

**HOUSEHOLD CATASTROPHIC HEALTH EXPENDITURES IN  
SELECTED TOWNSHIPS OF LOWER MYANMAR**



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THE REQUIREMENTS FOR THE DEGREE OF  
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THESIS ADVISORY COMMITTEE: JUTATIP SILLABUTRA, Ph.D.,  
SUKHONTHA KONGSIN, Ph.D.**ABSTRACT**

This descriptive study used secondary household survey data to measure the extent of household catastrophic health expenditures in both urban and rural areas of ten selected townships in Yangon Division of Lower Myanmar. The minimum standard approach was used to calculate the extent of catastrophic health expenditures in Lower Myanmar. Incidence and intensity of catastrophic health expenditures were calculated to identify the households incurring “financial catastrophe” expenditures due to health care payments and to find out whether household impact mattered more for worse-off (poor households) or better-off (rich households); a concentration index was calculated.

The results showed that mean total annual income for one year was 716,811 kyats. The findings also showed that 43% of households had health expenditures that were entirely out-of-pocket. Incidence or head count of catastrophic health care payments was calculated as the fraction of households with health care costs as a share of total expenditure exceeding the chosen threshold, and the results were 9.4%, 5.6% and 4.2% of the sample for 10%, 20% and 30% catastrophic threshold levels, respectively. Intensity or catastrophic gap, was defined as the average of households where health care payments as a proportion of income exceeded the catastrophic threshold, and results were 5.9%, 5.1% and 4.6% at the 10%, 20% and 30% threshold levels, respectively. It was more significant in urban areas, where the intensities were 8%, 7.3% and 6.8%. Mean Positive Gap (MPG) means that the mean out-of-pocket payments for health care in excess of the threshold over all households exceeding the threshold. In this study, the MPG for the 10%, 20% and 30% catastrophic thresholds levels were extra-ordinarily high, and the results were 62.8%, 92.5% and 112%, respectively. Concentration indices and rank-weighted versions of incidence and intensity highlight the extent of household catastrophic health care payment burdens, and indicate negative values, so the poor households paid more for health care.

In this study, the data were not specific for catastrophic health care payments and the study area was not nationally representative. Therefore, further studies should be done with more relevant data and nationally representative surveys for catastrophic health care payments in Myanmar.

**KEY WORDS : CATASTROPHIC HEALTH EXPENDITURES / HOUSEHOLD /  
LOWER MYANMAR**

96 pages

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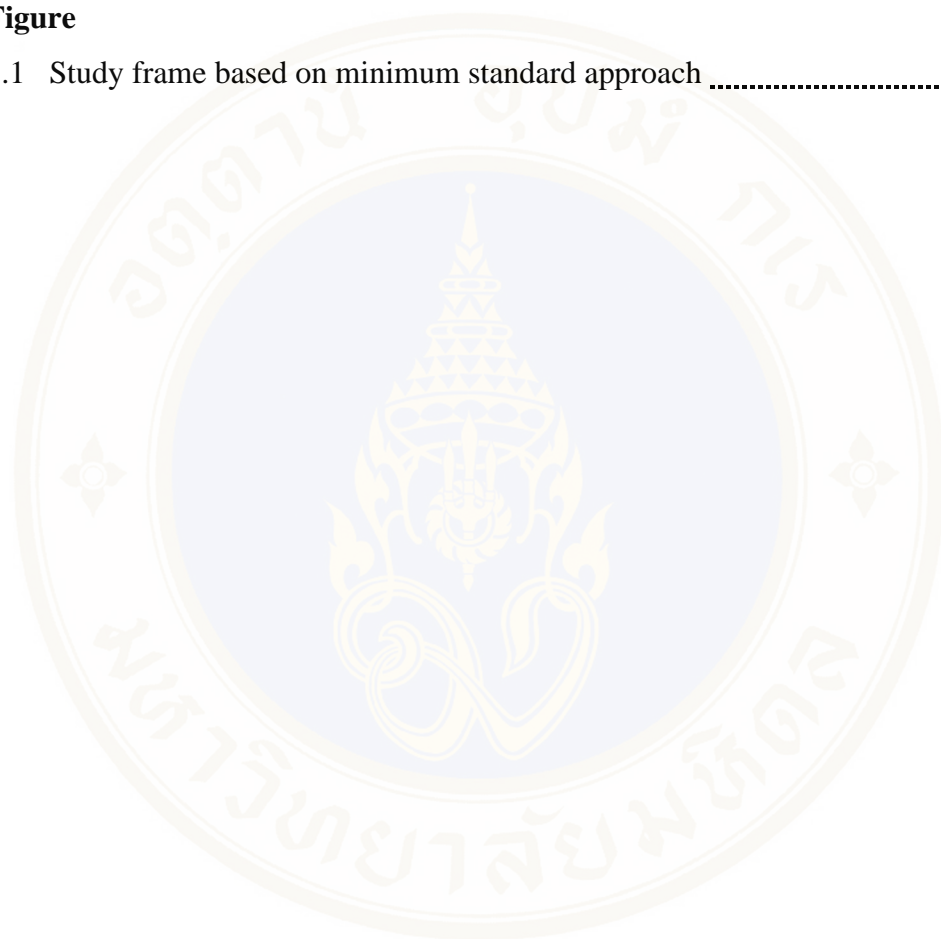
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## LIST OF ABBREVIATIONS

CCS	Community Cost Sharing
CBHI	Community-Based Health Insurance
Equitap Project	EQUITY in Health Financing in Asia Pacific Countries Funded by European Commission Project
$G_{cat}$	Catastrophic Gap Measures
GDP	Gross Domestic Product
$H_{cat}$	Catastrophic Headcount Measures
HEIS	Household Income and Expenditure Survey
INGOs	International Non-Governmental Organisation
IMR	Infant Mortality Rate
Kyat	Unit of Myanmar currency
MMR	Maternal Mortality Rate
MPG	Mean Positive Gap
NHS	National Health System
OECD	Organization for Economic Co-operation and Development
OOP	Out-of-Pocket Payments
OOPHC	Out of Pocket Health Care Payments
PHC	Primary Health Care
PHR	Partnerships for Health Reform Project
THE	Total Health Expenditure
TMO	Township Medical Officer
U5MR	Death in Children Under 5 Years
UNICEF	United Nations Fund for Children
USD	United States Dollars
WHO	World Health Organization

# CHAPTER I

## INTRODUCTION

### 1.1 Rationale and Justification

Health is a common theme and all countries have their concepts of health, as part of their culture. Almost all people all over the world want to be healthy. The World Health Organization (WHO) has stated that health is a state of complete physical, mental and social wellbeing and not merely an absence of disease or infirmity. However, in reality, no country is as healthy as it could be. No country does as much for the sick as it is technically capable of doing and no nation is wealthy enough to avoid all avoidable deaths.

All societies have limited resources and must, according to politically determined priorities, provide funds for health care in competition with funds for education, defense, agriculture, etc... The use of limited funds requires making choices. These choices reflect the overall political commitment to health and should, as far as possible, be based on an objective assessment of costs and benefits of available options.

WHO has stated that the objective of a good health system is twofold: *goodness* and *fairness*. the best attainable average level: *goodness* and the smallest feasible differences among individuals and groups: *fairness*. Goodness means better health and responsiveness while fairness means these are shared equally to everyone, without discrimination.

As described above, equity is an important goal of a good health system and it is also one of the most important criteria for judging the success of policies in the health sector. At its most basic equity implies some notion of fairness. Fairness is integral to our perspective on the world, as human beings are sociable animals and judge things in relative terms: we only know what we have by looking at what our neighbor has. This influences our judgment of our position in the social hierarchy, our

expectations and ultimately, our happiness. Therefore fairness is fundamental and is particularly so when applied to health, which is itself basic to our well being (1).

One of the indicators of fairness in a health system is fair financial contributions. It means that the risks each household faces due to the costs of the health system are distributed according to ability to pay rather than to the risk of illness. What is the “right” amount of health care financing? This is a political decision that reflects the social and economic value placed on health by a nation. There are vast differences in levels of expenditures on health between countries.

Most obvious contributor to unfair health financing is the practice of out-of-pocket health care payments. It can be unfair in two different ways. It can expose families to large unexpected costs that could not be foreseen and have to be paid out of pocket at the moment of utilization of services rather than being covered by some kind of prepayment. Or it can impose regressive payments, in which those least able to contribute pay proportionately more than the better-off (1).

Unfortunately many developing countries rely heavily on out of pocket (OOP) financing of health care and Myanmar is no exception. As a result, households are exposed to the risk of unforeseen medical expenditures. Where there are multiple sources of health financing, it is difficult to develop effective national planning without regulation and supplement any funding by government to prevent inequity between socioeconomic groups and between urban and rural populations(2).

The impact of these out of pocket payments for health care goes beyond catastrophic spending alone. Many people may decide not to use services, simply because they cannot afford either the direct costs, such as for consultations, medicines and laboratory tests, or the indirect costs, such as for transport and special food. Poor households are likely to sink even further into poverty because of the adverse effects of illness on their earnings and general welfare (3).

One aspect of fairness in payments for health care is that households ought not to be required to spend more than a given fraction of their income on health care in any given period and that spending in excess of this threshold can be labeled “*catastrophic*”. The catastrophic label main refers to the fact that falling ill can induce often sizeable and unpredictable shocks to a household’s living standards. Clearly, the extent to which illness actually results in catastrophic economic consequences for

households depends not only on medical care costs, but also on any effects from reduced labor supply and productivity and on the extent to which households are able to spread their consumption over several periods by borrowing and lending mechanisms.

In Myanmar, high private health expenditures are a cause of concern because most of these expenditures are OOP (4). A study of household catastrophic health expenditures in Upper Myanmar in 2006 and 2010 showed that there was little income related inequality for out of pocket health care payments but the incidence and intensity of catastrophic health care payment become more concentrated among the poor households because of all negative concentration indices. The incidence of catastrophic health care payment in Upper Myanmar was more concentrated among the poor for all thresholds. More over the magnitude of the catastrophic overshoot was also more concentrated among the poor(28) (36).

IF out of pocket health expenses are not too large, they did not need impoverish anyone or deter the poor from obtaining care. However, if these expenses exceed the ability to pay, the poor are likely to incur catastrophic payments. Thus, a study of “household catastrophic health expenditure” can reflect household financial contributions for health and its burdens in Myanmar community.

## **1.2 Research questions**

- (1) What was the extent of out of pocket payments for health care among households in ten selected townships in Yangon division of Republic of Union of Myanmar?
- (2) How many households incurred "financial catastrophic" expenditure due to health care payments?
- (3) Did the household catastrophic impact matter more for worse-off (poor households) or better-off (rich households)?

## **1.3 Research objectives**

### **1.3.1 General Objective**

To measure the extent of household catastrophic health expenditures in ten selected townships in Yangon division of Republic of Union of Myanmar.

### **1.3.2 Specific Objectives**

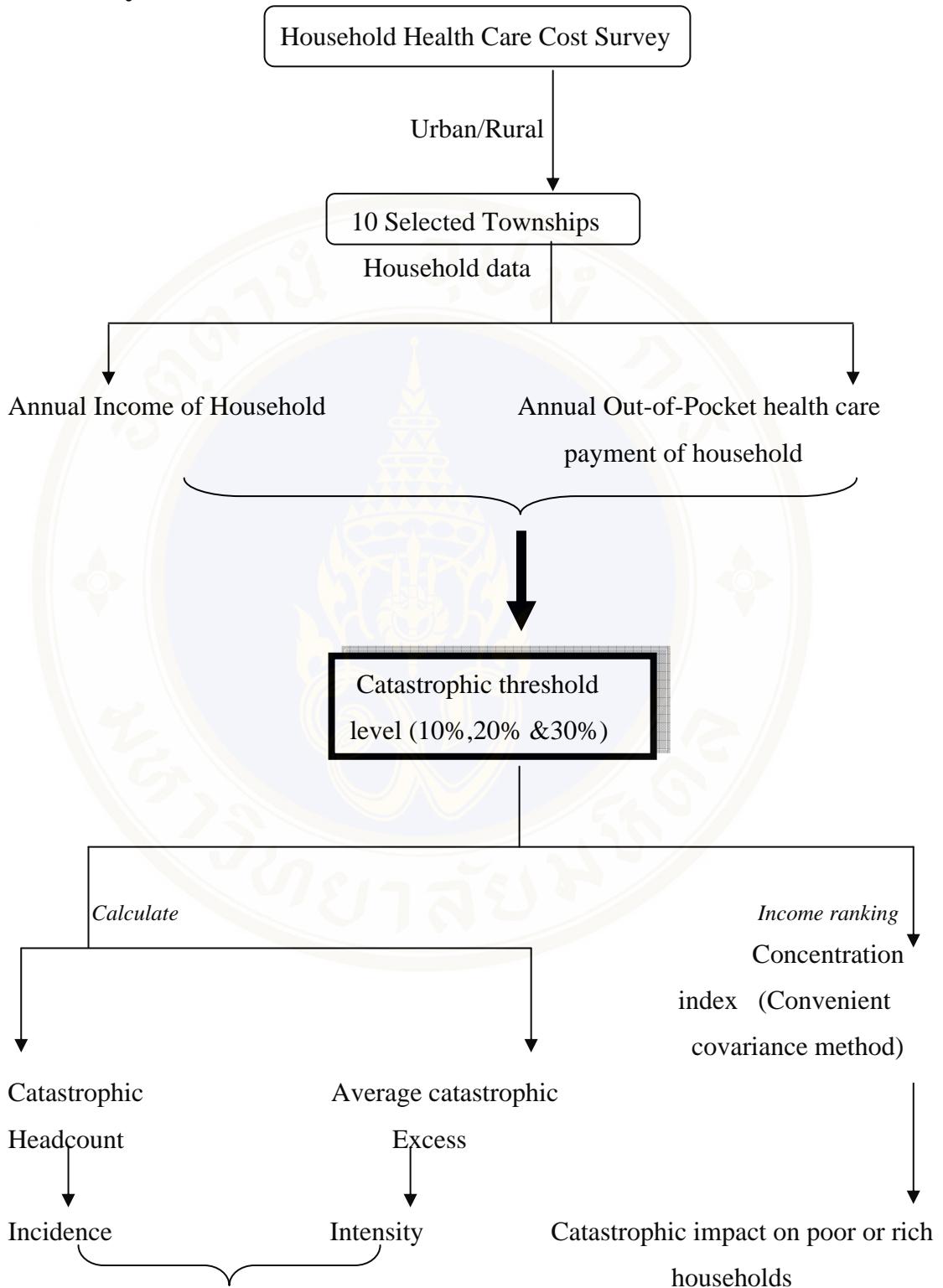
**1.3.2.1** To elicit the extent of out-of-pocket payments for health care among the households in ten selected townships in Yangon division of Republic of Union of Myanmar.

**1.3.2.2** To identify households incurring “financial catastrophic expenditure due to health care payments.

**1.3.2.3** To find out whether household impact matters more for worse-off (poor households) or better-off (rich households).

**1.3.2.4** To compare the catastrophic indices among urban and rural population in ten selected townships in Yangon division of Republic of Union of Myanmar.

### 1.4 Study frame\*



Extent of catastrophic health care payment

\* Based on minimum standard approach (10)

**Figure 1.1** Study frame based on minimum standard approach

## **1.5 Operational definitions**

### **1.5.1 Out of pocket payments**

Out of pocket (OOP) of households is defined as the actual amount of total income being spent on purchase of any health care services. All these expenditures related to costs of treatment for one or more of their household members including costs of hospitalization, surgical operations, consultations, drug, traditional healer and transportation etc.

### **1.5.2 Catastrophic health care payments**

Catastrophic health care payments means households spending more than a given fraction of their income on health care of whatever type (either curative or preventive) in a given period.

### **1.5.3 Catastrophic health care payments threshold levels**

Catastrophic health care payments threshold level is developed to estimate the impact of health care payment at various thresholds on selected indicators and these indicators reflect how much a household is entitled to spend on regular and transitory consumption of goods and services. In brief, they define the entitlement set of a household in a particular point of time.

