Catastrophic health expenditure and demand for health insurance in Nepal in the era of universal health coverage: implications for equity

ユニバーサル・ヘルス・カバレッジの時潮の中でのネパールにおける破滅的医療支出と医療保険需要：公平性への含意

Doctoral Dissertation

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Table of Contents

List of Tables

List of Figures

List of Appendices

Abbreviations

CBHI	Community-Based Health Insurance
CBS	Central Bureau of Statistics
CHE	Catastrophic Health Expenditure
CI	Confidence Interval
CTP	Capacity to Pay
CVM	Contingent Valuation Method
EHCS	Essential Health Care Service
GDP	Gross Domestic Product
GoN	Government of Nepal
LMICs	Low-and Middle- Income Countries
MHI	Mutual Health Insurance
MoHP	Ministry of Health and Population
NCDs	Non-Communicable Diseases
nFE	non-Food Expenditure
NHIS	National Health Insurance Scheme
NLSS	Nepal Living Standards Survey
NRs	Nepali Rupees
OLS	Ordinary Least Square
OOP	Out-of-pocket Payment
OR	Odds Ratio
PPP	Purchasing Power Parity
PPS	Probability Proportional to Size
PSU	Primary Sampling Unit

RESET	Ramsey Regression Equation Specification Error Test
SD	Standard Deviation
SDGs	Sustainable Development Goals
se	subsistence expenditure
SHSDC	Social Health Security Development Committee
SHSP	Social Health Security Program
TE	Total Expenditure
THE	Total Health Expenditure
TI	Total Income
TIOLI	Take-It-Or-Leave-It offer
UHC	Universal Health Coverage
VIF	Variance Inflation Factor
WHO	World Health Organization
WTP	Willingness to Pay

Summary

Objectives

Built on the notion of equity, universal health coverage (UHC) ensures that; a) all people can access health care services of sufficient quality they need (service coverage), and b) all people using the needed health care services do not suffer from financial hardship (financial protection). As Nepal paves its way to UHC, it is crucial for Nepal to have evidence on equity reflecting what groups of population across the nation are most affected by catastrophic health expenditure (CHE), and whether a newly launched social health security program (SHSP) – voluntary national health insurance aspiring to attain UHC – covers those groups of population. An overarching aim of this thesis was to access equity implications of CHE and demand for SHSP in Nepal by uniquely integrating findings of the following objectives;

i) To measure the nation-wide incidence, distribution, and determinants of CHE in Nepal.

ii) To estimate the coverage of SHSP by measuring demand for SHSP using the contingent valuation method/willingness to pay (CVM/WTP) approach, and to examine determinants of demand for SHSP.

Background

Countries aspiring to attain UHC are suggested to devise their health system in such a way that health care services needed by people are financed according to their ability to pay to ensure that people are financially protected while seeking health care. Financial protection is attained when out-of-pocket payment (OOP), at the point of health care service use, does not

expose the user to financial hardship. OOP results in CHE if it exceeds a specified threshold of household expenditure. UHC financial protection focuses on the reduction of CHE incidence by covering everyone, regardless of their financial or health background, with risk-pooling mechanisms, such as health insurance. CHE is an official indicator to measure UHC financial protection. Despite the call of UHC to protect households from CHE, OOP still makes almost half of total health expenditure (THE) in majority of low-and middle- income countries because risk-pooling mechanisms in those countries are either absent or inadequate.

Nepal is a low-income country in South Asia. OOP finances nearly 48% of THE. As a response to the high OOP, Nepal has established different public health subsidies. However, due to the fragmented nature of those subsidies, necessary financial protection has not been achieved. Voluntary community-based health insurance programs are present but have sporadic coverage and suffer from the pro-rich bias. Despite Nepal's effort to lower OOP, households are exposed continuously to OOP and risk of CHE.

In 2016, Nepal established insurance scheme called SHSP, based on family contribution, designed to achieve UHC by mitigating CHE. Progress towards UHC, for Nepal, involves SHSP coverage expansion. Although SHSP is not yet implemented in majority of districts, Nepal aims to roll out SHSP throughout the country by 2020. However, the SHSP report in 2017 states that the SHSP coverage in SHSP- implemented districts is low (5%).

Often, due to insufficient focus on equity in expanding health insurance schemes, it is likely that the most vulnerable population are left behind by the coverage. Additionally, when health insurance is voluntary, such as SHSP, coverage of health insurance depends on households' demand for it. Therefore, a better understanding of households' attribute that

influences the voluntary purchase of health insurance is essential for the policymakers to improve the coverage of a health insurance scheme.

Despite limited financial protection, high reliance on OOP in financing treatment, and low enrolment statistics in SHSP, which would seem to call for analyses; there has not been any studies not only on equity implication on Nepal's path to UHC but also on CHE and demand of health insurance in Nepal. Thus, with an intention to fill the existing evidence gap in Nepal by achieving the objectives as mentioned earlier.

Method

Two data sources were used for two empirical studies. The first objective was achieved by the empirical study 1. Information from 5988 households from the Nepal Living Standards Survey 2010/11 dataset was used to determine the national incidence, distribution, and determinants of CHE. Health expenditure was defined as catastrophic if it exceeded 40% of the household's capacity to pay. Multivariable regression was used to explore the relationship between the household's characteristics and CHE. The empirical study 2 achieved the second objective. The primary data from the cross-sectional household survey (n=1220) undertaken in Kathmandu and Kanchanpur districts in 2017 was utilized. The survey applied the CVM/WTP approach to estimate household demand for SHSP. The CVM/WTP is a relevant approach to obtain consumer valuations of good or services when there is a lack of a previous market for those goods or services. SHSP is not available in many districts in Nepal. In this context, as SHSP do not yet exist in a real market, the CVM/WTP is the most suited approach to estimate demand for SHSP. The Tobit regression was used to determine factors influencing households' demand for SHSP.

Results

Based on the household-weighted sample, the empirical study 1 found that the cumulative incidence of CHE was 10.3% per month in Nepal. This incidence was concentrated in the far-western region and households in the poorer expenditure quartiles. Multivariable logistic regression revealed that households were more likely to face CHE if they; had chronically ill member(s), had a higher burden of acute illness and injuries, had elderly (≥60 years) member(s), belong to the poor income strata, and located in the far-western region. In contrast, households were less likely to incur CHE when their household head was literate.

The empirical study 2 found a substantial variation between regional demand for SHSP. Although the mean WTP for SHSP was NRs 2831.4 per year, households in Kathmandu and Kanchanpur were willing to pay an average of NRs 3457.4 and NRs 2249.9, respectively. The mean WTP stated by households in Kanchanpur was lower than NRs 2500 – the starting premium of SHSP laid out by the administrator of SHSP. Findings indicate that SHSP had a higher coverage in Kathmandu and a lower coverage in Kanchanpur. The Tobit regression and its marginal effect analysis showed that households were likely to state a higher demand for SHSP if they were from Kathmandu, headed by educated household head, professionally employed, high income, had chronic illness episodes, and had previous insurance experience compared with their respective counterparts. Finding also illustrated that households were significantly reluctant to pay for SHSP if they preferred to get health care services from private providers in future.

Findings of two empirical studies when seen together exhibit the following: first, SHSP may fall short in coverage to provide equitable financial protection in health to the population in the far-west region (one of the most disadvantaged regions in Nepal) where CHE is concentrated. Second, many households from the low-income strata that have a

higher likelihood of incurring CHE remain uninsured even after the establishment of SHSP, exposing themselves to risk of OOP and subsequent CHE. Third, SHSP showed a tendency to attract health risk population. High health risk individuals are those regularly exposed to risk of CHE as demonstrated by the nation-wide data in the empirical study 1. Finally, SHSP does not seem to be inclusive in its coverage as it misses to attract the households with no education which indeed are the households exposed to CHE when compared with educated households.

Conclusions

On the one hand, empirical study 1 identified a high incidence of CHE in Nepal. CHE was disproportionately concentrated in the low-income household and households located in the disadvantaged regions. On the other hand, empirical study 2 found that SHSP leaves behind the low-income households and households in disadvantaged district – Kanchanpur. The agenda for universality in financial protection cannot be attained if SHSP does not cover those vulnerable population at risk of incurring CHE. Reluctance of Kanchanpur residents, poor households, and households headed by illiterate heads to voluntarily enroll to SHSP implies that SHSP should re-design the current institutional arrangements to cover those population as they are the ones at high risk of CHE. It is crucial for SHSP to ensure the equity and not to leave the disadvantaged population behind. These studies suggest that SHSP should reach the poor and disadvantaged population to ensure the equity as those are the populations not only likely incur CHE and but also likely to be missed out by SHSP coverage.

