage of households became impoverished decreased from 6.12% for lowest quintile group to 0.80% for the highest quintile group (see Table 18). This finding can be proved that poor households had higher percentage of being impoverishment after purchasing health care services than the rich households. The country level of non-poor households pushing into impoverishment because of health care utilization and paid from their out-of-pocket was 3.12%.

Table 18: Incidence of catastrophic health expenditure and impoverishment across quintiles

CHE	Expenditure quintile (%)					
	1	2	3	4	5	All
40% cut off	2.66	2.87	3.98	9.46	11.90	5.92
Impoverishment	6.12	3.79	2.84	2.44	0.80	3.12

Assessing the level to which social protection scheme can protect households from excessive health care expenditure is the key contribution of our study. The study found that catastrophic health expenditure and impoverishment varied across affiliates of different schemes, only 3.20% of households holding the equity card faced catastrophic health expenditure and 2.67% became impoverished, while 10% households received free care from health care providers experienced CHE but they

did face impoverishment (see Table 19). Households with insured people did not face with CHE and impoverishment but the proportion of households with insured people was very small.

Table 19: Incidence of catastrophic health expenditure and impoverishment by social protection schemes

Indicators	Social health schemes		
	Equity card	Free from providers	insurance
CHE 40% cut-off (%)	3.20	10.00	0.00
Impoverishment (%)	2.67	0.00	0.00

6.5 Determinants of Catastrophic Health Expenditure (CHE) with 40% cut off

Logistic regression analysis (Logit model) yielded a wide range of determinants associated with financial health catastrophe at the 40% threshold. Table 20 shows that the coefficient of urban indicator was statistically significant at 1% level of significance, this implied that CHE was associated with location of residence. Urban households were 0.18 times less likely to face on the probability of excessive health care spending than households in other rural areas . One of the surprising results was that households with large members were less likely to experience with CHE than those with small members at 5% of the significant level. Increasing one unit of household size would decrease the probability of households facing catastrophic health expenditure by 0.86 times. It should be from large household size having more working members and more agricultural lands for producing crops in Cambodia.

Old age of household head was also statistically significant to influence the effect on CHE, households headed by elderly were not at higher risk of catastrophic health expenditure than those headed by adult (OR=0.97, P=0.003) because elderly people heading household saved more incomes than adult household head. Furthermore, increasing years of education of household head could protect households from shock of health care spending. However, the coefficient of male leading his

household was not statistically significant to influence CHE, but its expected sign corresponds to our hypothesis that households headed by male were less likely to face CHE than those headed by female. Number of elderly members in household were not significantly associated with the probability of CHE occurrence.

Another factor associated with CHE was households with inpatient, by increasing one percent of households with hospitalized member, the probability of household suffering CHE will increase 1.04 times. Households having any member admitted into hospital were statistically significant to push households into excessive health spending. However, households with any member sought at outpatient department were statistically insignificant to explain the association to CHE.

Type of health facilities were also not statistically significantly associated with CHE, but we can observe from the negative coefficient of health provider variable, we can infer that individuals who consumed health care services at public providers are less likely to experience with CHE. Moreover, the survey asked households whether or not there was any individual in households having chronic disease, and households with severe illnesses that can stop them working or doing usual activities. These two explanatory variables were statistically significant to influence CHE, households with chronic illness and households with severe illness people were 2.17 and 2.78 times more likely to experience CHE than those without these type and degree of illness.

Furthermore, a variable that played important role to prevent households from disastrous health care spending is health equity card. We compare households having this card to those without this card, the result from regression analysis indicated that households having equity card could significantly be protected from catastrophic health spending.

The association between household consumption expenditure and catastrophic health expenditure shows a mixed picture. In general, the likelihood of a household incurring catastrophic health spending increased with rising household consumption quintile. All consumption quintile variables are statistically significant except the second quintile, this can clearly be explained that households grouping into the

third, fourth and fifth quintile groups were 2.62, 8.43, and 17.74 times more likely to experience with catastrophic health expenditure than the first quintile.