### **1.5.4 Incidence of catastrophic health care payments**

Incidence or head count of catastrophic health care payment has been defined as the fraction of the households whose health care costs as a amount of total income exceeding the chosen threshold.

### **1.5.5 Intensity of catastrophic health care payments**

Intensity or catastrophic gap is the average excess of the households whose health care payment as a proportion of income exceeds the catastrophic threshold.

### **1.5.6 Mean Positive Gap**

Mean Positive Gap (MPG) means that the mean out-of-pocket payments for health care in excess of the threshold over all households exceeding the threshold.

### **1.5.7 Catastrophic impact sensitivity to income rank**

Catastrophic impact sensitivity to income rank means that how the proportions of incidence and intensity of household catastrophic health care payments exceeding the threshold vary across the income distribution.

### **1.5.8 Households annual income**

Households annual income means income earned for a whole year from every member living together under a same pucca, wood and hut house; all categories of income generating resources were expressed in monetary term.

### **1.5.9 Urban**

An urban area is characterized by higher population density and vast human features in comparison to areas surrounding it. According to national data, 70% of the population resides in rural areas, whereas the remaining are urban dwellers. In one township in urban area has approximately about 200,000 -300,000 population and household size is not too big as rural and mostly stay as 4-6 peoples in one house(27).

### **1.5.10 Rural**

Rural areas are large and isolated areas of an open country with low population density. In Myanmar , about 70% of the population resides in rural areas and in one village has nearly 2000-3000 population and household size is big and round about up to 6-10 peoples stay together in one house(27).

### **1.5.11 Household data**

Household data are typically the results of measurements and can be the basis of graphs, images, or observations of a set of variables. Household data are often viewed as the lowest level of abstraction from which information and then knowledge are derived.

## 1.6 Limitations of the study

This study used secondary data that were obtained from “the household health care cost survey in Lower Myanmar” conducted by Department of Preventive and Social Medicine, University of Medicine, Yangon Division, Republic of Union of Myanmar in 2010. It could not be generalized to national representative, and quality of data could not be controlled.



## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Theoretical Model: two different approaches**

Improving health is critical to human welfare and essential to sustained economic and social development. The Constitution of WHO refers to the possibility of gaining the highest attainable standard of health for every individual by providing universal coverage of health care in every country. To achieve universal health coverage, countries need financing systems that enable people to use all types of health services: promotive, preventive, curative and rehabilitative; are cost money.

Today, annual global health expenditure is about US\$ 5.3 trillion (5). With the burden of communicable diseases remaining stubbornly high in some parts of the world, and the prevalence of non-communicable diseases increasing everywhere, health care costs can only continue to rise. This trend will be exacerbated by the more sophisticated medicines and procedures being developed to treat them.

In financing health, direct payments have the most serious repercussions for health. Direct payments or out-of-pocket payments are payments for charges or fees levied for consultations, medical or investigative procedures, medicines and other supplies and for laboratory tests may be officially sanctioned charges or unofficial under-the-table payments or sometimes both co-exist.

Making people pay at the point of delivery discourages them from using the services and encourages them to postpone health checks. This means they do not receive treatment early, when the prospects for cure are greatest. It has been estimated that a high proportion of the world's 1.3 billion poor have no access to health services simply because they can not afford to pay at the time. The risk of being pushed into poverty, or further into poverty, because they are too ill to work (6).

Therefore, it is clear that direct payments or out-of-pocket payments for health can cause households to incur catastrophic expenditures, which in turn can push

them into poverty. Many people who do seek treatment, and have to pay for it at the point of delivery, suffer severe financial difficulties as a consequence.

Every year, more than 150 million individuals in 44 million households throughout the world face financial catastrophe as a direct result of having to pay for health care, and about 25 million households or more than 100 million individuals are pushed into poverty by the need to pay for health services. When people have to pay fees or co-payments for health care, the amount can be so high in relation to income that it results in "*financial catastrophe*" for the individual or the household. Because of such high expenditure, people have to cut down on necessities such as food and clothing, or are unable to pay for their children's education (7).

Therefore, protection of people from catastrophic payments is widely accepted as a desirable objective of health policy. Catastrophic health expenditure is not always synonymous with high health care costs. A large bill for surgery might not be catastrophic if a household does not bear the full cost because the service is provided free or at a subsidized price, or is covered by third-party insurance. On the other hand, even small costs for common illnesses can be financially disastrous for poor households with no insurance cover. In order to explore a standard methodology for predicting household catastrophic health care payments, there are two schools of thought(10).

### **2.1.1 Agnostic approach**

This approach through the measurement of redistributive effect, captures the share of pre-payment income being spent on health care, as well as how unequal this share is across the income distribution. But it does *not* respond to the concern that payments might be "too large". Since no target distribution is specified for payments, this approach does not generate any information on the degree of inequity in the distribution of payments for health care. Household regional consumption data set was used to find the catastrophic health expenditure.

A household's capacity to pay is defined as effective income remaining after basic subsistence needs (food expenditure) have been met. Up to this point, there should be numerous questions raised about this methodology.

1. What is effective income?

2. What proportion of effective income is for food expenditure and what for non-food expenditure?
3. What threshold will be used for catastrophic health expenditure?
4. What kind of health expenditures should be counted?

In 2002, Ke Xu et al. prepared a multi-country analysis of catastrophic health expenditures based on group data. In this study, they used data from different surveys of 59 countries: Argentina to Zambia. They defined catastrophic health care payments as “a households reduction of their basic expenditures over a certain period of time in order to cope with the medical bills of one or more of their members”. And they agreed that there is still no consensus on catastrophic threshold. For their study, they developed a catastrophic threshold that was equal to, or above, 40% of a household’s capacity to pay, and a household’s capacity to pay was defined as effective income net of subsistence spending. Subsistence spending here was defined as the average food expenditure of households whose food share of total household expenditure is within the 45<sup>th</sup> and 55<sup>th</sup> percentile (Food share based poverty line).

They also developed two hypotheses in terms of system level and individual household level in Uganda, Indonesia and Lebanon to estimate catastrophic health care payments. For the system level, they used double logarithmic multivariate ordinary least squares (OLS) regression and for the individual household level, logistic regression methods. Later their method was adopted by the WHO and became WHO methodology for calculating catastrophic health care payments. In this paper, only focused on catastrophic health care costs and did not take into account either distribution of payments within households or impoverishment. They found that the proportion of households facing catastrophic payments from out-of-pocket health expenses varied widely between countries (less than 0.01% in Czech Republic and Slovakia to 10.5% in Vietnam). Catastrophic spending rates were highest in some countries in transition, and in certain Latin American Countries. The authors identified three key preconditions for catastrophic payments:

- 1) The availability of health services requiring payment,
- 2) Low capacity to pay and
- 3) The lack of prepayment or health insurance.

This methodology was based on an egalitarian concept of equity; the payment for health care must be linked not to usage of health services but rather to ability to pay.

### **2.1.2 Minimum standard approach**

An other researchers' group lead by Wagstaff and van Doorslaer developed another methodology for calculating catastrophic health care payments based on a *minimum standard approach*. The concern is not with inequality in any variable but rather with a variable exceeding or falling short of a threshold.

There are at least two minimum standard approaches. One approach sets the threshold in terms of proportionality of income and ensures that households do not spend more than some pre-specified fraction of their income (usually called  $z$ ) on health care; spending in excess of this threshold is labelled “catastrophic”. The logic behind that approach is to ensure that households have at least  $(1-z)$  of their income to spend on things other than health care. The other minimum standard approach sets the minimum in terms of the absolute level of income. The concern here is to ensure that spending on health care does not push households into poverty or further into it if they are already there. This is known as measurement the impoverishing effect of health care.

A group of researchers focus on minimum standard approach as Equitap Project (EQUITY in Health Financing in Asia Pacific Countries funded by European Commission). Wagstaff and van Doorslaer (2001) compared egalitarian concepts of fairness in health care payments (agnostic approach) and minimum standard approaches by using data on out-of-pocket health spending in Vietnam in 1993 and 1998. For both sets of approaches, they developed indices and showed how these can be quantified. They found that out-of-pocket payments had a smaller dis-equalizing effect on income distribution in 1998 than in 1993, whether income is measured as prepayment income, or as ability to pay. They explored the incidence and intensity of catastrophic payments in terms of both prepayment income and ability to pay-declined between 1993 and 1998, and both the incidence and the intensity of catastrophe became less concentrated among the poor. They used the catastrophic threshold of 2.5%, 5%, 10% and 15% of pre-payment income.

In 1993, the incidence of catastrophic health care payments was 60.97%, 38.19%, 18.40% and 9.26%. In threshold levels of 2.5%, 5%, 10% and 15% respectively. In 1998, the incidence reduced up to 55.47%, 33.02%, 14.20% and 7.73% respectively for each threshold level (10). The incidence and intensity of poverty was due primarily to poor people becoming even poorer rather than non-poor becoming poor. After that, the World Bank adopted a minimum standard approach as the standard methodology for assessing catastrophic health care payments.

Comparing the above two distinct approaches, Xe Xu method (agnostic approach) used only the whole regional consumption data set and not used total household income but for minimum standard approach, only need total household income and total health expenditure for finding catastrophic health expenditures. The minimum standard approach is easier to understand, collect data and apply than the agnostic approach. In terms of resource constraint setting, minimum standard approach is more suitable to use. Because of those considerations, the extent of catastrophic health expenditures in Myanmar was assessed by using the minimum standard approach.

## **2.2 The three core functions of health care financing**

### **2.2.1 Revenue collection**

The sources of funds, their structure and the means by which they are collected are the first core function. After all, any system needs a stable and sufficient cash flow. This includes not only the base from which contributions are generated but must also include discussion about the ease and efficiency with which such contributions can be extracted. For example, a large informal sector largely precludes the monthly remittance of contributions to any scheme.

### **2.2.2 Pooling of funds**

The unpredictability of illness, particularly at the individual level and the inability of individuals to mobilise sufficient resources to cover unexpected health care costs require some form of pre-paid mechanism and pooling of resources. In order to

prevent substantial reduction of income for such a mechanism (e.g. through a bad harvest) and / or large rises in expenditures (e.g. through an epidemic), there is the need to spread the income basis and the health risks over as broad a population group and period of time as possible.

### **2.2.3 Purchasing**

This covers the transfer of pooled resources to health service providers in such a way that appropriate and efficient services are available to the population. It includes accreditation and quality control but also payment modes which stimulate an efficient use of resources (35).

## **2.3 The four criteria for a health financing arrangement**

Discussion about health care financing has in the past tended to degenerate into controversy over ideology and definitions, most notably the “Bismarck vs. Beveridge“ - dichotomy. The WHO-framework, grounded on theoretical and operational principles, should allow any country or indeed any institution / organisation to judge whether and to what extent its current system or a proposed future system fulfils the core criteria and essential functions of an appropriate financial mechanism. In addition, it can serve as a guide in developing and enhancing an existing system .

### **2.3.1 Efficiency**

An efficient financing mechanism is one that generates a comparatively large amount of funding and is therefore superior to multiple funding mechanisms, each generating only limited amount of funds. In addition, the costs of fund collection and administration will be relatively low with an efficient financing mechanism, leaving as much revenue as possible for actual health service provision. *Allocative efficiency* refers to a situation in which the limited resources of a country are allocated in accordance with the wishes and needs of the patients and refers to the allocation of resources among different levels of care, e.g. tertiary (hospital) care vs. primary health care, and among services dealing with different areas of care (e.g. diseases) and in

different geographical regions. *Technical efficiency* is a measure of how well the health care system transforms inputs into a set of outputs based on a given set of technology and economic factors; meaning to generate a maximum of care with given resources (or achieve a defined level of output with a minimum of resources) without compromising the quality of care.

### 2.3.2 Equity

According to a dictionary definition, equity is a system of justice based on conscience and fairness (11) where equity is the state of being equal. Equality is concerned only with equal share and it is just a particular interpretation of equity. Equity is about fairness, and it may be judged fair to be unequal. In health care, it may be judged equitable to have unequal access to services; groups more likely to be ill should perhaps be given greater access.

The critical question here is "does equity set out to achieve fair health or fair health care?" Both ideas seem reasonable but in practice, most health care systems are not expected to set about the enormous task of achieving a fair distribution of health because there are many influences on health. More realistically, health systems are in the business of pursuing a fair distribution of health care, because this reflects their locus of control.

There is a general agreement that individuals should contribute to health care funding according to their ability to pay and should benefit from health services according to their need for care. An equitable health care financing system will, therefore, involve some form of cross-subsidy from the rich to the poor and from the healthy to the ill. *Horizontal* equity means providing equal healthcare to those who are the same in a relevant respect (such as having the same 'need'). *Vertical* equity means treating differently those who are different in relevant respects (such as having different 'need') with the goal of doing more for those who have a greater need. Exactly how the "need" for care and the ability to pay are determined and how they should translate into contribution to the system are much-debated issues.

Table 1 summarizes the possible dimensions of health care equity in terms of either horizontal or vertical equity.

**Table 2.1** Operational definitions of equity

<p><b>Horizontal Equity Criteria</b></p> <ol style="list-style-type: none"> <li>1. Equal expenditure for equal need; e.g. equal nurse cost per bed ratio in all acute hospitals</li> <li>2. Equal utilization for equal need; e.g. equal length of stay per health condition</li> <li>3. Equal access for equal need; e.g. equal waiting time for treatment for patient with similar conditions</li> <li>4. Equal health/reduced inequalities in health; e.g. equal age and sex adjusted standardized mortality ratio across health regions</li> </ol>
<p><b>Vertical Equity Criteria</b></p> <ol style="list-style-type: none"> <li>1. Unequal treatment for unequal need; e.g. unequal treatment of those with treatable trivial versus serious condition</li> <li>2. Progressive financing based on ability to pay; e.g. progressive income tax rates and mainly income-tax financed</li> </ol>

*Source:* Donaldson C & Gerard K, *Economics of Health Care Financing: The visible hand*

### 2.3.3 Feasibility

Feasibility is often overlooked in assessing financing mechanisms. After all, new form of financing cannot solely be designed at the blackboard but must take historical development, current soci-political environment and public demands into account. Major stakeholders need to support a proposed new financing mechanism and adequate administrative capacity is needed (e.g. actuarial expertise, information systems, etc.) for ensuring successful implementation.

### 2.3.4 Sustainability

The sustainability of a financing mechanism refers to its long-term stability and potential for generating (extra) revenue. If the revenue generated by a

financing mechanism is subject to considerable and frequent fluctuations, the mechanism cannot be regarded as reliable – which will have substantial effects on mid- to long-term planning, staff morale and the implementation of comprehensive programmes. Sustainability also implies ongoing long-term, purposeful planning for gradual increases in domestic funding for health services (35).

## **2.4 Achieving equity goals: on the path to universal coverage**

To achieve universal health coverage in order to fulfill equity goals of health care system, countries need financing systems that enable people to use all types of health services without incurring financial hardship.

Millions of people today can not use health services simply because they have to pay for them at the time they receive them. And many of those who do use services suffer financial hardship, or are even impoverished because they have to pay. Therefore, moving away from direct payments at the time services are received to prepayment is an important step to averting the financial hardship associated with paying for health services.

### **2.4.1 Pooled funds**

Progress towards universal coverage depends on raising adequate funds from a sufficiently large pool of individuals, supplemented where necessary by donor support and general government revenues, and spending these funds on the services a population needs. The more people who share the financial risk in this way, the lower the financial risk to which any one individual is exposed. The bigger the pool, the better able it is to cope with financial risks (20). Pools with only a few participants are likely to experience what actuaries term extreme fluctuations in utilization and claims.

For a pool to exist, money must be put into it, which is why a system of pre-payment is required. Pre-payment simply means that people pay before they are sick, then draw on the pooled funds when they fall ill. There are different ways of organizing pre-payment for those who can afford to pay and the most famous or notorious is the health insurance.