CHAPTER 1. BACKGROUND

BACKGROUND

1.1 Financial protection in health and universal health coverage

Financial protection in health is once again at the forefront of global health financing policy discussions. This resurgence of interest in health protection can be fairly attributed to the United Nation's sustainable development goals (SDGs) among others. Launched in 2015, SDGs (goal 3, target 3.8) targets to attain universal health coverage (UHC) by 2030 (1). Built on the notion of equity, UHC focuses on two aspects; a) that all people can access quality health care services they need (also referred to as service coverage); and b), that all people using the needed health care services do not suffer from financial hardship (also referred to as financial protection) (1, 2). These two, service coverage and financial protection, are adopted as the indicators to measure progress towards UHC by the SDGs (Figure 1) (1). Of them, financial protection, indicator 3.8.2 of UHC in the SDG framework is the focus of this thesis.

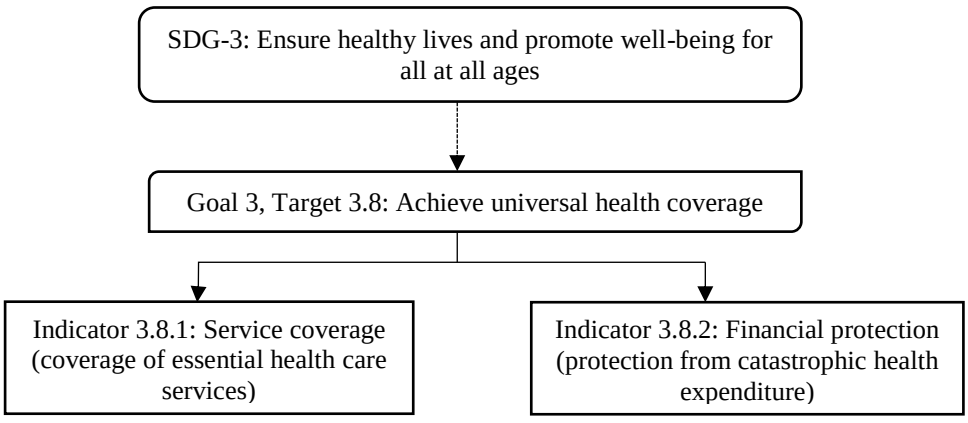

Figure 1 Target 3.8 and its indicators adopted from United Nations SDG Framework (1)

Financial protection in health is attained when out-of-pocket payment (OOP), at the point of health care service use does not expose people to financial hardship (3). OOP include payment for service fees, medicines, outpatient services, inpatient services. Any OOP in

health care that exceeds a specified threshold of household expenditure is catastrophic and is also referred to as catastrophic health expenditure (CHE) (4-6). A retrospective observational study states that globally more than 800 million people incur CHE, annually (6). Financial protection in health, primarily, focuses on the reduction of CHE incidence by covering everyone, regardless of their financial or health background, with risk-pooling mechanisms.

The range of risk-pooling mechanisms such as taxation, social health insurance, voluntary health insurance is considered as the effective policy option to offer financial protection in health (3). Risk-pooling mechanisms allow financial contribution to be collected before someone falls ill. The basic idea is to distribute financial risk related to health care use for which there is an uncertain need to all the members of the pool (7). When a country's financing system is financed through one or mix of the above-mentioned risk-pooling mechanisms, risk of CHE is reduced (2). Inversely, when a country's health financing system lacks risk-pooling mechanisms, households either forgo health care or seek health care privately via OOP (8). A greater reliance on OOP to finance health care cost is likely to increase probability of CHE (8).

The global community agrees that progress towards UHC requires measurement of CHE resulted from OOP (2). CHE increases financial burden to households and threatens their standards of living. A common understanding is that when health care expenditure becomes catastrophic, it reduces household's ability to pay on other essential items, such as food and education (9), hampering its living standards. Furthermore, household incurring CHE are more likely to compromise their children's education (10), sell assets (11), and are even pushed into poverty (8) to pay for health care. Monitoring CHE helps to understand how well health financing arrangements of the country has protected the population against OOP

associated with health care services (2). As an attempt to understand country's progress towards UHC, the global community mandates countries to generate evidence on CHE.

1.2 Health insurance in the context of UHC

A greater reliance on risk-pooling mechanisms, rather than OOP, is crucial for UHC attainment. A range of mechanisms providing insurance function and contributing to replacing OOP exists (12). Types of risk-pooling mechanisms with insurance function categorized on the basis of contribution and if contribution determines entitlements are; general tax-based, earmarked tax, social health insurance, voluntary insurance, and private insurance (13). The first two provide implicit insurance function whereas the last three have explicit insurance function.

The source of pool in general tax-based system is general government tax revenues. Individuals contribute to the provision of health care services through taxes on income, property, purchases, and other items (14). Taxes are usually income-adjusted; wealthier pay more and poorer pay less. The government pools these resources and allocated across all the demands on government resources (for instance, health and education) through the regular budgeting process (14). The participation in this pool is mandatory. Entitlements to services are independent of payment made.

A pool funded by earmarked taxation is being increasingly adopted to finance progress towards UHC. Earmarking involves separating all or a portion of total revenue and setting it aside for a designated purpose (15). For example, tax revenues from alcohol or tobacco purchases used to fund health services.

In social health insurance, insurance premium is paid either by employees or by their employer based on the salary that covers a package of service available to the insured and

their dependents (16). In many cases, those premiums are based on ability to pay and are made compulsory by the government. In social health insurance, governments also extend coverage to people who are self-employed, informal sector workers, unemployed or cannot contribute to social health insurance entitlements by subsidizing via government tax or non-tax revenues or exempting them from premiums (12).

Voluntary (community) health insurance schemes, such as community-based health insurance (CBHI), are schemes where the decision to pay for and join into the health insurance scheme is voluntary (17). The pooling of fund takes place at the level of a community who share common attributes. Entitlements are based on premiums made. Premium of such schemes is usually community-rated (each contributor in the community paying the same premiums regardless of ability to pay and an individual's health risks (18). CBHIs are commonly found in low-and middle- income countries (LMICs) (18).

Private health insurance is also voluntary health insurance. In private health insurance, premiums are not based on ability to pay but are based according to actuarially-based risk, that is, premium depends on risk of an individual; higher health risk individual pays a higher premium and lower health risk individual pay a lower premium (19). Risk factors also include age, gender, or any other pre-existing health conditions and entitlements are based on premiums made (19). Private health insurance is not the scope of this thesis as the thesis focuses on the government's initiative to risk-pooling and financial protection.

1.3 Equity in the context of UHC

UHC seeks health system to be equitable. Equity in access in health care services and equity in financing are embodied in the core of UHC. Equity in access implies equal access to health care services for the same need (20). Equity in financing focuses on the principle that

payments to health care services are in line with the ability to pay (14) to ensure that use of those health care services do not expose the service user to financial hardship (3). Where the payments are made on ability to pay and health care received is based on the need, a cross-subsidization from healthier individual to sicker, and from wealthier individual to poorer takes place (14). Unequal payment according to unequal ability to pay is considered as progressive payment because wealthier individuals pay a higher amount relative to poorer individuals.

OOP is considered the most inequitable and regressive form of health financing because wealthier and poorer individuals pay the same amount for the same service use on a fee-for-service basis (3), meaning that the poorer population and their wealthier counterpart pay the same fee for the same service regardless of their ability to pay. OOP may impact negatively in health care service utilization, particularly among the poor population as those population cannot afford to pay for health care services. This may exacerbate the gap in access of health care service between the poorer population and wealthier population.

1.4 Financial protection in health in LMICs

The greater episodes of CHE are associated with the higher proportion of OOP in the total health expenditure (THE) at the health system level (9). Reversely, OOP in health is found to decline when government expenditure on health care increases (6). The share of government health expenditure is lowest in LMICs particularly from South Asia (21) in contrast to LMICs of other regions. LMICs from Africa, for instance, Rwanda, Zambia, Senegal, and Tanzania's OOP comprised 21%, 24%, 32%, and 32% of the THE, respectively (22). Despite a call of UHC to protect households from CHE, OOP still makes almost half of the THE in most South Asian countries (23). For instance, OOP in India in 2014 accounted 62% (24), in

Bangladesh 64% (25), and in Nepal OOP accounted 48% share in the THE (23). Urgency to replace OOP by establishing some forms of health insurance in such countries is endorsed to achieve and sustain UHC.