Overall, all of the explanatory variables that uploaded into the logit regression model, majority of them were statistically insignificant to explain the association to catastrophic health expenditure.

Table 20: Determinant of catastrophic health expenditure using the cut-off point 40%

Independent Variables	Coefficient	Odd-Ratio	P-Value
Urban vs rural	-1.722*	0.178	0.000
Household size	-0.147**	0.862	0.028
Age of household head	-0.028*	0.971	0.003
Sex of household head(Male vs Female)	-0.188	0.828	0.496
Number of elderly >60	0.114	1.121	0.529
Years of education of household head	-0.097*	0.907	0.002
Inpatient	0.043*	1.044	0.000
Outpatient	0.007	1.007	0.115
Chronic illness vs elsewhere	0.778*	2.176	0.000
Severe vs elsewhere	1.024*	2.785	0.000
Health providers (public vs private)	-0.156	0.855	0.530
Household with equity card vs none	-0.714***	0.489	0.065
Quintile 2 vs 1	0.309	1.362	0.475
Quintile 3 vs 1	0.963**	2.621	0.022
Quintile 4 vs 1	2.131*	8.430	0.000
Quintile 5 vs 1	2.875*	17.742	0.000
_Cons	-1.993*	0.136	0.006
-Number of obs = 2176			
-LR chi2(16) = 216.94			
-Prob > chi2 = 0.0000			
-Pseudo R2 = 0.2215			
-Log likelihood = -381.2295			

- * Significant at 1% of significance level
- ** Significant at 5% of significance level
- *** Significant at 10% of significance level
- Quintile 1 is the poorest and quintile 5 is the richest.

6.6 Determinants of Catastrophic Health Expenditure with different cut offs

Table 21 illustrates the results of logistic regression analysis that identify the determinants of catastrophic health expenditure with three different cut-offs , 10% , 20%, and 30% comparing to 40% threshold showed in table 20. Households in urban areas were not associated with CHE 10% but they were statistically significant to explain the link to likelihood of CHE with 20%, 30%, and 40% . Urban households were 0.337, 0.302, 0.178 times less likely to experience with CHE at 20%, 30%, and 40% respectively than those in rural areas. One of interesting results was that the increasing of household size (more people living together in one household) were 1.065 times more likely to suffer CHE 10%, but they were 0.862 times less likely to face CHE with 40% threshold. Age of household head, on other hand, showed the similar figures with same negative sign of coefficients, they were statistically insignificant except CHE with 40% threshold.

Households with more elderly people were 1.201 and 1.235 times more likely to influence higher risk of facing CHE with 10% and 20% cut-off respectively. Higher education of household head can significantly protect households from incurring CHE with all thresholds. The main determinants of catastrophic health expenditure with all thresholds were households having member hospitalize, households with any member having chronic illness , and households with any member having severe illness that cannot do usual activities.

The result of this regression analysis also indicated that households who sought care at public health providers were less likely to experience with CHE with all four different cut-offs according to expected negative sign of each coefficient. Furthermore, households enrolling into health equity fund were significantly protected from high risk of CHE with 10% and 40% thresholds.

With similar pattern, households grouping into higher expenditure quintile groups were more likely to encounter CHE with all thresholds except CHE 10% cut-off.

Table 21: Determinants of Catastrophic Health Expenditure (CHE) with different cut offs