## **2.4.2 Alternative Health Care Financing**

### **Brief review of types of health insurance**

Four types of health insurance are widely used to pool risks, foster prepayment, raise revenues, and purchase services: state-based systems funded by the government and operated through ministries of health or national health services, social health insurance, community-based health insurance, and voluntary health insurance. The four approaches differ in important aspects that can affect their performance in countries with different income levels, employment structures, health needs, and administrative capacities. Each approach has its own strengths and weaknesses. None of these approaches is found to be inherently good or bad. Rather, the policy maker's challenge is to create viable "pathways" for the development of health insurance in a country—pathways that steadily improve financial protection through risk pooling and prepayment, increase the quality and effectiveness of health services, improve outcome indicators and equity, and do so in an affordable, equitable, and sustainable manner.

In considering the four prominent risk pooling systems used in connection with the provision of health insurance, policy makers worldwide need to be pragmatic to ensure that the development of health financing is well aligned with broader, country-specific economic, institutional, and cultural development.

Therefore, both a general understanding of financing mechanisms and more specific methods for evaluating them at the country level are important.

### **State-funded systems**

In 2002, Mossialos and Dixon suggested that the advantages of state-funded health care systems explain why they are the most widespread form of health financing. They provide universal access to coverage, can rely on many different financing resources, and can be relatively simple to manage. However, since they must compete annually for a share of the state budget, they may receive insufficient and unstable resources. In many countries, publicly financed health delivery systems have been found to be inefficient, like many other publicly managed services. Furthermore, state-funded systems tend to benefit the rich more than the poor, particularly in

developing countries (21). Therefore, to successfully implement a state-funded system in low- and middle-income countries, conditions must be established to raise sufficient resources for health (through sustained economic growth, a competent tax administration, and a consensus within the population in favor of taxation). Sound institutions must also be in place to make the system work. In addition, specific efforts must be made to target the poor while preserving the universal character of the system—in other words, to avoid making it “a poor system for poor people”.

### **Social health insurance**

Social health insurance can be an effective way to raise additional resources for health and to reach universal coverage. In particular, by making the financing of health care more transparent and stable, social health insurance may encourage a population to contribute more to the health coverage system. But these objectives can be reached at different speeds, depending on the political and socioeconomic characteristics of each country. For many low-income countries, particularly those with stagnant economies and ever growing proportions of workers in the informal sector, these objectives may be unrealistic in the foreseeable future. Therefore, before implementing a social health insurance scheme, a government should examine its suitability for the country's socioeconomic and political conditions and assess potential problems to determine whether they can be overcome or reduced to the degree needed to ensure that the advantages of social health insurance outweigh its potential drawbacks. This preparatory work may lead to the conclusion that it is appropriate to proceed with the reform, but it can also lead to a decision to postpone reform until the necessary preconditions are satisfied. Experience also shows that, in its initial stage of development, social health insurance has a tendency to divert resources from the poorer segment of the population to the richer segment. Consequently, countries considering establishment of a social health insurance system should be aware of this side effect and include mechanisms to protect the poor within their system framework. Finally, social health insurance can induce cost escalation, as observed in many countries of the OECD. Therefore, governments wishing to implement social health insurance schemes must design appropriate mechanisms to contain costs.

### **Community-based health insurance**

These schemes provide financial protection for people who otherwise would have no access to health coverage, and they can result in some degree of resource mobilization. Nonetheless, because most community-based systems are small and often barely financially viable, they are not particularly effective in reaching the poorest segments of the population. Preker et al.(2004) argued community-based health insurance can be established in settings with informal labor markets and limited institutional capacity, but a strong sense of local community solidarity is a prerequisite. The intervention of governments through subsidies, technical assistance, and initiatives to link community based health insurance schemes with more formal health financing is important to improve the efficiency and sustainability of such schemes. What emerges from the literature on community-based health insurance is that it is “better than nothing” in low-income settings where the implementation of any kind of collective financing scheme is problematic. But community-based health insurance is not likely to be the solution to all health care financing problems in low-income countries and should be regarded more “as a complement to—not a substitute for—strong government involvement in health care financing” (22). The most challenging and promising issues include how to design community-based health insurance schemes to ensure the best possible compatibility with larger systems, and how to make these small schemes evolve towards more comprehensive and sophisticated health financing systems.

### **Voluntary health insurance**

Voluntary systems require a certain level of commercial institutional capacity and can benefit from (but not necessarily depend on) a similar level of public sector institutional capacity. Tapay and Colombo (2004) stated that unlike social health insurance (which is harder to develop, widen, or sustain when national social solidarity is low, government institutional capacity is weak, and labor markets are informal), voluntary systems do not rely as much on local or national social solidarity and stable formal labor markets, although those conditions certainly help. However, such systems, unless subsidized by the government, can benefit only those citizens or businesses with the ability to pay. Moreover, such systems may be prone to certain

types of market failures in addition to equity challenges (23). They must, therefore, be developed cautiously and with an appropriate regulatory framework.

Health policy makers are faced with competing alternatives. For systems of health care financing, the choice of financing method should mobilize resources for health care and provide financial protection. It is necessary to assess the evidence of the extent to which community-based health insurance is an available option for low-income countries in mobilizing resources and providing financial protection. Overall, the evidence base is limited in scope and questionable in quality. There is strong evidence that community-based health insurance provides some financial protection by reducing out-of-pocket spending. There is evidence of moderate strength that such schemes improve cost-recovery. There is weak or no evidence that schemes have an effect on the quality of care or the efficiency with which care is produced. In absolute terms, the effects are small and schemes serve only a limited section of the population.

Bennett et al. (1998) identified that, in the context of inadequate public expenditure in the health sector, many countries have installed cost recovery systems, such as user fees, as a supplementary financing approach for health care services. This practice has raised concerns over equity and access to health care for the poor, and the search for complementary financing solutions continues. One response has been a rapidly growing phenomenon in some developing countries: community-based health insurance (CBHI). CBHI schemes are not a new phenomenon. Such schemes have been around for a long time and in some cases have evolved out of traditional risk pooling mechanisms. A 1997 review identified 81 documented CBHI schemes from throughout the world, with the majority in sub-Saharan Africa and Asia (26). In 2001, the WHO stated that the numbered in the hundreds, if not thousands. Recently there has been increased interest in CBHI; for example, the Commission on Macroeconomics and Health recommended that user payments increasingly be channeled through CBHI schemes. Communities and governments also seem to be increasingly focused upon CBHI schemes. In Ghana, the number of CBHI schemes in the country grew from four to 159 in just over two years, and national health financing policy in both Ghana and Tanzania is promoting a key role for CBHI. While varying in detail from country to country and scheme to scheme, CBHI schemes share the goal of finding ways for communities to meet their health financing needs through pooled

revenue collection and resource allocation decisions made by the community. CBHI schemes are a form of insurance: they allow members to pay small premiums on a regular basis to offset the risk of needing to pay large health care fees upon falling sick. However, unlike many insurance schemes, CBHI schemes are typically based on the concepts of mutual aid and social solidarity. CBHI schemes may develop around geographical entities (villages or districts), trade or professional groupings (such as trade unions or agricultural cooperatives), or health care facilities. CBHI schemes are typically designed by and for people in the informal and rural sectors who are unable to get adequate public, private, or employer-sponsored health insurance. Membership in a scheme is voluntary. The current social health insurance systems in Germany, Japan, and Korea have grown out of small-scale community-based schemes that would meet the definition of CBHI given above. Similarly the “Friendly Societies,” of which there were about 27,000 in the United Kingdom at the end of the nineteenth century, also operated much like today’s CBHI schemes. In West Africa traditional solidarity mechanisms, similar to CBHI schemes, have existed for many years. Different CBHI schemes have grown from different rationales. Some CBHI schemes may help protect members against the cost of user fees <sup>3 21</sup> Questions on CBHI associated with care in the public sector, as does the Community Health Fund scheme in Tanzania. Others primarily provide risk pooling for the fees associated with the use of private sector providers, as in the Self-Employed Women’s Association scheme in India. Others, such as the Bwamanda scheme in the Congo, try to use community resources to replace non-existent government budgets. In general CBHI schemes operate somewhat independently from government. Thus CBHI schemes may be a particularly appealing option in contexts where government capacity is very limited, or there is limited trust in government. However, as schemes become established it is critical that their relationship with government is clarified (24).

Schneider et al. (2001) conducted a survey in the Rwandan Ministry of Health instituted a CBHI pilot test in three districts, in 1999. In order to collect lessons for policy development, the Ministry collaborated with the Partnerships for Health Reform project (PHR) to conduct an impact evaluation with baseline surveys and follow-up surveys after one year of implementation. These studies investigated the impact of the CBHI schemes on members’ utilization of services and service delivery.

CBHI members were up to four times more likely to enter the modern health system when sick than non-members. New case consultation rates for scheme members ranged from 1.2 to 1.6 consultations per annum per capita, compared to rates of 0.2 to 0.3 for non-members and the population in control districts. The value of drugs consumed per consultation by CBHI members was, on average, lower than that for non-members. This most likely reflects the fact that members seek care earlier than non-members and thus require fewer drugs.

On a per capita basis, members contributed twice what non-members did to primary health care centers, significantly boosting cost recovery and resource mobilization for centers with large membership pools. As part of the CBHI management structure, regular assemblies of scheme managers, community members, and health center staff were held, contributing to the development of democratic decision-making processes in the health sector. CBHI schemes may have helped contribute to social solidarity by developing risk-pooling mechanisms across different population groups; this may be a critical contribution in post-conflict Rwanda. The training that was conducted as part of the development of the CBHI schemes helped build financial management capacity in communities and among health care providers (25).

## **2.5 General background of Myanmar**

### **2.5.1 Location**

Myanmar, approximately the size of France and England combined, is the largest country in mainland South-East Asia with a total land area of 676,578 square kilometers. It stretches 2200 kilometers from north to south and 925 kilometers from east-west at its widest point. Lying between 09°32' N and 28°31' N latitudes and 92°10' E and 101°11' E longitudes, it is bounded on the north and north-east by the People's Republic of China, on the east and south-east by the Lao People's Democratic Republic and the Kingdom of Thailand, on the west and south by the Bay of Bengal and Andaman Sea, and on the west by the People's Republic of Bangladesh and the Republic of India (27).

### 2.5.2 Geography

The country is divided administratively into 14 States and Divisions and five special administration regions. It consists of 66 districts, 330 townships, 60 sub-townships, 2781 wards, 13714 village tracts and 64910 villages. Myanmar falls into three well marked natural divisions, the western hills, the central belt and the Shan plateau on the east, with a continuation of this high land in the Tanintharyi. Three parallel chains of mountain ranges from north to south divide the country into three river systems, the Ayeyarwaddy, Sittaung and Thanlwin. Myanmar has abundant natural resources including land, water, forests, coal, minerals and marine resources, and natural gas and petroleum. Great diversity exists between the regions due to the rugged terrain in the hilly north which makes communication difficult. In the southern plains and swampy marshlands there are numerous rivers and tributaries criss-crossing the land in many places (27).

### 2.5.3 Demography

The population of Myanmar in 2007-2008 is estimated at 57.504 million with a growth rate of 1.75 %. About 70 % of the population resides in the rural areas, whereas the remainder are urban dwellers. The population density for the whole country is 85 per square kilometers and ranges from 595 per square kilometer in Yangon Division, where in lies the city of Yangon, to 14 per square kilometer in Chin State, the western part of the country (27).

**Table 2.2** Estimates of population and its structure (1980-2008)

Population/structure (in millions)	1980-81		1990-91		2000-01		2007-08		2008-09	
	Est.	%	Est.	%	Est.	%	Est.	%	Est.	%
0-14 years	13.03	38.77	14.70	36.05	16.43	32.77	18.57	32.30	18.87	32.32
15-59 years	18.44	54.86	23.47	57.55	29.72	59.29	33.87	58.90	34.38	58.89
≥ 60 years	2.14	6.37	2.61	6.40	3.98	7.94	5.06	8.80	5.13	8.79
Total	33.61	100	40.78	100	50.13	100	57.50	100	58.38	100
Female	16.93	50.37	20.57	50.44	25.22	50.31	28.92	50.29	29.35	50.27
Male	16.68	49.63	20.21	49.56	24.91	49.69	28.58	49.71	29.03	49.73
Sex ratio (M/100 F)	98.52		98.25		98.77		98.85		98.91	

*Source: Planning Department, Ministry of National Planning and Economic Development*

#### **2.5.4 People and Religion**

The Union of Myanmar is made up of 135 national groups speaking over 100 languages and dialects. The major ethnic groups are Kachin, Kayah, Kayin, Chin, Mon, Bamar, Rakhine and Shan. About 89.4% of the population mainly Bamar, Shan, Mon, Rakhine, and some Kayin, are Buddhists. The rest are Christians, Muslims, Hindus and Animists (27).

#### **2.5.5 Economy**

Myanmar is a country with a large land area rich in natural and human resources. Cognizant of the fact that the agricultural sector can contribute to overall economic growth of the country, the government has accorded top priority to agricultural development as the base for all round development of the economy. Following the adoption of a market oriented economy from a centralized economy, the government has carried out liberal economic reforms to ensure participation of the private sector in every sphere of economic activity. Encouragement for the development of the industrial sector has been provided since 1995. In order to support and to render assistance to small and medium size industries scattered all over the countries in an organized manner, the government has established 19 industrial zones in states and divisions (27).

#### **2.5.6 Social Development**

Development of the social sector has kept pace with economic development. Expansion of schools and institutes of higher education has been considerable especially in the States and Divisions. The adult literacy rate in 2005 was 94.1% while the school enrolment rate was 97.58%, increasing respectively from 79.7% and 67.13% in 1988. Expenditure for health and education has risen considerably, equity and access to education and health and social services have been ensured all over the country. With prevalence of tranquility, law and order in the border regions, social sector development can be expanded throughout the country. Twenty four special development regions have been designated in the whole country where health and education facilities are developed or upgraded along with other development activities. Some towns or villages in these regions have also been

upgraded to sub township level with development of infrastructure to ensure proper execution of administrative, economic and social functions (27).

**Table 2.3** Gross Domestic Product (Kyats in millions)

GDP	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Current	5625254.7	7716616.2	9078928.5	12286765.4	16852757.8	23331693.2
Real at 85- 86 prices	3184117.3	3624926.4	4116635.4	4675219.6	13893395.3	15551477.4
Growth %	12.0	13.8	13.6	13.6	13.1	11.9

*Source: Statistical Year Book, 2007, CSO*

*\*Provisional actual, 2000-01 Constant Producers' Prices, 2005-06 Constant Producers' Prices*

### 2.5.7 Health Care System in Myanmar

The Myanmar health care system evolves with the changing political and administrative system, and relative roles played by the key providers are also changing although the Ministry of Health remains the major provider of comprehensive health care. It has a pluralistic mix of public and private system both in the financing and provision. Health care is organized and provided both by public and private providers. The Ministry of Health is the main organization of health care provision. The Department of Health, one of 7 departments under the Ministry of Health, plays a major role in providing comprehensive health care through out the country including remote and hard to reach border areas. Some ministries are also providing health care, mainly curative, for their employees and their families. They include Ministries of Defense, Railways, Mines, Industry I, Industry II, Energy, Home and Transport. The Ministry of Labour has set up two general hospitals, one in Yangon and the other in Mandalay, and one TB hospital in Hlaingtharyar (Yangon) to render services to those entitled under the social security scheme. The Ministry of Industry (1) is running a Myanmar Pharmaceutical Factory and producing medicines and therapeutic agents to meet the domestic needs.

The private, for profit, sector is mainly providing ambulatory care though some providing institutional care has developed in Yangon, Mandalay and some large

cities in recent years. Funding and provision of care is fragmented. They are regulated in conformity with the provisions of the law (28).