The path towards UHC is not without any challenges. Moving towards UHC does not only require a strong political commitment but also requires strong solidarity to benefit all sections of the community, fairly (26). Financial viability while maintaining coverage and quality of services can be a significant challenge to LMICs those have already embarked their journey to UHC. In many LMICs, because of a larger population working in the informal economy, there are difficulties for taxation and compulsory social health insurance based on employment (3). Voluntary health insurance based on individual contribution is mainly seen in a majority of LMICs to replace OOP and move closer to UHC (18).

Some of LMICs have responded the call of UHC to ensure financial protection in health by establishing prepayment mechanisms. Countries such as Thailand, Vietnam, and the Philippines implemented social health insurance based on individual contribution to move towards UHC (27). Rwanda's *Mutuelle de Santé*- Mutual Health Insurance (MHI) provides financial protection to over 90% of the population (28) and is a noteworthy example which reflects that the CBHI can be an effective insurance policy to achieve financial protection in health. In MHI, participation is made compulsory by law and premium is based on the economic status of an individual (28). Ghana's National Health Insurance Scheme (NHIS), a voluntary health insurance scheme based on household contribution, covers more than 50% of the population and since the launch of the scheme in 2003, OOP was estimated to drop by 3% to 6% (29). However, it may be likely that insurance scheme based on voluntary contribution might have equity implications. Those schemes might exclude the poorest group from insurance scheme when premium is not adjusted to income as warned by Ekman (30)

because those households are unable to pay for insurance premium. This exclusion was seen in Ghana's insurance scheme that covered 52% of the wealthiest quintile and just 18% of the poorest (29).

Against this background, Nepal has also adopted social health security program (SHSP), based on households' voluntary contribution, with an intention to reduce OOP, improve financial protection among Nepalese households, and help Nepal achieve UHC (31). SHSP is the health insurance addressed by this thesis.

1.5 Overview of the socio-economic context of Nepal

Nepal is the field of this study.

Nepal, with its per capita income of 835 US$ in 2017 (32), remains one of the poorest and slowest growing economies in South Asia. Located in between India and China and spread in 147181 square kilometers, Nepal is home to 28.5 million people (33). It is a country with treacherous mountain topography, predominant rural population, and multiplicity of ethnic groups. Agriculture remains the largest employer accounting about 67% of employment (33). Besides agriculture, remittance has been contributing to the country's economic development. Seven out of 10 active population are engaged in an informal economy in Nepal (34).

From north-to-south transect, Nepal has three geographical belts, mountain, hill, and tarai. These belts represent an ecological variation of Nepal. Administratively, Nepal is divided into seven provinces[1], one to seven, from the east to the west. However, these

[1] Adopting the new constitution of 2015, Nepal has transitioned to decentralized democratic, federal, and secular republic from centralized administrative system. With the federalism, the central government of Nepal now shares power with 753 local governments and 7 provincial governments (33).

This thesis comprises of 2 study objectives. The first study objective- measurement of national incidence of CHE- was achieved from the secondary data analysis from the data collected in 2010/11 i.e., before federalism,

provinces are not developed proportionately. For example, province 3 which consists of Kathmandu (capital city) is more prosperous than other provinces. The Nepal living standards survey- third (NLSS-III), a nationwide household survey conducted in 2010/11 to measure the household welfare, estimates that around 25% of the population is below the poverty line (35). Poverty is not distributed evenly in all the provinces. Poverty is highest in province 7 (45%) while the lowest in province 1 (16%) (36). Further, rural Nepal has higher poverty than urban part (36).

The demographic dividend at the national level has already begun in Nepal as the share of the population that is working age is now higher than the share of the population that is not, lowering the dependency ratio. This is the result of a sharp decline in the mortality rate and fertility rate. For instance, the fertility rate declined from 4.9 children per woman of childbearing age in 1995 to 2.3 in 2015 (37). Average literacy rate in Nepal is 65% but greatly varies among population and regions. The literacy rate among female population six years of age and over is lower (57%) than that for males (75%) (38). Internal migration is high due to rapid urbanization. Kathmandu valley is the popular destination of internal migration which constituted about 46% from rural areas and 58% from other urban areas in 2011 (39) signposting a potential increase in urban poor population.

1.6 Health indicators of Nepal

Against the background of stagnant economic growth, Nepal has made remarkable achievements in some health indicators. Reduction in maternal mortality ratio from 539 per 100000 live births in 1996 to 239 per 100000 live births in 2016 (40) is noteworthy.

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so the analysis of that objective has five administrative regions- eastern, central, western, mid-western, and far-western instead of seven provinces.

Similarly, reduction in infant mortality rate to 32 per 1000 form 64 per 1000 and reduction of under-5 mortality rate to 39 from 91 per 1000 in the same period (40) gained Nepal an international recognition for staying on a track to achieve health-related millennium development goals. Immunization coverage is ever expanding. For instance, >80% of the target population were covered by all vaccines included in the national immunization program (41). Similarly, Nepal witnessed an increase in life expectancy at birth from 59.2 years in 1996 to 69.9 years in 2015 (42). These achievements aside, Nepal now faces new sets of challenges.

Epidemiological and demographical transition, emerging diseases, and health inequality among income quintiles and geographic locations are alarming challenges to the Nepalese health system. Nepal is facing an increasing burden of non-communicable diseases (NCDs). Major NCDs in Nepal are cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases. The mortality between 30 and 70 years of years from those NCDs were 2.8 per 1000 population in 2015 (41). Similarly, mortality rates attributed to unsafe water, sanitation, and handwashing was 37.7 per 100000 population in 2015 (41). While NCDs are increasingly becoming common in urban areas, rural Nepal is still plagued by infectious diseases (41) creating a double-burden of diseases.

1.7 Health care provision in Nepal

The Ministry of Health and Population (MoHP) of the Government of Nepal (GoN) plays a leadership role in the process of health policy and strategy formulation, program development, and service delivery. Under the MoHP, the department of health services is responsible for delivering preventive, promotive and curative health services throughout the

country. Nepal has a pluralistic health system with a multitude of health care facilities. These health facilities can be broadly classified into public and private.

Public health facilities are categorized into three levels based on the services they provide. These three levels are; primary, secondary, and tertiary (43). In the primary level, female community health volunteers, primary health care outreach clinics, community health units, health posts, primary health care centers provide health services. Primary health facilities serve as a linkage between community and referral hospital at the secondary level. In secondary level, district hospitals are the service providers. These are the first referral points from primary level. The final level is tertiary. The tertiary level consists of zonal, regional, and central hospitals. This level provides the most advanced health care and serves as a second-level referral point.

Apart from public health providers, Nepal also consists of private providers. Private health providers are present in the form of pharmacies, clinics, nursing homes, hospitals (private medical college hospitals, nongovernmental organization or community-run hospitals), and informal providers (such as traditional healers) (44). Private health providers are centered in urban areas. Private hospitals make 58% of total hospitals present in Nepal (45). The private for-profit sector dominates in providing curative care (46). A total of 63% consultation takes place in private health facilities, clinics (28%) and pharmacy (25%) make the highest share of private consultations (35). More often, government financing is not used to fund private provision, apart from some limited assistance to a few non-profit institutions and for some specific services, for instance in disease-specific case payment in the treatment of uterine prolapse (47). OOP in private health facilities are unregulated and often high-prices (48).

Health care provision in Nepal suffers from the uneven distribution of service providers and quality of service delivery across the country. In Nepal, 0.6 physician is available per 1000 population substantially less than the World Health Organization (WHO) recommendation of 2.3 per 1000 population (49). Significant equity gap continues to persist in Nepal pertaining to financial, regional, and institutional barriers (50). Wide variations in health care services availability and utilization indicate inequity in health care service access in Nepal. For instance, the rate of utilization of public health services is lowest in the low-income strata, almost half to that of the high-income strata (51). This utilization rate is double in educated households than that of households without education (51). Similarly, around 62% of the Nepalese households have access to health facilities within 30 minutes, with a wide variation between urban (86%) and rural (59%) households (35). Due to the lack of services and equipment in (especially rural public facilities), residents often bypass the nearest public health facility and turn up to either private providers or public health facilities in urban areas in search of quality service and competent providers (52).

