

THE IMPACT OF HOUSEHOLD'S INSURANCE COVERAGE ON HEALTH CARE
FINANCIAL PROTECTION

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บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)
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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

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รัฐบาลเวียดนามได้นำระบบการประกันสุขภาพมาใช้ในปี 2552 โดยมีเป้าหมายครอบคลุมระบบประกันสุขภาพถ้วนหน้าภายในปี 2557 ขณะที่รัฐบาลสามารถครอบคลุมได้เพียง 60% ของประชากรในปี 2553 และมีการรายงานผลกระทบจากการใช้ระบบประกันสุขภาพเพียงเล็กน้อยงานวิจัยมีวัตถุประสงค์เพื่อศึกษาผลกระทบของอัตราการมีประกันสุขภาพในครัวเรือนต่อการคุ้มครองทางการเงินในส่วนของค่าใช้จ่ายทางด้านสุขภาพ

การศึกษานี้ใช้แบบจำลองถดถอยโลจิท แบบจำลองการถดถอยเชิงเส้นและแบบจำลองถดถอยquintile สำหรับการวิเคราะห์ปัจจัยที่มีผลกระทบต่อสัดส่วนของค่าใช้จ่ายทางสุขภาพต่อความสามารถที่จะจ่ายเงินเองของครัวเรือน(OOP/CTP) โดยใช้ข้อมูลจากการสำรวจมาตรฐานชีวิตครัวเรือนเวียดนาม (VHLSS) ในปี 2553

จากผลการวิเคราะห์พบว่าอัตราการครอบคลุมระบบประกันสุขภาพในครัวเรือนส่งผลให้ครัวเรือนมีโอกาสที่ต่ำลงในการเผชิญกับค่าใช้จ่ายด้านสุขภาพที่สูงผิดปกติและช่วยลดสัดส่วนของค่าใช้จ่ายทางสุขภาพต่อความสามารถที่จะจ่ายเงินเองของครัวเรือน โดยผลดังกล่าวจะมีมากขึ้นสำหรับครอบครัวที่มีค่าใช้จ่ายในระดับที่สูงอยู่แล้ว ครัวเรือนที่มีสมาชิกมาก อาศัยอยู่ในชนบทและมีคะแนนดัชนีสินทรัพย์สูงมีโอกาสต่ำในการเผชิญภาวะของค่าใช้จ่ายทางสุขภาพที่สูงผิดปกติครัวเรือนที่มีผู้สูงอายุและเด็กมีโอกาสในการเผชิญภาวะของค่าใช้จ่ายทางสุขภาพที่สูงผิดปกติ

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The Vietnamese Government implemented the Law on Health Insurance in 2009, aimed at achieving Universal Health Coverage by 2014. However, we only achieved 60% of population coverage in 2010 and evidences of health insurance impacts were reported weakly. The main objective of this study is to determine the impact of health insurance coverage within a household on health care financial protection.

We used the data from the Vietnam Household Living Standard Survey (VHLSS) in 2010. Logit regression, OLS and quantile regression were employed to investigate the associated factors with catastrophic health care spending and out-of-pocket expenditure as a proportion of household capacity to pay (OOP/CTP).

The main findings of this study are that higher health insurance coverage rate within a household was found to be associated with lower probability of catastrophic health expenditure and reduced the out-of-pocket (OOP) spending as a proportion of household capacity to pay, especially for those in the upper tail of OOP distribution. More members in the households, living in the rural areas and higher asset index score are associated with lower rate of catastrophic encountering; while more elderly and children in households increases the chances of incurring catastrophic health spending for a household.

Field of Study: Health Economics and Health Care Management

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LIST OF ABBREVIATIONS

CHI	Compulsory health insurance
CHCs	Commune Health Centers
CPCs	District People's Committees
CTP	Capacity to pay
DHCs	Commune People's Committees
DID	Difference in difference
DPCs	District Health Centers
DRGs	Diagnosis-related groups
FFS	Fee-for-service
GDP	Gross domestic product
GSO	General Statistic Office
HCFFP	Health Care Fund for the Poor
LMI	Low-middle income
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
ODA	Official development assistance
OLS	Ordinary Least Square
OOP	Out-of-pocket
PCA	Principal Component Analysis
PPCs	Provincial People's Committees
SHI	Social Health Insurance
UC	Universal Coverage
VHI	Voluntary Health Insurance
VHWs	Village health workers
VSS	Vietnam Social Security (Agency)
WB	World Bank
WHO	World Health Organization

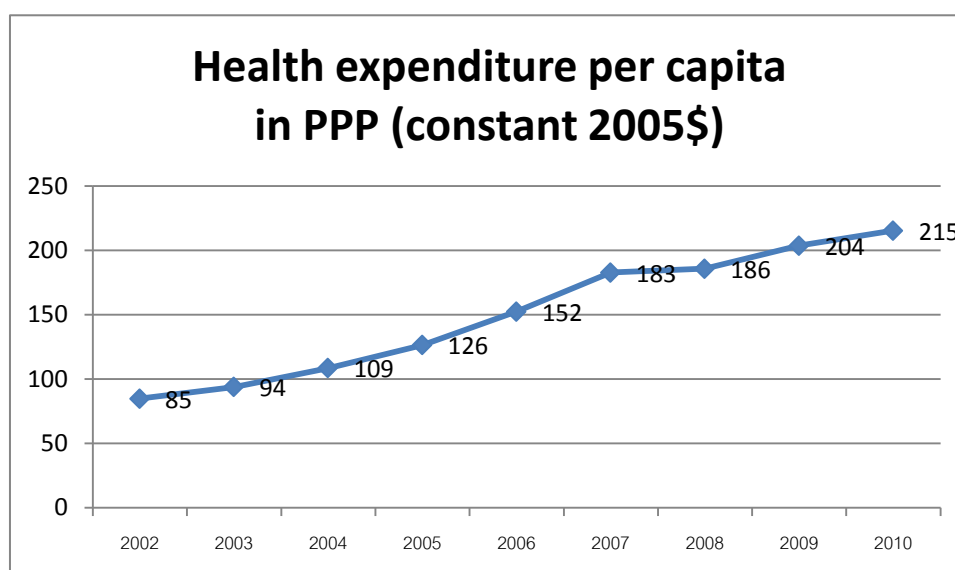
CHAPTER I INTRODUCTION

1.1. Problem And Significance

Universal health coverage (UHC) is proposed as a goal to achieve the welfare of human being and to prolong the economic and social growth (World Health Organization, 2010). A lot of countries have tried to attain the UHC through various healthcare reforms, health policies and regulations. The main financing trends for accomplishing the UHC are through the tax-based system, mandatory health insurance, or both. Depend on the funding capacity of the Government and the country context, each country chooses the optimal solution for itself. In Vietnam, the Ministry of Health (MOH) and the Government also pursue the UHC by all their attempt. So that the Law on Health Insurance was passed in 2008 and it was brought into operation on 1st July, 2009. The Law aims at reaching 100% population coverage by compulsory health insurance in the year of 2014 (Government of Vietnam, 2008). However, we only achieved 60% of the population covered by national health insurance in 2010 and still far way to attain full coverage (Tien, Phuong, Mathauer, & Phuong, 2011). The worse-off population had been given free health insurance cards such as the poor people, the Children under six years old, and other social protection groups. The challenging remain groups who are out of health insurance coverage now are the near poor household, pupils and students, the farmers, workers' dependents, self-business and informal workers.

Besides, total health expenditure of Vietnam has followed a sharply increasing trend in the period of ten years recently. Health expenditure per capita (in constant 2005 international \$PPP) moved up from \$ 85 in 2002 to \$ 215 in 2010, rising almost by 2.5 times (Figure 1.1). Total health expenditure as a proportion of Gross Domestic Product (GDP)enlarged from 5.2% in 2002 to **6.8%** in 2010 (World Bank Data, 1986-2010).

Figure 1.1 Health expenditure per capita, Vietnam 2002-2010



(Source: World Bank Data)

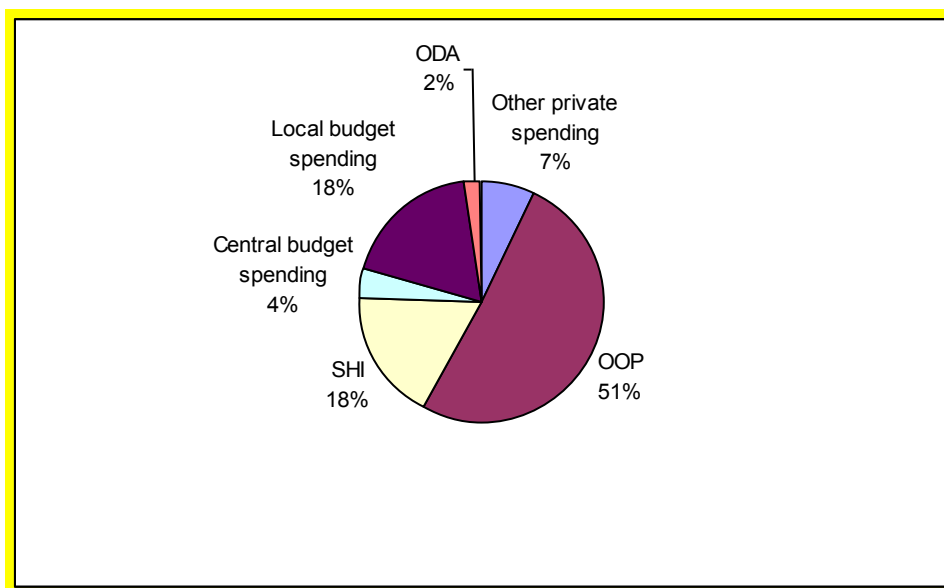
Table 1-1 Comparative Health care spending as percentage of GDP

Country	Government	Private	Total
Vietnam	2.59	4.25	6.84
Cameroon	1.52	3.61	5.13
China	2.72	2.35	5.07
India	1.18	2.87	4.05
Indonesia	1.28	1.33	2.61
Lao PDR	1.49	2.98	4.47
Myanmar	0.24	1.73	1.97
Philippines	1.28	2.34	3.61

(Sources: World Bank Data 2010)

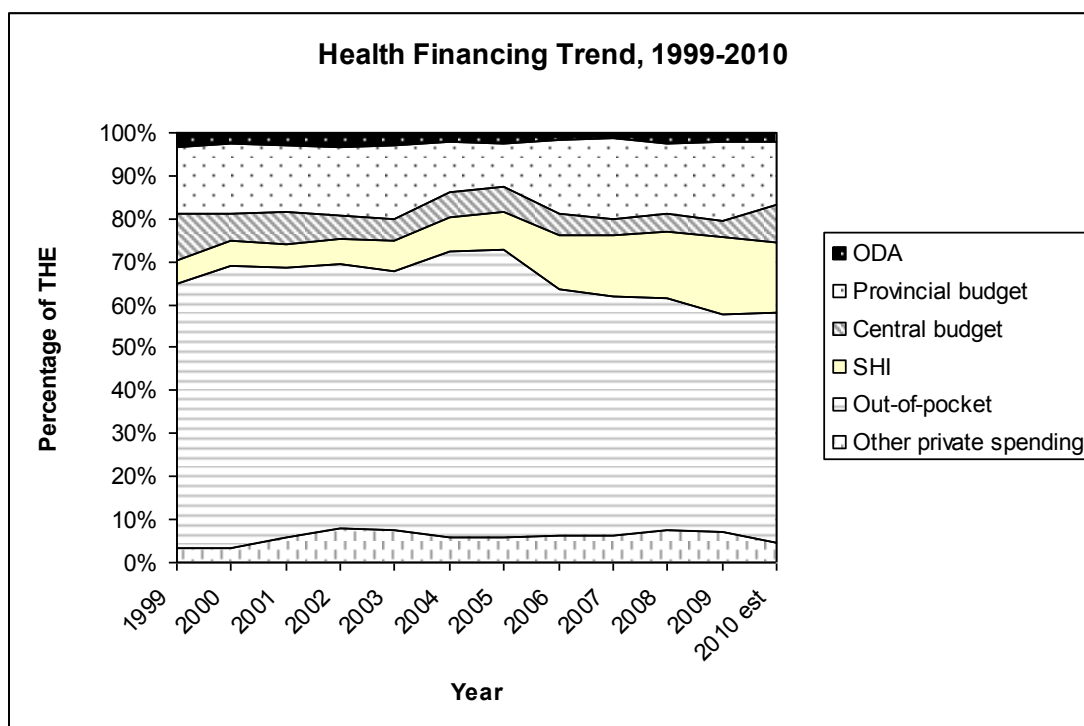
In comparison with other low middle-income (LMI) countries such as Cameroon, China, India and Laos, Vietnam spent as a bigger share of its GDP on health care (See Table 1-1). However, the health care spending mainly from households' budget: out-of-pocket (OOP) payments accounted for more than a half of total health expenditure while the Government funding for health was just 22% and the Social Health Insurance (SHI) fund was only 18% in 2009 (Figure 1.2).

Figure 1.2 Composition of national health expenditure, 2009



(Source: (Van Minh, Kim Phuong, Saksena, James, & Xu, 2012))

Figure 1.3 Trend of health expenditure, 1999-2010



(Source: MOH/WHO 2010)

The chart above reflects the large percentage of household's OOP spending for health in the period of 1999-2010 (Figure 1.3). The Official Development Assistance (ODA) – international financing aids for Vietnam was also slightly reducing as a result of the economic development of Vietnam. But the trend of reducing OOP seen in the above figure was a bright spot because the Social Health Insurance financing (SHI) had increased gradually.

As a matter of fact, OOP payments are still high while nearly 40% of the population is not protected by any kind of public health insurance. It means that a lot of households, especially the near poor, farmers, and informal sectors somehow cannot afford the health care cost and face up to adversity when they have illness and look for health care services. The problems could be more serious when the MoH must change the new fee schedule for all types of health care services in 2012, with the increasing trend from 2-4 times higher than existing price, because the previous fee schedule was out-of-date and not changed anything since 1995, even to adapt with

inflation. How to expand the coverage of health insurance becomes the most considerable question to all policy-makers, Vietnam social security agency (VSS), researchers and stakeholders.

Individual-based insurance has been performed since social health insurance (SHI) first introduced in 1992 and it seems to be not effective in term of management, monitoring and implementing. In practice, it's too difficult for the insurance agency to verify and distinguish about the condition, classification and organizational responsibility of the insured people. Besides, the uninsured cannot enroll easily due to do not have enough information with the complicated existing system about where and how to buy insurance and also their benefits. For example, a five-year-old and poor child can be classified into 2 types of health insurance by Government subsidy policies: either free health insurance card for members in a poor household or free health card for children under six years old. Also a near-poor student can get different discount rates for the health insurance premium (either 50% state subsidy for the near poor household or 30% for students). The school pupils or students must buy the insurance directly through their school or university while some of them can have free health cards for the poor at home. The internal migrant workers, who run a small business or in the informal sector, do not belong to any organization or company or governor's residence to purchase health card. Moreover, the deficit funding and adverse selection are till appearing serious up to now. As the result, this approach cannot continue to be used so the Government is trying to roll out the universal coverage at the household level by the next coming years.

However, evidences of Vietnamese health insurance impacts on reducing OOP and catastrophic payments were reported weakly in various studies (C. V. Nguyen, 2012a; Van Minh et al., 2012; Wagstaff, 2005,2007). Experiences of Thai's universal coverage scheme cannot apply in the situation of Vietnam due to differences in term of Government funding capacity and the tax system. The risk-pooling for health within a household hasn't been considered yet since health insurance based on individual level and contribution rate was calculated for a single person rather than household level. If the Law on Health Insurance changes to household-based

insurance, it will help to increase risk-pooling capacity to the VSS and also sustain the fund. How insurance coverage rate at household level may have an effect on reducing the household's burden for health care hasn't been seen obtainable in any study.

In a context that Vietnam hasn't achieved universal coverage yet and the Government and MOH would like to change the policy from individual-based enrollment into household-based insurance in the next coming years, but with lack of evidences, providing evidences on the financial protection impact of insurance coverage at household level is quite necessary and up-to-date valuable.

1.2. Research Question

Our study points toward answering these following questions:

1.2.1. Primary question

What is the impact of health insurance coverage within a household on out-of-pocket health expenditure and catastrophic health care spendings?

1.2.2. Secondary questions

1. What is the current health insurance coverage among households, classified by different socioeconomic characteristics?
2. What is the impact of household insurance status on health care financial protection (e.g. from catastrophic spendings)?
3. Is there any different effect of households' health insurance coverage rate on group of high health care financial protection compared with group of low level?

1.3. Research Objectives

1.3.1. General objectives

The overall objective of this study is to determine the impacts of health insurance coverage within a household on out-of-pocket health expenditure in the proportion of households' capacity to pay and catastrophic healthcare spendings.

1.3.2. Specific objectives

Specifically, we aim at analyzing the patterns of the following:

1. Classification of household insurance enrollment regarding different socioeconomic characteristics.
2. Catastrophic rate; and impacts of insurance enrollment from household perspective and associated factors on healthcare financial protection (e.g. from catastrophic spending).
3. Out-of-pocket health expenditure as the proportion of households' capacity to pay and its determinants

1.4. Scope Of The Study

This research will analyze the financial protection of health insurance from the household's perspective about insurance status together with other associated factors. Secondary data used in this study was selected from the latest nationally representative household survey in 2010 - Vietnam Household Living standard surveys (VHLSSs), one year after launching the Law on Health Insurance towards universal coverage.