### 2.5.8 Health Care Financing

The public, not for profit, health care sector, and the private, for profit, sector are the two main health care delivery sectors in Myanmar. The Health Care Financing System in Myanmar is public-private mix system. Official Data stated that public health care expenditure has increased on both current and capital yearly. Total public health expenditure increased from kyat 464.1 million in 1988-89 to kyat 23411.8 million in 2005-06. The total national health expenditure was equivalent to 2.5% of GDP for the year 2001-2002 (29).

**Table 2.4** Estimation of National Health Expenditure (2001-2002) of Myanmar

<i>No</i>	<i>Source</i>	<i>Amount (Millions Kyats)</i>	<i>Percent</i>
1	<i>Government</i>	11957.5	13.6
2	<i>Social security</i>	313.5	0.36
3	<i>Community contribution</i>	475.0	0.54
4	<i>Private households</i>	64483.4	73.4
5	<i>International aids</i>	10624.5	12.1

*Source: MOH, 2007*

**Table 2.5** Selected National Health Accounts in Myanmar

	2001	2002	2003	2004	2005
Total expenditure(% of GDP)	2.1	2.3	2.2	2.2	2.2
% Total expenditure on health (Public Expenditure)	11.8	14.4	11.2	12.9	10.6
Private expenditure(% GDP)	88.2	85.6	88.8	87.1	89.4
% of total government expenditure	1.1	1.5	1.2	1.4	1.1
External source (% of total expenditure)	1.1	7.1	6.8	13.1	12.9
Social security expenditure (% of total expenditure)	3.3	3.2	3.2	3.2	3.2
Out of pocket expenditure (% of private expenditure)	99.2	99.3	99.4	99.4	99.4
Private prepaid plans (% of private expenditure)	0	0	0	0	0

*Source: World Health Organization. World Health Report, 2008*

About 80% of health expenditures in Myanmar are funded privately. At the primary and secondary care level, this is leading to an overemphasis on income generating curative care by providers, and less focus on prevention. And for families, this means higher out-of-pocket investments in securing health care provision, especially for catastrophic health events. Recent household-based studies indicate that as many as 20-30% of all households suffer from catastrophic payments for health (30).

Between 1948 and 1992, government tax revenue was the major source of health finance. A community cost sharing (CCS) scheme was developed in 1992, in which those who can afford to pay, contribute some share of the costs of curative health services at public health facilities. In theory at least, exemptions are made for the poor.

In fact, the CCS in Myanmar is based on out-of-pocket expenditures by individuals on a fee-for-service basis. Through the CCS, user charges are made for essential drugs, and other medical services like laboratory, radiology, and private inpatient rooms, to patients at hospitals under the Ministry of Health.

However, one of the few evaluations of the equity implications of the CCS in Myanmar states that “in practice, there is no systematic arrangement for exempting the poor , a recommendation letter from local authority is used for exemption, but in-depth interviews found no one producing it , in practice there was not a single out-patient exempted from drug charge” (31).

The failure of the CCS to exempt the poor, together with the previously quoted study which found a high proportion of people suffering from catastrophic payments for health care, reveal tip of the ice berg in terms of the real dimensions of health-related poverty in Myanmar.

Although there are no CBHIs of any kind in Myanmar yet, some INGOs are introducing community financing schemes that could alleviate illness-related financial burdens on community members. There is just one social security scheme in place in Myanmar, a scheme introduced in 1956 covering both government and private employees. Despite being compulsory, the coverage is still very low: less than one percent of the total population is covered (500,000 insured as of March 2009, [www.mol.gov.mm](http://www.mol.gov.mm)).

The latest available National Health Accounts give the following picture. The table depicts clearly that health care financing essentially rests on private health care expenditure which come from direct payments – the least equitable and financially viable form of health care financing. Insurance mechanisms are virtually non-existing. Expenditures for pharmaceuticals make up almost 50% of all private expenditures. The overall level of health care expenditure per head in comparison to the GDP is with 2.3% just half of the 5% recommended by WHO. Government spending on health care must be deemed wholly inadequate with just 1.8% of total spending. This even more so, as fiscal space is quite reasonable with total government expenditure being around 21% of GDP.

**Table 2.6** Major Macroeconomic and health care financing indicators for Myanmar, 1995-2006

<b>Year</b>				
1995	2000	2005	2006	
<b>Macroeconomic indicators</b>				
GDP (mKyat)	604 729	2 552 730	9 747 325	11 766 275
General Government Expenditure (mKyat)	165 558	630 333	2 046 938	2 470 918
Exchange rate (Kyat / 1 USD)	120	355	1095	1 280
Assumed population (m)	43 134	45 884	47 967	48 379
<b>Expenditures in m Kyats</b>				
Total Health Expenditures	12 989	54 059	210 237	272 253
Total Expenditures on Pharmaceuticals	4 703	22 840	86 111	103 828
... of which are private	4 468	21 698	82 127	99 018
<b>Expenditure ratios</b>				
Total Expenditure on Health (THE) as % of GDP	2.1	2.1	2.2	2.3
External Resources on health as % of THE	0.1	1.1	9.0	13.9
Government Expenditure as % of THE	18.9	13.4	10.6	16.8
... of which come from Social Security Funds (%)	1.6	3.1	2.2	1.6
Private Expenditures as % of THE	81.1	86.6	89.4	83.2
... of which are out-of-pocket	99.5	99.2	99.4	99.4
Health Expenditures (% of Government Expenditures)	1.5	1.2	1.1	1.8
<b>Per-capita indicators</b>				
Total Expenditures on Health internal USD rate	20	29	38	43
Government Expenditures at internal USD rate	4	4	4	7

*Source: WHO – National Health Accounts Series*

It is obvious that the major source of health expenditure is private expenditure. Private health expenditure comprises the outlays of insurers and third-party payers other than social security, mandated employer health services and other enterprise provided health services, non-profit institutions and non-governmental organizations financed health care, private investments in medical care facilities and household out-of-pocket spending. 99% of private expenditure is out of pocket

expenditure in Myanmar (3). Since most of health expenditure is out of pocket, it may be assumed that households will face potential financial distress, and the economic burden of low-income families suffering from catastrophic illnesses (28).

### **2.5.9 Health indicators and health system**

Life expectancy is about 61 years for men and 65 years for women, and the infant mortality rate (IMR) stands at about 50 per 1,000, whereas the under-five mortality rate is around 66/1,000 with very high variations between urban and rural areas. Acute respiratory infection, pre-maturity/low birth weight and diarrhea are the leading causes of death in children under 5 years (U5MR). The Maternal mortality (MMR) is high with 255 deaths per 100,000 live births (and this is doubtless an under-representation of the true rate) (32).

Myanmar is served by 1,473 Rural Health Centres and 6,599 Sub Rural Health Centres under the administration of the Township Medical Officers (TMOs) and the Township Health Team. Townships (n = 325) have a catchment area of 100,000 – 200,000, and are responsible for the management of all secondary and primary care services, which include hospitals and rural health centres. Midwives and public health supervisors are stationed at the village level. In addition, there are voluntary health workers (community health workers and auxiliary midwives) providing primary health care to the community on an outreach basis (32). However, health facilities are heavily skewed towards inpatient care.

**Table 2.7** Different types of health facilities in Myanmar 1988 - 2008

	Year		
	1988-9	2003-4	2007-8
Government Hospitals	631	790	839
Primary + Secondary Health Centers	64	84	86
Maternal + Child Health Centers	348	348	348
Rural Health Centers	1337	1424	1473
Traditional Clinic and Hospitals	91	251	251

*Source: Ministry of Health, Health Statistics*

### 2.5.10 Poverty line

The World Bank officially has stated that individual daily income less than one US dollar per day is regarded as extreme poverty and less than two US dollar per day is poverty. This is the international poverty line.

In Myanmar, there is no known poverty line in terms of local setting. According to the Household Income and Expenditure Survey (HEIS) conducted in 2001 by the Central Statistical Organization, Ministry of National Planning and Economic Development, with a sample size of 30,000 households from 75 sampled townships, poverty incidence (proportion of people below \$ 1 purchasing power parity) was estimated as 20.7 % for urban, 28.4 % for rural and union rate was 26.6 % (34).

Htoo Kyaw Swar et al. stated that relative poverty line for households under an irrigated ecosystem was 986 kyats per day per person and for households in rainfed villages was 855 kyats per day per person, during 2008 cropping year and average daily income of people from irrigated households was 131 kyats higher than that for rainfed households(33).

As there was no official information on poverty line was defined using the mean income calculated for each ecosystem in the study region(43). Thus, an individual or household with income at or below the mean income of the same community would be considered poor.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

#### **3.1 Study Design**

The descriptive study using secondary household survey data was conducted to explore the extent of out of pocket payments and magnitude of household financial catastrophe for health care and household catastrophic impact.

#### **3.2 Study population**

The study population include households residing in both urban and rural areas of ten selected townships in Yangon division of Republic of Union of Myanmar.

#### **3.3 Sample size**

There are 2000 households (1000 from urban and 1000 from rural area) from ten townships, namely: Hle`Gu Township, Htauk Gaint Township, Hmaw Bi Township, Taik Gyi Township, Htan Ta Bin Township and Mingaladon Township, Shwe Pyi Thar Township, Phoogyi Township, Thong Khwa Township and Inn Daing Township.

#### **3.4 Sampling Design**

“Household Health Care Cost Survey” is the survey conducted by final year medical students of University of Medicine ,Yangon, during their three weeks Residential Field Training program. Pre-structured questionnaire was prepared and pre-tested by Department of Preventive and Social Medicine, University of Medicine, Yangon. It is compulsory for all final year medical students to participate. Students

were divided into 40 groups and each group contained 12-15 students with a group leader and a supervisor (teaching staff from University of Medicine).

To achieve maximum precision in the estimates within a given sample size and to avoid bias in the selection of the sample, this survey based on huge sample size. Sampling design is primarily based on random/probability sampling technique with three stages.

**Stage 1:** Selection of states and divisions: there are 3 states and 1 divisions in Lower Myanmar. Among them 1 state was selected by the fishbowl draw method. The fishbowl draw method is one of the most common methods of drawing a random sample. If the total population is small, it is an easy procedure to number each element using separate slips of paper for each element, put all the slips into a box, and then picks them out one by one without looking, until the number of slips selected equals the sample size decided upon (46).

**Stage 2:** Selection of townships: out of 44 townships in selected state, 10 townships are picked up by students' group leaders by the fishbowl draw method.

**Stage 3:** Selection of households: each student group was assigned to interview 100 households in urban area and 100 in rural area of their townships. Teaching staffs from Department of Preventive and Social Medicine trained the student groups and supervisors about the sampling techniques emphasizing on simple random sampling by using random number table. The procedure for selecting a sample using a table of random numbers is as follows:

- 1) Identify the total number of elements in the study population.
- 2) Number each elements starting from 1.
- 3) If the table for random number is on more than one page, choose the starting page by a random procedure. Again, select a column or row that will be the starting point with a random procedure and proceed from there in a predetermined direction.
- 4) Corresponding to the number of digits to which the total population runs, select the same number, randomly, of columns or rows of digits from the table.
- 5) Decide on the sample size.

- 6) Select the required number of elements for the sample from the table. If the same number is selected twice, discard it and go to the next. This can happen as the table for random numbers is generated by sampling with replacement.

However, in this survey, sample size is predetermined (200 households for each township). And there is no way to know whether the interviewers strictly followed the rules of simple random sampling procedure of data collection in 10 townships. This may become a problem in processing and analysis of data.

### **3.5 Data management and data analysis**

Data analysis was done by SPSS version 17. The socio-demographic characteristics of age was described by mean age and standard deviation; gender, education level, ethnicity, religion, occupation, household members, home environment, illness and out of pocket payments in head of the households were described by the frequency tables. The catastrophic health expenditures were determined by the minimum standard approach as follows:

#### **Household Annual Income (X)**

Household annual income is explored by interview with household heads or a responsible adult member from each household. The formal income (salary, business profit, wage, farm profit) and informal income (winning lottery, gambling profit, tips and under-table income) for the previous year were recorded for each member and totaled to gain the annual household income.

The second part of income component, non-monetary income, was not included in the survey because it would have been too difficult to quantify and the data collectors were medical doctors (non-economists).

Since household income was the denominator for calculating the incidence of catastrophic health care payment, and without non-monetary income, the incidence of catastrophic health care payment can be overestimated. To avoid this problem, a higher threshold level for catastrophic health care payment was used in this study.

Usually, in the literature, catastrophic threshold was either 2.5%, 5%, 10% or 15% of household income and sometimes 5%, 10%, 15% and 25% (10). In this study, the catastrophic threshold used 10%, 20% and 30% of household annual income.

### **Out of pocket health care payments (T)**

To obtain health care payment data, the interviewee were asked about any health problems of household members in the previous year such as communicable diseases, non-communicable diseases and accidents, respective treatments such as out-patient treatment, in-patient treatment, surgical operations and total estimated costs of health care whether they were direct or indirect health care costs. If there was any borrowing or lending present, interviewee was encouraged to reveal it.

### **Incidence of catastrophic health care payment**

Let  $E_i = 1$  if  $T_i/X_i > Z_{cat}$  and  $E_i = 0$  if  $T_i/X_i \leq Z_{cat}$

$X_i$  = pre-payment income (household annual total income)

$T_i$  = Out-of-pocket health care payments within 1 year

$Z_{cat}$  = Threshold level for catastrophic health care payment

It represents the proportion of households whose health expenditure exceeded the threshold  $Z_{cat}$ . This is called the *catastrophic payment headcount* ( $H_{cat}$ )(10).

The formula is as follows:

$$H_{cat} = \frac{1}{N} \sum_{i=1}^N E_i = \mu_E$$

$N$  = Total sample size

$\mu_E$  = the mean of  $E_i$

### **Intensity of catastrophic health care payment**

The average excess or  $G_{cat}$  was obtained. This will capture the height by which payments as a proportion of income exceeded the threshold  $Z_{cat}$ (10). The formula is-

$$G_{cat} = \frac{1}{N} \sum_{i=1}^N O_i = \mu_o$$

$\mu_o$  = the mean of  $O_i$

$N$  = sample size

$O_i$  = the catastrophic overshoot, and the value of  $O_i$  are as follows:

$$O_i = \begin{cases} \frac{T_i}{X_i} - Z_{cat} & ; E_i = 1 \\ 0 & ; E_i = 0 \end{cases}$$

$X_i$  = pre-payment income (household annual total income)

$T_i$  = Out-of-pocket health care payments within 1 year

$Z_{cat}$  = Threshold level for catastrophic health care payment

It means the average excess of the household which payment as a proportion of income exceeds the catastrophic threshold. For example if intensity 5% at the threshold level of 10%, it means the households in that township exceeding 10 per cent catastrophic threshold spend 5% in excess of 10% of their income.

### The mean positive gap (MPG)

The MPG is the ratio of catastrophic gap measures ( $G_{cat}$ ) to catastrophic headcount measures ( $H_{cat}$ )(10). It is defined as follows:

$$MPG_{cat} = G_{cat}/H_{cat}$$

The MPG reflects the mean share of overshoot of out-of-pocket payments for health care in excess of the threshold over all households exceeding the threshold. By calculating the MPG, one can know the average percentage of out-of-pocket payment in excess of the threshold in terms of annual income of the households with exceeding the threshold.

### **Catastrophic impact sensitive to income rank**

To measure who is going to suffer more (rich or poor household) due to catastrophic health care payment, catastrophic impact sensitive to income rank (how the proportions of those exceeding the threshold vary across the income distribution) must be calculated(10).