1.8 Health financing landscape in Nepal

The GoN is committed to achieving UHC. This commitment to UHC in Nepal is backed by the National Health Insurance Policy 2013 (53), National Health Policy 2014 (54), Nepal Health Sector Strategy 2015-2020 (50). The following section presents key health expenditure indicators, health financing system, and a quest for UHC in Nepal.

1.8.1 Health care expenditure indicators

In 2014, the total expenditure in health accounted for 5.8% of the country's Gross Domestic Product (GDP) (23). General government expenditure on health translated into 1.1% of GDP

which was lower than the global average of 5.8% in 2015 and slightly higher than that of other South Asian countries average (0.9%) (55). Per capita government expenditure on health was 27.3 Purchasing Power Parity (PPP) in the international dollar ($) higher than the low-income country average (19.8 PPP$) but lesser than the South Asian countries average (54.1 PPP$) and much lesser than the global average (711.3 PPP$) in 2015 (56).

1.8.2 Health financing system in Nepal

Health financing system comprises three important functions; first, revenue generation; second, pooling; and third, purchasing services. These functions in relation to the Nepalese health financing system are explained as follows;

Revenue generation

Revenue generation is the process of raising money for the health system from various sources (57).

The principal source of financing health care in Nepal is OOP. Around 48% share of THE is comprised of OOP (23), and a large portion (80%) of OOP is made to private health care providers (23).

Government (public) funds are the second largest financing source. Government fund includes taxes, premiums to CBHI and SHSP, support from external development partners/donors (58). No data is available on the premium share of CBHI and SHSP (23) (CBHI and SHSP are voluntary health insurance schemes in Nepal, and their explanations are provided under separate headings “1.8.3.1 CBHI in Nepal” and “1.8.3.2 SHSP in Nepal”). However, financial aid from external development partners (also called as rest of the world) is important part ($1/5^{th}$) of Nepal’s THE (23).

Pooling

The pooling function of health financing system is concerned with how revenue (and contributions) or fund generated are put together (in a pool) (57).

Only slightly more than half of resources are pooled in the Nepalese health financing system. Publicly collected funds are pooled nationally. The MoHP utilizes public fund made available by the Ministry of Finance (58).

Often, funding provided by the external development partners are also channeled through the government by converting them into "on-budget" (47). Other public pools are from CBHI and SHSP premiums.

Purchasing

Purchasing function deals using the pooled fund to pay for providers for delivering services to the population (43).

The MoHP is a key purchasing agency in the Nepalese health financing system. It purchases health services through the documented process from public and some selected private providers utilizing the pooled funds (59). The payment mechanism to providers used by the MoHP includes line-item budgeting, capitation, output based budgeting (population-specific case payment, output based budgeting (disease-specific case payment) (59).

Revenue generation	Public	Donors	Out of pocket payment
Pooling	Public (MoHP)	Public (other)	No pooling
Purchasing	Public (MoHP)		Individual: direct payment for health services at the point of use by the service user.

Figure 2 Summary of health financing functions in Nepal (Adapted from (46))

Not all resources for health care services are pooled in Nepal. Almost half of the financing in Nepal is not pooled as it derives from OOP (Figure 2). In this case, individual (patient) must pay for his/her health care expenses directly to the service provider at a point of service use on a fee-for-service basis (46). Often, providers, in this case, are private health providers.

1.8.3 Quest for UHC in Nepal

The GoN has prioritized improving people's access to health care services. Nepal has the Safe Motherhood Program (*Ama Surakshya*) introduced in 2005 that provides conditional cash transfers for institutional deliveries at public health facilities as well as designated private facilities (60). In 2007, for the first time in the Nepalese history, health care was recognized as a fundamental human right by the interim constitution of Nepal which is now also recognized by the Constitution of Nepal (2015). The free essential health care service (EHCS) package also called free health policy was introduced in 2007 (61). The EHCS package in its initial years targeted the poor and marginalized population in an effort to improve their access to basic health services. Later, the package was extended to all receiving

service up to district level public health facilities. Besides, various schemes that provide subsidized treatment in registered hospitals have been introduced, such as subsidy in the treatment of heart disease, kidney problems, cancer, spinal and head injury, Alzheimer's disease, sickle cell anemia, and Parkinson's disease through *Bipanna Nagarik Kosh* (62). The GoN has also made provisions for free treatment of heart disease for elderly > 75 years and children < 15 years. About 70 types of essentials medicines are available from public health facilities at free of cost (61). (Appendix 1- Key global and local UHC initiatives)

Available statistics state that even after implementation of the EHCS, in 2013, nearly 20% outpatients were charged for the registration fee and medicines those were supposed to be free of cost (63). The demand for free essentials medicines generally outstrips supply at public facilities resulting in the need for patients to purchase those medicines from private facilities (64). For instance, health care providers from 93% of hospitals asked patients to buy essentials medicines (supposed to be available at public hospitals free of cost) from a private institution (63) exposing them to risk of CHE.

1.8.3.1 CBHI in Nepal

In 2003, the MoHP introduced CBHI scheme in six districts *(Dang, Kailali, Morang, Nawalparasi, Rauthat, Udayapur)* with an intention to provide financial protection for the poor and disadvantaged people. The MoHP provides a block grant to CBHI schemes to subsidize CBHI premium for disadvantaged groups *(Dalits, Janajatis)*. The CBHI management set premium on the basis of experience. Premiums to the schemes and their benefit package differs in each CBHI implemented district. The co-payment (payment made to health service providers by a service user) ranges from 10% to 80% of price of the service utilized (48).

The benefit packages cover medicine, diagnostic services, hospitalization, and transportation. These packages are in addition to free health service, the EHCS, introduced in 2007. CBHI schemes have referral services in its benefit package. Referrals are usually to the district or zonal public hospitals (48).

The review done in 2012 to analyze the performance of CBHI in those districts found that average coverage rate was strikingly low at 3.4% (48). Those CBHI schemes suffered from the pro-rich bias and were not able to provide financial protection to the poor against healthcare cost incurred (48). Majority of households were not covered with CBHI schemes exposing themselves to risk of incurring CHE. Two reasons could explain the weak results of CBHI schemes. First, CBHI schemes operated in a single community in isolation, meaning that CBHI schemes were not integrated to district-wide or national scheme resulting small pool. Second, the identification of poor and disadvantaged was made arbitrarily (48) which might have excluded the vulnerable groups from getting the membership of those schemes.

1.8.3.2 SHSP in Nepal

Learning from the CBHI experience, Nepal established a voluntary health insurance scheme, SHSP, in 2016 (65). In contrast to CBHI schemes, SHSP is a national health insurance program based on voluntary participation of households established and implemented by the Social Health Security Development Committee (SHSDC) (65). The SHSDC is a semiautonomous body of the GoN and a key implementer of SHSP. SHSP is expected to play a crucial role in driving Nepal towards achieving UHC (65). SHSP is expected to correct current inequities in access to health care services by making health care services available and accessible to everyone- rich and poor, educated and uneducated, urban residents and rural residents, alike (31). SHSP was piloted in three districts- *Kailai*, *Baglung*, and *Ilam* in April

2016 (31). SHSP premium is community-rated, independent of household income and health status of an individual.

Premium depends on family size. SHSP requires for the family size of 5 or smaller to pay a premium of NRs 2500 per annum for the membership and such families are entitled to health care services up to NRs 50000 (31). For the family size larger than 5, a starting premium of NRs 2500 for five members and an additional premium of NRs 425 per additional family member is set. The entitlement ceiling is NRs 50000 per year plus NRs 10000 per year per additional member or NRs 100000 per year (31). The government has indicated that SHSP premium will be subsidized to the poor however it is not clear yet how the government will proceed in the future in this regard (65).

Benefit package available to SHSP members includes the following services; emergency services, outpatient services, selected inpatient services, selected diagnostic services, and about 70 drugs that come in different forms (tablets, capsules, drops, pastes, syrups, injections, and suspensions) (66). These services are in addition to the EHCS packages. SHSP members are provided services mainly by the public health providers at the primary level (primary health centers, health posts) and public hospitals (district, zonal, regional, central) at the secondary and tertiary levels (61). Besides, a few private health institutions are also contracted by SHSP to provide service to its members (61). SHSP members aged 40 years or over can have the whole-body check-up free of cost once a year at the nearest public health facility (66). Transportation and referral services are available. SHSP members can choose the nearest public health care service facility as their first referral facility. When the treatment cannot proceed in the chosen health facility, the member is then referred to the higher level designated public hospitals (of secondary or tertiary level). However, this referral algorithm is not strictly followed in an emergency (66).