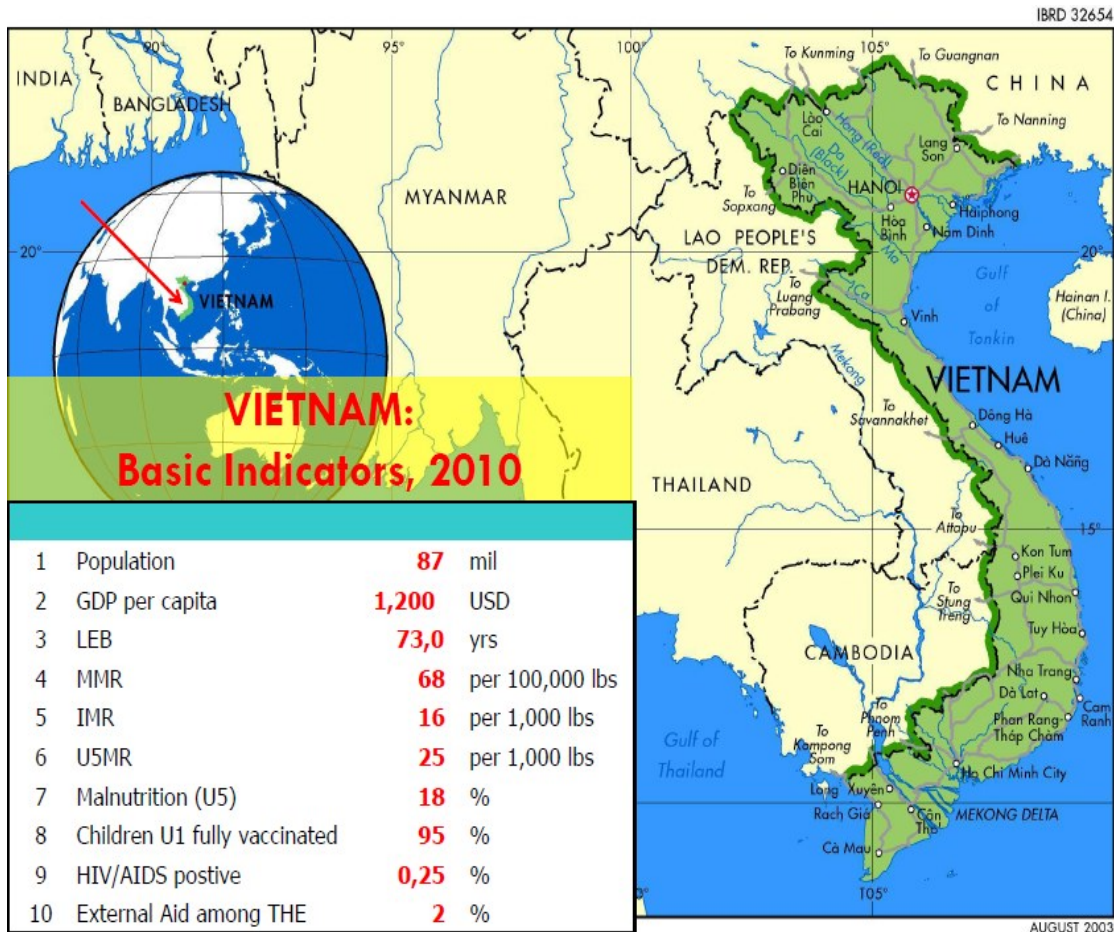
1.5. Possible Benefits

This study aims at providing timely and critical evidences for the Government and MoH about the impact of different scales of household's insurance enrollment on reducing OOP and incurring catastrophic spending. With the results of the study, the Government can carefully consider and adjust with the plan of family-based insurance in the next coming years as a new approach to achieve Universal coverage. On the

other hand, it can be applied in increasing awareness and compliance of the targeted remains population. The second application is quite important to address the root causes of the expanding the population coverage in Vietnam and also in other low-middle income countries.

CHAPTER II BACKGROUND

Figure 2.1 Factsheet of Vietnam



(Source: World Bank Data 2010)

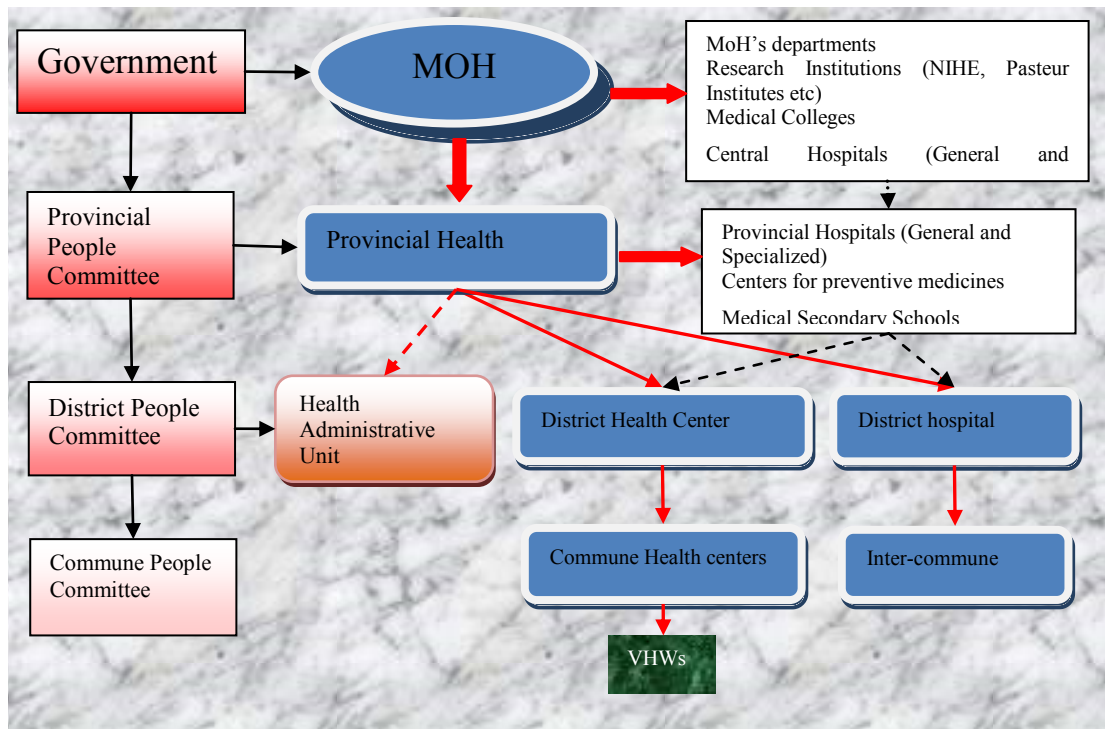
Vietnam is a Southeast Asian developing country which shares the borders with China, Lao Democratic Republic and Cambodia. The country spreads the area of 330957.6 square km and with a population of about 87.840 million in 2011 (General Statistics Office, 2011). The Gross domestic product (GDP) per capita in 2011 is estimated as around US\$1400, on a par with other low-middle income (LMI) countries such as Cameroon, India, Indonesia, the Philippines and Laos. However, average life expectancy has improved astonishingly from 61.9 years in 1986 to 74.8 years in 2010 (World bank data), with 72.9 years for male and 76.9 years for female, and even higher than other LMI countries (India 65.1 years, Cameroon 51.1 years,

Indonesia 68.9 years, Philippines 68.5 years and Laos 67.1 years...) (World Bank Data, 1986-2010).

2.1. The structure of health care system in Vietnam

The health care system in Viet Nam is structured into the system of three levels. Ministry of Health (MoH) which is the highest administrative level is responsible not only for devising and performing any health policy and program in the whole country but also for managing, monitoring and evaluating all related-health problems and healthcare activities. Under MoH, 63 provincial health bureaus carry outcall state health policies and interventions within the province. In fact, they also act as a part of the local government under the Provincial People's Committees (PPCs). The primary health care level contains district health centers (DHCs); commune health centers (CHCs) and village health workers (VHWs). Village health workers, who receive basic medical training from DHCs, become increasingly important to bring together medical doctors, health staff and patients in the community nowadays. They conjointly provide health knowledge and basically essential medical care to people in the village, especially in the rural and remote area(Ali, 2009).

Figure 2.2 The health care system in Vietnam



(Source: (Tien et al., 2011))

Currently, Vietnam has 36 central hospitals, 409 provincial public hospitals, and 645 district hospitals; 48 industrial hospitals and 10748 CHCs, with total 164800 beds together with 121 private hospitals as regards of nearly 6290 beds in the whole country. However, only 21 hospitals among 1300s hospitals above can achieve ISO 9001 standardize, stated by Dr. Luong Ngoc Khue - Director of Department of Health care management (Thuan, 2011).

Notably that almost 100% of communes in the nation of Vietnam have its own CHC (Ministry of Health & Health Partnership Group, 2010). To ensure the quality of care and infrastructure at the grass - root level, MoH mandates the national quality standard for CHCs with 10 key groups of indicators, especially regarding that each CHC must have at least one doctor working regularly or at least three times per week. According to a report from MoH, about 75% of communes nationwide has reached this standard (Chi, 2011).

One another important indicator is the number of beds per 1000 people, reported by MoH as 20.5 beds/ 10,000 people, higher than Indonesia (6 beds/10,000 population) and the Philippines (13 beds/10,000 population). (Department of Planning and Finance (MOH), 2010).

Despite the wide scale of the institutional facilities, there still remains a big gap between infrastructure and quality of care in primary health care and higher level. Overloading and long waiting time are quite common in high level facilities (central hospitals, provincial hospitals) while low quality of care and limited services and infrastructure are existing in primary health facilities. However, the leading and most advanced hospitals are central hospitals that belong to the State, but not private sector.

After decentralization, the public hospitals have more autonomy and authority to further improve their performance and efficiency, but also increase the chance to be more “privatization” with their own “for-profit units/services” (outpatient, inpatient) inside their hospitals. On the other hand, the old reimbursement system by “hospital fee scheme”, which has just only been changed within this year 2012 after being implemented nearly 20 years ago without any adjustment, cannot allow the hospital to recover its own cost, especially in the primary healthcare level (for example, district hospital).

2.2. Historical development of Vietnamese Health Insurance System

1. The first period: Evolution of Vietnam Social Health insurance in early 1990s to 1998

In the past of early 1980s, the Vietnam health system was based entirely on the Central Government financing and regulation, which allowed people to enjoy free health care, but with limited resources and accessibility. Facing with a serious economic crisis at that time, there was no choice for the country but to launch a DOI MOI (or “Renovation”) reforms of the whole economy. Then by action, compulsory Social Health Insurance (SHI) was implemented in all provinces through the First Government decree promulgated in 1992 (Decree No. 299/1992/HĐBT) after a

piloting voluntary health insurance scheme in some provinces during the period of 1989-1992. The scheme covered civil servants, workers in the formal sector of the enterprises with at least 10 employees (both state-owned and private enterprises), pensioners, social protection groups and remaining voluntary groups from the pilot such as pupils, students. However, the main problem of this period was that each province had its own provincial health insurance agency and funding, overlapped with a national insurance fund. Due to inefficiency in management and financing, the Government had to merge all provincial health insurance funds and agencies into a single national health insurance fund, managed by one agency, namely Vietnam Social Security office through Decree 58/1998/ND-CP in 1998.

2. Expanding the National Social Insurance Scheme to vulnerable and worse-off groups 1998-2008

In the first period of public health insurance in Vietnam, the coverage of it was based almost on individual enrollment, rather than families. Several policies targeted to the poor were implemented but not successfully. Continuously, in 2002, the Prime Minister signed the Decision 139 about raising “Health Care Fund for the Poor” (HCFFP) in any provinces in the country, which allow the poor beneficiaries to be able to access for health services free of charge. Besides, a different program was run in 2005 to provide free health care for children under 6 years old. By the end of 2006, nationally about 30.5 million people were covered by health insurance (about 36.3 % of the total population) (Heath Strategy and Policy Institute, 2006).

However, due to the problems of low contribution rate, severe adverse selection, supply-induce-demand and with no ceiling for reimbursement, the Fund for Social Insurance of 2005 faced the deficit of 139 billion VND, and continued deficit of 117.9 billion VND with HCFFP and 162 billion VND with the voluntary health insurance scheme in 2006 (Ministry of Health, 2007). So that MoH had to implement Circular 22 for Voluntary Health Insurance (2005) specified that there was at least 10% of household in the commune or at least 10% of students in each school or college/university involvement in the scheme; 100% members in the household

engagement; minimum 30% participation of total members in each association and mass organization as condition to join in the Voluntary scheme. Nevertheless, these conditions became barriers to expand the coverage, so they were sooner rejected and replaced by Circular 14 (2007).

Despite the fact that Vietnam had made big progress in expanding the financial protection for healthcare to the poor, minority and vulnerable groups (like children under 6 years old) in this period, social health insurance still remained a lot of challenges and issues, and required comprehensive and thorough reform in health sector and health financing.

3. Law on Health Insurance

In 2008, after many attempts of the Government and MoH, the Law on Health Insurance was approved and took effect on 1st July, 2009.

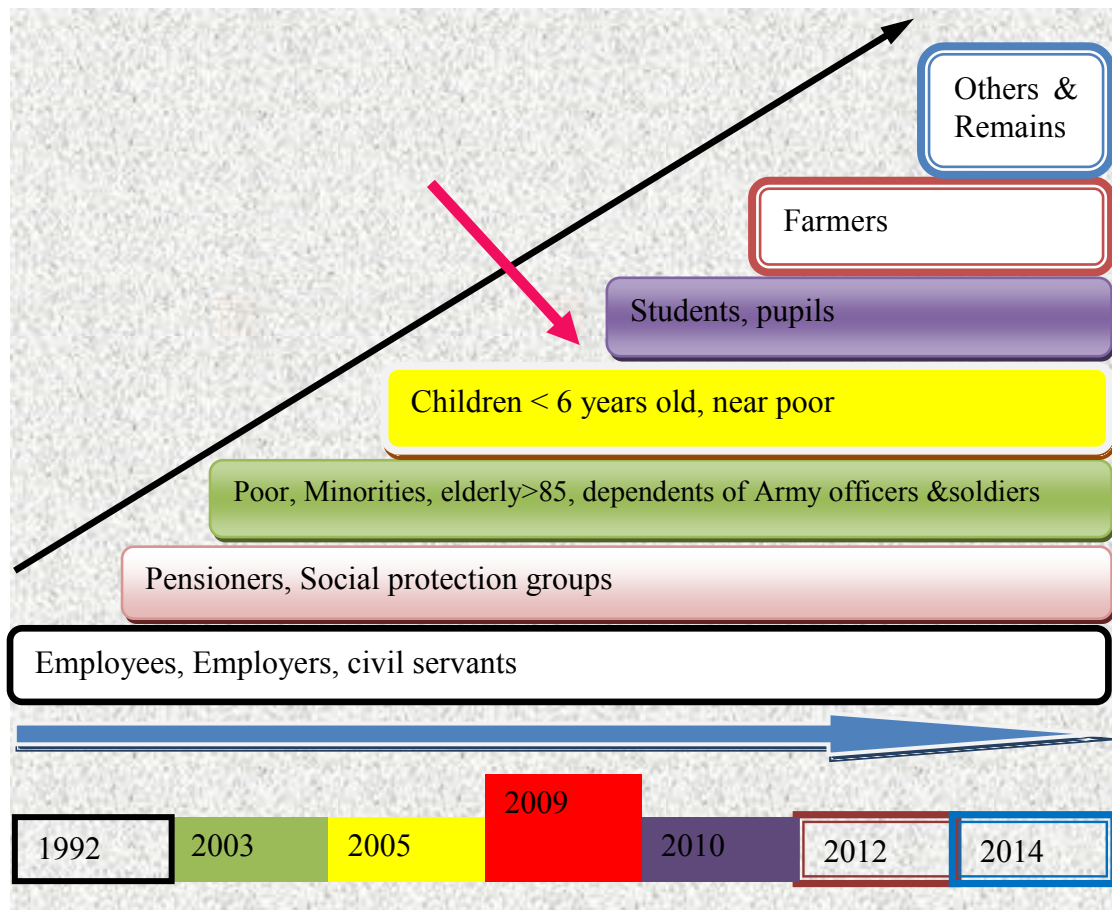
According to the Law, all the groups from 20 first categories below must be compulsorily enrolled in the National Health Insurance in 2009 at once. And then the students and pupils became mandatory on 1/1/2010; the agriculture families on 1/1/2012 and the rest on 1/1/2014. However, up to now, the groups remained uninsured are the near poor, students, farmers, informal sector and dependents. The Government has already subsidized for the near poor household with at least 50% of the premium, the students with 30% of the contribution rate.

Table 2-1 Health insurance membership classification according to Law on Health Insurance, 2009

No.	Membership categories	Time to start
1	Workers, employers, managers of enterprises and civil servants	1/7/2009
2	Officers of the Ministry of Public Security	1/7/2009
3	Pensioners, person who receives monthly allowance	1/7/2009
4	Person who receives monthly social security allowance because of occupational injuries and diseases	1/7/2009
5	Workers who stopped receiving the social security allowance for disability to receive subsidy from the Government budget	1/7/2009
6	Retired commune civil servants who receive a monthly social security allowance	1/7/2009
7	Retired commune civil servants who receive a monthly subsidy allowance subsidy from the Government budget	1/7/2009
8	Unemployed who receive an unemployment allowance	1/7/2009
9	People awarded for revolutionary merit	1/7/2009
10	Veterans according to Law of Veterans	1/7/2009
11	Veterans who directly served in the war against the United States	1/7/2009
12	Representative of the National Assembly and People's Committees	1/7/2009
13	People who receive a monthly social protection subsidy allowance	1/7/2009
14	The poor, the ethnic minorities living in disadvantage areas	1/7/2009
15	Dependents of people awarded for revolutionary merit	1/7/2009
16	Dependents of officers from the Ministry of Defense and Ministry of Public Security	1/7/2009
17	Children under 6 years old	1/7/2009
18	Donors who donated organs	1/7/2009
19	Foreigner studying in Vietnam by Vietnamese Government scholarships and fellowships	1/7/2009
20	Near poor families	1/7/2009
21	Pupils and students	1/1/2010
22	Member of Agriculture households	1/1/2012
23	Dependents of employees and formal sector	1/1/2014
24	Members of cooperatives and self-business	1/1/2014
25	Others	1/1/2014

(Source: (Tien et al., 2011))

Figure 2.3 Roadmap towards Universal Coverage



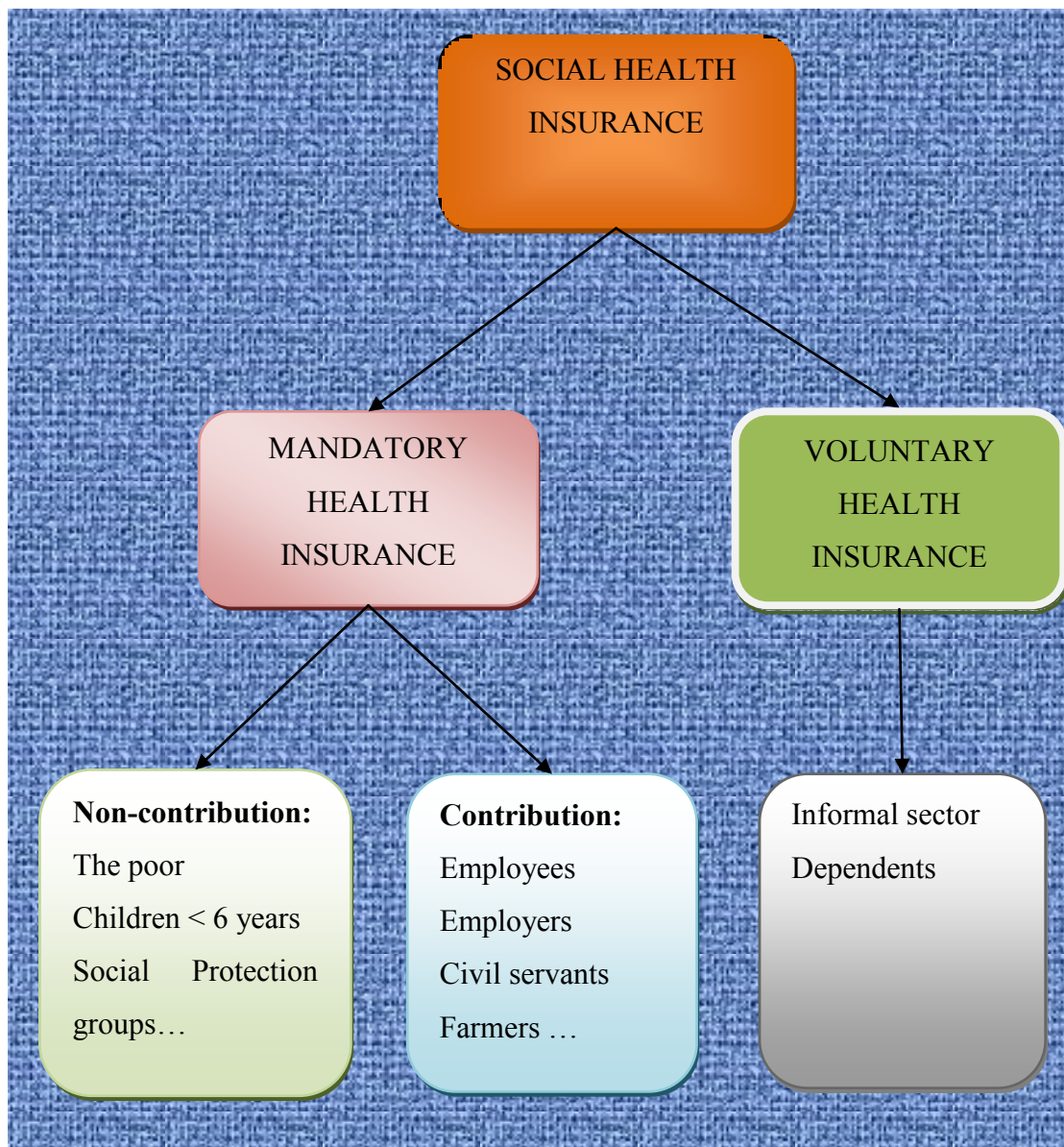
(Source: Vietnam Social Security)

Tran Van Tien et al. stated that since the Vietnam insurance system coverage relied mostly on individual-based, not by *household-based*, so the Vietnamese Social Security cannot control, manage and monitor the membership and enrollment successfully (Tien et al., 2011).