Independent Variables	10% cut-off		20% cut-off		30% cut-off	
	Coef	OR	Coef	OR	Coef	OR
Urban vs rural	-0.852	0.426	-1.087*	0.337	-1.194*	0.302
Household size	0.063**	1.065	0.0143	1.014	-0.031	0.968
Age of household head	-0.007	0.992	-0.005	0.994	-0.008	0.991
Sex of household head(Male vs Female)	0.132	1.141	0.198	1.219	0.009	1.009
Number of elderly >60	0.183**	1.201	0.211***	1.235	0.200	1.222
Years of education of household head	-0.044*	0.956	-0.040**	0.960	-0.054**	0.947
Inpatient	0.071*	1.073	0.058*	1.060	0.072*	1.074
Outpatient	0.012*	1.012	0.012*	1.012	0.013	1.013
Chronic illness vs elsewhere	0.795*	2.214	0.704*	2.023	0.693*	2.001
Severe vs elsewhere	0.974*	2.650	1.050*	2.858	0.999*	2.716
Health providers (public vs private)	-0.462*	0.629	-0.246	0.781	-0.308	0.734
Household with equity card vs none	-0.588*	0.555	-0.431**	0.649	-0.273	0.760
Quintile 2 vs 1	-0.120	0.886	-0.233	0.791	-0.162	0.850
Quintile 3 vs 1	0.166	1.180	0.424**	1.529	0.805*	2.237
Quintile 4 vs 1	0.418**	1.519	0.772*	2.165	1.386*	4.002
Quintile 5 vs 1	0.326	1.386	0.931*	2.539	1.796*	6.030
_Cons	-1.227*	0.293	-2.317*	0.098	-2.947*	0.052
Number of obs = 2178						

- * Significant at 1% of significance level
- ** Significant at 5% of significance level
- *** Significant at 10% of significance level
- Quintile 1 is the poorest and quintile 5 is the richest.

6.7 Determinants of medical impoverishment

A non-poor household becomes impoverished when its total household expenditure is less than national poverty line after purchasing health care services by out-of-pocket payment. The incidence of impoverishment was 3.12% , this medical impoverishment was treated as a binary dependent variable and we also used logit regression to identify its determinants associated. Impoverishment due to health care utilization was significantly associated with region of the residence and household size (see table 22). Contrasting with catastrophic health expenditure, households located in urban area were 2.70 times more likely to be impoverished than those in rural area, and large household size was 3.31 times also more likely to push household into impoverishment.

Elderly household head, and households with more elderly people and sex of household head were not the determinant of impoverishment due to health care payment. These variables were statistically insignificant at any level, thus households having aging head, more elderly members living together, and sex of household head did not affect on the probability of households became impoverished.

However, education of household head was statistically significant to prevent households from the high risk of being impoverishment after consuming health care services. Increasing years of education of household head could be less likely to reduce the probability of households pushing into impoverishment.

Interestingly, the proportion of households with hospitalized member or sought care at outpatient services, or households with any member having chronic illness were not statistically and insignificantly associated with impoverishment. But households with any member having severe illness that could not work or do usual daily activities were the main determinant to influence households to became impoverished. Households with any member having severe illness were 3.53 times more likely to be impoverishment with 1% of significant level.

Type of health facilities were also not statistically and significantly associated with impoverishment, but we can observe from the negative coefficient of health

provider variable, we would infer that households with individuals who consumed health care services at public providers were less likely to be impoverished.

There was not a surprise that the government policy to expand the health equity fund coverage to alleviate poverty resulted from health care cost. We compared households having this card to those without this card, the result from regression analysis suggested that households having health equity card could significantly be protected from being impoverishment.

Contrary to catastrophic health expenditure, all expenditure quintiles were statistically significant at 1% level, therefore, we can explain that households grouping into higher expenditure quintiles were less likely to be poor after purchasing health care services than those at the poorest quintile.

Table 22: Determinants of impoverishment

Independent Variables	Coefficient	Odd-Ratio	P-Value
Urban vs Rural	0.993**	2.701	0.028
Household size	1.198*	3.316	0.000
Age of household head	-0.009	0.990	0.455
Sex of household head(Male vs Female)	0.138	1.148	0.708
Number of elderly >60	0.392	1.480	0.103
Years of education of household head	-0.157*	0.854	0.004
Inpatient	0.007	1.007	0.805
Outpatient	0.011	1.011	0.101
Chronic illness vs elsewhere	0.276	1.317	0.428
Severe vs elsewhere	1.262*	3.533	0.005
Health providers (public vs private)	-0.515	0.597	0.190
Household with equity card vs none	-0.916**	0.400	0.055
Quintile 2 vs 1	-2.100*	0.122	0.000
Quintile 3 vs 1	-3.821*	0.021	0.000
Quintile 4 vs 1	-5.201*	0.005	0.000
Quintile 5 vs 1	-8.628*	0.0001	0.000
_Cons	-6.904*	0.001	0.000
Number of obs [2] = 2018			
LR chi2(16) = 182.26			
Prob > chi2 = 0.0000			
Pseudo R2 = 0.3250			
Log likelihood = -189.28127			

- * Significant at 1% of significance level
- ** Significant at 5% of significance level
- Quintile 1 is the poorest and quintile 5 the wealthiest.