Enrolment to SHSP is facilitated by "Enrolment Assistants" at community who visit potential households, help them fill out the enrolment forms, collect SHSP premium, and issue identification card at the time of enrolment (66). Enrolment assistants are responsible to report enrolment officers stationed at districts (Appendix 2- SHSP enrolment process). Two year-and-half years into the program, SHSP covers 32 districts, and the program aims to cover all districts by 2020 (61). The enrolment rate, however, differs across the SHSP implemented districts. For instance, data available from 15 SHSP implemented districts, the lowest enrollment (0.7%) was seen in *Achham* whereas the highest (15.1%) in *Palpa,* and the average enrolment rate was 4.8%[2] in SHSP implemented district in 2016/17 (61). Enrolment and coverage are used interchangeably here as households those voluntarily enroll into SHSP are covered by the SHSP scheme. The overall enrolment and SHSP renewal[3] rates in early SHSP implemented districts are not as expected as per the report released by the SHSDC (61). This fact has prompted concern about SHSP that the coverage in SHSP implemented districts is low.

1.9 Gaps in financial protection evidence in Nepal

High reliance on OOP, a large share of poverty, and high morbidity might have potentially exposed Nepalese households, particularly the poor and vulnerable households, to CHE of which Nepal does not have evidence.

In the past, a few attempts were undertaken to measure the household health care expenditure in Nepal (6, 67-70). Using 1994/95 NLSS data, one of the earlier studies

[2] The average enrolment rate calculated from data compiled from the SHSDC Report (October 2017).
[3] As provisioned in the SHSP (Operations) Rules 2072, the membership to the program is valid only for one-year period from the date beginning of membership. To continue SHSP membership for the following year, households are required to renew their membership by paying SHSP premium.

examined OOP in Nepal and found that financing health care by OOP was the significant economic burden to the Nepalese households (68). However, that study did not extend its analysis to CHE. Similarly, multi-country studies have reported the incidence of CHE in Nepal. However, those studies did not explain the CHE variation by regions or socio-economic context (6, 67). Other existing studies on CHE in Nepal are either disease-specific (69) or place-specific (70). Those studies missed providing a complete national scenario on CHE and its subnational disaggregation as recommended by the global community to obtain the national picture of households affected most by CHE (71).

Nepal has committed to UHC by establishing SHSP. The effective expansion of coverage of insurance scheme which relies on the voluntary purchase of an insurance policy by households requires estimation of households' demand for such insurance policy. However, Nepal does not have any evidence to draw on the demand for SHSP.

1.10 Demand for health, health care services, and health insurance

A theoretical framework, demand for health, health services and health insurance, by Besley, illustrates that demand for health insurance is derived from an individual demand for health (72). Assuming health itself as a valued good, there will be a demand for health. Health can either be treated as stock, which can be invested in or as flow as in construct of quality-adjusted life-years (73). Given that health services are essential to maintain health, demand for health care services is a derived demand that depends on the underlying demand for health (74). Future illness may occur randomly, and health care services can be expensive, demand for health insurance can exist.

Demand for health insurance is the function of its premium, the income of an individual, education, health status of an individual, and other characteristics, such as the age

of an individual (14). A demand curve (Figure 3) is a two-dimensional representation of this function in which responses to changes in premium are seen as movements along the demand curve *(ceteris paribus)* (73).

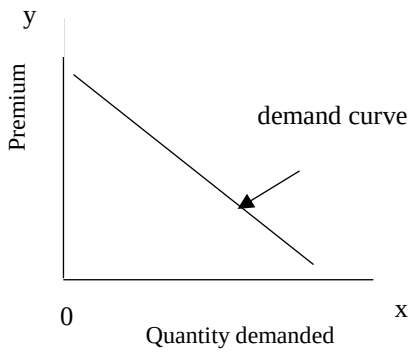


Figure 3 The demand curve

1.11 Willingness to pay for health insurance

Willingness to pay (WTP) refers to the maximum amount an individual is willing to pay to acquire goods or services (73). In WTP studies, the respondents are directly asked a hypothetical question about how much maximum would they be willing to pay for goods or services which are not yet available in the market, were those goods or services to become available (75). This approach of direct inquiry is termed as contingent valuation method (CVM) (76). The CVM/WTP is a relevant approach to obtain consumer valuations of good or services in the context when there is a lack of a previous market for those goods or services (mainly because those are new to the study area). The schedule of WTP values for the goods or services stated by individuals can be used to construct the demand curve (14).

SHSP is the goods or services in the question in this thesis. The CVM/WTP approach to estimate demand for SHSP, instead of an observational study on real demand for SHSP, is used by this study because of the following reason. SHSP is not available in the majority of

districts in Nepal. Notably, at the time of this study design, SHSP was being piloted in one out of 77 districts of Nepal which was later extended to two other districts. Since piloting was in the preliminary stage, an observational study on a real demand for SHSP was not feasible. Similarly, those pilot districts do not necessarily reflect the socio-economic and health related diversities of Nepal. The CVM/WTP approach is often used as an alternative to get information on demand for good or service which are not available in the real market. Therefore, this study preferred the CVM/WTP approach to elicit household's demand for SHSP. WTP for SHSP, here, is defined as the maximum amount of SHSP premium households would be willing to pay to get enrolled in SHSP.

1.12 Rationale of the thesis

UHC is the focus of health financing policy, globally and locally. Countries aiming to achieve UHC are expected to achieve 100% financial protection from OOP in health (8). For this financial protection to be achieved, health financing policy should explicitly aim at improving population coverage by health insurance schemes keeping equity in the core of such coverage (77), i.e., ensuring all irrespective of their income, regional, educational, and other background are covered by health insurance schemes.

CHE is the indicator for monitoring of UHC financial protection in health as laid-out by the SDGs. In the era of UHC, countries aspiring to provide financial protection in health are encouraged to measure CHE to track households suffering undue financial hardship as a result of seeking health care. Evidence on CHE and its variations among subnational attributes are shown to be crucial in designing evidence-based policy by the international studies (78-80). However, Nepal has limited evidence on the nation-wide CHE incidence and its subnational disaggregation. As a nation committed to achieving UHC, Nepal needs to

monitor UHC financial protection. For this purpose, a study reporting the incidence, distribution, and determinants of CHE in a nation is urgently required.

On top of that, more recently, after the launch of SHSP, a concern about coverage of health insurance is growing in Nepal (31). Nepalese policymakers would be greatly benefitted from evidence of demand for SHSP. WTP studies are usually undertaken before scaling-up voluntary health insurance schemes to improve their coverage and sustainability (81). In the Nepalese context, evidence generated by WTP for SHSP study can be beneficial to improve the coverage of SHSP and ensure equity in coverage. WTP for SHSP study can effectively gather information on households' demand for SHSP. The demand curve for SHSP can be estimated from the schedule of households' WTP for SHSP and supply curve from a schedule of SHSP premium specified by the SHSDC. Evidence on demand for SHSP, therefore, gives a starting point for rethinking the current institutional arrangements of SHSP and an opportunity in a policy discussion to change the coverage of SHSP by changing the premium schedule for SHSP.

Knowledge of the demand for health insurance among households in Nepal is extremely limited. WTP studies are almost non-existent in Nepal probably due to methodological difficulties in undertaking those types of surveys. Russell and colleagues note that the administration of WTP surveys requires a special series of questions to reduce bias, which is challenging to administer (82).

Given the existing literature and unique Nepalese setting, there is a need for research on financial impact resulted by OOP in health and demand for health insurance. Understanding which sub-group of the population is affected by CHE and how they value health insurance may provide insights to design health financing system of the country better. Not only can such studies help to fill a gap in the Nepalese literature by providing a better

understanding of the multiplicity of factors which contribute to understand household health expenditure in this pluralistic setting, but they can also provide a valuable foundation on which new equitable health financing policy decisions can be made and existing health financing policies can be altered.

1.13 Objectives

UHC stipulates to provide financial protection in health to all. Countries are establishing health insurance schemes and expanding their coverage to cover all people so that people can access to needed health care services without facing CHE. Often, when there is insufficient focus on equity in expanding such health insurance schemes, it is likely that the most vulnerable population are left behind by the coverage. Uninsured vulnerable population are at risk of CHE. A fear of health expenditure might prevent such population from accessing health care services in future. Therefore, it becomes necessary to track vulnerable households exposed to risk of CHE so that those households can be targeted by health insurance schemes. Additionally, when health insurance scheme is voluntary, such as Nepal's SHSP, coverage of health insurance depends on households' demand for it. For this reason, a better understanding of households' attribute that influences the voluntary purchase of health insurance is essential for policymakers to improve the equity in coverage of a health insurance scheme, i.e., an assurance that all group of population are covered by health insurance schemes.