2.3. Overview about current health insurance system in Vietnam

Currently, under Vietnam Social Security Agency (VSS), there are two main schemes: Compulsory Health Insurance (CHI) and Voluntary Health Insurance (VHI).

Figure 2.4 Social Health Insurance schemes



In fact, the groups of informal sector and dependent still remain under the Voluntary Scheme due to they have not been mandatory by the Law yet, up to 2014. However, the enrollment compliance of other groups is not completely successful; especially the Government faces difficulties in the near poor group, agricultural households and private enterprises.

Contribution rate (or premium)

- Those who receive wages: 4.5% of salary/wages; of which 2/3 paid by employer and 1/3 paid by employee.
- Social protection group: 4.5% of minimum salary (In 2010: 650,000VND x 4.5% x 12 months = 351,000 VND; at present: 1,050,000 VND x 4.5% x12 months = 567,000 VND) but was paid by government budget.
- Pensioners, unemployed and who received monthly security allowance: 4.5% of minimum salary, paid by Social Security agency.
- The poor, under-six children: 4.5% of minimum salary; paid by government budget.
- The near poor: 4.5% of minimum salary; government subsidized 50% of that premium.
- Student and pupils: 3% of minimum salary; government subsidized 30%.
- People in agricultural households, informal sector, dependents and others: 4.5% of minimum salary.

Benefit Package and conditions

Overall, Vietnam Social Health Insurance provides a quite comprehensive benefit package including outpatient services and inpatient services, rehabilitation, antenatal care, delivery and screening some diseases. Besides, the insurance also includes the high cost services like organ transplantation, renal replacement therapy, invasive cardiovascular treatment, magnetic resonance imaging (MRI). The benefit packages above are according to an all-embracing list announced by MoH and VSS. Moreover, the poor are also covered the transportation costs if have to be referred into higher level.

Exclusion is nursing and home care, additional drug, prostheses, teeth, glasses and hearing aids, occupational diseases and accident at the workplace, self-injury, and drug addicted.

Preventive health care actually is directly provided by the State fund to CHCs level, so that both uninsured and insured are beneficiaries with fundamental preventive services.

The insured people will be exempted at register primary health care level (CHCs, District Hospital) if total reimbursement is less than 15% minimum salary. Coinsurance is applied further with different rates: 0% for children under 6 years old, police officers and “war heroes”; 5% copayment for pensioners, the poor or who receive a social monthly allowance; and 20% for others. The pass-by insured people without referral line must pay higher co-insurance rate: 30% at Grade III hospitals (district hospital), 50% at Grade II hospitals (provincial hospital) and 70% at Grade I Hospital (Central Hospital).

To control the fund and avoid deficit, reimbursement ceiling is applied with no more than 40 times of minimum salary. There are no differences in the benefit package between the voluntarily insured and the compulsorily insured groups.

However, patients sometimes must pay out-of-pocket first, then claim directly to the local VSS agencies, in case of traffic accident (but without violating traffic law)...

Quality of care

In terms of quality control, The VSS plays very little role in keeping an eye on quality of services. The overutilization and overload of high level hospitals make the long waiting lines, the quality reducing, and corruption (under-table money, kickback ...) and increasing more habits of spending out of pocket, even with the low income family. A study about quality of care between public and private clinics in countryside area indicated that almost were under the national standard, however, public facilities were still better than small private one. There were no differences from the patients' satisfaction and costs between public and private ones (Tuan, Dung, Neu, & Dibley, 2005).

CHAPTER III LITERATURE REVIEW

3.1. Theoretical Framework

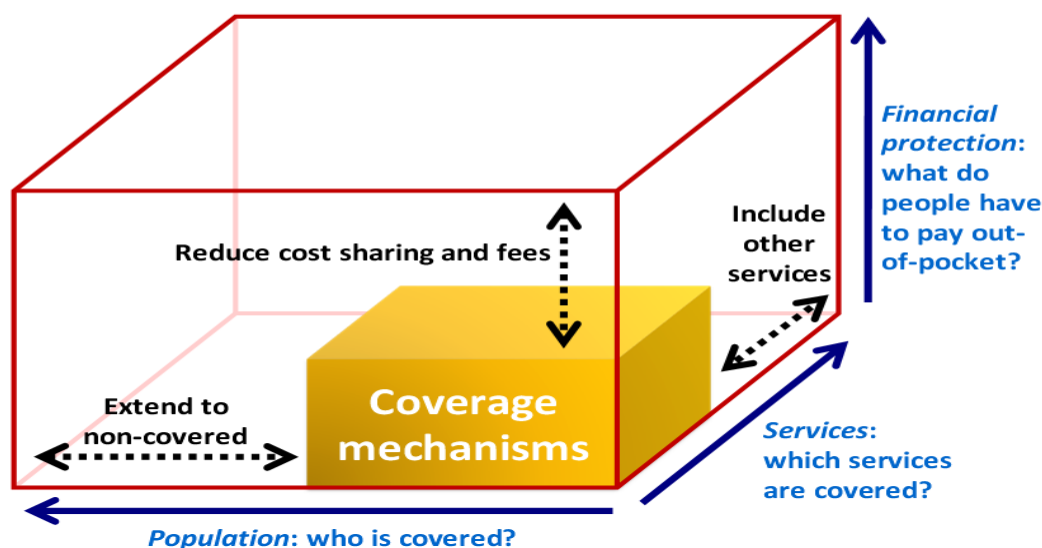
Health and related-health issues are inherently unpredictable. No one can anticipate when it can happen to him, how severe it is and how much cost he must bare (Brown & Churchill, 1999). Economists and academic scholars endeavor to find the reasonable way estimating the need and spending for health care, based on age, health condition, inherited factors and other socioeconomic characteristics. In order to manage uncertainty in health care costs, household can use some risk management method, such as change their life-style behaviors to lessen the risk of sickness and morbidity and financial strategies to deal with aftermath of health care. Three main financial strategies are: Risk lessening; Risk dealing and Risk pooling strategies (Ali, 2009). Among these mechanisms, risk lessening and risk dealing management are just concerned with self-protected, in term of individual, or family or small group of people through medical savings accounts, loans, credits. The worse-off group cannot protect themselves due to they even cannot afford or just cover their essential expenditure on food. As a result, the poor cannot access to health care and bare the consequence of illness and disability like a vicious circle. Only the risk pooling approach can be used by the Government as a key tool to ensure the well-being and equity in the society. The WHO defines that risk pooling is “the practice of bringing several risks together for insurance purposes in order to balance the consequences of the realization of each individual risk” (World Health Organization, 2000). This concept is now further fulfilled into Universal Health Coverage and recommended to worldwide countries by WHO. So how can a country achieve universal coverage?

The World Health Report 2010 outlined a conceptual framework with three broad dimensions of universal health coverage (UHC): population coverage, service coverage, and financial coverage. The report also recommends that payment in advance compulsorily is the most efficient and equitable way towards UC, whether through the tax system or mandatory contributions for health insurance (World Health

Organization, 2010). Obviously, no country has ever achieved totally population targeted for all health services without any healthcare financial burden to households; and no more waiting lists. Each country must tradeoff between broadening the number of health services and reducing the level of OOP payments for health without exceeding demand for healthcare. The decision-making process is extremely head-aching to the Government; but principally must base on addressing priority problems in each country. In case of high OOP health expenditure and till low compliance for Law on Health Insurance in Vietnam, financing reforms and extending the financial protection of health insurance are the keywords for solving the question how to achieve UC.

Figure 3.1 Conceptual Framework towards Universal Coverage

Towards universal coverage



(Source: WHO Report 2010)

With the rationale above, assessment the financial protection of the current health insurance system becomes one of the most necessary and required. However, there were lot arguments about what indicators should be added up and measured under financial coverage together with population coverage and service coverage.

For financial protection, researchers, econometricians and policy-makers had made agreement on 2 important indicators: catastrophic and impoverishment spending. Both catastrophic and impoverishment are related to proportion of spending directly by a household for healthcare in the total budget of that household or within the household's ability to pay (Xu et al., 2003). Catastrophic was defined as 40% of OOP spending in effective income of the family (capacity to pay) or 10% of total consumption of household (Donnell & et al, 2005; Xu et al., 2003).

Table 3-1 The rate of incurring catastrophic and impoverishing in Vietnam during the period of 2002-2010

	2002	2004	2006	2008	2010
	%	%	%	%	%
Cata10	30.8	33.9	29.9	31.7	24.4
Cata20	15	17.6	14.9	16.1	11.7
Cata30	8.3	10.2	8.8	9.7	6.6
Cata40	4.7	5.7	5.1	5.5	3.9
Impoverishment	3.4	4.1	3.1	3.5	2.5

(Source: (Van Minh et al., 2012))

It's shown in the Table 3-1 above not only the magnitude of the financial encumbrance of Vietnamese households but also the trend for health care spending in the period of nearly 10 previous years.

Table 3-2 Average OOP health expenditure per month of households
(Unit: 1000VND)

Year	OOP for outpatient care	OOP for hospitalization	OOP for other health services	Total OOP
2002	16.1	28.1	23.1	67.3
2004	48.4	51.5	26.5	126.4
2006	57	50.4	32.6	140
2008	78.6	78.4	44.3	201.3
2010	97.1	96	49.9	243

(Source: (Van Minh et al., 2012))

Van Minh et al. (2012) found that OOP health expenditure of household had an increase over years (Table 3-2).

3.2. Health insurance and financial protection: Empirical studies

Regarding financial protection impact of health insurance, there are various studies not only in Vietnam but also in over the world reported about it. One of the very early-bird studies is by Adam W. and Eddy v D. about financial burden for health care in Vietnam (2002), using data from VLSSs in 1992-93 and 1997-98 (Wagstaff & van Doorslaer, 2003). Due to have no available information about health insurance at that time, Wagstaff just found that catastrophic at threshold 10% happen more among the rich rather than the poor.

Adam W. also studied about the impact of free health insurance for the poor (HCFPP) in Vietnam using the data from VHLSSs 2002 and 2004. However, due to limited in data before implementing, only single differences approach and propensity score matching with trimming sample could be used in his study. The results showed that HCFPP considerably enlarge service utilization, especially hospitalization, and decreased the probability of suffering catastrophic spending (with cutoff 10%); however, not reduced mean out-of-pocket health expenditure (Wagstaff, 2007).

In a study of 6 Asian countries, discussion about catastrophic of threshold 10% and its determinants had been performed deeply. The effects were differentiated through the mean and the variance of the OOP payments by estimating an OLS model with fixing for heteroskedasticity (Donnell & et al, 2005). For health insurance status, information was only available in Hong Kong, Thailand and Vietnam and with individual insurance status.

From a PhD dissertation, Shehazd I Ali analyzed the impact of Voluntary health insurance on OOP payments and unfairness using a cross-sectional household survey data in 3 Vietnamese provinces in 1999. The results showed that insurance could help reduce expected health care expenditure, robust after fixing the insurance preference-choice biases (Ali, 2009). Despite the fact that the study was quite well-

performed, but due to the data was not representative of the whole country, he couldn't generalize the results as national impacts. Besides, Ali only paid attention on individual effects, but not household effects, whereas majority household acts like a single unit when any member in the family is faced with health problems.

A huge and latest research on financial encumbrance of household's OOP spending for health was published in 2012. The research using data from 5 VHLSSs in the whole period of 2002-2010 became a full picture of financing trends in Vietnamese household. They figured out that the rate of catastrophic (with cut-off point 40%) and impoverishment kept staying highly from early 2000s until 2008 (before universal coverage), and only declined in 2010, impact of health insurance was insignificant (Van Minh et al., 2012). However, in order to determine the capacity of financial protection of the health insurance system in Vietnam for household perspective, using the enrollment of individuals seemed not to be satisfied and comprehensive.

From another framework for measuring financial protection in the health sector, Rugger (2012) and Nguyen, K.T. (2012) brought a new point of view on the financial protection concept: multidimensional sketch, including not only straight effects (accessibility, comparative costs, health insurance status and utilization) but also social effects (dealing strategies and resource redistribution in household spending). They collected the data from 706 households in Dai Dong commune, Hanoi (2008) clarified as the poor, near-poor and non-poor households, and run OLS on mean differences in healthcare costs. However, the study collected information only of people seeking care and their insurance status but not to whom without health insurance and refuse treatment, leading to the overestimated problem.

There were a large number of studies evaluated the effects of particular health insurance programs or health policies in Vietnam. Nguyen (2012b) using the panel data of VHLSS 2004 and 2006 with the method of difference-in-difference (DID) ascertained that Voluntary Health Insurance (VHI) could help enhance healthcare seeking behavior; however, the effect on OOP expense is insignificant. In another

research conducted by Nguyen (2012a), health insurance for Children was taken into account using panel data. Impacts of health insurance for children are till modest. In both studies above, financial burden to household is not clarified clearly.

An interesting study about the payment mechanism for health insurance in Vietnam was carried out in 2012 by Nguyen and Connell. They focused on examining the effects of implementing 20% co-insurance for VHI by a policy in 2007 to demand for health care, using a quasi-natural experiment study design with dataset of VHLSSs in 2006 and 2008. The finding was that co-insurance had no reducing-effect on health care utilization (H. T. Nguyen & Connelly, 2012). However, the study cannot point out the marginal effect of coinsurance.

Researchers are now more interested in the remaining groups like farmer, informal sectors and their dependents which accounted for a large proportion in the targeted population. Obviously that it's too touch to expand the coverage by individual, which requires a lot of administration and supervision the overlap among members within a household. A study showed that 64.4 % of the informal sector is earning income by only one activity, so increasing the coverage rate through business and employee registration may help. Besides, this study also suggested that individual is more disposed to participate in those regions where the implementation of health insurance has been more successful (Paulette, Tran, Tran, & Vu, 2011).

Looking at a systematic review reported about the impact of health insurance for the poor and informal sector in developing countries in 2012, 34 studies were analyzed and evaluated. But almost studies paid attention to the specific type of health insurance or on an individual level, rather than the rate of insured member within a household (Acharya et al., 2012).

Noticeably, almost the previous studies about financial protection of health insurance used the dataset from VHLSSs – as a generalized picture of Vietnam – and focusing on some specific kinds of health insurance but not comprehensive national health insurance in Vietnam.

As the existing knowledge above, it's obvious to state that studying about the impacts of the household's insurance status on health care financial protection is really necessary and valuable.

3.3. Other socio-economic factors and financial protection

Household socioeconomic characteristics have been considered through a lot of studies about financial protection and related to health insurance. The factors such as the number of people in the household, having elderly or children under 5 years old, the location of the household or the economic status of the household (for example: expenditure quintile) are quite common in these studies (Donnell & et al, 2005; Van Minh et al., 2012). Positive sign was founded with household living in the rural area and having elderly; and more people were negative sign (Donnell & et al, 2005; Van Minh et al., 2012)

Related to health utilization and financial protection, some studies also concern with the characteristics of the head of the household such as: gender, education and occupation stand out (Donnell & et al, 2005). However, Van Minh et al.(2012) figured out that there was no significant different effect between man and woman as the head of household.

Other variables are: sanitary toilet, secure drinking water (Donnell & et al, 2005)

To handle with endogeneity, some studies use instrument variables: ownership of land and size of land; wealth index or using panel data (Donnell & et al, 2005).

CHAPTER IV RESEARCH METHODOLOGY

4.1. Conceptual framework

Secondary data analysis is conducted in this study. It will focus on analyzing the impact of health insurance coverage rate in a household on healthcare financial protection.

Household insurance status is defined as the rate of total number of insured people/household size. We consider in more advance about the rate of having mandatory and voluntary health insurance in the family.

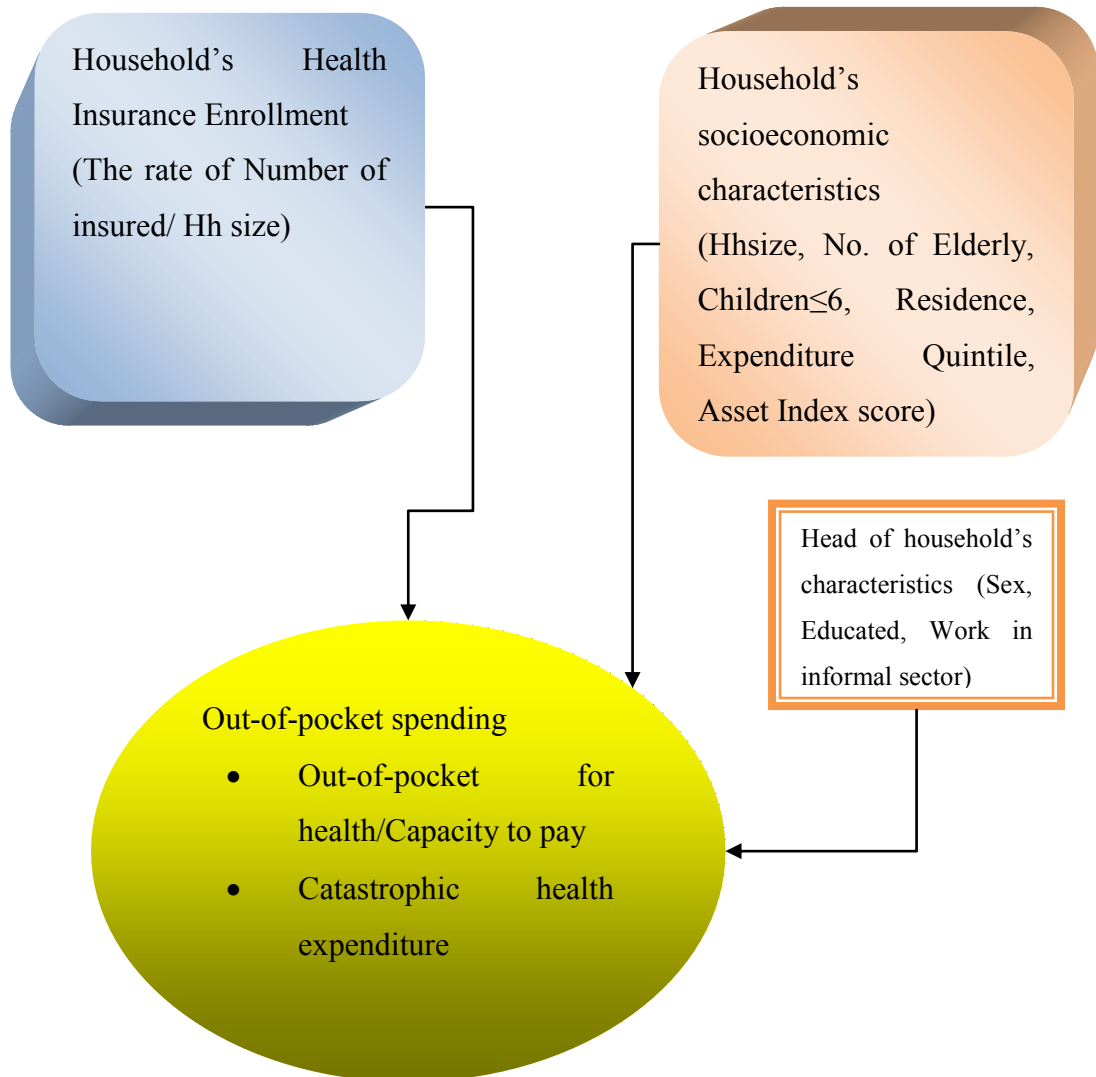
The household insurance status can also be divided into groups: full coverage, partial coverage and non-coverage. We classify these groups with different socioeconomic characteristics.