### **Concentration index based on convenient covariance formula**

Due to the data were micro data, the convenient covariance method was used to measure concentration index. The concentration indices for  $E_i$  and  $O_i$  were determined by the following formula(10):

$$C_E = 2 \text{ cov } (E_i, R_i) / \mu_E$$

$$C_O = 2 \text{ cov } (E_i, R_i) / \mu_O$$

Where

$E_i$  is the out of pocket whose inequality is being measured

$R_i$  =  $i$ th individual's (household's) relative fractional rank in the income distribution (cumulative probability distribution)

$\text{Cov } (E_i, R_i)$  = covariance between  $E_i$  and  $R_i$

The value of the concentration index is between -1 and +1. If the value of the concentration index is 0, there is no income-related inequality. The values close to 0 imply very little income related inequality. Negative values mean that poorer units have more adverse health effects than would be expected under conditions of equality and positive values means richer units have more adverse health events. The concentration index for headcount measures ( $C_E$ ) and gap measures ( $C_O$ ) can be interpreted as above. If  $C_E$  and  $C_O$  are exactly zero, it can be said that there is no income-related inequality of catastrophic headcount and overshoot. Positive  $C_E$  and  $C_O$  values will indicate a greater tendency for the better-off to exceed the payment threshold and to overshoot. Similarly, negative  $C_E$  and  $C_O$  values mean a greater tendency for the poor to exceed the payment threshold and to overshoot.

## CHAPTER IV

### RESEARCH RESULTS

Analysis is based on secondary source information on “Household Health Care Cost Survey” in Lower Myanmar collected by the Department of Preventive and Social Medicine for the year 2010 to explore the extent of out of pocket payments and magnitude of household financial catastrophe for health care and household catastrophic impact.

#### 4.1 Socio-demographic characteristics of the household heads

**Table 4.1** Frequency and percentage of the Socio-demographic characteristics of the household heads

	Urban		Rural		Total	
	Frequency (n= 1000)	Percent (100%)	Frequency (n=1000)	Percent (100%)	Frequency (n=2000)	Percent (100%)
<b>Age groups</b>						
<25 year	148	14.8%	144	14.4%	292	14.6%
25 - 60 years	803	80.3%	794	79.4%	1597	79.85%
>60 year	49	4.9%	62	6.2%	111	5.55%
Mean = 37.43, SD = 12.0589,	Minimum = 16 ,		Maximum = 86			
<b>Gender</b>						
Male	912	91.2%	892	89.2%	1804	90.2%
Female	88	8.8%	108	10.8%	196	9.8%
<b>Education level</b>						
Illiterate	76	7.6%	67	6.7%	143	7.15%
Read & Write	371	37.1%	380	38%	751	37.55%
Primary school	252	25.2%	243	24.3%	495	24.75%
Middle school	169	16.9%	172	17.2%	341	17.05%
High school	48	4.8%	64	6.4%	112	5.6%

**Table 4.1** Frequency and percentage of the Socio-demographic characteristics of the household heads (cont.)

	Urban		Rural		Total	
	Frequency (n= 1000)	Percent (100%)	Frequency (n=1000)	Percent (100%)	Frequency (n=2000)	Percent (100%)
Diploma	59	5.9%	58	5.8%	117	5.85%
University graduate	15	1.5%	11	1.1%	26	1.3%
Post graduate	10	1%	5	0.5%	15	0.75%
<b>Ethnicity</b>						
Bamar	974	97.4%	969	96.9%	1943	97.15%
Shan	5	0.5%	5	0.5%	10	0.5%
Karen	3	0.3%	5	0.5%	8	0.4%
Others	18	1.8%	21	2.1%	39	1.95%
<b>Religion</b>						
Buddhist	949	94.9%	972	97.2%	1921	96.05%
Christian	11	1.1%	8	0.8%	19	0.95%
Islam	40	4%	20	2%	60	3%
<b>Occupation</b>						
Employed for wages	377	37.7%	371	37.1%	748	37.4%
Self-employed	502	50.2%	490	49%	992	49.6%
Unemployed	46	4.6%	37	3.7%	83	4.15%
Student	4	0.4%	4	0.4%	8	0.4%
Retired	24	2.4%	29	2.9%	53	2.65%
Government employee	47	4.7%	69	6.9%	116	5.8%
<b>Number of household members</b>						
1-3	255	25.5%	284	28.4%	539	26.95%
4-6	535	53.5%	551	55.1%	1086	54.3%
7-9	170	17%	132	13.2%	302	15.1%
10-12	34	3.4%	27	2.7%	61	3.05%
13-15	6	0.6%	6	0.6%	12	0.6%
Mean=4.915, SD=2.335						

Ages of the household heads were ranged between 16 to 86 years and the mean age was 37.4 years. Mostly 80% of household heads were between the ages of 25 to 60 years. Majority of the household heads were male in both urban and rural

area. Only 9% of the households were headed by females. Regarding education level, most of the household head (37.5 %) in both urban and rural area were just read and write. Less than 2 per cent of them graduated from university. Nearly 96% of the respondent were Buddhists.

Nearly half of the household heads were self-employed. 4 per cents of the household heads were unemployed for various reasons and only 5 percents were government employee. Nearly 55 percents of the households possessed up to six household members. The remaining households were larger in size but extra-ordinarily large households with members more than twelve were very rare in both urban and rural areas.

## 4.2 Home environment of the household heads

**Table 4.2** Frequency and percentage environmental characteristics

	Urban		Rural		Total	
	Frequency (n=1000)	Percent (100%)	Frequency (n=1000)	Percent (100%)	Frequency (n=2000)	Percent (100%)
<b>Type of housing</b>						
Pucca	454	45.4%	436	43.6%	890	44.5%
Wood	443	44.3%	446	44.6%	889	44.45%
Hut	103	10.3%	118	11.8%	221	11.05%
<b>Sources of water supply</b>						
Town water supply	277	27.7%	304	30.4%	581	29.05%
From wells	305	30.5%	299	29.9%	604	30.2%
From rivers & streams	189	18.9%	160	16%	349	17.45%
From ponds & lakes	18	1.8%	23	2.3%	41	2.05%
Others	211	21.1%	214	21.4%	425	21.25%

**Table 4.2** Frequency and percentage environmental characteristics (cont.)

	Urban		Rural		Total	
	Frequency (n=1000)	Percent (100%)	Frequency (n=1000)	Percent (100%)	Frequency (n=2000)	Percent (100%)
<b>Type of latrine used</b>						
No latrine	51	5.1%	60	6%	111	5.55%
Bucket latrine	168	16.8%	180	18%	348	17.4%
Unsanitary pit latrine	391	39.1%	354	35.4%	745	37.25%
Sanitary pit latrine	228	22.8%	262	26.2%	490	24.5%
Water sealed latrine	101	10.1%	70	7%	171	8.55%
Septic tank	31	3.1%	51	5.1%	82	4.1%
Others	30	3%	23	2.3%	53	2.65%
<b>Pest activity</b>						
Absent	282	28.2%	278	27.8%	560	28%
Barely present	622	62.2%	647	64.7%	1269	63.45%
Fairly present	83	8.3%	63	6.3%	146	7.3%
A lot	13	1.3%	12	1.2%	25	1.25%

Except for more huts in rural areas, there were not too differences in type of house between urban and rural areas. The majority of water sources in both urban and rural areas were town main water supply (from city development committees ) and wells (both shallow and deep wells ). Nearly 60 % of households used pit latrines. 17 % used very unsanitary bucket latrines and rural usage of bucket latrines (18%) was a higher than urban usage (16%). 5 % of the households had no latrine.

Pests are troublesome and destructive animals or things which are deleterious to human health. Here pests means mosquitoes, flies, fleas and bugs. 28 % of the households declared that their homes were free from pests. However pests were present in the remaining households (70%).

### 4.3 Catastrophic health expenditures of the household heads

#### 4.3.1 Household income

Annual households' income was estimated by combing individual household members' money income. Household income quartiles were divided as quartiles and less than quartile 1 mean that the poorest income group, between quartile 1 and 3 mean that middle income group and above the quartile 3 mean that richest group respectively.

**Table 4.3** Income quartile of the households

Quintile	Range	Mean	Frequency	Percent
1 <sup>st</sup> Quintile (Poorest)	6,000-192,000	109387.5	401	19.7%
2 <sup>nd</sup> Quintile	192,001-300,000	237619.5	521	25.5%
3 <sup>rd</sup> Quintile (Middle)	300,001-400,000	347705	307	15.4%
4 <sup>th</sup> Quintile	400,001-700,000	533127.3	393	19.3%
5 <sup>th</sup> Quintile (Richest)	7,000,001-20,000,000	2356217	378	20.1%

(Mean = 716,811 , SD = 2,024,158 , Minimum= 6,000, Maximum= 20,000,000)

**Table 4.4** Income quartile of the households (Urban)

Quintile	Range	Mean	Frequency	Percent
1 <sup>st</sup> Quintile (Poorest)	6,000-180,000	111837	205	20.5%
2 <sup>nd</sup> Quintile	180,001-300,000	236124.5	263	26.3%
3 <sup>rd</sup> Quintile (Middle)	300,001-400,000	342830	159	15.9%
4 <sup>th</sup> Quintile	400,001-600,000	514345	179	17.9%
5 <sup>th</sup> Quintile (Richest)	600,001-20,000,000	2386520	194	19.4%

(Mean = 718,331 , SD = 2,153,978 , Minimum= 6,000, Maximum= 20,000,000)

**Table 4.5** Income quartile of the households (Rural)

Quintile	Range	Mean	Frequency	Percent
1 <sup>st</sup> Quintile (Poorest)	6,000-200,000	107575.5	276	27.6%
2 <sup>nd</sup> Quintile	200,001-300,000	238477	176	17.6%
3 <sup>rd</sup> Quintile (Middle)	300,001-400,000	352580	149	14.9%
4 <sup>th</sup> Quintile	400,001-720,000	555659.5	214	21.4%
5 <sup>th</sup> Quintile (Richest)	720,001-20,000,000	2322163	185	18.5%

(Mean = 715,291, SD = 1,886,505, Minimum= 6,000, Maximum= 20,000,000 )

Table 4.3- 4.5 show that the average annual household income was 716,811 kyats. The mean urban income was 718,331 kyats and the mean rural income was 715,291 kyats.

#### 4.3.2 Illness of the household members

Respondents were asked whether anyone who had had any significant illness in their families, during the previous 12 months? The answers are summarized as follows;

**Table 4.6** Illness episode attacking family members during the previous 12 months

Type	Urban		Rural		Total	
	Frequency (n=1000)	Percent (100%)	Frequency (n=1000)	Percent (100%)	Frequency (n=2000)	Percent (100%)
Yes	950	95%	945	94.5%	1895	94.75%
No	50	5%	55	5.5%	105	5.25%

95% of the respondents ( both urban and rural ) stated that their household members had had at least one illness episode during the previous 12 months. 5% denied of any illness in their household members.

### 4.3.3 Association between urban and rural area of illness episode attacking family members during the previous 12 months

**Table 4.7** Association between urban and rural area of illness episode attacking family members during the previous 12 months

	Illness		Total
	Yes	No	
Urban	950	50	1000
Rural	945	55	1000
Total	1895	105	2000

$$\chi^2 = 0.251, p \text{ value} = 0.616$$

There is no statistically significant association between urban and rural area of illness episode attacking family members during the previous 12 months ( $\chi^2 = 0.251$ ,  $p \text{ value} = 0.616$ ).

### 4.3.4 Out of pocket payments in head of the households

**Table 4.8** Frequency and percentage of out of pocket payments

Out of pocket payments	Urban		Rural		Total	
	Frequency (n=1000)	Percent (100%)	Frequency (n=1000)	Percent (100%)	Frequency (n=2000)	Percent (100%)
Present	383	38.3%	464	46.4%	847	42.35%
Absent	617	61.7%	536	53.6%	1153	57.65%

Of those, 847 households had health expenditure that were entirely out of pocket. All these expenditures referred to costs of treatment for one or more of their household members, and included costs of hospitalization, surgical operations, consultations, drug and transportation etc.

### 4.3.5 Association between urban and rural area of out of pocket payments in head of the households

**Table 4.9** Association between urban and rural area of out of pocket payments in head of the households

	Illness		Total
	Yes	No	
Urban	383	617	1000
Rural	464	536	1000
Total	847	1153	2000

$\chi^2 = 13.437$ , p value < 0.001

There is a statistically significant association between urban and rural area of **out of** pocket payments in head of the households ( $\chi^2 = 13.437$ , p value < 0.001).

### 4.3.6 Cost of health care

Household's health care cost were divided as quartiles and less than quartile 1 mean that the household paid less than 2000 kyats for health care, between quartile 1 and quartile 2 mean that the household paid between 2001 kyats to 5000 kyats, between quartile 2 and quartile 3 mean that the household paid between 5001 kyats to 30,000 kyats and above the quartile 3 mean that the household paid above 3001 kyats for health care respectively.

**Table 4.10** Direct costs of health care

Cost groups	Urban		Rural		Total	
	Frequency (n= 383)	Percent (100%)	Frequency (n=464)	Percent (100%)	Frequency (n=847)	Percent (100%)
Mean	61,085		48,706		54,232	
SD	174,687		143,476		158,272	
Minimum	275		210		200	
Maximum	2,000,000		1,500,000		2,000,000	
< 2,000 kyats	112	29.32%	141	30.39%	253	29.89%
2,001 kyats - 5,000 kyats	84	21.98%	94	20.26%	178	21.08%
5,001 kyats -30,000 kyats	107	28.02%	128	27.59%	235	27.76%
30,001 kyats - 2,000,000 kyats	79	20.68%	101	21.76%	180	21.27%
Mean =54232, SD=158,272 Minimum = 200, Maximum =2,000,000						

30% of the households spent less than 2,000 kyats to treat the illness of household members. 21% of the households used 30,001 kyats to 2,000,000 kyats to treat of members' illnesses.

#### 4.4 Catastrophic Health Care Payments of the households

##### 4.4.1 Incidence of catastrophic health care payments

The incidence or head count of catastrophic health care payments has been defined as the percentage of households spending more than certain threshold of percentage share of out of pocket payment to total annual household income. The result in table 4.11 shows that overall incidence of catastrophic health care payments by catastrophic thresholds.

**Table 4.11** Overall Incidence of catastrophic health care payments by catastrophic thresholds

Incidence (hcat)	Threshold level z		
	10%	20%	30%
Combine	9.4%	5.6%	4.2%
Urban	8.5%	5.5%	4.5%
Rural	10.3%	5.6%	3.8%

9.4% of households spent more than 10% of their income on health care payments. Proportions of household spending more than 20% and 30% of total income were 5.6% and 4.2% respectively. The percentage of the household in rural which spent more than 10% was higher than those in urban. However, the trends of incidence of catastrophic health care payment decreased by increasing threshold levels.

#### 4.4.2 Intensity of catastrophic health care payments

**Table 4.12** Intensity of household catastrophic health care payments by catastrophic thresholds

Intensity (gcat)	Threshold level z		
	10%	20%	30%
Combine	5.9%	5.1%	4.6%
Urban	8.0%	7.3%	6.8%
Rural	3.8%	3.0%	2.5%

Intensity or catastrophic gap is the average excess of the household which payment as a proportion of income exceeds the catastrophic threshold. Then, OOP health care payments of the households as a proportion of their income exceeding the 3 catastrophic threshold levels were calculated and it is also known as catastrophic payment excess or overshoot. Regarding calculation of intensities of total sample, the intensities were 5.9%, 5.1% and 4.6% at the threshold per cents of 10%, 20% and 30% respectively.

### 4.4.3 Mean Positive Gap (MPG)

The Mean Positive Gap (MPG) or Mean Positive Overshoot (MPO) reflects the mean out of pocket payments for health care in excess of the threshold over all households *exceeding the threshold*.

The MPG is the indicator of mean overshoot among households with the catastrophic health care payments. It amplifies the intensity of catastrophic health care payment problem.

Table 4.13 is the summary finding of Mean Positive Gap of households with catastrophic health care payments for 3 defined thresholds.

**Table 4.13** Mean Positive Gap of household catastrophic health care payments by catastrophic thresholds

MPG	Threshold level z		
	10%	20%	30%
Combine	62.8%	92.5%	112.0%
Urban	93.8%	131.90%	150.0%
Rural	37.1%	53.8%	66.9%

Calculating MPG with total sample size, MPG at 10%, 20% and 30% threshold levels were 62.8%, 92.5% and 112% respectively. MPGs in the urban areas were higher than rural area in this study.