As Nepal paves its way to UHC, it is crucial for Nepal to have evidence on equity reflecting what groups of population across the nation are most affected by CHE and whether or not those populations be protected by a newly launched SHSP– a national health insurance aspiring to attain UHC. Despite limited financial protection, high reliance on OOP in

financing treatment, and low enrolment statistics in SHSP, which would seem to call for analysis; there has not been any study not only on equity implication on Nepal's path to UHC but also on CHE and demand of health insurance in Nepal. Thus, with an intention to fill the existing evidence gap in Nepal, this thesis had an overarching aim to access equity implications of CHE and demand of health insurance in Nepal in the era of UHC by uniquely integrating findings of the following objectives;

Objective 1

To measure the nation-wide incidence, distribution, and determinants of CHE in Nepal.

More specifically;

i. To determine the incidence and sub-national distribution of CHE.
ii. To examine factors determining CHE in Nepal.

Objective 2

To estimate potential coverage of SHSP in Nepal.

More specifically;

i. To estimate demand for SHSP using the CVM/WTP approach.
ii. To determine factors influencing demand for SHSP.

Organization of thesis

This thesis is organized into the following sections; Chapter 2 reviews relevant literature. Chapter 3 focuses on empirical study 1 which is based on objective 1 of the thesis. This chapter introduces the method applied to achieve objective 1, presents the results, discussions, and conclusions of study objective 1. Chapter 4 provides an overview of the

empirical study 2 which is based on objective 2. This chapter discusses the methods applied, results, discussion, and conclusion of empirical study 2. Chapter 5 is the final chapter of the study which brings both empirical studies together to discuss and conclude the findings and implications of the thesis.

CHAPTER 2. LITERATURE REVIEW

LITERATURE REVIEW

This chapter reviews related literature and finds evidence gap in current literature on financial protection in health and demand for health insurance in Nepal.

2.1 Review of the key concepts

2.1.1 Definition of UHC

The axes of a UHC cube can give a starting point in defining UHC. Figure 1 is the WHO's "Cube Diagram" or UHC cube which illustrates policy options a country can adapt to progress on the journey to UHC (57). The axes of the UHC cube represent; a) the services covered by pooled funds, b) the population covered, and c) the proportion of costs covered. This cube is popular among the policymakers as it shows the difference between current national coverage situation in a country and the policy goal of UHC which helps policymakers in identifying significant gaps (83). The idea is, as the country is nearer to UHC, the current pooled funds shown by the inner box becomes more prominent in size and coverage. For instance, in countries with the long-standing history of financial protection in health such as in Japan or most European countries, the inner box, current pooled fund, fills most of the space (57).

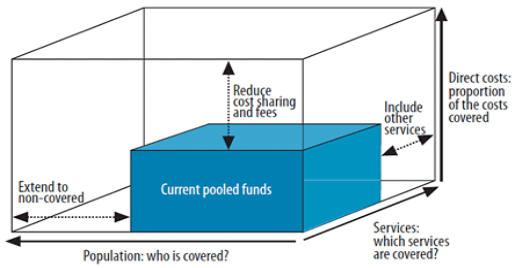


Figure 4 The UHC cube (Adopted from WHO 2010 (57))

UHC means that all people and communities can use the promotive, preventive, curative, rehabilitative, and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the service user to the financial hardship (3).

Extending the coverage from pooled funds along the three dimensions calls for health financing reforms that increase the availability of funds for health. Options to improve the pooled fund include (but are not limited to) allocating higher budget in the health sector, introducing compulsory health insurance, among others (8). Introducing voluntary health insurance is assumed to give a good start to the journey of UHC to LMICs where risk-pooling from taxation and/or compulsory social health insurance is difficult to implement (57). Similarly, in the center of UHC financing reforms lies, equity in access to health care services and equity in financing.

Equity in access to health care services and equity in financing and are crucial coverage goals in a health system designed to achieve UHC (77). Definitions of equity in the health care system can be classified into horizontal equity and vertical equity (84, 85). Horizontal equity implies equal treatment for equals whereas vertical equity implies unequal treatment for unequal.

In health provision, one of the aspects of the health care system, horizontal equity is defined in the principle of equal access to health care services for equal need – for example, the equal waiting time for patients with the same disease condition. This contrasts to vertical equity, denoting unequal access to health care for individuals with different needs (20) – for example, different treatment to the patient with a different level of severity in a disaster emergency.

In health financing, another aspect of the health care system, horizontal equity is referred to as the principle that those have similar ability to pay should contribute a similar amount in financing health care services (86). For instance, equal health insurance premium to households with equal ability to pay. Likewise, vertical equity in health financing is defined as unequal payment for unequal ability to pay (86) – for example, unequal health insurance premium for households with unequal ability to pay. All in all, equity in financing suggests financing of health care should be according to ability to pay. A progressive health financing mechanism is one in which wealthier households pay more than poorer households do (14).

2.1.2 Definition of CHE

A key objective of UHC is to provide financial protection for everyone. Insights into the existing extent of financial protection are provided through incidence CHE in a country (57). CHE is defined as the state where OOP as the share of household resources equals to or exceeds a certain threshold. OOP, as defined in the literature (87) includes (cash and/or in-kind) payment done;

i. in medicines; health services not requiring an overnight stay in hospital (outpatient); health services requiring hospital stays (inpatient); other health services such as diagnostics, lab fees, emergency services; health products;
ii. by the service user at the point of service use for any services (preventive, curative, rehabilitative, palliative, etc.) provided by any type of health care provider (doctors, nurses, paramedics, traditional healers, etc.) and financed from household income, or savings, or loans net of a third-party payment.

The following components are crucial to defining CHE; OOP as a numerator, household resources as a denominator, and threshold usually expressed as a percentage (2).

(OOP health payment/household resources)>= x%

Where, x= threshold used

CHE does not have established gold standard definition. Financing protection in health literature has divided measurement in defining household resources and the choice of threshold.

Household resources are household consumption expenditure or income. Household consumption expenditure is defined as a monetary and in-kind payment on goods or services a household consumes over a period of time (88). Various components of consumption are grouped into three main categories; consumption of food items, consumption of housing, and consumption of other non-food items (89). Similarly, household income is the total flow of resources into a household throughout duration, for instance, a year. Employment wage, income from self-employment, transfers paid are some of the sources of household income (89).

Household resources are defined in two ways; first "budget share approach" and second "capacity to pay (CTP)" approach (4, 20, 90).

The budget share approach defines household resources in relation to total household consumption expenditure or income. This approach does not differentiate between spending on essential items (such as food) and spending on non-discretionary items (20).

OOP /total household expenditure or income

The budget share approach is criticized for failing to differentiate between poor household: those who manage to meet their essential expenditure with little left for

discretionary expenditure and the wealthy: those who have much more left for discretionary expenditure (91).

The CTP approach is said to have addressed limitation posed by the budget share approach (90). The CTP approach considers that poor households tend to spend more share of the available household resources in essential items, such as food, than the wealthy household. So, this approach defines household resources as net of such essential spending (20). Household's CTP can be defined in two possible ways; first, CTP as the household resource net of all food expenditure (20). This method, however, does not take into consideration that not all food items are non-discretionary (4). The second definition of CTP introduces the term subsistence expenditure *(se)* equivalent to term non-discretionary expenditure. *se* is average food expenditure per equivalent adult across households in the 45th - 55th percentile of the food budget share (71). Household's expenditure above *se* is considered as discretionary. This share of expenditure can be made available to other items including health (8). The CTP is defined as household resource net of *se*, when the household's actual food expenditure is below *se* (4).

$$OOP / CTP$$

where, CTP=capacity to pay

CHE measurement threshold is another set of debate in defining CHE. Literature review shows that studies have been using thresholds usually ranging from 5% to 40% (92-94). The choice of threshold is arbitrary (95). Smaller thresholds, for instance, 5% - 25%, is used in the budget share approach while larger threshold, for instance, 30% - 40% is used in the CTP approach. More recently, the budget share approach uses 10% or 25% threshold while the CTP approach uses 40% threshold (2, 6, 8).