We can calculate the mean Out-of-pocket (OOP) health expenditure, the ratio Out-of-pocket/ Capacity to pay (OOP/CTP) and the rate of incurring catastrophic payment.

Econometric regression is run to estimate the impacts of health insurance from household perspective on financial protection. Explanatory variables of catastrophic payment are health insurance coverage rate within a household, number of the elderly and children in household, household size, location (urban/rural), the expenditure quintile; the head of household's characteristics (e.g. Gender, education, work in informal sector) and the asset index score.

Logit regression is used to identify impacts of the household's insurance status and other socioeconomic variable on catastrophic pattern of household out-of pocket health expenditure. OLS and quantile regression are employed to estimate the impacts of health insurance coverage and other socioeconomic characteristics on the ratio OOP/CTP of household.

Figure 4.1 Conceptual Framework



4.2. Operational definitions

- Individual-based insurance: The unit for institutional design and organizational practice of the national health insurance in Vietnam is currently at individual level. This term doesn't directly reflect to any current specific health insurance scheme.

- Household-based insurance: Household will be chosen as the unit of institutional design and organizational perform for the health insurance schemes under Vietnamese national Health insurance. So that the premium for a household's insurance would be calculated accurately, taking the risk pooling within the household into consideration.
- Health insurance coverage within a household (also household's insurance status or household's insurance enrollment): It's defined as the numbers of insured members in a household divided by the household size. The health insurance coverage rate within a household will be also classified into 3 categories: full coverage (100% of members in the household have health insurance), partial coverage (from at least one member to less than 100% of members in the household has health insurance) and non-coverage (None of household's member has health insurance card).

We employ the definition of catastrophic health expenditure from the World Health Organization (WHO) guideline and discussion paper from Ke Xu and other authors (Wagstaff, 2008; World Health Organization, 2005; Xu et al., 2003) as below:

- Out-of-pocket health payment: All health care cost and health-related cost must be paid directly and actually by household. It takes into account the health service fees, medicine, facilities, coinsurance and other health-related payments such as: transportation.
- Household's consumption expenditure: Including not only money spending on goods and services but also value of exchange items or self-produced commodities from household.
- Household's capacity to pay: It is defined as "effective income" of the household or the non-subsistence spending. Household's capacity to pay is equal total household's consumption subtract household's subsistence expenditure.
- Household subsistence expenditure: It is the minimum essential money to preserve the primary need for life in the society. Subsistence spending is explored from the poverty line, taking into account the average food

expenditures per equivalent household member of the households at the 45-55th percentile in the country. The household subsistence spending is calculated as poverty line multiple by equivalent household size.

- Catastrophic health expenditure: A household is incurring catastrophic health expenditure when it must pay OOP for health equal or greater than 40% of household capacity to pay. We also consider other different cut-off points of 10%, 20%, 30%, 40% and 50%.
- Quintile (Expenditure quintile or living standard of households): We base on equivalent expenditure per capita to classify household into 5 quintile groups.

(For more detail, see Appendix B)

4.3. Source Of Data

We use the data from the most recent national survey in 2010 of Vietnam Household Living Standard Surveys (VHLSSs) which were performed by General Statistical Office of Vietnam (GSO) and supported by World Bank experts every two years. VHLSSs used the multistage and cluster sampling techniques. VHLSS 2010 didn't have any panel data with all previous surveys because it was redesigned and prepared for a new round 2010-2020 (The sampling frame of VHLSS 2010 was based on a population census from 2009 while previous VHLSSs used the population census from 1999). Information was collected through face-to-face interviews with the head of households. The numbers of households included in the VHLSS in 2010 were 69,360: with 22,365 households investigated about income; 37,596 household about income and other issues and 9,400 households about income, expenditure and related issues. So that, the number of households used in this research was 9400 (with information of income and expenditure). All analyses of the data from household were weighted in term of the probability of each household unit being sampled to reveal the whole Vietnamese population. The weighting indicator is made available in the dataset by the GSO.

4.4. Method of analysis

The method of our study is secondary data analysis.

Logit model, OLS and quantile regression are employed in our analysis.

4.3.1. *Classification of health insurance coverage rate in a household*

Information of individual's health insurance status is transferred into household level by taking the rate of number of people have health insurance divided by the household size.

The classification of household's health insurance rate is explored further into 3 groups: Households with full health insurance coverage (100% of its members had health insurance), partial coverage (from at least one member to less than 100% of its member had health insurance) and non-coverage (100% members didn't have health insurance).

We also classify health insurance coverage status of the household by residence (Rural or Urban areas) and expenditure quintile.

4.3.2. *Catastrophic health expenditure and its determinants:*

The technique to create catastrophic health expenditure indicator was described clearly in the Operational Definitions part above and Appendix B.

We calculate the percentage of household facing with catastrophic health care spending and then classify by other socioeconomic characteristics.

Logit regression is used to estimate the determinants of catastrophic spending.

The dependent variables are dummy variables on incurring catastrophic health expenditure CATA40, CATA30, CATA20, CATA10 (OOP/CTP at cut-off points 40%, 30%, 20%, 10%, respectively).

The independent variables are:

- ❖ Household's enrolled status: $HI = \frac{\text{Total number of insured members}}{\text{household size}}$.

- ❖ Head of household characteristic: The head of household is a man (Manhead=1); the head of households has low education (**highest education** is less than high school → Loweduhead=1) and the head of household work in informal sector (Infohead =1). Here **informal sector** is defined as: agriculture households and self-business.
- ❖ And other socioeconomic indicators such as household size, number of elderly people in the household (>65years old), number of children under 6 years old in the household, living area (urban/rural), household expenditure quintile and asset index score.

Asset index score was derived by Principal Component Analysis (PCA) with 21 main types of durable assets and 6 housing conditions. PCA is the “reduction dimensions” statistic technique which allows us to investigate the linear combination of assets in the household through variance maximization, in order to reflect the wealth index of households(Phusit, 2006).

The asset index score was derived from the following equation:

$$A_i = \hat{\gamma}_1 a_{i1} + \dots + \hat{\gamma}_k a_{ik}$$

Where: $a_{ik} = (x_{ik} - \bar{x}_k) / s_k$

A_i : the standardized asset index score of household i^{th}

$\hat{\gamma}_k$: the weight or scoring factor for each asset k

a_{ik} : the standardized score of asset k for household i^{th}

x_{ik} : the dummy variable, whether the household i^{th} has the asset ($x=1$) or doesn't have the asset ($x=0$). Here we have: \bar{x}_k and s_k are the sample mean and standard deviation of asset k for all households.

The model can be represented by equations below:

Cata = f (HI, Hhsize, Have children<6, Have elderly, Urban, Expenditure Quintile, Asset index score, Head of household characteristics)

Or:

$$\begin{aligned}
 \ln \left[\frac{\Pr(Cata = 1)}{1 - \Pr(Cata = 1)} \right] \\
 &= \beta_0 + \beta_1 HI + \beta_2 hhs\text{ize} + \beta_3 \text{Age6}_n + \beta_4 \text{Age65}_n \\
 &+ \beta_5 \text{Urban} + \beta_6 \text{Manhead} + \beta_7 \text{Loweduhead} \\
 &+ \beta_8 \text{Infohead} + \beta_{9i} \text{Quintile}_i + \beta_{10} Z_pcwi + \varepsilon
 \end{aligned}$$

Table 4-1 List of explanatory variables and expected sign of coefficients

Definition	Name	Type of Variable	Expected sign	Explanation	Previous findings
Household's HI enrolled status	HI	Continuous	-	Health insurance based on risk-pooling mechanism, so the more people are insured in household, the less chance household incurring catastrophic payment	No studies use the rate of insured members/hhsize. Use specific type of HI, the results are varied and modest
Residence (Urban =1)	Urban	Dummy	-	Rural areas have lower income and less awareness about diseases, so households living in rural area are more likely facing catastrophic payment	OR <1 (Van Minh et al., 2012)
Quintile i (the 1 st quintile will be the reference group)	Quintile _i	Dummies	+/-	The lowest quintile may get the free health cards and less likely facing catastrophic payment. Also, the lowest quintile has lower capacity to pay, more likely incurring catastrophic.	Both side(Van Minh et al., 2012)

Definition	Name	Type of Variable	Expected sign	Explanation	Previous findings
Household size	Hhsize	Continuous	+/-	More member, higher risk to have illness and spending (contagious diseases), but also higher chance to earn more income	OR >1 (Van Minh et al., 2012), both signs (Donnell & et al, 2005)
Number of children <6 years old in household	Age6_n	Dummy	+	The high risk group, have more chance to seeking care, also more cost	Insignificant with having children under 5 (Van Minh et al., 2012)
Number of elderly (>65 years old) in household	Age65_n	Dummy	+	The high risk group, especially with chronic diseases and high cost care	OR >1 (Van Minh et al., 2012)
Head of household is a man	Manhead	Dummy	-	The male head of household is less likely seeking care and less desire health care	Insignificant (Van Minh et al., 2012)
Head of household has low education	Loweduhead	Dummy	+	Low education relates to low income and likely less capacity to pay of household	Not available
Head of household works in informal sector	Infohead	Dummy	+	Relate to low and inconsistent income	Not available
Asset index score	Z_pcwi	Continuous	-	The asset index score is the indicator for non-cash stock of household	Not available

4.3.3. OOP/CTP and Quantile regression

a. Empirical strategy Quantile regression:

While OLS estimates the relationship between one or more explanatory variables with a conditional mean of dependent variable Y given $X=x$, with the same marginal effect across the distribution of Y , Quantile regression can capture different effects of X on conditional quantiles of Y . So that Quantile regression can explore more information about the effect of X on Y when Y distribution is heavy tail and outliers of Y are important. Moreover, quantile regression can give a robust estimation in case of heteroskedastic data while OLS model become bias due to violating the assumption about constant error term. It's also useful when the conditional distribution of Y is not unimodal or asymmetric.

Quantile regression was formulated by generalizing the concept of a univariate quantile to conditional quantile given one or more control variables (Chen, 2005; Koenker & Gilbert Bassett, 1978; Koenker & Hallock, 2001).

Variable Y is stochastic with cumulative distribution function (CDF) as equation below:

$$F(y) = \text{Prob}(Y \leq y)$$

The τ th quantile of Y is derived as below:

$$Q(\tau) = F_Y^{-1} = \text{infimum}\{y : F(y) \leq \tau\}$$

where $0 < \tau < 1$. Particularly, we have the median quantile as $Q(1/2)$.

For a stochastic sample $\{y_1, \dots, y_n\}$ of Y , it's renowned that the sample median is minimizing of the sum of absolute deviations

$$\min_{\xi \in \mathbb{R}} \sum_{i=1}^n |y_i - \xi|$$

Also, the general τ th sample quantile $\xi(\tau)$, which similar to $Q(\tau)$, may be generated as the optimization's solution:

$$\min_{\xi \in \mathbb{R}} \sum_{i=1}^n \rho(y_i - \xi)$$

where $\rho_\tau(z) = z(\tau - I(z < 0))$, $0 < \tau < 1$. Here $I(\cdot)$ refers to the indicator function.

In contrast to OLS and maximum likelihood, the quantile regression was implemented by using **linear programming methods**.

The sample mean, which minimizes the sum of squared residuals

$$\hat{\beta} = \operatorname{argmin}_{\mu \in R} \sum_{i=1}^n (y_i - \mu)^2$$

can be applied to the linear conditional mean function, $Q(\tau | X=x) = x' \beta$ by solving:

$$\hat{\beta}(\tau) = \operatorname{argmin}_{\beta \in R^p} \sum_{i=1}^n (y_i - x'_i \beta)^2$$

Here, we estimate the linear conditional quantile function, $Q(\tau | X=x) = x' \beta(\tau)$ for any quantile $\tau \in (0, 1)$ as following:

$$\hat{\beta}(\tau) = \operatorname{argmin}_{\beta \in R^p} \sum_{i=1}^n \rho_{\tau}(y_i - x'_i \beta)^2$$

The τ th **regression quantile** is $\hat{\beta}(\tau)$.

For the j th explanatory variable, the marginal effect is the coefficient for the quantile τ th

$$\frac{\partial Q_{\tau}(Y|X)}{\partial x_j} = \beta_j(\tau)$$

$\beta_j(\tau)$ is interpreted as the change in a specified quantile τ th of the regressand variable y produced by one unit change in the explanatory variable x_j .

The marginal effects are for minuscule changes in the independent variable, assuming that the regressand variable remains in the same quantile.

b. The quantile model used in our research is:

OOP/CTP (τ) = f (HI, Hhsize, Have children<6, Have elderly, Urban, Expenditure Quintile, Asset index score, Head of household characteristics)

Or:

$$\text{OOP/CTP}(\tau) = \beta_{1\tau} \text{HI} + \beta_{2\tau} \text{Hhsize} + \beta_{3\tau} \text{Age6_n} + \beta_{4\tau} \text{Age65_n} + \beta_{5\tau} \text{Urban} + \beta_{6\tau i} \text{Quintile}_i + \beta_{7\tau} \text{Z_pcwi} + \beta_{8\tau} \text{Manhead} + \beta_{9\tau} \text{Loweduhead} + \beta_{10\tau} \text{Infohead} + \varepsilon$$

(Quintile _{i} are dummy variables of expenditure quintile. The first quintile group is the reference group)

The independent variables are defined as in the previous part of Catastrophic health spending.

The quantile distribution of variable OOP/CTP is first explored by histogram and quantile plot. We expect to figure out which τ th quantiles are important to reflect

the households with high level of OOP in the proportion of capacity to pay of the household (those potential facing with catastrophic payment).

Interpretation of the results:

In OLS model, the coefficient of each independent variable indicates the average change in OOP/CTP produced by one unit change in that explanatory variable. But the quantile coefficients estimate the change in a particular quantile of OOP/CTP caused by one unit change in the regressors. This provides the information to compare how different percentiles of OOP/CTP may be more effected by certain factors than other percentiles (the change in size of the coefficients).

CHAPTER V DATA DESCRIPTION

This chapter will provide an overview about our data VHLSS 2010 and the general information about the study population. Number of households in this dataset is 9400 and the weighted number of households which reflect the whole Vietnamese households are 22,334,062. We also present the classification of households' health insurance coverage in this Chapter.

Table 5-1 Description of the Data in VHLSS 2010¹

Variables	Mean	SD.	Min	Max
Household size (persons)	3.87	1.55	1	15
Number of elderly (over 65) in household	0.28	0.57	0	3
Number of children under 6 in household	0.37	0.61	0	4
Wealth index score	0.09	1.01	-2.45	2.92
OOB for outpatient (per month)*	92.64	287.35	0	16041.67
OOB for inpatient (per month)*	91.57	450.85	0	20500
OOB for drug (per month)*	44.34	120.03	0	3666.67
OOB for medical equipment (per month)*	3.32	17.26	0	833.33
Total OOB per month*	231.87	588.72	0	21666.67
Household expenditure per month*	4995.26	5142.01	178.33	110477.50
Equivalent household size	2.09	0.49	1.00	4.56
Equivalentized food expenditure*	1117.51	733.82	66.75	10172.28
Poverty line*	1154.88	0.00	1154.88	1154.88
Subsistence spending*	2413.32	562.03	1154.88	5261.98
Capacity to pay*	3129.27	4820.85	10.83	108340.90
OOB/CTP	0.09	0.14	0.00	0.94

* Unit: 1000 VND (Thousand Vietnam Dong)

According to Table 5-1, the average household size was 3.87 while mean of the number of elderly (>65 years old) was 0.28 and children under 6 years old was 0.37. Our findings were quite similar with the results from the Report of VHLSS 2010 (General Statistics Office, 2010). These figures are reasonable because the typical nuclear families in Vietnam nowadays are with four members: parents and one or two children. However, there were still households with large scale of 15 members. It can

¹ Here we summarize all statistic results with the weighted indicator that provided by GSO.

be explained by the remaining of traditional families with three or four generations living together and birth control failure, especially in the rural and mountainous areas or among the minority ethnic groups.

On average in one month, a household spent 92,640 VND for outpatient service; 91,570 VND for hospitalization and total 231,870 VND out-of-pocket health spending. Our findings are on par with other studies and reports (General Statistics Office, 2010; Van Minh et al., 2012). Notably, this amount of household's OOP spending for health per month nearly equal one third of minimum salary in 2010 (650,000 VND and increased into 730,000VND from 1st May 2010).The mean of capacity to pay per month of household was 3,129,270 VND. The ratio OOP/CTP was 0.09 on average; however it had a large range (0.00-0.94).

Table 5-2 Distribution of some characteristics of households in VHLSS 2010

Characteristics	Percentage
Location	
<i>Urban</i>	30.50%
<i>Rural</i>	69.50%
The head of household is a man	
<i>Yes</i>	73.99%
<i>No</i>	26.01%
The head of household works in informal sector²	
<i>Yes</i>	67.86%
<i>No</i>	32.14%
The head of household has low education³	
<i>Yes</i>	71.96%
<i>No</i>	28.04%

It's shown in the Table 5-2 that more people lived in the rural areas (69.5%) than the urban areas (30.5%). Majority of the head of households was a man (73.99%); working in informal sector (67.86%) and having low education (71.96%)

² The head of household works in informal sector: Those who work in agriculture households or self-business.

³ The head of household has low education: The highest qualification of the head of household was at secondary school level

Table 5-3 Expenditure quintile by location

Location	Expenditure quintile (equivalent expenditure per capita)				
	1	2	3	4	5
<i>Rural</i>	26.20%	24.13%	21.66%	17.70%	10.31%
<i>Urban</i>	5.88%	10.60%	16.21%	25.23%	42.08%

(Chi square Test: $p < 0.05$)

The percentage of the 1st and 2nd quintile households (the poorest and the poor groups) in the rural area is greater than 50%, while that percentage is only less than 20% in the urban area. It means that the households living in the municipal areas are more likely having higher living standards with better income than ones living in the rural areas.