### 4.4.4 Concentration index for headcount measures

**Table 4.14** Concentration Indices for incidence and intensity of household catastrophic health care payments

Threshold	10%	20%	30%
Incidence (CE)	-0.0013	-0.0018	-0.0019
Intensity (CO)	-0.0356	-0.0608	-0.0813

**Table 4.15** Concentration Indices for incidence and intensity of household catastrophic health care payments (Urban)

Threshold	10%	20%	30%
Incidence (CE)	<i>-0.0014</i>	<i>-0.0018</i>	<i>-0.0022</i>
Intensity (CO)	<i>-0.0055</i>	<i>-0.0058</i>	<i>-0.0062</i>

**Table 4.16** Concentration Indices for incidence and intensity of household catastrophic health care payments (Rural)

Threshold	10%	20%	30%
Incidence (CE)	<i>-0.00097</i>	<i>-0.00143</i>	<i>-0.00211</i>
Intensity (CO)	<i>-0.00263</i>	<i>-0.00267</i>	<i>-0.00320</i>

Table 4.14 - 4.16 show that all concentration indices were close to zero. This means that there was little income related inequality of incidence of catastrophic health care payment. However, negative values of concentration indices indicate a greater tendency for the worse-off (poor) to exceed the payment threshold.

Similarly negative values of concentration indices for overshoot indicated that there was income inequality among overshoot households and the poorer households pay much more for health care than the rich ones.

## CHAPTER V

### DISCUSSION

The present study attempts to explore the extent of out of pocket payments and magnitude of household financial catastrophe for health care and household catastrophic impact.

This study will provide information for policy-makers about the extent of catastrophic health care payments of Lower Myanmar community in terms of health financing aspect of health equity analysis. This information can be used for re-designing of the national health financing system not only to allow people to access services when they are needed, but also to protect households from financial catastrophe by reducing out-of-pocket spending.

#### 5.1 Methodology

The analysis of this study was based on the concept of Wagstaff's catastrophic, the minimum standard approach, for catastrophic health care payment. Although, there had another methodology for catastrophic health care payment such as Ke Xu's method or agnostic approach(8). However, the minimum standard approach is more suitable to use because it is easier to understand and needs only two types of data; estimated annual total household income and estimate annual total health care cost. Moreover, Ke Xu's method assume that health care expenditure is within non-food expenditure but there is no exact proportion of food expenditure, non-food expenditure and saving included in individual or household income in Myanmar. So it is not appropriate to assume that health care costs must be come out from non-food expenditure and saving (ability to pay or capacity to pay).

The incidence and intensity of household catastrophic health care payments will not indicate whether it is poor or better-off individuals who exceed the threshold.

This can be done by catastrophic impact sensitive to income rank (how the proportions of those exceeding the threshold vary across the income distribution). There are many indices to measure this impact. In order to choose the appropriate index, review of the relevant literatures is mandatory.

There exists a wide variety of indicators for the magnitude of inequalities in health. Among them, the Gini Coefficient and the Concentration Index, have been taken from the field of health economics and applied to the study of health inequalities. The Gini coefficient is based on the Lorenz Curve, a cumulative frequency curve that compares the distribution of a specific variable with the uniform distribution that represents equality(38). The value of Gini Coefficient ranges from 0 (perfect equality) to 1 (total inequality). However, Gini Coefficient and Lorenz Curve approach do not take into account the socioeconomic group. So it can not measure the direction and the strength of the association between socio-economic level and health and is not a valid indicator (42). So this index can not be used to measure catastrophic impact in this study.

There are generally two approaches to get Concentration Index; Concentration Curve and Concentration Index approach (grouped data) and Concentration Index by convenient covariance method (micro-data). The Concentration Curve and Concentration Index are calculated by the same logic as the Lorenz Curve and the Gini Coefficient, but incorporating the social dimension. Concentration Index meets the necessary requirements for the measurement of the inequalities in health. PAHO (2001) suggested that good indicators of inequality should reflect the socioeconomic dimension of inequalities in the health field, use information on the entire population and be sensitive to changes in the distribution and size of the population across socioeconomic groups(37).

For grouped data case, concentration curve is almost the same method as the construction of Lorenz Curve but the population (sample) is ordered by socioeconomic status and not following a health variable. The concentration curve can show the cumulative percentage of catastrophic health care payments accruing to the poorest p% of the sample(40).

The Concentration Index of a variable can be computed by using a simple convenient covariance formula. In practice, to find household's relative fractional rank in the income distribution, household data must be sorted by ascending order of income and divided by sample size. So the household with least annual income (poorest) will be almost 0 and the richest household will be 1. Therefore, the value of household's relative fractional rank in the income distribution ranges between 0 and 1(42).

## **5.2 Socio-demographic characteristics of the households**

In addition to the composition of the household, its size is a possible determinant of catastrophic payments. If economies of scale in the consumption of medical care are limited relative to those of other items, then the household budget share devoted to health care should rise with household size. On the other hand, larger households have a larger supply of informal carers that can substitute for formal medical care and so constrain health costs. The findings from IHLCS 2004-2005 and the qualitative study provide the key characteristics of the poor and identified them. The poor households have larger members (6.1 persons per household) than non-poor households (4.9 persons per household) and the pattern holds true in all states and divisions. In this study, most of the household members in both urban and rural have within 4 to 6 members(30).

The level of education of the head of household is lower for poor households. Lower education signifies reduced access to income earning opportunities and lower returns/remuneration for economic activities(34). In this study, 37.5 per cents mostly in both urban and rural area of the household heads were just read and write education level and primary education as 25 per cents. Only where less than 2 percent of them were graduates. In this study, nearly half of the household heads were self-employed. 4 per cents of the household heads were unemployed for various reasons and only 5 percents were government employee.

Union of Myanmar is made up of 135 national groups. The major ethnic groups are Bamar, Kachin, Kayah, Kayin, Chin, Mon, Rakhine and Shan. Since this

study was conducted in area where Bamar ethnicity is concentrated most, it was not a surprised thing that the vast majority of the household were Bamar.

Poor households usually live in lower quality dwellings(34). But in this study, except a little bit more hut in rural areas, there were not too differences in type of house between urban and rural areas. Sanitary toilets, safe drinking water and solid housing are all associated with a significantly lower risk of catastrophic payments(34). This suggests that public health interventions might be effective measures to protect households from the risk of burdensome payments for health care. From a policy perspective, it is important to make the distinguish between household characteristics that raise the expected value of health payments and those that increase exposure to risk.

In Myanmar, many households have informal income, especially government and private employees. Total household income earned for the whole year were calculated in this study. However, all categories of income generating resources were expressed in monetary terms. Non- monetary income was unavoidably excluded in this survey. Since household income was the denominator for calculating the incidence of catastrophic health care payment, and without non-monetary income, the incidence of catastrophic health care payment can be overestimated. To avoid this problem, a higher threshold level for catastrophic health care payment used in this study. They were set as 10% ,20% and 30% of household annual income. Although, in the literature, catastrophic threshold was usually either 2.5%, 5%, 10% or 15% of household income and sometimes 5%, 10%, 15% and 25% (11).

Even household total income is extremely difficult to collect partly because of recall bias and partly because of confidentiality and Myanmar people are extremely sensitive to honestly answer what is the exact amount of their true income. They are afraid of income tax and other unforeseeable complications. This study used secondary data and obtained from “household living standard and life style survey in Lower Myanmar” conducted by Department of Preventive and Social Medicine, University of Dental Medicine, Yangon , Union of Myanmar in 2010.

In order to avoid underestimation, both formal and informal income of each and every household member was investigated and totaled to get the annual household’s income. However only by asking about monetary income of household

members, and excluding of non monetary income, it was not possible to calculate the exact amount of informal income, and the possible existence of recall bias, may have been underestimated. In this study , the distribution of income, shown by quintiles and mean total annual income for one year was 716,811 kyats in both urban and rural areas. The mean urban income was 718,331 kyats and the mean rural income was 715,291 kyats and not too difference between urban and rural areas.

USD 1/day, adjusted for purchasing power parity, is the most commonly used standard to identify the poverty line for developing countries and is used by the World Bank(44). In Myanmar, there is no known poverty line. Myanmar, in striving to build a peaceful, modern and developed nation, have formulated and implemented a series of short term economic plans. (27). However, according to the Household Income and Expenditure Survey (HEIS) conducted in 2001 by Central Statistical Organization, Ministry of National Planning and Economic Development with a sample size of 30,000 households from 75 sampled townships, poverty incidence (proportion of people below \$ 1 purchasing power parity) was estimated as 20.7 % for urban areas , 28.4 % for rural areas and union rate was 26.6 %(40) .

The UN Millenium Development Goals Report 2006 recorded Asia leading the decline in global poverty, and that Asia's extreme poverty rates had fallen rapidly. The decline from 1990 to 2002 was 21%, 57% and 67 % for Southern Asia, Eastern Asia and South East Asia respectively. Myanmar is one of the SE Asian countries where there is no extreme poverty and hunger(34).

Another things as poor households have lower access to a range of health services and worse health outcomes(34). Regarding this study, the question of "Is there anyone who got any significant illness in your family, during last 12 months?" was asked. The results found as 48 percents of the household head confessed that their household members contracted at least one of the illness episodes during last 12 months. 2 percents denied it and only less than 1 percents did not know any illness in the household members.

### **5.3 Incidence, intensity and mean positive gap of household catastrophic health care payments**

#### **5.3.1 Incidence of household catastrophic health care payments**

The incidence of catastrophic health care payments in ten townships of Yangon division was 9.4%, 5.6% and 4.2% of the sample for 10%, 20% and 30% catastrophic threshold levels respectively.

In the study conducted by Thant- Sin- Htoo (2006) in Upper Myanmar, the incidences were 8.11%, 6.59%, 4.38% and 3.82% at 10%, 15%, 25% and 30% threshold levels(28). In the study conducted by Win-Htay-Aung (2010) in five townships of Central Myanmar, the incidence were 23.9%, 15.1% and 11.9% (36). Compared to those studies , the incidence of this study is higher than the Upper Myanmar but central Myanmar is more higher than Lower Myanmar.

It was already assumed that the incidence of catastrophic health care payments in Myanmar can be more than other South East Asia Countries because of no public or private health insurance system. In compare to SEA countries in 10% threshold level, the incidences at 10% threshold level are more than that of Sri Lanka (2.98%), Thailand (3.52%) and Hong Kong Special Administrative Region (SAR) (5.86%), and this may reflect the capacity of better-off households to medical needs by diverting resources from expendable consumption while poor households are constrained in the extent to which they can divert resources away from food and shelter but less than those of India (10.84%), and Bangladesh (15.57%) (2) .See in Appendix B. A higher level of incidence is associated with a higher probability of incurring catastrophic payments for health care.

Although the incidence decreases progressively when the thresholds increase, it is still 4.2% based on the highest threshold (30%). The reduction of incidence in this study is only about 5% from lowest to highest threshold. In compared with Vietnam, according to Wagstaff & Doorslaer (2001) the incidence of household catastrophic health care payments decreases from 60.97% for the 2.5% threshold level to 9.26% for the 15% threshold level, so the reduction is over 50% from lowest to highest threshold level. The following table shows that at the lower thresholds, the

incidence of catastrophic health costs is more concentrated among poor in both years, through more so in 1998 than in 1993. This means that the better off are more likely to overshoot the threshold there is more concentration of overshooting among the better off in 1998 than in 1993. This coupled with the results mentioned above indicates that whilst at lower thresholds it is the poor who are more likely to exceed them, they do not spend so far above the threshold as do the better off. Since the concentration indices are all positive, the index  $G_{cat}$  is smaller than the mean catastrophic excess. (10). See in (Table 5.1).

**Table 5.1** Incidence (headcount) and intensity (or gap) of catastrophic out of pocket payments in Vietnam, 1993-98

Threshold level $Z_{cat}$	1993				1998			
	2.5%	5%	10%	15%	2.5%	5%	10%	15%
Headcount measures								
H <sub>cat</sub>	60.97%	38.19%	18.40%	9.26%	55.47%	33.02%	14.20%	7.73%
CE	-0.0161	-0.0113	0.0125	0.0068	-0.0391	-0.0290	0.0279	0.1123
W <sub>Ecat</sub>	61.95%	38.62%	18.17%	9.20%	57.63%	33.98%	13.80%	6.86%
Gap measures								
G <sub>cat</sub>	4.06%	2.85%	1.51%	0.84%	3.41%	2.34%	1.24%	0.71%
MPG <sub>cat</sub>	6.66%	7.47%	8.21%	9.06%	6.14%	7.09%	8.76%	9.20%
Co	0.0057	0.0151	0.0298	0.0408	0.0513	0.0932	0.1829	0.2794
WG <sub>cat</sub>	4.04%	2.81%	1.47%	0.80%	3.23%	2.12%	1.02%	0.51%

Source: *Paying for Health Care: Quantifying Fairness, Catastrophe and Impoverishment, with Applications to Vietnam, 1993-98*, Wagstaff, A & van Doorslaer, E., 2001

In this study, 30% threshold level is set to be the highest threshold level for the incidence of catastrophic health care payment and compared with household income and expenditure survey conducted by the Central Statistical Organization (CSO) in 2004-2005, 64.06% of household expenditure was for food and beverages and only 35.94% was for non-food (40). So mostly households exceeds 30% catastrophic threshold level because they cannot save their income and all of their income are used up for health care and food only.

### **5.3.2 Intensity and Mean Positive Gap of household catastrophic health care payments**

The intensities were 5.9%, 5.1% and 4.6% at 10%, 20% and 30% threshold levels, respectively. It was more significant in urban areas where the intensities were 8%, 7.3% and 6.8%. Wagstaff (2001) stated that in Vietnam, the average overshoot for 10% catastrophic threshold was 1.51% in 1993 and only 1.24% in 1998. Average overshoot for 15% catastrophic threshold was only 0.84% in 1993 & 0.71% in 1998(10).

In the study conducted by Thant- Sin- Htoo (2006) in Upper Myanmar, the intensities were 4.76%, 4.39%, 3.84% and 3.63% at 10%, 15%, 25% and 30% threshold levels(28). In the study conducted by Win-Htay-Aung (2010) in five townships of Central Myanmar, the intensities were 6.8%, 5.8% and 5.1%(36). Compared to those studies , the urban intensities of this study are significantly higher.

It is more obvious with the mean positive gaps (MPG)results. MPG reflects the mean out-of-pocket payments for health care in excess of the threshold over all households exceeding the threshold. It amplifies the intensity of catastrophic health care payment problem.

The MPG results were much higher than similar studies conducted by Thant-Sin-Htoo (2006) and Win-Htay-Aung (2010). In the former study, MPGs at 10%, 15%, 25% and 30% threshold levels were 58.7%, 66.6%, 87.7% and 95% respectively(28). Households which exceeded 10% threshold level paid 68.7% of their income for health and those exceeding the 30% threshold spent 125% of their income on health. In the latter study, the MPG, at 10%, 20% and 30% threshold levels were 28.45%, 38.41% and 42.86% respectively(36). This means households which exceeded the 10% threshold level actually paid 38.45% of their income for health and those exceeding the 30% threshold spent 72.86% of their total income on health. But in this study, it was found that the MPG results were extra-ordinarily high. Compared to other Asian countries at 10%, 15% & 25% threshold levels, the MPG in lower Myanmar is highest (2). See in (Table 5.2).