2.1.2.1 Operational definition of CHE

This thesis defines CHE based on the CTP approach using 40% threshold. CHE defined using the budget share approach is considered easy to calculate and communicate and used by the SDGs to compute CHE (8). However, the budget share approach usually takes 5% to 25% threshold and tend to show CHE concentration among the wealthier households which might not be the actual case (8, 90). For instance, when CHE is defined as the state where OOP as the share of total household expenditure equals to or surpasses 10% threshold would show a higher concentration of CHE among wealthier households as they easily overshoot 10% threshold (90, 96). This thesis uses the CTP approach 40% threshold as recommended by literature to reduce this disadvantage (4, 20). The CTP method acknowledges that every household needs to spend on basic goods and reflects equity concern that basic goods absorb a greater share of the poor household resource leaving a little or nothing at all to spend on other goods and services.

$$OOP/CTP >= 40\%$$

2.1.3 Conceptual underpinnings of demand for health insurance

Financial protection as set in the UHC framework is based on theoretical foundations of health insurance (97). Individuals are uncertain about the timing and type of their future health care consumption (98). Uncertainty refers to an event which may or may not occur, and its probability of occurring is also not known. These uncertainties in future health care consumption may have led to the demand for health insurance (72). The fundamental purpose of a health insurance scheme is to reduce uncertainty over future OOP (99). Health insurance is said to improve welfare by distributing risk of financial loss due to illness.

An insurance policy is seen as a state-contingent claim because insurance is obtained before the state of the world is known (100). This means the buyer of an insurance policy (consumer) pays for the policy which entitles him/her to wealth or income if the event against which he/she is insured occurs. The buyer decides in uncertainty to cover him/herself with insurance to protect from the potential financial loss due to future illness (97). The consumer's decision to insure him/herself from the potential loss originates from the assumption that the consumer gains utility from expected wealth (101).

Demand for health insurance has been explained using the expected utility model (101). The expected utility maximization theory holds the assumption that a consumer demands a commodity (health insurance) at a given price in accordance to his/her preferences and budget constraints to maximize the expected utility considering the probability of uncertain events (102). Consumer's budget constraint is his/her income or budget and utility is the satisfaction or benefit gained by using that commodity. The consumer tends to maximize utility from expected wealth (97, 101).

The decision to purchase a health insurance policy is based on a comparison of expected utility with, and without, health insurance (103). The expected utility theory assumes that consumer's utility, *U*, is the function of income (or wealth), *Y*. The consumer has *x* probability of getting ill and spend *L* on health care. In the context of health insurance, the consumer could purchase insurance coverage for a premium of P = *x. L* where he/she would receive a payoff transfer, *I*, when ill. Since the health insurance has full coverage and for simplicity, assume *L= I*. The expected utility without utility is,

$$EU_0 = (l-x)\, U(Y) + xU(Y-L)$$

The expected utility with the utility is

$$EU_1 = (l-x)\, U(Y-P) + xU(Y-L+I-P)$$

$$= (l-x)\,U(Y-P) + xU(Y-P)$$

Consumer purchases health insurance if $EU_1 > EU_0$ (104) because he/she is a risk averter who is attempting to maximize expected utility.

The demand for health insurance model presupposes that the consumer faces gamble (choices of insurance), lists the possible outcomes, calculates the monetary value attached to each outcome, and gains the utility from the expected value of the gamble.

2.1.4 Definition of WTP

Consumer's monetary valuations of a good or service may be assessed either indirectly by observing and modeling past healthcare utilization quantities or by asking them directly the amount they are willing to pay for those goods or services (82). The latter part is referred to as WTP. WTP is the maximum amount of money a consumer would be willing to pay for the goods or services (14). The CVM is utilized to elicit a consumer's WTP for goods or services those are not yet available in the market (105). As Mitchell and Carson (1986) state, "The method...circumvents the absence of markets for public goods by presenting consumers with hypothetical markets in which they have the opportunity to buy the good in question. Because the elicited WTP values are contingent upon the particular hypothetical market described to the respondent, this approach came to be called the contingent valuation method" (76 p 2-3).

The CVM/WTP approach requires potential consumers of goods or services to respond to a hypothetical question, what maximum amount they would be willing to pay to access those goods or services if they were to become available. The stated WTP values reveal monetary valuation each consumer associated with goods or services in consideration. In an actual market too, consumer's decision to purchase certain goods or services is

governed mainly by the relationship between market price and consumer's reservation price for that good or services (75). The later part, consumer's reservation price, can be approximated to maximum worth perceived by him/her of the goods or services being considered for purchase (75), which is equivalent to the elicited WTP value of goods or services under consideration. Consumer's preference for certain goods or services becomes the demand they are willing to pay (106). Thus, WTP values also called shadow reservation prices can be used to construct the demand curve (14). Such demand curves offer guidance to policymakers on price-setting and goods or services uptake rate, i.e., service coverage (75).

2.1.5 Measuring WTP

In the CVM, consumer's WTP for good or services can be elicited using various techniques such as open-ended format, payment cards, take-it-or-leave-it offer (TIOLI), and the bidding game (76). Each of these techniques varies in its way the question is administered to a consumer to elicit his/her WTP for goods or services.

In the open-ended format, respondents are just asked to suggest their maximum monetary valuation without giving them any formats or prompt or guidance to elicit the value (75). In payment scale technique, all respondents are asked to choose from the pre-specified and ordered WTP value list. In the TIOLI technique, respondents either accept or reject the pre-determined value, and different respondents receive different pre-determined values. In the bidding game technique, the interviewer offers the starting bid which is either accepted or rejected by the respondent after which bidding (higher or lower depending on the respondent's response) of WTP value takes place.

The closed-ended approach, such as TIOLI, provides binary response while the open-ended and the bidding game approach yields continuous WTP values (107). In the open-

ended, and bidding game approach, it might be likely that the WTP value responded be censored containing a higher proportion of zero values (107).

It is worth noting that, each of WTP measurement techniques is subjected to some form of potential bias. For instance, the range bias in the payment card technique, "Yes" saying behavior in TIOLI, starting point bias in the bidding game technique (76).

In this thesis, the CVM is referred as a direct method that uses survey questionnaire to elicit consumer's WTP for health insurance, i.e., ask consumer directly how much he/she would be willing and able to pay for specified health insurance (SHSP). This thesis used the bidding game technique as the advantage of the bidding game lies in obtaining reliable and precise estimates of WTP than those based on a single technique, such as open-ended and payment scale techniques (108, 109).

2.2 Empirical review of relevant studies

This section presents a review of empirical studies on financial protection in health (measured as CHE) and demand for health insurance studies also referred as WTP for health insurance studies in LMICs including Nepal. I carried literature review of two topics; studies on financial protection/CHE and studies on WTP for health insurance separately with an intention to develop two separate studies.

2.2.1 Studies on CHE

In search of the relevant literature on financial protection in health, I conducted a Boolean search to summarize the available data of financial protection in health. I used the following search strategy to search the relevant studies in databases such as PubMed/Medline, EconLit,

Science Direct, Google Scholar, Wiley Online Library, Web of Science, and CAB Direct. The following key words were used to search related and relevant literature on CHE. *(catastrophic health expenditure OR catastrophic health spending OR CHE OR out-of-pocket spending OR out-of-pocket health payment OR OOP OR OOPS OR health expenditure OR health spending AND low-and-middle OR middle-income OR low income OR lmic OR developing countries OR least developed countr*)*

I also searched for reference in organizational databases, for instance, WHO library database, and the World Bank Group database. I considered literature published in English and Nepali for the literature review. In order to be eligible for review, studies had to pass the following inclusion criteria:

i. Studies conducted in LMIC(s);
ii. Studies exclusively reporting the incidence of CHE experienced by households/individuals at sub-national and/or national level.

Table 1 lists studies closely considered for establishing evidence on CHE. Multi-country studies reporting CHE in LMICs are listed separately in table 2.