Table 5-4 Health insurance coverage rate within a household

	Mean	SD
Total	0.593	0.362
Type of Health Insurance		
<i>Mandatory</i>	0.385	0.391
<i>Voluntary</i>	0.208	0.272
Quintile⁴		
<i>1st</i>	0.682	0.387
<i>2nd</i>	0.532	0.37
<i>3rd</i>	0.519	0.35
<i>4th</i>	0.568	0.339
<i>5th</i>	0.664	0.333
Location		
<i>Urban</i>	0.636	0.347
<i>Rural</i>	0.574	0.367

The mean of coverage rate of health insurance within a household was 0.593. The mean of mandatory health insurance coverage rate was 0.385 while the mean of voluntary health insurance enrolled rate was 0.208. This is because in one household,

⁴ Quintile: Expenditure per (equivalent) capita (See Operational Definition in Chapter 4). We will use this definition throughout this Chapter.

members may have both type of mandatory and voluntary health insurance. For example, in an agriculture household, parents may have voluntary health insurance while their children must buy compulsory health insurance at school. According to the Law on Health insurance, 21 first groups of membership classification were obligated to buy health insurance in 2010 while only 4 groups (farmers, dependents and informal sector and others) could delay to be obligated up to 2012 and 2014. This explains why the average compulsory health insurance coverage rate in household was higher than the rate of voluntary health insurance.

Among different expenditure quintile groups, the first quintile group (the poorest) had the highest average health insurance coverage rate (0.68) and the third quintile (the average group) had the lowest rate. The household lived in the urban areas have the higher mean coverage rate than the rural households (0.64 compare to 0.57) (Table 5-4).

Table 5-5 Classification of household health insurance coverage⁵

	Full coverage	Partial coverage		Non-coverage	Chi square test
		≥50%	<50%		
Total	34.51%	31.45%	19.21%	14.83%	-
Quintile					Chi2= 1.6e+06 (p = 0.000)
<i>1st</i>	54.00%	18.21%	12.41%	15.38%	
<i>2nd</i>	29.86%	28.19%	23.36%	18.59%	
<i>3rd</i>	24.28%	33.96%	24.63%	17.13%	
<i>4th</i>	26.16%	39.76%	20.33%	13.75%	
<i>5th</i>	38.24%	37.15%	15.31%	9.30%	
Location					Chi2= 1.5e+05 (p = 0.000)
<i>Urban</i>	36.83%	34.84%	16.66%	11.67%	
<i>Rural</i>	33.49%	29.97%	20.32%	16.22%	

In the Table 5-5 above, 34.5% of households have full coverage; 50.7% of households partially enrolled (31.45% of households with more than half of members

⁵ Classification of household health insurance coverage as below:

Full coverage: 100% of members in household had health insurance.

Partial coverage:

≥50%: Households had from 50% to less than 100% of health insurance coverage

<50%: Households had from at least one enrollment to less than 50% of health insurance coverage

Non-coverage: Households with none of their members had health insurance.

had health insurance) and only 14.8% of household have no health insurance at all. Compared among different expenditure quintile groups, the households in the first quintile group had the highest percentage of household with full coverage while the third quintile ones had lowest percentage full coverage household. The 5th quintile group had the smallest percentage of household with no health insurance (9.3%) while the second quintile group had the highest percentage (18.6%). The differences of health insurance coverage among quintile groups above can be explained partially as the result of Government subsidy, in which free health cards and premium discount were provided just for specific groups, not the whole population. The low compliance to health insurance of second quintile group above may reflect the near poor households that couldn't afford even for a half of the health insurance premium (they get the subsidy 50% of premium from the Government budget).

(P-value of Chi-square Test <0.05: there are statistically significant differences in proportion of household health insurance enrollment classification among quintile groups and location groups).

Table 5-6 Characteristics of households with non-coverage of health insurance

	Number of households (N) ⁶	Percentage (%)
Total	3,312,659	100%
Quintile		
<i>1st</i>	687,358	20.75%
<i>2nd</i>	830,390	25.07%
<i>3rd</i>	765,214	23.10%
<i>4th</i>	614,312	18.54%
<i>5th</i>	415,385	12.54%
Location		
<i>Urban</i>	795,120	24%
<i>Rural</i>	2,517,539	76%

Among households without any health insurance coverage, the majority of them were living in the rural areas (76%) and belonged to 3 first quintiles (68.92%), especial the second quintile group (the poor). These findings are consistent with

⁶ The number of households were weighted to reflect the whole Vietnam population.

previous tables. As explained above, they suggest that besides the poor household, the near-poor household needs to be subsidized more in the near future.

Table 5-7 The use of health insurance when individuals seek care

	Frequency	Percentage
Number of individuals seeking outpatient care and have health insurance	9125	100%
Use health insurance when seeking outpatient services		
Yes	6315	69.21%
No	2810	30.79%
Number of individuals hospitalized and have health insurance	2288	100%
Use health insurance when hospitalized		
Yes	1834	80.16%
No	454	19.84%

Table 5-7 above shows the percentage of individuals using health insurance when they sought outpatient care and inpatient care. Among 36,988 individuals in our analysis, only 9,125 people sought outpatient care and had health insurance; and 2,288 people were hospitalized and had health insurance. Among those who have health insurance, the number of people who didn't use health insurance when seeking outpatient care and hospitalization were 2,810 and 454, respectively.

As a matter of fact, the insurance package and reimbursement policy somehow do not meet with the expectation of some people: private room, private bed, imported drugs (out of the national essential drug list) etc. and no waiting time. That's why some individuals choose to pay cash instead to get high quality of care and services. Notably that in the same public facilities, there are some for-profit units or wards due to decentralization and socialization. Another reason may be explained because of the poor health services at commune health centers and high coinsurance rate at higher facility levels that reduce the role of prepayment in healthcare by health insurance.

Table 5-8 Average number of outpatient utilization and inpatient utilization per year (Individual analysis)

	Mean number of outpatient services	Mean number of inpatient services
Quintile		
<i>1st</i>	2.74	0.32
<i>2nd</i>	3.21	0.29
<i>3rd</i>	3.42	0.31
<i>4th</i>	3.58	0.30
<i>5th</i>	3.54	0.29
Location		
<i>Urban</i>	3.54	0.29
<i>Rural</i>	3.21	0.31
Health insurance		
<i>No</i>	3.28	0.23
<i>Yes</i>	3.31	0.34

In the Table 5-8, the poor household members seemed to seek for outpatient care less than the better-off groups, while they were more likely hospitalized than those groups. It could be explained by the fact that the worse-off group only sought care when they had severe symptoms and diseases which must be taken care in the hospitals. Also the same for those living in rural areas (lower income and living standard) compared with those living in urban areas (better-off group). People who had health insurance had higher rate of utilization for both inpatient and outpatient care.

CHAPTER VI RESULTS AND DISCUSSION

Continue with previous chapter, the main results of the study will be shown in this chapter together with the discussion part to answer the research questions in the first section.

This section will be divided into 3 parts: Catastrophic health expenditure and its determinants; OOP/CTP and its determinants and Discussion.

(Other tables and results are presented in the Appendix C)

6.1. Catastrophic expenditure and determinants

Table 6-1 Probability of households facing catastrophic health payment

	Number of households (N)	Percentage (%)
Cata10	6,131,343	27.45%
Cata20	3,039,607	13.61%
Cata30	1,771,324	7.93%
Cata40	1,050,166	4.70%
Cata50	584,693	2.62%

Table 6-1 presents the percentage of household facing with catastrophic payment at different threshold 10%, 20%, 30%, 40% and 50% (using out-of-pocket payment as the proportion of capacity to pay OOP/CTP⁷): 27.45%, 13.61%, 7.93%, 4.7% and 2.62%, respectively. The table also points out the absolute numbers of household with catastrophic spending (with weighted indicator).

⁷ We obtain CATA10, CATA20, CATA30, CATA40, CATA50 as below:
 CATA10 =1 (Yes) if OOP/CTP \geq 10%, otherwise CATA10=0 (No)
 CATA20= 1 (Yes) if OOP/CTP \geq 20%, otherwise CATA20=0 (No)
 CATA30 =1 (Yes) if OOP/CTP \geq 30%,otherwise CATA30=0 (No)
 CATA40= 1 (Yes) if OOP/CTP \geq 40%,otherwise CATA40=0 (No)
 CATA50= 1 (Yes) if OOP/CTP \geq 50%,otherwise CATA50=0 (No)

Table 6-2 Pattern of catastrophic with socioeconomic characteristics

	Cata10		Cata20		Cata30		Cata40	
	Yes	No	Yes	No	Yes	No	Yes	No
Quintile								
<i>1st</i>	32.76%	67.24%	16.86%	83.14%	9.36%	90.64%	5.03%	94.97%
<i>2nd</i>	32.67%	67.33%	16.24%	83.76%	9.10%	90.90%	5.77%	94.23%
<i>3rd</i>	29.32%	70.68%	13.66%	86.34%	8.67%	91.33%	4.95%	95.05%
<i>4th</i>	25.19%	74.81%	13.24%	86.76%	7.93%	92.07%	4.65%	95.35%
<i>5th</i>	17.30%	82.70%	8.04%	91.96%	4.60%	95.40%	3.11%	96.89%
Location								
<i>Rural</i>	30.20%	69.80%	15.30%	84.70%	9.11%	90.89%	5.41%	94.59%
<i>Urban</i>	21.18%	78.82%	9.76%	90.24%	5.23%	94.77%	3.09%	96.91%
Health insurance								
<i>No</i>	31.73%	68.27%	17.00%	83.00%	10.92%	89.08%	7.29%	92.71%
<i>Yes⁸</i>	26.70%	73.30%	13.02%	86.98%	7.41%	92.59%	4.25%	95.75%

Among quintile groups, the first and 2nd quintiles had the highest percentage of households with catastrophic health expenditure at any cut-off points: 10%, 20%, 30%, and 40%. The 5th quintile group had the smallest probability of catastrophic health care spending (only 3.11% at CATA40). The household living in rural areas faced catastrophic payment with higher chance than ones living in the urban areas. This is reasonable as we found that the urban areas had higher living standard than the rural (See table 6-2).

Compared to household without any health insurance, the households with at least one health insurance card were less likely to incur catastrophic payment (7.29% vs. 4.25% at CATA40).

⁸ Here we define Health insurance as “Yes= Households had at least one member with health insurance card.”; otherwise, “No”.

Table 6-3 Determinants of catastrophic health spending at cut-off point 10%

(Logit model for Cata10)

Explanatory Variables	Coefficient	p-value
Constant	-0.688***	0.000
Household's health insurance coverage	-0.199***	0.006
The head of household is a man	-0.173***	0.004
Household size	-0.09***	0.000
Number of elderly (over 65)	0.607***	0.000
Number of children under 6 years old	0.194***	0.000
Urban	-0.279***	0.000
1st quintile (Reference group)		
2nd quintile	0.225***	0.004
3rd quintile	0.194**	0.020
4th quintile	0.124	0.177
5th quintile	-0.153	0.162
The head of household is low education	0.16**	0.013
The head of household in informal sector	-0.122*	0.054
Asset index score	-0.216***	0.000
Number of observations	9212	
Log Pseudo likelihood	-12270151	
Wald chi2(13)	407.77	
Prob. (Wald test)	0.0000	
Pseudo R-squared	0.047	

***: Significant at 1% significance level

** : Significant at 5% significance level

* : Significant at 10% significance level

The Table 6-3 above shows the results of Logistic regression for determinants of Catastrophic 10%. The characteristics have the significant effects on Catastrophic 10% at 95% of confidence interval are: Health insurance coverage rate within a household, the head of the household is a man, household size, the number of elderly, the number of children under 6, living in urban area, the second and the third quintile group, the head of household has low education and asset index score ($p < 0.05$).

The households with higher rate of health insurance coverage were less likely facing catastrophic expenditure at cut-off point 10%. Households of which the head of

the household was a man had lower rate of catastrophic health spending. Larger household size was significantly associated with lower chance of incurring catastrophic. Households with more number of elderly or children under six had significantly higher chance of catastrophic expenditure. Households living in urban areas were less likely facing catastrophic health payment than ones living in rural area. Households belonged to the second and the third expenditure quintiles were more likely to spend catastrophic payment for health than the first quintile households. Households with the head of the household having low education had higher chance incurring catastrophic payment. Households with higher score of wealth index were less likely to face catastrophic health spending.

The average of predicted probabilities for facing Catastrophic at threshold 10% is about **27.26%** which is nearly similar to the actual frequency for Catastrophic 10% (27.45%). The logit model correctly predict **73.35%** of the observations' probability and the rest are misclassified.

The results we found about are reasonable because coefficients followed the expected sign in the Chapter IV (Methodology). Health insurance could help protect households from catastrophic health spending because it followed risk pooling mechanism among households. Households living in the urban area had better income and living condition (Table 5-3), so that their capacity to pay were larger than those living in the rural areas. Besides, more elderly people and children in the household would increase healthcare cost because they were the high risk group with more severe diseases and symptoms. Larger household size could help earn higher income and more human resource to deal with illness and healthcare cost. The asset wealth index score represented the non-cash wealth of household, whether household had or didn't have some specific types of assets and housing conditions. With higher asset index score, households could have more non-cash stock which are exchangeable into cash at the time of need (by selling assets).

Table 6-4 below shows the estimated coefficients of Logistic model for determinants of Catastrophic 20%. The explanatory variables have the significant effects on Catastrophic 20% at 95% of confidence interval are: Health insurance

coverage rate within a household, household size, the number of elderly, the number of children under 6, living in urban area, the second, the third and the fourth quintile group and asset index score ($p < 0.05$).

Table 6-4 Determinants of catastrophic health spending at cut-off point 20%

(Logit model for Cata20)

Explanatory Variables	Coefficient	p-value
Constant	-1.454***	0.000
Household's health insurance coverage	-0.232**	0.013
The head of household is a man	-0.119	0.121
Household size	-0.161***	0.000
Number of elderly (over 65)	0.61***	0.000
Number of children under 6 years old	0.205***	0.001
Urban	-0.34***	0.000
1st quintile (Reference group)		
2nd quintile	0.28***	0.005
3rd quintile	0.254**	0.019
4th quintile	0.416***	0.000
5th quintile	0.125	0.386
The head of household is low education	0.098	0.247
The head of household in informal sector	-0.121	0.136
Asset index score	-0.333***	0.000
Number of observations	9212	
Log Pseudo likelihood	-8225168.6	
Wald chi2(13)	334.82	
Prob. (Wald test)	0.0000	
Pseudo R-squared	0.0509	

***: Significant at 1% significance level

** : Significant at 5% significance level

* : Significant at 10% significance level

The main findings of the model are (Holding all other variables equal): The households with higher rate of health insurance coverage were less likely facing catastrophic expenditure at cut-off point 20%. Increasing one more person was significantly associated with less chances of incurring catastrophic health spending. Households with more number of elderly or children under six had significantly higher chance of catastrophic expenditure at cut-off 20%. Households living in urban

areas were found less likely facing catastrophic health payment than ones living in rural area. Households belonged to 2nd, 3rd and 4th expenditure quintiles were more likely to spend catastrophic payment for health than the first quintile households. And households with higher score of wealth index were less chance to face catastrophic health spending.

The average of predicted probabilities for facing Catastrophic at threshold 20% is about 13.4% which is nearly similar to the actual frequency for Catastrophic 20% (13.6%). The logit model correctly predicted 86.6% of the values and the rest are misclassified.

The better-off quintile groups were more likely to suffer catastrophic health care spending than the worse-off quintile groups (1st quintile). It may be explained by the fact that, the poor households received the free health insurance and got better financial protection. Another reason for suffering less catastrophic health payment of the poor may be due to the low rate of using healthcare services. The high non-medical expense (for instance, accommodation and transportation) and economic lost due to absence from work prevent the poor to seeking care and only come to the hospitals when with severe symptoms.

The Table 6-5 below shows the estimated coefficients and marginal effects of Logistic model for determinants of Catastrophic at threshold 30%. The independent variables significantly associated with Catastrophic 30% are: Household size, the head of the household is a man, the number of elderly, the number of children under 6, living in urban area, the 2nd, 3rd, 4th and 5th quintile groups and wealth index score ($p < 0.05$).

The households with male head of household were less likely facing catastrophic expenditure at cut-off point 30% than the households with female head of household. Households with larger size were significantly associated with less chances of incurring catastrophic. Households with more number of elderly or children under six had significantly higher chance of catastrophic expenditure at cut-off 30%. Households living in urban areas were less likely facing catastrophic health payment than ones living in rural area. Moreover, households belonged to 2nd, 3rd,

4th and 5th expenditure quintiles were more likely incurring catastrophic payment for health than the first quintile households. Households with higher score of wealth index were less likely to face catastrophic health expenditure.

Table 6-5 Determinants of catastrophic health spending at cut-off point 30%

(Logit model for Cata30)

Explanatory Variables	Coefficient	p-value
Constant	-2.102***	0.000
Household's health insurance coverage	-0.127	0.283
The head of household is a man	-0.211**	0.028
Household size	-0.233***	0.000
Number of elderly (over 65)	0.652***	0.000
Number of children under 6 years old	0.186**	0.022
Urban	-0.495***	0.000
1st quintile (Reference group)		
2nd quintile	0.439***	0.001
3rd quintile	0.639***	0.000
4th quintile	0.806***	0.000
5th quintile	0.576***	0.002
The head of household is low education	0.093	0.388
The head of household in informal sector	-0.093	0.358
Asset index score	-0.474***	0.000
Number of observations	9212	
Log Pseudo likelihood	-5614875.8	
Wald chi2(13)	328.88	
Prob. (Wald test)	0.000	
Pseudo R-squared	0.0663	

***: Significant at 1% significance level

** : Significant at 5% significance level

* : Significant at 10% significance level

The average of predicted probabilities for facing Catastrophic at threshold 30% is about 7.8% which is quite closed to the actual frequency for Catastrophic 30% (7.9%). The logit model correctly predicted 92.21% of the observations' probability and the rest are misclassified.

The Table 6-6 below presents the estimated coefficients of Logistic model for determinants of Catastrophic 40%, one of **our main interests**. The determinants significantly associated with Catastrophic 40% at 95% of confidence interval are: Household size, the number of elderly, the number of children under 6, living in urban area, the 2nd, 3rd, 4th and 5th quintile groups and wealth index score ($p < 0.05$). Notably, health insurance enrollment rate within a household has marginally significant effect on catastrophic incurring (cut-off 40%) with 10% significance level ($p < 0.1$).