**Table 5.2** Mean Positive Gap of catastrophic OOP payments for health care among Asian Countries

Country	Catastrophic Thresholds		
	10%	15%	25%
Bangladesh	12.98%	14.15%	16.07%
China	10.12%	11.52%	12.38%
Hong Kong SAR	9.4%	11.08%	12.06%
India	8.49%	9.65%	11.03%
Indonesia	11.48%	13.09%	14.64%
Rep of Korea	11.23%	12.48%	13.94%
Kyrgyz Rep.	6.02%	6.71%	7.46%
Malaysia	8.58%	10.58%	13.15%
Nepal	10.85%	13.88%	20.59%
Philippines	10.81%	12.01%	12.68%
Sri Lanka	8.89%	10.41%	15.56%
Taiwan	7.46%	9.39%	11.79%
Thailand	9.39%	10.41%	9.05%
Vietnam	9.18%	9.58%	10.46%

Source: *Paying out-of-pocket for health care in Asia: Catastrophic and poverty impact*, Doorslaer et al 2005.

The main thing behind this finding is the presence of outlier households. There were 28 households who used 100% (all of their annual income) to as much as 1777.8% of income (17 times of their annual income) for health care. The presence of these outliers may be due to underestimation of household annual income. Estimation of household annual income in this study had some limitations. Asking only income of household members in money terms, exclusion of non monetary aspects of income, and the possible existence of recall bias can underestimate the household income. Since income is the denominator for calculation of household out-of-pocket share for health care, underestimation of income may develop outliers. In addition, out-of-pocket health care payments within one year (numerator for out of pocket payments share for health care) can also be erroneous because of recall bias. Another possibility is that if a household can afford health care as much as 20 times of their annual

income, apart from dissolving their assets and borrowing, they may have other source of unreported earnings.

Whatever it is, high intensity and large MPG can be a serious problem. However, it should be noted that data from similar studies in other countries included non monetary income. In this study, income data in the survey does not include non monetary income and it causes underestimation of households' annual average incomes. Moreover, the definition of money income in this study is not comprehensive.

Then, based on this, both intensity and MPG of Myanmar may be the overestimated and the actual difference between this study and other Asian countries may not be that much.

#### **5.4 Concentration indices and rank-weighted versions of incidence and intensity of household catastrophic health care payments**

This section highlights the extent of household catastrophic health care payments burdens on whether poor households or rich households because incidence and intensity of household catastrophic health care payments can't indicate whether it is poor or better-off individuals who exceed the threshold. All concentration indices calculated by convenience covariance formula, for headcount measures ( $C_E$ ) and gap measures ( $C_O$ ) revealed negative values.

The findings are generally similar to other studies conducted by Thant-Sin-Htoo (2006) and Win-Htay-Aung (2010) where all concentration indices were negatives and indicated income related inequalities in health care payments and that the poor pay more for health care.

**Table 5.3** Concentration indices for incidence and intensity of household catastrophic health care payments in Thant –Sin-Htoo (2006) survey (28)

Thresholds	10%	15%	25%	30%
Incidence( $C_E$ )	- 0.001972	- 0.002124	- 0.002283	-0.002618
Intensity( $C_O$ )	- 0.00504	- 0.00501	-0.00573	-0.00551

**Table 5.4** Concentration indices for incidence and intensity of household catastrophic health care payments in Win-Htay-Aung (2010) survey (36)

Thresholds	10%	20%	30%
Incidence ( $C_E$ )	- 0.00176	- 0.00278	-0.00290
Intensity ( $C_O$ )	- 0.416	-0.450	-0.474

Therefore it can be concluded that there is a greater tendency for the worse-off to exceed the payment threshold and that poor households pay more for health care. It may be a precipitating factor for the households to lead poverty.

Comparing with Vietnam (1993-98) for incidence and intensity of catastrophic out of payments in threshold levels and result shown as follows:

**Table 5.5** Concentration indices for incidence and intensity of household catastrophic health care payments in Vietnam (1993-98) survey (10)

Thresholds	1993				1998			
	2.5%	5%	10%	15%	2.5%	5%	10%	15%
Incidence ( $C_E$ )	-	-	0.0125	0.0068	-	-	0.0279	0.1123
Intensity ( $C_O$ )	0.0057	0.0151	0.0298	0.0408	0.0513	0.0932	0.1829	0.2794

According to the above table, catastrophic health costs was more concentrated among the rich in both years, though more so in 1998 than in 1993. The better off were more likely to overshoot the threshold by a larger amount in both years

whatever the threshold but in Myanmar, most of the studies about concentration indices for incidence and intensity of household catastrophic health care payments results shows that catastrophic health costs was more concentrated among the poor in each of the years because of lack of health insurance system. In Myanmar, high private health expenditures are a cause of concern because most of these expenditures are out-of-pocket.

In financing health, direct payments have the most serious repercussions for health. This means they do not receive treatment early, when the prospects for cure are greatest. It has been estimated that a high proportion of the world's 1.3 billion poor have no access to health services simply because they can not afford to pay at the time(6).

Therefore, it is clear that direct payments or out-of-pocket payments for health can cause households to incur catastrophic expenditures, which in turn can push them into poverty. Many people who do seek treatment, and have to pay for it at the point of delivery, suffer severe financial difficulties as a consequence.

## **CHAPTER VI**

### **CONCLUSION AND RECOMMENDATIONS**

#### **6.1 Conclusion**

The study of catastrophic health care payment in ten townships of Yangon division was done using the data from survey on household health care costs conducted by the Department of Preventive and Social Medicine during 2010. The incidence and intensity of catastrophic health care payments in terms of 3 defined threshold levels were determined and the impact of catastrophic health care payment matters more for poor or rich households by calculating concentration indices was presented. The study findings reflect views and voices of stakeholders, particularly the target beneficiaries at the grassroots levels. However the results presented in this report could form the basis for designing and undertaking a quantitative household-level survey.

Incidence of catastrophic health care payment was calculated by household catastrophic headcounts. Since more than half of the sample did not incur catastrophic payments, the incidences are not so high. This may be under-reporting of health care payments and lack of health care access. Although incidences are not high, the average overshoot and mean positive gap results implying an extremely high intensity of catastrophic health care payments especially in urban areas of the Yangon division. Moreover there was an existence of outlier households which belonged to all catastrophic threshold levels and used up all of their income and assets by health care payments. Underestimation of income may be the main possible underlying reason but, if it is reliable, those figures indicate the alarming state. There is significant income related inequality for health care payments and both the incidence and intensity of catastrophic health care payment become more concentrated among the poor households. Higher catastrophic impact for poor households is generally associated with foregoing initial formal treatment due to lack of purchasing power.

In conclusion, the attempts to develop at the national level and the regional level, will need economic, institutional, administrative and reforms, human resource development and poverty reduction programs, to name a few. The incidence of catastrophic health expenditures and the clearly voiced need for health care of good quality provide good ground for innovations; the communities seem to be “ready” for trying out something new and are quite willing to give full support. The major aspect we could not properly address in this study and analysis is how to deal with catastrophic health expenditures for an individual. It seems as if this aspect cannot be answered satisfactorily at present and we suggest to work on this aspect before operations commence and give it careful attention in the pilot phase. This uncertainty needs to be covered and be willing to pay substantial subsidies in the first phase of operation. At any rate, start of operations should be careful and very conservative.

## 6.2 Recommendations

The finding shown as negative values of concentration indices for overshoot indicated that there was income inequality among overshoot households and that poorer households pay much more for health care than the rich ones. More interventions concerning the health care payments are recommended as following:

### 6.2.1 Recommendations for further research

1) In the catastrophic health care payment, the threshold is in terms of payments and set as a proportion of pre-payment income and is classified as *catastrophic* and in this study, only this approach can be done and cannot do another threshold as *impoverishing*. The incidence and intensity of impoverishing impact should be done as a supplementary to catastrophic health care payments in order to accomplish the mission.

2) Health is a function, not only of medical care, but also of the overall integrated development of socio-cultural, economic, educational, and political factors. Therefore, to raise the health status and quality of life, a focused approach integrating the development of social, cultural, economical, educational to bring about overall transformation of a society is need.

3) In this study, the data were not specific for catastrophic health care payments and study area was not nationally representative. So further studies should be done with more relevant data and nationally representative surveys for catastrophic health care payments in Myanmar.

4) The time series methods should be applied in analysis, we can determine whether the payment problem is more or less intensified in the future.

### **6.2.2 Recommendations for policy implications**

1) In order to reduce the financial burden of health care services both in urban and rural areas, should be made more affordable especially for poor households. Affordability can be increased by minimizing the expenses of commuting from rural to urban for basic minimum health services. This can be achieved by increasing the coverage and promoting the quality of health care services available from rural health centers and sub centers.

2) There is no universal formula that can be used to help poor countries design ways to reduce out of pocket payments. Countries at different stages of economic development and in different social and political contexts have different problems and will develop different solutions. Because all types of systems take time to fully mature, mixes of prepayment mechanism types, including taxes and insurance contributions, are likely to be found in the transition period. So the key to reducing financial catastrophe is moving away from out of pocket payments to prepayment mechanisms. In Myanmar, all people have been entitled to free primary health services from public facilities since 1978. In 1996, a community cost sharing scheme was implemented for the essential drugs and hospital treatment but the poor are still entitled to free health care from public facilities in principle. But there is no uniform standard on whom, how much and what services are entitled for the poor. Although both pre- payment and out of pocket payments are expenditure made eventually by households, they are fundamentally different in financing health care. Pre- payment mechanisms improve equal access to services and protect households from financial loss while out-of-pocket payments can be a barrier for accessing health services and a heavy financial burden of ill health to a low income household. The analysis of catastrophic health care payments revealed that health care cost constitute a very high

barrier to accessing health services for households in need. In order to alleviate this situation, policy makers should consider some form of social health protection.

3) The Ministry of Health can actively advocate for complementary policies to reduce social inequalities and increased funding for health because they can improve health, reduce the chances of financial catastrophe, help poor households escape from poverty, and contribute to overall economic growth.



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### APPENDIX A

Map of Yangon Division, Republic of Union of Myanmar



## APPENDIX B

### Computing the concentration index by the convenient covariance formula in SPSS

It can be computed easily by commanding SPSS syntax. The following command (SPSS syntax) can generate a concentration index for each catastrophic threshold level. The fractional rank variable ( $R_i$ ) can be computed by the RANK command. The CORRELATION command with the covariance option can be used to obtain the covariance between catastrophic health expenditure variable ( $E_i$  or  $O_i$ ) and the fractional rank variable. The DESCRIPTIVES command can then be used to calculate the mean of catastrophic health expenditure variable ( $\mu_E$  or  $\mu_O$ ).

The SPSS syntax below is for concentration index for catastrophic headcount ( $C_E$ )

```
RANK VARIABLES= inc (A) / RFRACRATIO into RNKINC / PRINT= YES / TIES= MEAN.  
CORRELATIONS /VARIABLES= rinc heat /STATISTICS XPROD / MISSING=PAIRWISE.  
DESCRIPTIVES VARIABLES= heat rinc /STATISTICS= MEAN.
```

## APPENDIX C

### 1. Concentration index for incidence of catastrophic health care payment at 10%, 20% and 30% threshold levels

**Table 4.17** Covariance for incidence of catastrophic health care payment at 10%, 20% and 30% threshold levels

	$\mu$ ( sample mean of y)	covariance	Result
<b>Both urban and rural</b>			
Hcat 10	9.4	-0.006	-0.0013
Hcat 20	5.6	-0.006	-0.0018
Hcat 30	4.2	-0.004	-0.0019
Gcat 10	5.9	-0.105	-0.0356
Gcat20	5.1	-0.155	-0.0608
Gcat 30	4.6	-0.187	-0.0813
<b>Urban</b>			
Hcat 10	8.5	-0.006	-0.0014
Hcat 20	5.5	-0.005	-0.0018
Hcat 30	4.5	-0.005	-0.0022
Gcat 10	8	-0.022	-0.0055
Gcat20	7.3	-0.021	-0.0058
Gcat 30	6.8	-0.021	-0.0062
<b>Rural</b>			
Hcat 10	10.3	-0.005	-0.00097
Hcat 20	5.6	-0.004	-0.00143
Hcat 30	3.8	-0.004	-0.00211
Gcat 10	3.8	-0.005	-0.00263
Gcat20	3	-0.004	-0.00267
Gcat 30	2.5	-0.004	-0.00320

**2. Concentration index for incidence of catastrophic health care payment at 10% threshold level**

**Table 4.18** Covariance for incidence of catastrophic health care payment at 10% threshold level

		Fractional Rank of income	hcat10
Fractional Rank of income	Pearson Correlation	1	-.068
	Sig. (2-tailed)		.002
	Sum of Squares and Cross-products	166.200	-11.392
	Covariance	.083	<b>-.006</b>
	N	2000	2000
hcat10	Pearson Correlation	-.068	1
	Sig. (2-tailed)	.002	
	Sum of Squares and Cross-products	-11.392	170.328
	Covariance	<b>-.006</b>	.085
	N	2000	2000

Calculation of Concentration index for incidence of catastrophic health care payment at 10% threshold level

$$C_E H_{cat} = 2 \times (-0.006) / 9.4 = \mathbf{-0.0013}$$

**Table 4.19** Covariance for incidence of catastrophic health care payment at 10% threshold level for Urban

		Fractional Rank of income	hcat10
Fractional Rank of income	Pearson Correlation	1	-.080
	Sig. (2-tailed)		.012
	Sum of Squares and Cross-products	83.086	-6.398
	Covariance	.083	<b>-.006</b>
	N	1000	1000
hcat10	Pearson Correlation	-.080	1
	Sig. (2-tailed)	.012	
	Sum of Squares and Cross-products	-6.398	77.775
	Covariance	<b>-.006</b>	.078
	N	1000	1000

Calculation of Concentration index for incidence of catastrophic health care payment at 10% threshold level for urban

$$C_E H_{cat} = 2 \times (-0.006) / 8.5 = \mathbf{-0.0014}$$

**Table 4.20** Covariance for incidence of catastrophic health care payment at 10% threshold level for Rural

		Fractional Rank of income	hcat10
Fractional Rank of income	Pearson Correlation	1	-.059
	Sig. (2-tailed)		.064
	Sum of Squares and Cross-products	83.109	-5.142
	Covariance	.083	<b>-.005</b>
	N	1000	1000
hcat10	Pearson Correlation	-.059	1
	Sig. (2-tailed)	.064	
	Sum of Squares and Cross-products	-5.142	92.391
	Covariance	<b>-.005</b>	.092
	N	1000	1000

Calculation of Concentration index for incidence of catastrophic health care payment at 10% threshold level for rural

$$C_E H_{cat} = 2 \times (-0.005) / 10.3 = \mathbf{-0.00097}$$

**3. Concentration index for incidence of catastrophic health care payment at 20% threshold level**

**Table 4.21** Covariance for incidence of catastrophic health care payment at 20% threshold level

		Fractional Rank of income	hcat20
Fractional Rank of income	Pearson Correlation	1	-.070
	Sig. (2-tailed)		.002
	Sum of Squares and Cross-products	166.200	-9.286
	Covariance	.083	<b>-.005</b>
	N	2000	2000
hcat20	Pearson Correlation	-.070	1
	Sig. (2-tailed)	.002	
	Sum of Squares and Cross-products	-9.286	104.840
	Covariance	<b>-.005</b>	.052
	N	2000	2000

Calculation of Concentration index for incidence of catastrophic health care payment at 20% threshold level

$$C_E H_{cat} = 2 \times (-0.006) / 5.6 = \mathbf{-0.0018}$$

**Table 4.22** Covariance for incidence of catastrophic health care payment at 20% threshold level ( Urban )

		Fractional Rank of income	hcat20
Fractional Rank of income	Pearson Correlation	1	-.075
	Sig. (2-tailed)		.018
	Sum of Squares and Cross-products	83.086	-4.930
	Covariance	.083	<b>-.005</b>
hcat20	N	1000	1000
	Pearson Correlation	-.075	1
	Sig. (2-tailed)	.018	
	Sum of Squares and Cross-products	-4.930	51.975
	Covariance	<b>-.005</b>	.052
	N	1000	1000