[2] Numbers of non-poor households who sought care

6.8 Discussion

The results of CSES 2012 analysis show that 18.47% of people reported their illnesses during the survey. The proportion of individuals with self-reported illnesses was higher compared to the report in 2009 that accounted for 14.00% (GIZ, 2012) . People in rural areas experienced more illnesses than those living in urban and the main city. An increase in reported illnesses leaded to increase health care utilization from 90% in 2009 to 92.14% in 2012. Interestingly, it can be clearly seen that ill people in rural area sought care more than those in other regions. This could be resulted from more availabilities to access the health care services, the introduction of social health protection schemes, and other socio-economic and demographic determinants (Bigdeli & Annear, 2009).

However, health seeking behavior among households having illness was 20.02 % at public health facility. This proportion is still relatively low compare to private health providers. Private health facilities were the most common health care providers for poor and rich Cambodian people. Even though they had equity card to access free health care, the result of analysis indicated that more than half of them went to private health providers where this card was illegible. The factors associated with this behavior can be, because of the long waiting, quality of public service providers, and other determinants.

The analysis report of CSES 2009 identified that the percentage of survey respondents having a free exemption was less than six percent. However, this could not be differentiated the coverage by each health financing scheme, health equity fund, community base health insurance, and subsidy for the poor (GIZ, 2012). In our finding, more than ten percent of households having the health equity card and less than one percent having free exemption from public health providers, community base health insurance and private insurance. Just more than 20% and 15.49 % of households grouping into the poorest quintile and the second poorest quintile reported having health equity card. The policy of health equity fund is to target the poor, this is surprised that the richest and second richest households also occupied the equity card to access public health care, 3.03% and 3.65% respectively. There

should be an investigation on the effectiveness of the pre- and post-identification process of legibility for this social health protection program.

The incidence rates of catastrophic health expenditure and impoverishment can be measured when people utilize health care services and pay from their out-of-pocket. The proportion of households experienced with catastrophic health expenditure with threshold 40% and impoverishment due to medical spending were 5.92% and 3.12% respectively, these rates are higher than previous SCES 2009 finding (4.27% and 1.6%). It can be clear that the increase in health care utilization especially among the households in rural area, and rising out-of-pocket health expenditure leaded to increase the proportion of CHE and impoverishment. According to NHA report 2012, high out-of-pocket health spending accounted for 60% of total health expenditure in Cambodia.

The proportion of CHE from our result was similar to the finding in Vietnam in 2010 (5.5%), while the proportion of households pushing into poverty in Vietnam was much more lower (2.5%) comparing to our study in 2012 (Van Minh, Kim Phuong, Saksena, James, & Xu, 2013). In comparing with other low and middle countries, the incidence of the catastrophic health expenditure and impoverishment in Cambodia were higher than the corresponding figures for Laos in 2008 in which catastrophic health expenditure and impoverishment were recorded at 1.7% and 1.1% respectively (WHO, 2011b), and for the Philippines in 2009 were 1.2% and 1% (WHO, 2011d).

China in 2008, on other hand, the incidence rate of households encountered CHE with 40% threshold and impoverishment were much more higher than that found in our study, 13.0% and 7.5% respectively, (Li et al., 2014).

Assessing the level to which social protection scheme protecting households from excessive health care expenditure is the key contribution of our study that we are focusing on expansion of health equity fund coverage up to 76% of poor target population in 2012. From our descriptive statistic results, only 10.76% study households were covered by social health protection schemes. Among those, 10.39% of total households having health equity card, 0.29 % and 0.08% received

free care from health providers and insurance respectively. This finding suggests that the coverage need to be expanded further to achieve the goal of universal health coverage. The study also found that catastrophic health expenditure and impoverishment varied across affiliates of different schemes, only 3.20% of households holding the equity card faced catastrophic health expenditure and 2.67% became impoverished, while 10% households received free care from health care providers experienced CHE but did not impoverish. Households with insured people did not face with CHE and impoverishment but the proportion of households with insured people was very small.