Table 6-6 Determinants of catastrophic health spending at cut-off point 40%

(Logit model for Cata40)

Explanatory Variables	Coefficient	p-value
Constant	-2.462***	0.000
Household's health insurance coverage	-0.261*	0.092
The head of household is a man	-0.183	0.136
Household size	-0.36***	0.000
Number of elderly (over 65)	0.748***	0.000
Number of children under 6 years old	0.303***	0.005
Urban	-0.584***	0.000
1st quintile (Reference group)		
2nd quintile	0.715***	0.000
3rd quintile	0.855***	0.000
4th quintile	1.093***	0.000
5th quintile	1.099***	0.000
The head of household is low education	0.074	0.594
The head of household in informal sector	-0.174	0.171
Asset index score	-0.548***	0.000
Number of observations	9212	
Log pseudo likelihood	-3741483	
Wald chi2(13)	289.09	
Prob. (Wald test)	0.0000	
Pseudo R-squared	0.088	

***: Significant at 1% significance level

** : Significant at 5% significance level

* : Significant at 10% significance level

Increasing one more person in the household was significantly associated with less likely incurring catastrophic. Households with more number of elderly or children

under six had significantly higher chance of catastrophic expenditure at cut-off 40%. Households living in urban areas were less likely facing catastrophic health payment than ones living in rural area. Households belonged to 2nd, 3rd, 4th and 5th expenditure quintiles were more likely to spend catastrophic payment for health than the first quintile households. Lastly, households with higher score of wealth index were less likely to face catastrophic health expenditure

The average of predicted probabilities for facing Catastrophic at threshold 40% is about 4.6% which is a bit close to the actual frequency for Catastrophic 40% (4.7%). The logit model correctly predicted 95.4% of observations' probability and the rest are misclassified. (Table 6-6)

Table 6-7 Marginal effects of explanatory variables in the 4 logit models of Catastrophic health expenditure at cut-of point 10%, 20%, 30% and 40%

Explanatory variables	CATA10	CATA20	CATA30	CATA40
Household's health insurance coverage	-0.038***	-0.025**	-0.008	-0.008*
The head of household is a man	-0.033***	-0.013	-0.013**	-0.006
Household size	-0.017***	-0.017***	-0.014***	-0.012***
Number of elderly (over 65)	0.117***	0.065***	0.039***	0.024***
Number of children under 6 years old	0.037***	0.022***	0.011**	0.010***
Urban	-0.054***	-0.036***	-0.03***	-0.019***
1st quintile (Reference group)				
2nd quintile	0.043***	0.030***	0.026***	0.023***
3rd quintile	0.037**	0.027**	0.038***	0.028***
4th quintile	0.024	0.044***	0.048***	0.035***
5th quintile	-0.029	0.013	0.034***	0.035***
The head of household is low education	0.031**	0.010	0.006	0.002
The head of household in informal sector	-0.024*	-0.013	-0.006	-0.006
Asset index score	-0.042***	-0.035***	-0.028***	-0.018***

***: Significant at 1% significance level

** : Significant at 5% significance level

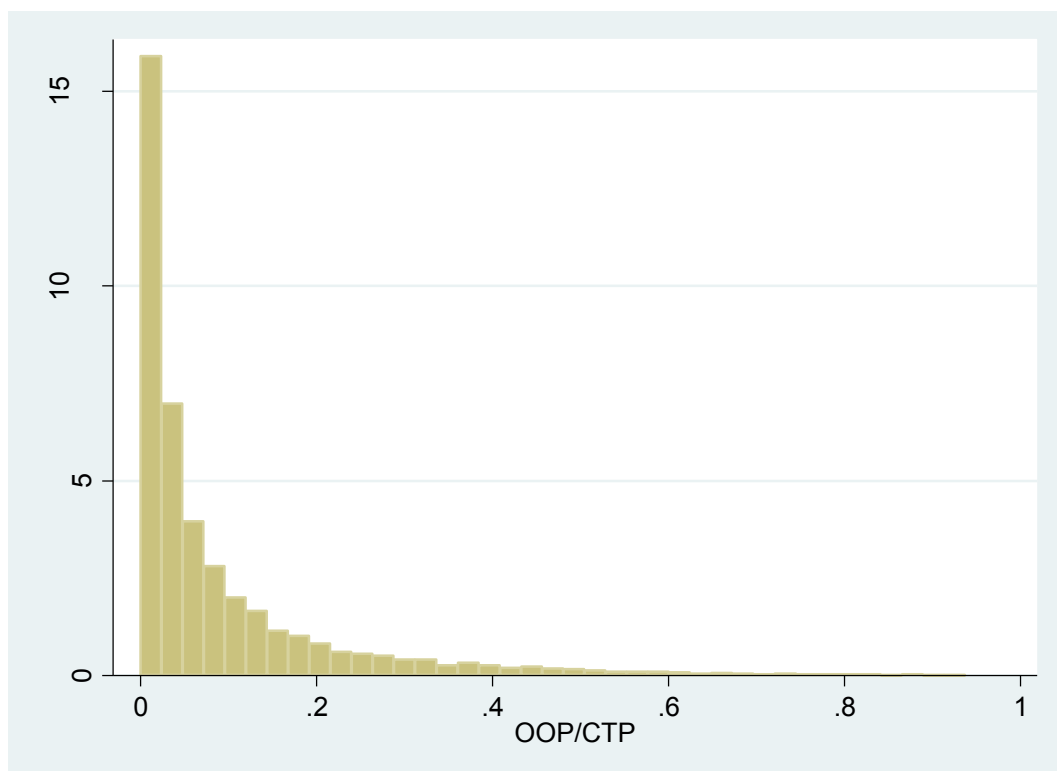
* : Significant at 10% significance level

It's obvious to say that all the sign of the marginal effects for health insurance coverage rate within a household in 4 models higher up are negative (with dependent variables CATA 10, CATA20, CATA30, CATA40). It indicates that household with higher health insurance coverage rate were less likely facing with catastrophic payment.

However, in the table above, health insurance was found to have different impacts on different levels of out-of-pocket payment in the proportion of household capacity to pay.

6.2. The ratio of household's Out-of-pocket health expenditure to its capacity to pay (OOP/CTP) and its determinants

Figure 6.1 Histogram of OOP/CTP



There were 495 households with zero out-of-pocket health care spending in our dataset (accounted for 5.3%)

In the Figure 6.1 and Figure 6.2, it's obvious to say that variable OOP/CTP does not have a normal distribution, but right-skewed distribution with outliers.

Similar to the descriptive analysis in the first part of Chapter V (Table 5-1), OOP/CTP has a wide range value from 0.0 to 0.94 and with the mean is equal to 0.09, that cannot represent the whole population (far different from the outliers – household with very high OOP payment compared to its capacity to pay). It raises a question whether Linear regression with conditional mean of OOP/CTP (dependent variable) would provide estimations appropriate and reasonable enough to represent population, especially the household with high proportion of OOP?

Figure 6.2 *Box plot of OOP/CTP*

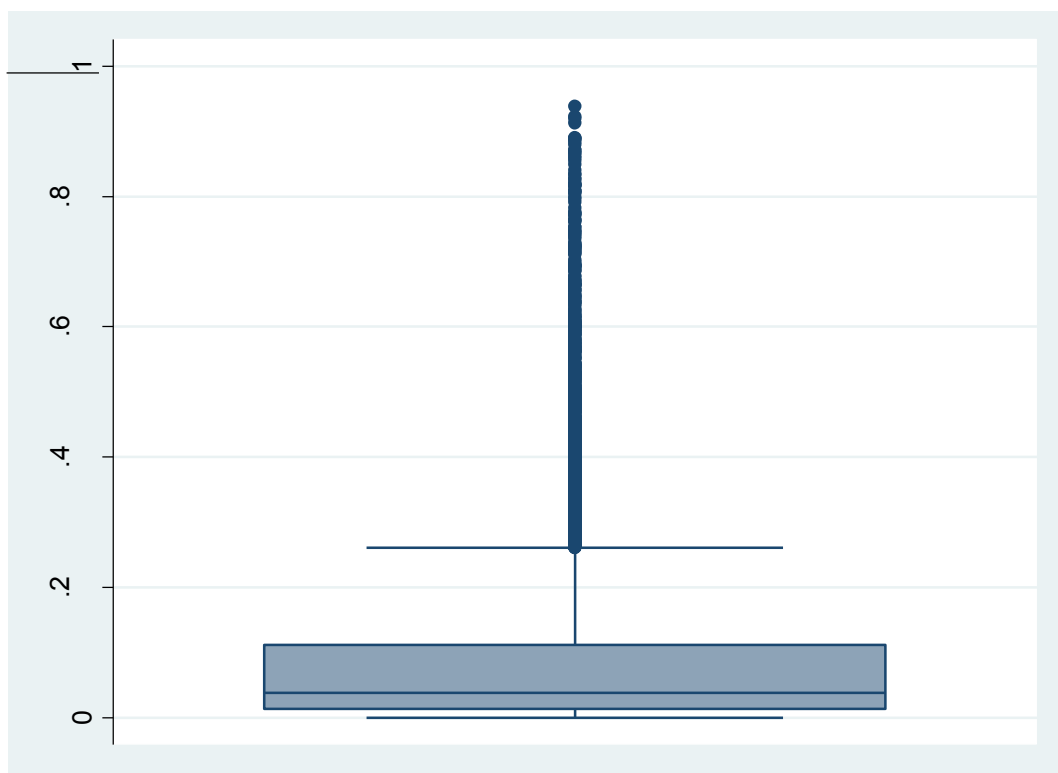
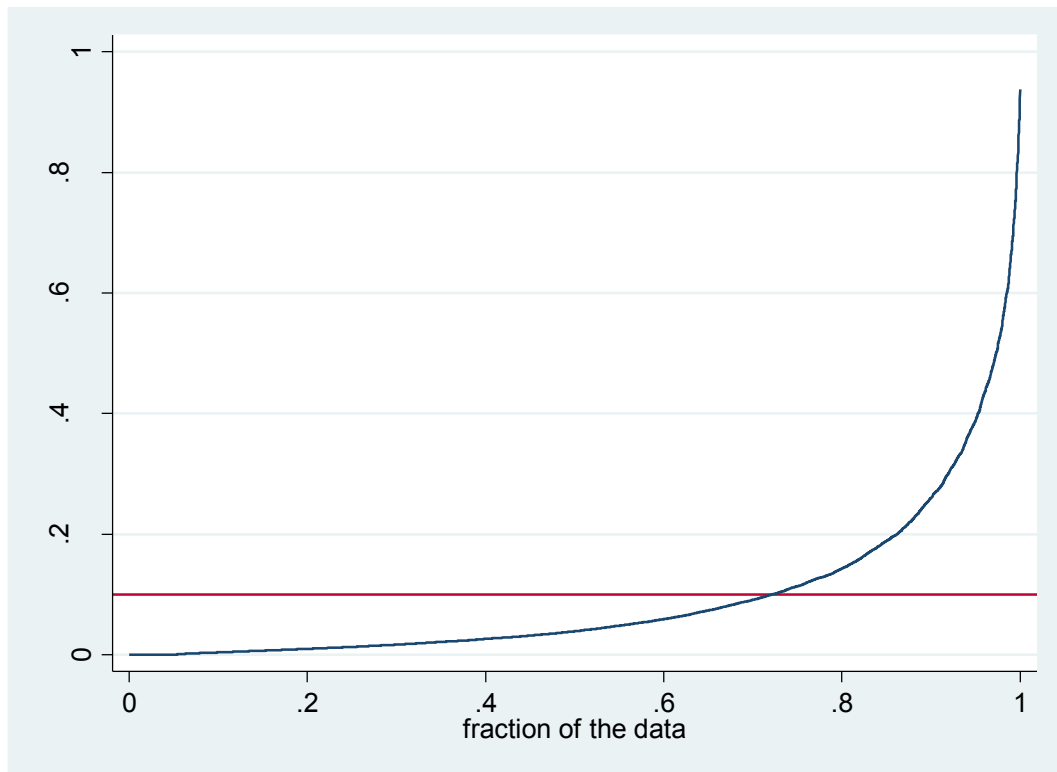


Figure 6.3 Plot OOP/CTP by Quantiles



The Figure 6.3 above shows the plot graph of OOP/CTP by quantiles. The vertical axis indicates the value of OOP/CTP while the horizontal axis represents the percentile of the data. The left part of the graph reflect the group of households with low OOP/CTP while the right represents the group with very high OOP compared to its capacity to pay. The households which tend to catastrophic payment (OOP/CTP >10%) are belong to the 75thQuantile upward onward face.

Table 6-8 OOP/CTP classified by socioeconomic characteristics of households

	Mean	SD	Min	Max
Quintile				
<i>1st</i>	0.106	0.137	0	0.819
<i>2nd</i>	0.107	0.139	0	0.833
<i>3rd</i>	0.097	0.133	0	0.922
<i>4th</i>	0.088	0.134	0	0.889
<i>5th</i>	0.065	0.128	0	0.938
Location				
<i>Urban</i>	0.073	0.115	0	0.890
<i>Rural</i>	0.100	0.141	0	0.938
Health insurance				
<i>No enrolled</i>	0.110	0.154	0	0.912
<i>At least one enrolled</i>	0.090	0.131	0	0.938

Households who belonged to the low quintile group tended to pay OOP as a share of household's capacity to pay more than those belonged to the higher quintile groups. Households located in non-municipal areas pay higher rate of OOP as a proportion of household's capacity to pay than those in municipal areas.

Table 6-9 Linear Regression estimated for OOP/CTP

Explanatory variables	Coefficient	p-value	95% Confidence Interval	
Constant	0.118***	0.000	0.1048	0.1312
Household's health insurance coverage	-0.0105***	0.008	-0.0182	-0.0027
The head of household is a man	-0.008**	0.014	-0.0144	-0.0017
Household size	-0.0094***	0.000	-0.0113	-0.0074
Number of elderly (over 65)	0.0416***	0.000	0.0367	0.0464
Number of children under 6 years old	0.0138***	0.000	0.0089	0.0187
Urban	-0.0181***	0.000	-0.0248	-0.0114
1st quintile (Reference group)				
2nd quintile	0.0181***	0.000	0.0093	0.0269
3rd quintile	0.0188***	0.000	0.0096	0.028
4th quintile	0.0207***	0.000	0.0109	0.0306
5th quintile	0.0138**	0.016	0.0026	0.0251
The head of household is low education	0.0052	0.120	-0.0013	0.0117
The head of household in informal sector	-0.0071**	0.034	-0.0136	-0.0005
Asset index score	-0.0178***	0.000	-0.0214	-0.0142
Number of observations	9212			
F-stat	50.12			
Prob. >F	0.000			
Adj. R-squared	0.0648			
Root MSE	0.1298			

***: Significant at 1% significance level

** : Significant at 5% significance level

* : Significant at 10% significance level

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity:

Ho: Constant variance

Variables: hi manhead hhsized age65_n age6_n urban quintile loweduhead infohead z_pcwi

chi2 (10) = 228.81

Prob > chi2 = 0.0000

It's shown in the OLS model above (Table 6-9) the coefficients of independent variables estimated for dependent variable OOP/CTP. The independent variables which are found to significantly determine the OOP/CTP: Health insurance coverage rate within a household, the head of the household is a man, household size, the number of elderly, the number of children under 6, living in urban area, 2nd, 3rd, 4th and the last quintile group, the head of household working in informal sector and asset index score ($p < 0.05$).

With the results of the Regression, if health insurance coverage rate within household increase by 1%, the OOP/CTP can be reduced by 1.05%. However, the estimation of this OLS model can be biased due to the Heteroskedasticity. The result of Breusch-Pagan test for heteroskedasticity ($p < 0.05$) indicates that.

However, from Figure 6.1 to 6.3 above, OLS would not be the good model for our dataset, so that we switch to Quantile regression for better estimation.⁹

Coefficient estimates for 25th, 50th, 75th and 81st quantile regression and the OLS coefficient estimates for the OOP/CTP are presented in the following table:

⁹ We also consider the endogeneity problem with variable Health insurance coverage rate of household, but found insignificant for test of Endogeneity (Dubin Wu-Hausman test). (See Appendix C)

Table 6-10 Results of Quantile Regression compare with OLS Regression

Explanatory variables	Coefficients of OLS	Coefficients of Quantile regressions at different quantiles ¹⁰			
		25th	50th	75th	81th
Constant	0.1180** *	0.0206 *** (0.01790; 0.0233)	0.0533 *** (0.0475; 0.0591)	0.1355 *** (0.1164; 0.1546)	0.1819*** (0.1518; 0.2121)
Household's health insurance coverage	-0.0105 ***	-0.0038 ***§ (-0.0054; -0.0022)	-0.0054 ***§ (-0.0088; -0.0021)	-0.0129 ** (-0.0240; -0.0018)	-0.0204** (-0.0379; -0.0029)
The head of household is a man	-0.0080 **	-0.0013* (-0.0026; 0.0001)	-0.0039 ***§ (-0.0068; -0.0011)	-0.0095 ** (-0.0186; -0.0004)	-0.0090 (-0.0232; 0.0051)
Household size	-0.0094***	-0.0007 ***§ (-0.0011; -0.0003)	-0.0024 ***§ (-0.0032; -0.0015)	-0.0077 *** (-0.0106; -0.0049)	-0.0121 *** (-0.0167; -0.0076)
Number of elderly (over 65)	0.0416***	0.0081 ***§ (0.0070; 0.0091)	0.0278 ***§ (0.0257; 0.0299)	0.0632 ***§ (0.0562; 0.0701)	0.0753 *** (0.0645; 0.0861)
Number of children under 6 years old	0.0138***	0.0054 ***§ (0.0044; 0.0063)	0.0105 ***§ (0.0084; 0.0126)	0.0166 *** (0.0098; 0.0235)	0.0210 *** (0.0104; 0.0316)
Urban	-0.0181***	-0.0006 (-0.0021; 0.0008)	-0.0034 **§ (-0.0063; -0.0004)	-0.0196 *** (-0.0291; -0.0101)	-0.0294*** (-0.0441; -0.0148)
1st quintile (Reference group)					
2nd quintile	0.0181 ***	0.0016*	0.0023	0.0155 **	0.0281 ***

¹⁰ Coefficients with 95% Confidence Interval

Explanatory variables	Coefficients of OLS	Coefficients of Quantile regressions at different quantiles ¹⁰			
		25th	50th	75th	81th
3rd quintile	0.0188 ***	(-0.0001; 0.0039) -0.0004	(-0.0014; 0.0060) -0.0026	(0.0034; 0.0276) 0.0142 **	(0.0092; 0.0469) 0.0223 **
4th quintile	0.0207 ***	(-0.0022; 0.0015) -0.0052 ***§	(-0.0066; 0.0013) -0.0094 ***§	(0.0015; 0.0270) 0.0071	(0.0024; 0.0421) 0.0230 **
5th quintile	0.0138 **	(-0.0072; -0.0031) -0.0095 ***§	(-0.0137; -0.0051) -0.0186 ***§	(-0.0068; 0.0209) -0.009	(0.0012; 0.0449) 0.0080
The head of household is low education	0.0052	(-0.0119; -0.0070) 0.0007	(-0.0236; -0.0136) 0.0031 **	(-0.0246; 0.0066) 0.0055	(-0.0164; 0.0320) 0.0067
The head of household in informal sector	-0.0071 **	(-0.0006; 0.0021) -0.0011	(0.0002; 0.0060) -0.0030 **§	(-0.0039; 0.0149) -0.0053	(-0.0081; 0.0216) -0.0065
Asset index score	-0.0178 ***	(-0.0025; 0.0003) -0.0002	(-0.0059; -0.0001) -0.0029 ***§	(-0.0148; 0.0042) -0.0149 ***	(-0.0214; 0.0083) -0.0237 ***
		(-0.0010; 0.0006)	(-0.0045; -0.0013)	(-0.0200; -0.010)	(-0.0315; -0.0158)

(Continuous with previous table)

***, **, *: *Quantile regression/OLS coefficients are significantly different from zero at the 1%, 5% and 10% significance level, respectively.*

§: *Quantile regression coefficients are significantly different from OLS coefficients at the 5% significance level, when the OLS coefficient is outside of the quantile regression coefficient 95% confidence interval.*

We can see in the Table 6-10 above, all the coefficients of independent variable - health insurance coverage rate within a household - are significantly different from 0 at the 25th, 50th, 75th and 81st quantiles. The sign of them indicate that health insurance can reduce the magnitude of OOP/CTP, but with different effects at different points across the distribution of OOP/CTP: 25th, 50th, 75th and 81st quantiles. Notably, at the high proportion of OOP in the capacity to pay of the household, health insurance also had the higher marginal effects on reducing OOP/CTP (1.29% and 2.04%).