Calculation of Concentration index for incidence of catastrophic health care payment at 20% threshold level ( Urban)

$$C_E H_{cat} = 2 \times (-0.005) / 5.5 = \mathbf{-0.0018}$$

**Table 4.23** Covariance for incidence of catastrophic health care payment at 20% threshold level ( Rural )

		Fractional Rank of income	hcat20
Fractional Rank of income	Pearson Correlation	1	-.066
	Sig. (2-tailed)		.038
	Sum of Squares and Cross-products	83.109	-4.353
	Covariance	.083	<b>-.004</b>
hcat20	N	1000	1000
	Pearson Correlation	-.066	1
	Sig. (2-tailed)	.038	
	Sum of Squares and Cross-products	-4.353	52.864
	Covariance	<b>-.004</b>	.053
	N	1000	1000

Calculation of Concentration index for incidence of catastrophic health care payment at 20% threshold level ( Rural )

$$C_E H_{cat} = 2 \times (-0.004) / 5.6 = \mathbf{-0.00143}$$

**4. Concentration index for incidence of catastrophic health care payment at 30% threshold level**

**Table 4.24** Covariance for incidence of catastrophic health care payment at 30% threshold level

		Fractional Rank of income	hcat30
Fractional Rank of income	Pearson Correlation	1	-.073
	Sig. (2-tailed)		.001
	Sum of Squares and Cross-products	166.200	-8.354
	Covariance	.083	<b>-.004</b>
hcat30	N	2000	2000
	Pearson Correlation	-.073	1
	Sig. (2-tailed)	.001	
	Sum of Squares and Cross-products	-8.354	79.556
	Covariance	<b>-.004</b>	.040
	N	2000	2000

Calculation of Concentration index for incidence of catastrophic health care payment at 30% threshold level

$$C_E H_{cat} = 2 \times (-0.004) / 4.2 = \mathbf{-0.0019}$$

**Table 4.25** Covariance for incidence of catastrophic health care payment at 30% threshold level ( Urban )

		Fractional Rank of income	hcat30
Fractional Rank of income	Pearson Correlation	1	-.076
	Sig. (2-tailed)		.016
	Sum of Squares and Cross- products	83.086	-4.538
	Covariance	.083	<b>-.005</b>
hcat30	N	1000	1000
	Pearson Correlation	-.076	1
	Sig. (2-tailed)	.016	
	Sum of Squares and Cross- products	-4.538	42.975
	Covariance	<b>-.005</b>	.043
	N	1000	1000

Calculation of Concentration index for incidence of catastrophic health care payment at 30% threshold level ( Urban )

$$C_E H_{cat} = 2 \times (-0.005) / 4.5 = -0.0022$$

**Table 4.26** Covariance for incidence of catastrophic health care payment at 30% threshold level ( Rural )

		Fractional Rank of income	hcat30
Fractional Rank of income	Pearson Correlation	1	-.068
	Sig. (2-tailed)		.031
	Sum of Squares and Cross- products	83.109	-3.758
	Covariance	.083	<b>-.004</b>
hcat30	N	1000	1000
	Pearson Correlation	-.068	1
	Sig. (2-tailed)	.031	
	Sum of Squares and Cross- products	-3.758	36.556
	Covariance	<b>-.004</b>	.037
	N	1000	1000

Calculation of Concentration index for incidence of catastrophic health care payment at 30% threshold level ( Rural )

$$C_E H_{cat} = 2 \times (-0.004) / 3.8 = \mathbf{-0.00211}$$

**5. Concentration index for intensity of catastrophic health care payment at 10% threshold level**

**Table 4.27** Covariance for intensity of catastrophic health care payment at 10% threshold level

		Fractional Rank of income	gcat10
Fractional Rank of income	Pearson Correlation	1	-.192
	Sig. (2-tailed)		.008
	Sum of Squares and Cross-products	166.200	-19.692
	Covariance	.083	<b>-.105</b>
	N	2000	2000
gcat10	Pearson Correlation	-.192	1
	Sig. (2-tailed)	.008	
	Sum of Squares and Cross-products	-19.692	597.933
	Covariance	<b>-.105</b>	3.198
	N	2000	2000

Calculation of Concentration index for intensity of catastrophic health care payment at 10% threshold level

$$C_o G_{cat} = 2 \times (-0.105) / 5.9 = \mathbf{-0.0356}$$

**Table 4.28** Covariance for intensity of catastrophic health care payment at 10% threshold level ( Urban )

		Fractional Rank of income	gcat10
Fractional Rank of income	Pearson Correlation	1	-.096
	Sig. (2-tailed)		.002
	Sum of Squares and Cross-products	83.086	-21.869
	Covariance	.083	<b>-.022</b>
	N	1000	1000
gcat10	Pearson Correlation	-.096	1
	Sig. (2-tailed)	.002	
	Sum of Squares and Cross-products	-21.869	618.559
	Covariance	<b>-.022</b>	.619
	N	1000	1000

Calculation of Concentration index for intensity of catastrophic health care payment at 10% threshold level ( Urban )

$$C_O G_{cat} = 2 \times (-0.022) / 8 = \mathbf{-0.0055}$$

**Table 4.29** Covariance for intensity of catastrophic health care payment at 10% threshold level ( Rural )

		Fractional Rank of income	gcat10
Fractional Rank of income	Pearson Correlation	1	-.082
	Sig. (2-tailed)		.010
	Sum of Squares and Cross-products	83.109	-5.031
	Covariance	.083	<b>-.005</b>
gcat10	N	1000	1000
	Pearson Correlation	-.082	1
	Sig. (2-tailed)	.010	
	Sum of Squares and Cross-products	-5.031	45.584
	Covariance	<b>-.005</b>	.046
	N	1000	1000

Calculation of Concentration index for intensity of catastrophic health care payment at 10% threshold level ( Rural )

$$C_O G_{cat10} = 2 \times (-0.005) / 3.8 = \mathbf{-0.00263}$$

## 6. Concentration index for intensity of catastrophic health care payment at 20% threshold level

**Table 4.30** Covariance for intensity of catastrophic health care payment at 20% threshold level

		Fractional Rank of income	gcat20
Fractional Rank of income	Pearson Correlation	1	-.246
	Sig. (2-tailed)		.009
	Sum of Squares and Cross-products	166.200	-17.067
	Covariance	.083	<b>-.155</b>
	N	2000	2000
gcat20	Pearson Correlation	-.246	1
	Sig. (2-tailed)	.009	
	Sum of Squares and Cross-products	-17.067	555.016
	Covariance	<b>-.155</b>	15.046
	N	2000	2000

Calculation of Concentration index for intensity of catastrophic health care payment at 20% threshold level

$$C_O G_{cat} = 2 \times (-0.155) / 5.1 = \mathbf{-0.0608}$$

**Table 4.31** Covariance for intensity of catastrophic health care payment at 20% threshold level ( Urban )

		Fractional Rank of income	gcat20
Fractional Rank of income	Pearson Correlation	1	-.095
	Sig. (2-tailed)		.003
	Sum of Squares and Cross-products	83.086	-21.277
	Covariance	.083	<b>-.021</b>
gcat20	N	1000	1000
	Pearson Correlation	-.095	1
	Sig. (2-tailed)	.003	
	Sum of Squares and Cross-products	-21.277	604.461
	Covariance	<b>-.021</b>	.605
	N	1000	1000

Calculation of Concentration index for intensity of catastrophic health care payment at 20% threshold level ( Urban )

$$C_O G_{cat} = 2 \times (-0.021) / 7.3 = \mathbf{-0.0058}$$

**Table 4.32** Covariance for intensity of catastrophic health care payment at 20% threshold level ( Rural )

		Fractional Rank of income	gcat20
Fractional Rank of income	Pearson Correlation	1	-.078
	Sig. (2-tailed)		.014
	Sum of Squares and Cross-products	83.109	-4.434
	Covariance	.083	<b>-.004</b>
gcat20	N	1000	1000
	Pearson Correlation	-.078	1
	Sig. (2-tailed)	.014	
	Sum of Squares and Cross-products	-4.434	39.374
	Covariance	<b>-.004</b>	0.039
	N	1000	1000

Calculation of Concentration index for intensity of catastrophic health care payment at 20% threshold level ( Rural )

$$C_O G_{cat20} = 2 \times (-0.004) / 3 = \mathbf{-0.00267}$$

**7. Concentration index for intensity of catastrophic health care payment at 30% threshold level**

**Table 4.33** Covariance for intensity of catastrophic health care payment at 30% threshold level

		Fractional Rank of	
		income	gcat30
Fractional Rank of income	Pearson Correlation	1	-.269
	Sig. (2-tailed)		.014
	Sum of Squares and Cross-products	166.200	-15.350
	Covariance	.083	<b>-.187</b>
	N	2000	2000
gcat30	Pearson Correlation	-.269	1
	Sig. (2-tailed)	.014	
	Sum of Squares and Cross-products	-15.350	526.455
	Covariance	<b>-.187</b>	6.420
	N	2000	2000

Calculation of Concentration index for intensity of catastrophic health care payment at 30% threshold level

$$C_O G_{cat} = 2 \times (-0.187) / 4.6 = \mathbf{-0.0813}$$

**Table 4.34** Covariance for intensity of catastrophic health care payment at 30% threshold level ( Urban )

		Fractional Rank of income	gcat30
Fractional Rank of income	Pearson Correlation	1	-.094
	Sig. (2-tailed)		.003
	Sum of Squares and Cross-products	83.086	-20.759
	Covariance	.083	<b>-.021</b>
	N	1000	1000
gcat30	Pearson Correlation	-.094	1
	Sig. (2-tailed)	.003	
	Sum of Squares and Cross-products	-20.759	591.180
	Covariance	<b>-.021</b>	.592
	N	1000	1000

Calculation of Concentration index for intensity of catastrophic health care payment at 30% threshold level ( Urban )

$$C_O G_{cat} = 2 \times (-0.021) / 6.8 = \mathbf{-0.0062}$$

**Table 4.35** Covariance for intensity of catastrophic health care payment at 30% threshold level ( Rural )

		Fractional Rank of income	gcat30
Fractional Rank of income	Pearson Correlation	1	-.075
	Sig. (2-tailed)		.018
	Sum of Squares and Cross-products	83.109	-3.999
	Covariance	.083	<b>-.004</b>
	N	1000	1000
gcat30	Pearson Correlation	-.075	1
	Sig. (2-tailed)	.018	
	Sum of Squares and Cross-products	-3.999	34.111
	Covariance	<b>-.004</b>	.034
	N	1000	1000

Calculation of Concentration index for intensity of catastrophic health care payment at 30% threshold level ( Rural )

$$C_O G_{cat} = 2 \times (-0.004) / 2.5 = \mathbf{-0.00320}$$

**8. Comparison between urban and rural income**

**Table 4.36** Comparison between urban and rural income

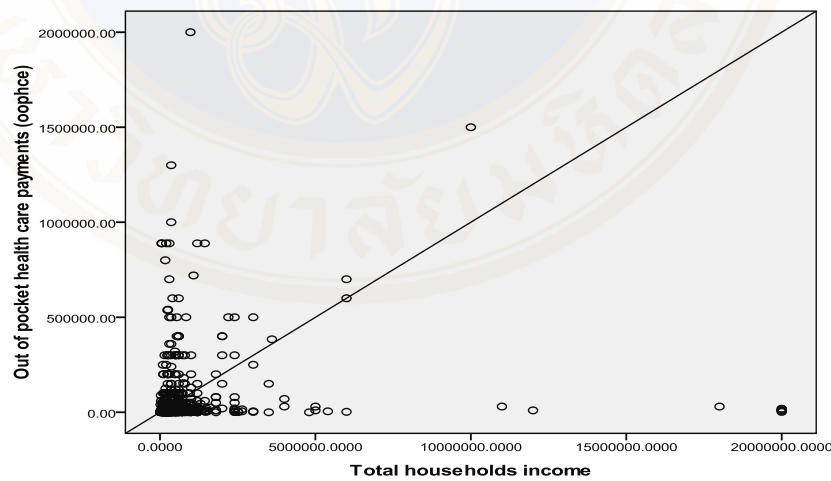
	N	Mean	StDev	SE Mean
Urban income	1000	718331	2153978	68115
Rural income	1000	715291	1886505	59657
Difference	1000	3040.30	2877354.82	90989.95

95% lower bound for mean difference: -146763.76

T-Test of mean difference = 0 (vs > 0): T-Value = 0.03 P-Value = 0.487

There is no significant at 0.05 level of significant that not too difference between urban and rural areas.

**9. Correlation between household income and out of pocket health care payments**



Pearson correlation of households income and oophce = 0.08

P-Value = 0.01

**Figure 4.1** Correlation between households income and out of pocket health care payments

This is significant at 0.05 level of significant that there is a relationship between the households income and out of pocket health care payments (oophce). The coefficient of correlation confirms the positive linear relationship. In this figure showed that most of the household spent the health care payments less than 5,000,000 kyats and the result showed that if the income amount is increased , the out of pocket health care payments will be also increased and it has directly relationship.

### 10. Probability of incurring catastrophic payments in South East Asia Countries

**Table 5.1** Probability of incurring catastrophic payments in South East Asia

Countries	Bangladesh		Hong Kong		India		Sri Lanka		Thailand	
	estimate	SE	estimate	SE	estimate	SE	estimate	SE	estimate	SE
<b>OOP &gt; 5% total exp.</b>										
hholds. > threshold	27.63%		12.98%		25.59%		10.97%		8.43%	
Probit	<b>0.8096</b>	0.0586	<b>0.1196</b>	0.0339	<b>0.3958</b>	0.0102	<b>0.1841</b>	0.0344	<b>0.2850</b>	0.0267
Endog. corrected Probit	-0.3221	0.2714	<b>-0.6595</b>	0.2897	<b>-0.1784</b>	0.0711	<b>0.1800</b>	0.0990	0.0848	0.0595
Exogeneity test [ $\chi^2(1)$ ]	16.6	p=.0000	7.37	p=.0066	66.41	p=.0000	0.00	p=.9641	14.77	p=.0001
<b>OOP &gt; 10% total exp.</b>										
hholds. > threshold	15.57%		5.86%		10.84%		2.98%		3.52%	
Probit estimate	<b>0.8860</b>	0.0645	<b>0.1499</b>	0.0408	<b>0.4462</b>	0.0125	<b>0.3252</b>	0.0469	<b>0.3898</b>	0.0325
Endog. corrected Probit	-0.1874	0.2939	-0.5418	0.3654	-0.1285	0.0892	0.1678	0.1421	0.0740	0.0759
Exogeneity test [ $\chi^2(1)$ ]	13.38	p=.0003	3.65	p=.0561	42.14	p=.0000	1.38	p=.2406	22.71	p=.0000
<b>OOP &gt; 15% total exp.</b>										
hholds. > threshold	9.87%		3.04%		5.52%		1.54%		1.92%	
Probit estimate	<b>0.9941</b>	0.0748	<b>0.2199</b>	0.0506	<b>0.5676</b>	0.0156	<b>0.4203</b>	0.0576	<b>0.4161</b>	0.0388
Endog. corrected Probit	-0.1491	0.3296	-0.3594	0.4344	-0.1196	0.1117	0.0296	0.1834	0.0641	0.0933
Exogeneity test [ $\chi^2(1)$ ]	12.02	p=.0005	1.8	p=.1801	38.34	p=.0000	5.01	p=.0252	18.89	p=.0000
<b>Instrument validity</b>										
Significance of IVs in RF	F <sub>2,339</sub> =	72.9	F <sub>1,7606</sub> =	118.44	F <sub>4,118775</sub> =	532.67	F <sub>3,9321</sub> =	436.32	F <sub>2,17457</sub> =	1242.65
		p=.0000		p=.0000		p=.0000		p=.0000		p=.0000
Overidentification test	$\chi^2(1)=0.32$	p=.5725	just identified		$\chi^2(3)=19.81$	p=.0000	$\chi^2(2)=4.00$	p=.1354	$\chi^2(1)=2.76$	p=.0968

*Source: Explaining the incidence of catastrophic expenditures on health care: Comparative evidence from Asia, Doorslaer et al 2005.*

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