Factors associated with catastrophic health expenditure mainly included households with more members getting illness, households having their ill-members admitted to hospitals, households with chronic illness, households with severe illness that could not do usual activities or stop working, and private health providers. These determinants exerted an influence on the risk of catastrophic health expenditure. Our finding was also supported from the studies in China using data from 2008 and 2011 (Li et al., 2014), (Wang et al., 2015) and in Georgia in 2007 (Gotsadze et al., 2009).

As reported in different studies from different countries such as Vietnam and Egypt, geographical households of residence was also the main determinant of catastrophic health spending. Households resided in urban area were less likely to experience CHE than those in rural area (Van Minh et al., 2013),(Rashad, 2011). Rashad, 2011 additionally found that large households in Egypt were less likely to encounter excessive health payment, this can be an evidence of my finding. The reason to support this result is that large household should take more advantages of economies of scale or it should be from large household size had more working members and more agricultural land for producing crops in Cambodia.

Interestingly, households grouping into higher consumption expenditure quintiles were more likely to face catastrophic health spending than those in the poorest quintile, this can result from the effect of social health protection schemes covered only the poor.

However, other factors such old age of household head, high education of household head were less likely to experience catastrophic health spending. Importantly, households with equity card were statistically significant to explain their association with CHE. These households can be protected from high risk of catastrophic health expenditure.

Unlike catastrophic health expenditure, households located in urban area were more 2.701 times likely to be impoverished than those in rural area, even though there were more availabilities of health facility and easily accessible, the costs were much higher expensive. Households having member who sought care at outpatient services, and households with member who had severe illness that unable to do usual activities were statistically significant to influence the probability of impoverishment after paying from their out-of-pocket health expenditure. These variables were more likely to push households into impoverishment from medical expenses. This finding is consistent with the result from another study in Western and Central Rural China in 2011 (Shi et al., 2011).

Another evidence from Thailand in 2011 supporting my finding also included that increasing household size was more likely to become impoverished after consuming health care services (Bussabawalai, 2010). However, increasing years of education of household head were less likely to force households into impoverishment. Households who sought care at public health providers were statistically insignificant at any level, but the negative sign of its coefficient should be inferred that households who sought care at public health providers were less likely to became impoverished.

Similarly to CHE, it is not surprised that the result from regression analysis indicated that households having equity card can be significantly protected from pushing into medical impoverishment. Therefore, the government should expand the coverage of health equity fund to all poor population. However, the number of households having insured members are considerably too small, insurance variable has been dropped from the model.

Conversely, our finding showed that households grouping into higher expenditure quintiles were more likely to face catastrophic health expenditure, but they were less likely to be impoverishment after purchasing health care services than those at the poorest quintile.

CHAPTER VII
CONCLUSION AND POLICY IMPLICATION

7.1 Conclusion

The study on poverty related catastrophic health expenditure among households in Cambodia in 2012 was set out to calculate the proportion of households facing catastrophic health spending and impoverishment after purchasing health care services, and identified determinants associated with catastrophic health spending and impoverishment. The study has also sought to know whether or not health equity fund can protect households from catastrophic health expenditure and impoverishment. The main empirical findings were discussed on previous chapter specific and were summarized within this respective empirical chapter. This section synthesizes the empirical findings to answer our study's research questions and objectives.

Our study indicated that the proportion of households facing catastrophic health payment varied according to the thresholds we used. This can be expected that the incidence decreases when the threshold increases. Based on threshold 40% of capacity to pay, more preferences to compare with different countries, incidence rate of catastrophic health expenditure was 5.92% and impoverishment was 3.12%.The finding revealed that the incidence of catastrophic health expenditure and impoverishment were relatively high comparing to analysis in 2009 (4.27% and 1.6% respectively.