The coefficients of number of elderly and children in the household are also significantly different from 0 and point out increasing the OOP/CTP at 25th, 50th, 75th and 81st quantiles. It also indicate that the effect of the number of elderly and children have larger impact on higher quantiles of OOP/CTP. Household size was found to be reducing OOP/CTP.

Figure 6.4 *Quantile plot for OOP/CTP by health insurance's coefficient estimated*

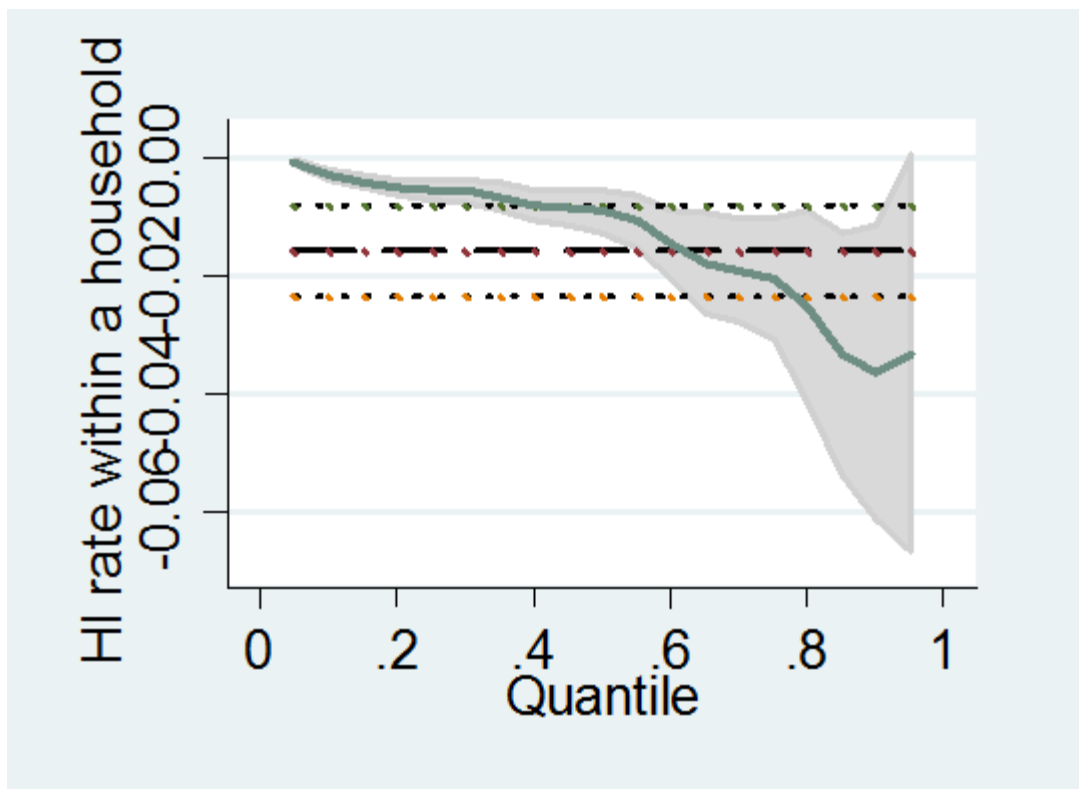
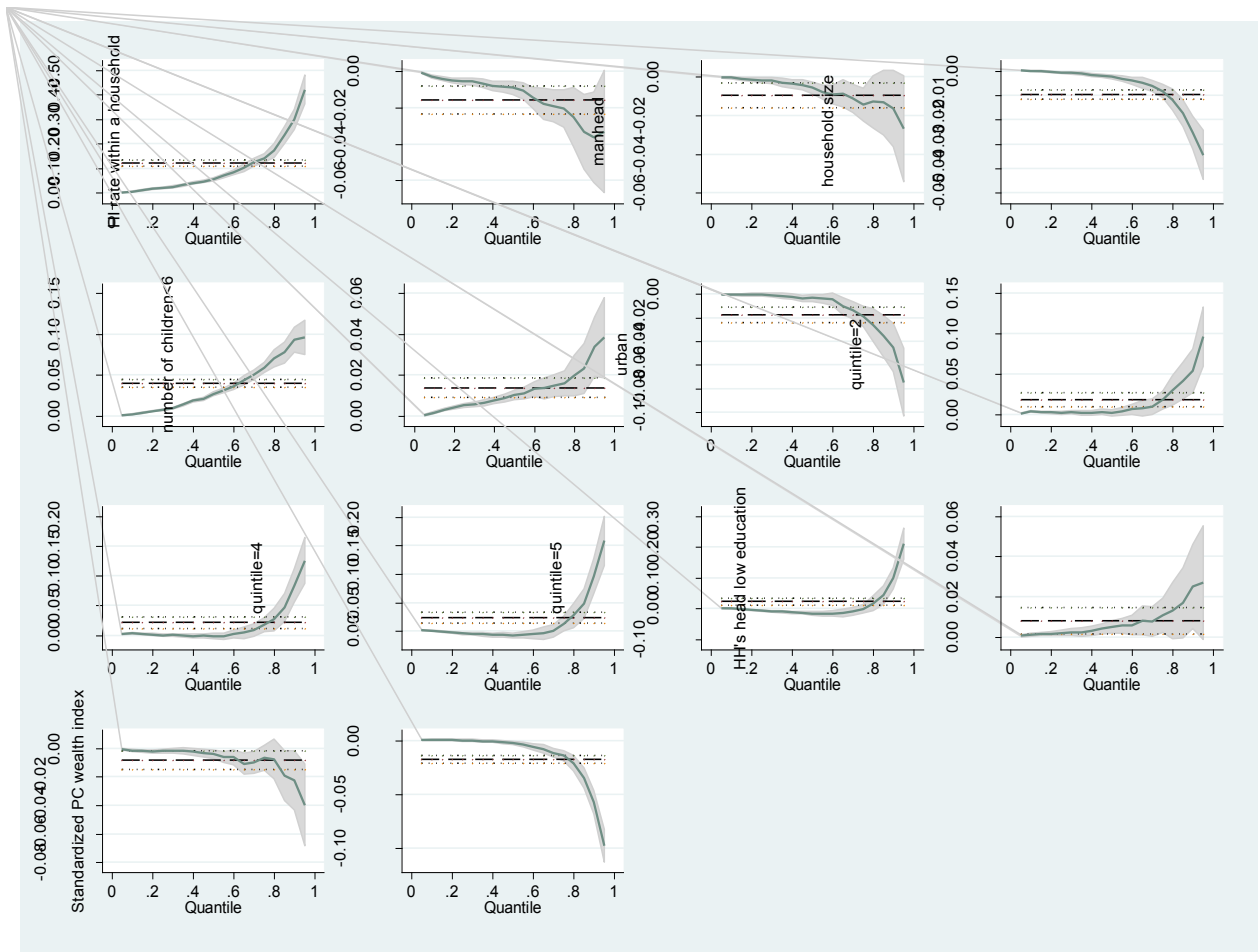


Figure 6.5 Quantile Plot for OOP/CTP



The figure 6.4 and Figure 6.5 show the quantile coefficients and its 95% Confident Interval (the curve with light blue area) and together with the OLS coefficients (dash line). We can see the coefficients estimated by quantile regression are far different from OLS at some variables, for example, household size, number of elderly, number of children under 6, residence, expenditure quintile group, wealth index score and health insurance variable.

6.3. Discussion

6.3.1. *Classification of household's health insurance enrollment*

The first part of this study provides a picture of health insurance coverage at household level while previous studies or reports just gave the percentage of insured people among the population (individual level) or the typical type of health insurance like Free health card for the poor, Free health insurance for children under six years old, etc. The mean coverage rate within a household is 59.3%, which is consistent with the health insurance coverage rate in 2010 (60% of population) (Tien et al., 2011). Among quintile groups, the first quintile group had the highest percentage of household with full health insurance coverage, that is reasonable because the poorest people may get the free health care cards for everyone in their families. It can reflect the policy of the Government somehow targeting the vulnerable. When looking at the group of non-insurance households, we see that the 2nd and the 3rd quintile groups were less likely involving in the health insurance scheme than the 4th and the 5th groups. It suggests that the Government policy should focus more on the near poor and average households to attract them, in order to roll out the universal coverage. Also for the households who located in the rural areas, maybe the lower premium contribution rate should be applied for them according to their capacity to pay and living standards.

The problem of not use health insurance when seeking care even with a small number raised a question about quality and ability of public health facilities: Can public health sector be ready and adaptable with UHC? Maybe the bad experiences about quality of care in the past, or the waiting time were the leading causes. Besides, the people who were pass-by till received the reimbursement but with lower rate also influenced the practice of patients. On another hand, the high expectation of people about health care could lead to the fact that people choose to spend their own money instead for high quality of care and imported drugs which are not covered by health insurance.

We also find that somehow outpatient utilization rate of the worse-off was lower than the better-off, but the rate of inpatient care was higher. It means that the poor seemed to delay their treatment and health examination, up to when they

couldn't bear or ignore the illness and severe symptoms which need to be hospitalized. Even the poor get the free health insurance, but the co-insurance 5% and other non-medical expenses such as accommodation, caregiver cost, travelling... were still their big burden.

For household-based insurance approach, it's worth to mention how to improve the information management system for national health insurance in the near future. As a matter of fact that Vietnam still doesn't have electronic Identification Card (ID) and almost the work is managed by paper document, those may become challenges for VSS to administer the new system.

6.3.2. The rate of incurring catastrophic health payment and its determinants

We found the percentage of household incurring catastrophic out-of-pocket spending for health at threshold 10%, 20%, 30%, 40% and 50% (Household's OOP for health equal to or exceed 10%, 20%, 30%, 40% and 50% capacity to pay of household) were 27.45%, 13.61%, 7.93%, 4.7% and 2.62%. These results were a little higher than Van Minh et al. (2012). Defined by WHO, the cut-off point catastrophic at 40% of capacity to pay was widely used in other studies. Compared with previous period, Xu et al. found the catastrophic rate of Vietnam was 10.45% in VLSS 1997-1998, highest among 59 countries in his study (Xu et al., 2003). In the study of Van Minh et al. (2012), they suggested that the catastrophic in Vietnam the periods of 2002-2010 had a trend of remaining, only declined in 2010, maybe due to the impact of Law on health insurance. On par with other countries, the probability of catastrophic among households in Vietnam was lower than China with 13% in 2008 (Li et al., 2012) and Bangladesh (with a study in Rajshahi city, 2011) with 9% (Rahman, Gilmour, Saito, Sultana, & Shibuya, 2013); but much higher than Turkey with 0.6% (Yardim, Cilingiroglu, & Yardim, 2010) and Thailand with 0.77% (Somkotra & Lagrada, 2009).

With respect to the determinants of catastrophic health expenditure, we figured out that the health insurance coverage rate within a household associated with reducing chance of catastrophic incurring (significant at CATA10, CATA20 and marginal significant at CATA40). It means that universal health coverage in Vietnam

has gone in the right way: increasing the coverage rate may help reducing household's catastrophic health expenditure through risk pooling. Previous studies just found that health insurance have some initial effects, but only modestly (Donnell & et al, 2005; Lieberman & Wagstaff, 2008; Van Minh et al., 2012). Perhaps due to using specific types of health insurance, or "have at least one health insurance enrollment in household", they couldn't explore the comprehensive effect of health insurance in households (in terms of the health insurance coverage rate in a household). However, its financial protection still needs to be expanded in the future. Because, the ceiling reimbursement (maximum 40 million VND per one high technical service) and the limited capacity of the Health insurance budget with deficit funding condition sometimes also pointed out the bound of the risk pooling.

Other factors like the number of elderly and the children under six in household were found significantly associated with higher probability of catastrophic; while households living in the urban areas were less likely facing with catastrophic health spending than the rural households. These findings are similar with other studies (Donnell & et al, 2005; Li et al., 2012; Somkotra & Lagrada, 2009; Van Minh et al., 2012). However, only the children under 6 years old are the beneficiaries of the Government policy (Free health insurance), the elderly need to be taken into consideration for some subsidy policies in the next coming days. Also the households in rural should be focused more in policy-making process.

Household members in VHLSS were defined as "those who share accommodation and meals from 6 months or more over the past 12 months, and share a pool of incomes". In fact, a household was chosen into the survey mainly according to their residential registration at the local government. We also analyze the pattern of household size in the Table A-1 (Appendix C) and we find out that almost households were with less than 6 members (accounted for more than 80% of household population), indicating that majority of Vietnamese households are nuclear ones. Household with larger size and living in the urban areas were significantly less likely encountering catastrophic health spending in our study. This finding is on par with the studies in other countries (Li et al., 2012; Somkotra & Lagrada, 2009). This implies that more members in the households, higher risk pooling within a household: among

the young and the old, the weak and the strong, the dependent and independent, children and adults. Larger household size could help to draw more resources directly in time of need. While living in the municipal areas had more income and better condition of life than non-municipal areas.

Considering asset index score, which indicated the non-cash wealth stock, we found that higher score households were less likely bearing health financial shock. Asset index score was derived through principal component analysis, whose purpose is to reduce the dimension of the durable asset variables in the dataset and explore the relation among them (Phusit, 2006; Vyas & Kumaranayake, 2006). It can be an indicator for the wealth-being and the coping strategy of household to deal with financial hardship due to non-predicted health care cost. We didn't use the factors like ownership of lands/houses and/or the total residential area because we figured that more than 90% of households in VHLSS 2010 had only one house (See Appendix C). Once they couldn't handle with the health care cost, they would seek for financial support from relatives, friends; or sell other durable assets in the households, such as motorbikes, televisions, wards; and/or reduce the essential consumption in the family. Selling house is the dead-end road.

The 2nd, 3rd, 4th and 5th expenditure quintile were likely more facing with catastrophic payment than the first quintile group. It may be explained because the poor household received the free healthcare card, they can be protected more than others.

6.3.3. OOP/CTP and its determinants

Regarding financial protection of health insurance, it's better to consider the impacts from household perspective, not individual level. Because when any member in the household has any health problems, he or she will not be able to deal with illness by themselves, but with the resource and support from every member in households. So that the capacity to pay of household needs to be taken into consideration rather than the real income of each individual; or household's impacts rather than individual's effects.

Other indicators need to be investigated under financial protection of health insurance are out-of-pocket healthcare spending and OOP in the share of household's

capacity to pay. OOP is easier to understand for policy maker and other majority of people. It's expected to lessen the OOP of household in the total national expenditure for health. However, a small number of OOP can be the hardship to the poor households while a large OOP can be accepted in the rich households without any consequence of it. So that OOP only is not a good indicator for assessing financial protection. The better use is OOP in the proportion of household capacity to pay (OOP/CTP) which fraction of it equal or greater than 0.4 means catastrophic spending (WHO guideline).

We applied the OLS and quantile regression to model the OOP/CTP with associated factors. OOP/CTP had a right skewed distribution with extreme values (maximum value = 0.94). The mean conditional dependent variable ($\overline{OOP/CTP}=0.09$) can not represent for those households who had catastrophic health expenditure so that quantile regression was employed to find out the effect of explanatory variables on households with high OOP level, especially health insurance status of households. The results show that health insurance coverage within a household can help to reduce OOP in the proportion of household's capacity to pay at 25th, 50th, 75th and 81st quantiles but stronger effect was found at 75th and 81st quantiles (marginal effect = -0.0129 and -0.204). It means that if increasing 1 % of health insurance coverage within a household, it can reduce OOP/CTP by 0.0129 and 0.0204 for those household at high level of OOP spending for health (at 75th and 81st quantiles).

The reducing of OOP in the household budget could help households draw more resources not only for other essential activities like education, human development but also for investment and better quality of life.

The number of elderly and children in the household had the same trend at increasing the OOP health spending in the budget of the household because they are the groups with high risk of health problem and illness.

6.3.4. Limitation of the study

Firstly, the secondary data we used was from a cross-sectional survey which does not allow us to explore more the long-term consequence of catastrophic payment and 12 months recall period can obtain unexpected measurement errors (Lu, Chin, Li, & Murray, 2009). Secondly, due to lack information about the health condition and

diseases of each members in households, we cannot estimate the un-met need care and non-access among poor households and also health status of households' member (For example, the number of people who had chronic disease in households, or those who were hospitalized at the time the head of household answered the questions). However, we still use indicators for health risk in our model: number of elderly and number of children under six years old. Next, we could not use experimental study design or panel data to handle the endogeneity between health insurance coverage within a household and the out-of-pocket in the proportion of household's capacity to pay. Lastly, we couldn't investigate the coping strategies of households: how they deal with catastrophic spending (for example: using savings) and be pushed into impoverishment or not.

CHAPTER VII RECOMMENDATION AND CONCLUSION

7.1. Conclusion

The Law on Health Insurance to achieve the Universal health coverage in Vietnam was a benefit policy and toward equity and well-being of people. However, after 2 years implemented, the population coverage is only 60% and households' OOP for health are still quite high. The current individual-based insurance system seems not to be efficient and effective in terms of executing, controlling and management. Household-based insurance may help to address those problems. But evidences of health insurance impacts were modest through some studies in Vietnam. The problem is that when considering the impacts of health insurance, researchers focused only on specific types of health insurance scheme or health insurance enrollment of individual, but not the health insurance status of the household. That's the reason why we conducted this study to investigate the effects of household's health insurance enrollment on financial protection (for example: OOP/CTP, catastrophic health care spending)

This study used the data from the Vietnam Household Living standard survey (VHLSS) in 2010, with information about income and expenditure of 9400 households which are representative for the whole Vietnam. We employed the logit regression to test for the impacts of the household's health insurance status and other socioeconomic variables on the catastrophic health expenditure. OLS and quantile regression are used to estimate the impact on the ratio OOP/CTP.

Firstly, one of the main findings of this research is the mean coverage rate of health insurance at household level was 59.3%. The first quintile group had the highest health insurance coverage rate while the third quintile had the lowest. 34.5% households had full health coverage, 50.7% had partial coverage and only 14.8% households were non-coverage. The poorest group also had the highest percentage of full health insurance coverage at household level, while the second and the third quintile households had less percentage of full coverage households. Among households with no health insurance, 78% belonged to 3 first quintile groups (highest rate was 3rd Quintile: 23.10%).