After expansion of HEF coverage to reach 76% of total poor population in 2012, the proportion of CHE and impoverishment could not be lowered down. However, only 3.20% of households holding the equity card experienced catastrophic health expenditure and 2.67% became impoverished, while 10% households received free care from health care providers experienced CHE, but did not impoverish. Households with insured people can protected from the shock of health expenditure but the proportion of households with insured people was very small.

Logistic regression result indicated that the main factors significantly associated with catastrophic health spending were the location of households, household size, age of household head, and education of household head. Households having their members admitted in hospitals, households with chronic illness members, households with severe illness members that cannot work or do usual activities, and households grouping into higher consumption expenditure quintiles are also the main factors associated with the risk of CHE. However, social health protection schemes such as health equity fund can protect households from high risk of disastrous health care payment.

Another result from the logit regression analysis identifying the determinants of households pushing into impoverishment indicated that variables such as location of household residence, households who had their member admitted into hospital, households with chronic or severe illness, and households with higher consumption quintiles were statistically significant to explain the likelihood of households became impoverished. These variables are the main factors pushing households to impoverishment after purchasing health services.

Education of household head, public health providers, and households covered by health equity fund scheme were statistically significant to explain that household head with higher education, households sought care at the public health care services, households with health equity fund scheme were less likely to be poor after health care utilization. Furthermore, variables such as age of household head, and number of elderly people in household were also statistically insignificant to explain their link to impoverishment. Households grouping into higher economic quintile group were less likely to be impoverishment than those grouping into lower economic quintile.

7.2 Policy implication

The finding from our study can offer some suggestions for evidence-based policy solutions to protect households from facing catastrophic health expenditure and pushing into impoverishment in Cambodia. As our results indicated, the government

policy to alleviate the poverty by expanding health equity fund coverage does not always translate into improvement of household situation of incurring catastrophic health expenditure and impoverishment. There have not been deniable that households having equity card can protect from suffering CHE and poverty due to health payment, but the challenge is that even though they were health equity fund members, more than half of them sought care at private health facilities that were illegible for free. This should be suggested that the government should review the quality of public health care service deliveries or conduct a further study on this issue.

One of reasons that the proportion of catastrophic health spending and poverty due to health care cost cannot lower down is that out of pocket health spending in 2012 was still high. The government should increase financial resource allocation to health and reform health care functions not only to provide service satisfaction, but to prevent households from facing CHE and impoverishment.

From the regression analysis results, solutions to catastrophic health expenditure and impoverishment should look at the variables associated. Households with accessing to health equity fund were less likely to suffer CHE and impoverishment than those without any scheme. Therefore, the government should expand these coverage to all poor people. However, households from higher consumption quintiles were more likely to incur CHE than the poorest quintile group. This suggests that policy makers should increase people's awareness regarding to the benefits of enrolling community based health insurance or private insurance that may be an effective strategy for protecting all households against CHE and impoverishment due to health expenditures.

7.3 Limitation of study

A similar study was done in 2009 using CSES data 2004, 2007, and 2009. Our study analyzes a cross-sectional data in 2012 only. Thus, the limitation is that it cannot be seen the change of the result year by year, but according to the finding of a previous study, there was a small change of incidence of households experienced

CHE and became impoverished. CSES 2012 was selecting households for interview about whether or not any member had illness and sought care during the last 30 days prior to interview, so we could not identify the time fixed effect in our study.

Cambodian socio-economic survey is annual based and national study, so the result of our analysis can be nationally representative. But the households selected for interview are not the same from year to year, within a household there could be sub-households whose decision-making is independent from others, even though expenditures are collected at household-level. Another limitation is some variables are not included in the survey such as expenditures by kind of diseases, and economic loss due to illness or injury.

Also, in this study we are arguing that CHE instantaneously impoverishes households, because it is a cross-sectional study and the questionnaire asked household heads whether any member of their household was sick, had illness or injury at any time in the last 30 days before the interview took place and how much in total was spent on treatment at any health care provider.

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APPENDIX

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