The incidence of catastrophic health expenditure (as 40% of household's capacity to pay) was 4.7%; in absolute number, 1,050,166 households. Regarding the determinants of catastrophic health spending, we figured out that households with higher health insurance coverage rate had lower probability of catastrophic incurring significantly at cut-off point 10%, and 20%, marginally significant at 40%. The number of household's members was associated with lower rate of catastrophic health expenditure. Households with more elderly and children were more likely facing with catastrophic spending. Households living in urban areas are less likely facing catastrophic health payment than ones living in rural area. Households belonged to 2nd, 3rd, 4th and 5th expenditure quintiles were more likely to spend catastrophic payment for health than the first quintile households. Households with higher score of wealth index were less likely to face catastrophic health expenditure.

The results of quantile regression for OOP/CTP indicated the larger impacts of health insurance on reducing OOP/CTP, especially at 75th and 81st quantiles. Health insurance coverage rate within a household increases 1%, it would help reduce OOP/CTP by 0.0109 and 0.0204, respectively.

7.2. Recommendation

Different from the results of other studies, our study points out the significant impact of health insurance coverage at household level. It was a critical evidence for policy-makers to implement the new health insurance management approach: household-based insurance and also help increase awareness and compliance of the population with health insurance.

According to the Figure 2.3 (Road map towards Universal Coverage), the remaining of voluntary health insurance up to 2014 are agricultural households, informal sectors, dependents of workers and employees and others. So that our findings are quite important to point out the pilot group for implementing new policy about household-based insurance: the farmer households in rural area.

From our results, the second quintile group seemed to have a low rate of household's health insurance coverage. Also the second and the third quintile groups had the low percentage of full health coverage. They were also more likely facing with catastrophic health care payment than the poorest who tended to be the targeted

beneficiaries of Free health card for the Poor. So that those groups of household need to be subsidized more or even 100% premium free, especially the rural poverty line.

Our results recommend that the groups of people or households who should be subsidized and focused more by the Government in the future are the elderly and especially those with the old female head of household.

The quality of care problem, especially difference between the insured and uninsured people, needs to be investigated and solving by the MOH and researchers.

Our study also suggest some good research questions for researchers and all stakeholders to further investigate, such as: What is appropriate premium rate for household-based insurance? How to apply high technical information management system for the new health insurance design (such as: electronic Identification Cards, electronic medical records)?

We also recommend the GSO to include more information about health status and chronic diseases and coping strategies ¹¹of household into the VHLSS next round.

¹¹ Coping strategies = How do households deal with unpredicted health care cost? By savings; or borrowing money from friends and relatives; reducing household's consumption and or selling assets and houses/lands.

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APPENDICES

APPENDIX A

KEY QUESTIONS IN VHLSS 2010

In the VLSSs, all members of the household were listed with their clear insurance status by asking the heads of the household the questions: “Please tell full names of each household members in your household”, then with the list of households’ members, continuous with “Over the past 12 months, has <Name> had a health insurance card or a free healthcare booklet/card/certificate?” and “Had <Name> used the health insurance cards or free health cards when seeking care and treatment?”. To investigate the health expenditure of the household, the question was “Has anyone in your household visited health facilities or had home visits by physicians for check-ups and treatment over the last 12 months?” If the answer was “yes” the follow-up questions were: 1) number of outpatient visits and corresponding household expenditure over the past 12 months; 2) number of inpatient visits and corresponding household expenditure over the past 12 months and 3) other health services and spending.

APPENDIX B

DEFINITIONS AND CONSTRUCTIONS OF VARIABLES FOR CATASTROPHIC

By Ke Xu (Discussion paper, WHO 2005)

“Out-of-pocket health payments: Out-of-pocket health payments bear on the direct spending by households every time when they acquire health services, include doctor’s fees, spending for tests, medicines and hospital bills. OOP also are net of insurance reimbursement.

Household’s consumption expenditure: Household consumption expenditure embraces in term of either monetary or in-kind on all goods and services, and the money value of the consumption of home-based products.

Household subsistence spending: The household subsistence spending is the minimum prerequisite to sustain fundamental life in a society. A subsistence spending can be explored through a poverty line. Poverty line is defined from households’ spending on food as a share of total household expenditure, at the 50th of the country. Here to avoid measurement bias, it’s necessary to use the figure within the 45th and 55th percentile of the total sample. Considering the economy scale of household consumption, the household equivalence scale is used rather than actual household size. The value of the parameter β has been estimated from prior studies derived from 59 countries’ household survey data, and it equals 0.56:

$$eqsize = hhsiz e^{\beta}$$

The equivalized food for household is calculated by the equation:

$$eqfood = \frac{food}{eqsize}$$

Then Poverty line is defined as below:

$$PL = \frac{\sum w * eqfood}{\sum w}$$

Whereas: w stand for the weighted average of food consumption of households within the range of 45th - 55th percentile.

So that, subsistence expenditure for each household is equal:

$$SE = PL * eqzise$$

Household's capacity to pay: A household's capacity to pay is derived as effective income remaining after fundamental subsistence needs have been met. Effective income is taken to be the total consumption expenditure of the household.

$$CTP = EXP - SE$$

However, some households may report food expenditure that is lower than subsistence spending ($SE > \text{food}$). Such a situation could also be due to the fact that the reported food expenditure in the survey does not consider food subsidies, coupons, self-production and other non-cash means of food consumption. In this particular case the non-food expenditure is used as non-subsistence spending.

Catastrophic health expenditure: Catastrophic health expenditure crops up when a household's total out-of-pocket payments for health equal or transcend 40% of household's capacity to pay (We also used the threshold point of 10%, 20% and 30%).

Living standard: The living standard of the households used in our study is based on their consumption expenditure. Households will be classified into living standard quintiles.”

APPENDIX C
SOME DETAILED RESULTS

1. Description of the dataset

Table A-1 Distribution of Household size in VHLSS 2010

Household size (person)	Frequency	Percentage	Cumulative
<i>1</i>	458	4.87	4.87
<i>2</i>	1,178	12.53	17.4
<i>3</i>	1,858	19.77	37.17
<i>4</i>	3,080	32.77	69.94
<i>5</i>	1,540	16.38	86.32
<i>6</i>	770	8.19	94.51
<i>7</i>	300	3.19	97.7
<i>8</i>	132	1.4	99.11
<i>9</i>	48	0.51	99.62
<i>10</i>	19	0.2	99.82
<i>11</i>	9	0.1	99.91
<i>12</i>	5	0.05	99.97
<i>13</i>	1	0.01	99.98
<i>15</i>	2	0.02	100
Total	9,400	100	

It's shown in table above the distribution of household size in VHLSS 2010. Majority of households are the modern household or nuclear households with parents and children (3-5 members in a household) as nearly 70% of the whole sample.

Table A-2 Households' ownership of lands and houses

Number of houses	Other lands/houses			Total
	Yes	No	Missing	
0	0	0	9	9
1	722	8,474	0	9,196
2	71	119	0	190
3	3	1	0	4
11	0	1	0	1
Total	796	8,595	9	9,400

In the table above, there were 8474 households (90.1%) having only one house, but without owning any land.

Table A-3 Top-ten assets with the highest factor score

Assets	Factor score
Electric cooker	0.18477
Refrigerator	0.11656
Gas cooker	0.10938
Washing machine	0.10914
(Bath) Water heater	0.09967
Juice extractor	0.09205
Computer	0.09165
Air conditioner	0.0876
Desk	0.07818
Mobile Telephone	0.07708

Table A-4 Pearson correlation among Asset index, Expenditure and Income of households

	Asset index	Expenditure	Income
Asset index	1		
Expenditure	0.4889	1	
Income	0.3251	0.5218	1

The Pearson correlation coefficient of asset index score with expenditure was 0.49, while with income was 0.33; on par with other studies (Phusit, 2006).

Table A-5 Asset index score among expenditure quintile groups

Expenditure Quintile	Asset index score	Mean	SD
<i>1st quintile</i>		-0.868	0.679
<i>2nd quintile</i>		-0.313	0.681
<i>3rd quintile</i>		0.054	0.718
<i>4th quintile</i>		0.457	0.782
<i>5th quintile</i>		1.077	0.930

Table A-6 Description of sample in the econometric regressions (with 9212 households)

Variables	Mean	SD.	Min	Max
Household size (persons)	3.88	1.54	1	15
Number of elderly (>65) in household	0.36	0.61	0	4
Number of children under 6 in household	0.28	0.57	0	3
Wealth index score	0.09	1.01	-2.45	2.92
OOP for outpatient (per month)*	93.71	289.03	0	16041.67
OOP for inpatient (per month)*	92.61	454.36	0	20500.00
OOP for drug (per month)*	44.67	120.63	0	3666.67
OOP for medical equipment (per month)*	3.37	17.40	0	833.33
Total OOP per month*	234.35	592.69	0	21666.67
Household expenditure per month*	5051.26	5159.93	178.33	110477.50
Equivalent household size	2.09	0.48	1	4.56
Equivalentized food expenditure*	1127.25	735.05	66.75	10172.28
Poverty line*	1154.88	0.00	1154.88	1154.88
Subsistence spending*	2418.64	557.39	1154.88	5261.98
Capacity to pay*	3169.82	4845.31	54.83	108340.90
OOP/CTP	0.09	0.13	0	0.94

(With weighted indicator)

Table A-7 Test for Multicollinearity

Variable	VIF¹²	SQRT VIF	Tolerance	R-Squared
hi	1.09	1.05	0.9143	0.0857
manhead	1.1	1.05	0.9109	0.0891
hhsz	1.28	1.13	0.7841	0.2159
age65_n	1.07	1.04	0.9304	0.0696
age6_n	1.24	1.11	0.8064	0.1936
urban	1.29	1.14	0.7723	0.2277
quintile	1.88	1.37	0.5324	0.4676
loweduhead	1.18	1.09	0.846	0.154
infohead	1.31	1.14	0.7647	0.2353
z_pcwi	1.86	1.36	0.5371	0.4629
Mean VIF	1.33			

¹² VIF: Variance inflation factor. As a rule of thumb, a variable of which VIF is greater than 10 may need to be deeply examined. Tolerance is 1/VIF and suggests multicollinearity problem if it is less than 0.1.

Here the result of multicollinearity test is fine, no multicollinearity detected (VIF<10 and tolerance >0.1).

2. Health insurance coverage in household

The list of 17 provinces with average health insurance coverage rate within a household lower than 50% are: Hai Duong, Hung Yen, Nam Dinh, Phu Yen, Binh Phuoc, Tay Ninh, Tien Giang, Ben Tre, Vinh Long, Dong Thap, An Giang, Kien Giang, Can Tho, Hau Giang, Soc Trang, Bac Lieu, Ca Mau.

In the Table A-8 below, the rate of mandatory health insurance coverage within a household was 38.5%. Among the quintile groups, the poorest also has the highest rate and the third group had the lowest rate, similar with the results in Chapter V. There was no different between the urban households and the rural households.

Table A-8 Mandatory health insurance coverage rate within a household

	Mean	SD
Total	0.385	0.391
Expenditure Quintile		
<i>1st</i>	0.577	0.443
<i>2nd</i>	0.353	0.392
<i>3rd</i>	0.299	0.352
<i>4th</i>	0.303	0.33
<i>5th</i>	0.395	0.361
Location		
<i>Urban</i>	0.383	0.36
<i>Rural</i>	0.386	0.404

Table A-9 Voluntary health insurance coverage rate within a household

	Mean	SD
Total	0.208	0.272
Expenditure Quintile		
<i>1st</i>	0.105	0.230
<i>2nd</i>	0.179	0.257
<i>3rd</i>	0.220	0.275
<i>4th</i>	0.265	0.284
<i>5th</i>	0.269	0.278
Location		
<i>Urban</i>	0.254	0.284
<i>Rural</i>	0.187	0.265

According to the Table A-9, the voluntary health insurance coverage rate within a household was 20.8% on average. The 5th quintile group had the highest rate while the first quintile group had the lowest rate. The urban households also enrolled more on the voluntary health insurance scheme than the rural ones (0.25 compare with 0.19).

Pair t Test:

Ho: himandatory = hivoluntary

Ha: himandatory # hivoluntary

$$t = 34.4268$$

$$\Pr (|T| > |t|) = 0.0000$$

Interpretation: Mean of mandatory health insurance coverage rate is different from mean of voluntary health insurance rate.

Table A-10 Classification of households without utilization, healthcare cost and health insurance

	Frequency (n)	Percentage (%)
Total	74	100%
Quintile		
<i>1st</i>	20	27.03%
<i>2nd</i>	14	18.92%
<i>3rd</i>	15	20.27%
<i>4th</i>	14	18.92%
<i>5th</i>	11	14.86%
Location		
<i>Rural</i>	55	74.32%
<i>Urban</i>	19	25.68%

In this table, we consider 74 households with zero OOP, no healthcare service and no health insurance.

3. Testing for endogeneity of Health insurance variable (with dependent variable OOP/CTP)

Health insurance coverage rate within a household may be an endogenous variable to OOP/CTP. We employed an instrument variable to test for endogeneity problem: dummy variable PROVINCELOW, whether households located in the 17 provinces that had low coverage of health insurance (<0.5) above or not. (PROVINCELOW=1 if yes)

The Pearson correlation between PROVINCELOW and health insurance coverage rate within a household: $r_1 = -0.2529$.

The Pearson correlation between PROVINCELOW and OOP/CTP of households: $r_2 = 0.0299$.

It meant that PROVINCELOW had linear relationship with household health insurance status.

Table A-11 Two-stage least-squares (2SLS) estimation for OOP/CTP

	OLS regression for dependent variable (OOP/CTP)	2SLS: first stage for HI	2SLS: second stage for OOP/CTP
hi	-0.0105**		-0.0261
manhead	-0.0080**	0.0020	-0.0080**
hhsz	-0.0094***	0.0020	-0.0093***
age65_n	0.0416***	0.0327***	0.0421***
age6_n	0.0138***	0.0517***	0.0146***
urban	-0.0181***	0.0010	-0.0179***
Quintile			
2nd quintile	0.0181***	-0.1142***	0.01610***
3rd quintile	0.0188***	-0.1331***	0.01649***
4th quintile	0.0207***	-0.1067***	0.01888***
5th quintile	0.0138**	-0.0569***	0.01284*
loweduhead	0.0052	-0.1188***	0.00323
infohead	-0.0071*	-0.1217***	-0.00907**
z_pcwi	-0.0178***	-0.0163***	-0.01799***
PROVINCELOW (Instrument V.)		-0.1578***	
C	0.1180***	0.8458***	0.13074***

Tests of endogeneity: Ho: variables are exogenous
 Durbin (score) chi2 (1) = 0.12825 (p = 0.7203)
 Wu-Hausman F (1, 9197) = 0.128043 (p = 0.7205)

The table and the Test for endogeneity above shows that health insurance coverage rate within a household was not a seriously endogenous problem for OOP/CTP estimation.

Table A-12 F-statistic for joint significance of instruments:

	R-square	Adjusted R-sq.	Partial R-sq.	Robust F statistic	Probability (p)
HI	0.1547	0.1535	0.0544	504.428	0

The F statistic for joint significance of instruments is a test to identify weak instruments. Here the F-statistic = 504.428 which is larger than the rule of thumb of 10. Therefore, the instrument variable PROVINCELOW is not weak.

Table A-13 Determinants of catastrophic at cut-off point 40% (CATA40)

	Coefficient	p	Marginal effect
himandatory	-0.2112	0.194	-0.0068
hivoluntary	-0.4399*	0.089	-0.0142
2nd Quintile	0.7249***	0.000	0.0290
3rd Quintile	0.8664***	0.000	0.0363
4th Quintile	1.1080***	0.000	0.0502
5th Quintile	1.1064***	0.000	0.0501
manhead	-0.1864	0.131	-0.0063
hhsz	-0.3512***	0.000	-0.0113
age65_n	0.7437***	0.000	0.0240
age6_n	0.2770**	0.015	0.0089
urban	-0.5766***	0.000	-0.0169
loweduhead	0.0824	0.555	0.0026
infohead	-0.1646	0.202	-0.0055
z_pcwi	-0.5361***	0.000	-0.0173
constant	-2.4880***	0.000	
Number of observation	9212		
Log Pseudo likelihood	-3740151.4		
Wald chi2(13)	292.81		
Prob. (Wald test)	0.0000		
Pseudo R-squared	0.0884		

In the Table A-13, the households who had higher rate of voluntary health insurance enrollment had lower chance of encountering catastrophic health payment (marginally significant). However, because a household could have both types of health insurance (mandatory and voluntary health insurance) so that we could not completely distinguish the effects of 2 health insurance types.

Table A-14 OLS estimation for OOP_CTP, with robust Standard Errors

Dependent V: OOP_CTP	Coefficient	p	95% Confident Interval	
hi	-0.0105**	0.023	-0.0195	-0.0014
manhead	-0.0080**	0.026	-0.0150	-0.0010
hhsz	-0.0094***	0.000	-0.0116	-0.0072
age65_n	0.0416***	0.000	0.0351	0.0481
age6_n	0.0138***	0.000	0.0091	0.0185
urban	-0.0181***	0.000	-0.0250	-0.0112
2nd Quintile	0.0181***	0.000	0.0086	0.0277
3rd Quintile	0.0188***	0.000	0.0088	0.0289
4th Quintile	0.0207***	0.000	0.0095	0.0320
5th Quintile	0.0138**	0.038	0.0007	0.0269
loweduhead	0.0052	0.155	-0.0020	0.0123
infohead	-0.0071*	0.060	-0.0144	0.0003
z_pcwi	-0.0178***	0.000	-0.0217	-0.0139
_cons	0.1180***	0.000	0.1030	0.1329
Number of observations	9212			
F-stat	38.25			
Prob. >F	0.0000			
Adj. R-squared	0.0662			
Root MSE	0.12978			

The coefficients are remaining the same while only the F-stat reduces, compared with the Table 6-9 in chapter VI.

Table A-15 OLS estimation for OOP_CTP, with robust Standard Errors

OOP_CTP	Coefficients	p	95% Confident Interval	
himandatory	-0.0084*	0.091	-0.0182354	0.0013553
hivoluntary	-0.0161***	0.009	-0.0283473	-0.0039483
manhead	-0.0080**	0.026	-0.0150024	-0.0009498
hhsiz	-0.0092***	0.000	-0.0113983	-0.0069316
age65_n	0.0414***	0.000	0.0348891	0.0479294
age6_n	0.0128***	0.000	0.0078016	0.0178431
urban	-0.0179***	0.000	-0.024834	-0.0110519
2nd Quintile	0.0186***	0.000	0.009015	0.0282342
3rd Quintile	0.0195***	0.000	0.0093643	0.0295789
4th Quintile	0.0215***	0.000	0.0102369	0.0328189
5th Quintile	0.0143**	0.033	0.001179	0.0273874
loweduhead	0.0055	0.134	-0.0016774	0.0126165
infohead	-0.0066*	0.081	-0.0140316	0.0008187
z_pcwi	-0.0174***	0.000	-0.0212734	-0.0134622
_cons	0.1168***	0.000	0.1017916	0.1318952
Number of observations				
F-stat	35.5			
Prob. >F	0.0000			
Adj. R-squared	0.0663			
Root MSE	0.12978			

In this table, the size of coefficient of voluntary health insurance is large than the mandatory health insurance. It could suggest the adverse selection problem raising among those buy voluntary health insurance just when they need to use it.

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