Table 1 List of studies used for the narrative review of CHE

S.N.	Citation	Country	Data source	Measurement approach	Threshold	CHE
1	Wagstaff et al., 2003 (90)	Vietnam	Living standard survey 1993 and 1998	Budget share	10% of TE	14.2
				CTP	40%	5.1
2	Su et al., 2006 (110)	Burkina Faso	Nouna district household survey, 2001	CTP	40% of nFE	6.1
3	Li et al., 2012 (78)	China	National Health Service Survey, 2008	CTP	40%	13.0
4	Yardim et al., 2010 (80)	Turkey	Household budget survey and consumption expenditures, 2006	CTP	40%	0.6
5	Ghosh, 2011 (111)	India	National sample survey on consumption expenditure, 2005	Budget share	5-25% of TE	
					5	29.9
					10	15.4
					25	4.1
6	Limwattananon et al.,2007 (112)	Thailand	Household survey 2000-2004	Budget share	10% of TE	14.6
7	Flores et al., 2008 (113)	India	National sample survey, 1995-96 (hospitalized cases)	Budget share	5-20% of TE	12.4-54.9
8	Gotsadze et al., 2009 (114)	Georgia	Health care utilization and expenditure survey, 2007	CTP	40%	11.7
9	Sun et al., 2009 (115)	China	National household survey, 2005	CTP	40%	9.3
10	Van Minh et al.,2012 (79)	Vietnam	Living standards survey, 2010	CTP	40%	4.6
11	Brinda et al.,2014 (116)	Tanzania	Tanzania national panel survey, 2008	nFE as proxy for CTP	40%	18.0
12	Chuma et al., 2012 (92)	Kenya	Health expenditure and utilization survey, 2007	Budget share	10% TE	15.5
				CTP	25% of nFE	16.0
13	Kavosi et al., 2012 (117)	Iran	Household survey, 2003	CTP	40%	11.8

14	Bhojani et al.,2012 (118)	India	Banglore census, 2009	Budget share	10%	16
15	Onoka et al., 2011(94)	Nigeria	Household consumption expenditure data	CTP	40% of nFE	14.8
16	Barros et al.,2011 (119)	Brazil	Brazilian household budget survey,2002-2003	CTP	10-40%	2-16
17	Onwujekwe et al., 2012(120)	Nigeria	Household data	CTP	40% of nFE	27
18	Arsenijevic et al., 2013(121)	Serbia	Living standards measurement survey, 2007	Budget share	10-20% of TE	5.0
19	Somkotra et al.,2008 (122)	Thailand	Socioeconomic survey 2000-2004	Budget share CTP	5-15% of TE 20 -25% of nFE	2.7-15.0 1.8-5.2
20	Amaya Lara et al., 2009 (123)	Colombia	Health services use and expenditure study, 2001	CTP	40%	4.9
21	Daneshkohan et al.,2011(124)	Iran	Household survey, 2008	CTP	40%	22.2
22	Buigut et al., 2015(96)	Kenya	Household survey,2013	Budget share CTP	5-30% of TE 5-30% of CTP	28.8-18.5 0-1.5
23	Rahman et al., 2013 (125)	Bangladesh	Household survey in urban city, 2011	CTP	40%	9.0
24	Adhikari et al.,2009 (69)	Nepal	Patient survey, 2004 (hospitalization cases)	Budget share	5-15% TI	31-75
25	Saito et al., 2014 (70)	Nepal	Household survey in urban city, 2011-12	Budget share	10% of TE	13.8
26	Dorjdagva et al., 2016 (126)	Mongolia	Household socio-economic survey 2012	CTP	10-40%	1.1-5.5
27	Khan et al., 2017 (127)	Bangladesh	Household income and expenditure survey 2010	Budget share	10% of TE	14.2

CTP= capacity to pay; TE= total expenditure; nFE= non-food expenditure; TI= total income

Table 2 List of multi-country CHE studies

S.N.	Citation	Number of countries included	Data source	Threshold	CHE (%)	Nepal included
1	Xu et al., 2003 (4)	59	Household surveys 1991-2000	40% of CTP	0-10.5	No
2	Xu et al., 2007 (9)	89	Household surveys 1990-2003	40% of CTP	0-10.0	No
3	Van Doorslaer et al., 2007 (67)	14	Household surveys 1995-2002	5 to 25% of TE 40% of nFE	2.0-15.6 0.2-7.1	Yes CHE= 1.2-14.7 4.5-17.1
4	Knaul et al., 2011(128)	12	Household surveys	30% of nFE	1 to 25	No
5	Bredenkamp et al., 2010 (129)	5	Living standards data, 2000-2005	5-25% of TI	44.7-0.2	No
6	Saksena et al., 2010 (130)	51	World health survey 2003	40% of CTP	1.3- 33.6	Yes CHE= 14.1

CTP= capacity to pay; TE= total expenditure; nFE= non-food expenditure; TI= total income

Tables 1 and 2 reflect that several attempts are made to quantify CHE in LMICs. As discussed in section 2.1.2, CHE can be measured using either of two approaches; budget share approach or CTP approach or both. The primary intention of CHE measurement by the above-listed studies was in examining an incidence of financial hardship caused by OOP, and in examining if direct health expenditure was larger relative to household's total income/expenditure or ability to pay. Literature review result shows that past studies were divided into the approach and threshold used in the absence of an established "correct" method to measure the incidence of CHE. Form the review of the studies I found that almost 40% of the studies used the budget share approach while 60% used the CTP approach to measure the incidence of CHE. Similarly, the threshold used within each approach is arbitrary.

The review shows that the incidence of CHE varied strikingly across countries. Using 40% CTP approach, the incidence of CHE was 13.0% in China in 2008 (78) while that of Vietnam was 4.9% in 2010 (79) and Turkey had 0.6% in 2006 (80). Similarly, the review illustrates that the incidence of CHE can differ according to the denominator (approach) used. For instance, in Vietnam, the incidence of CHE using 10% budget share approach was 14.2% while CHE at 40% CTP was 5.1% (90). Also, setting different threshold within the same approach also varies CHE incidence. For instance, CHE at 5% budget share approach was 28.8% while that in 30% of a budget share was 15.5% in Kenya (96). The review exemplifies that regardless of the approach and threshold used, CHE is concentrated in LMICs where risk-pooling mechanisms are absent or limited (92, 96, 116, 125).

Studies also have reported the impact of health insurance in lowering the incidence of CHE. The Thai experience also shows a decreasing incidence of inpatient CHE to 14.6% in 2004 from 31% in 2000 after the launch of universal coverage in 2001 (112). A study from

Mexico also shows the positive impact of national insurance to lower the incidence of catastrophic health expenditure (131). Counterintuitively, the Chinese study shows that financial protection in China was not improved despite above 95% coverage by insurance, the catastrophic health spending is reported even higher among poor and rural households (78, 93).

Nepal has limited evidence in the incidence of CHE. Using 1994/95 NLSS dataset, one of the earlier examined OOP in Nepal (68). That study found that financing health care by OOP was higher in Nepal. However, that study did not mention the incidence of CHE. Similarly, two multi-country studies also used the same dataset (1994/1995 NLSS) to report the incidence of CHE in Nepal (67, 130). Those studies reported the incidence of CHE in Nepal to be either as low as 1.2% (67) or as high as 14.1% (130). This difference in findings can be subjected to methodological variation. Furthermore, those studies did not describe the CHE variation by regional context or socio-economic status or by household illness episodes. Other existing studies on CHE in Nepal are either disease-specific (69) or are place-specific (urban-centric) (70). Disease-specific CHE study captured CHE among 72 hospital cases where CHE among those patients were found to be 75% using 5% budget share approach (69). Similarly, place-specific CHE study was centered in the capital city, Kathmandu, whose results might not necessarily be generalized in the national context.

Those previous studies may have provided an incomplete national scenario on CHE. There remains an evidence gap in the Nepalese literature in understanding the national estimates of CHE incidence and its determinants. Thus, as indicated in the UHC framework, there is an urgent need to estimate a nation-wide CHE and its determinants in Nepal, to measure UHC progress.

2.2.2 Studies on WTP for health insurance

I carried out literature search using the keyword related to WTP for health insurance on electronic databases with an intention to retrieve academic journal articles on WTP for health insurance in LMICs. The electronic databases used were PubMed/Medline, Google Scholar, Science Direct, Web of Science, and CAB Direct. In the interest of the objective of this thesis, I limited the search of empirical studies by the following categories;

i. Studies conducted in middle-income and/or low-income countries;
ii. Studies conducted in the household or individual level;
iii. Studies reporting household's or individual's WTP exclusively for health insurance.

I used the following search strategy to search the related and relevant literature; *(Willingness to pay OR WTP OR demand) AND (health insurance OR social health insurance OR community-based health insurance OR cbhi OR voluntary health insurance OR micro health insurance) AND (low-and-middle income OR lmic* OR middle income OR low income OR developing OR least developed countr*).*

I applied the different combination of these terms to above-listed databases. I did not limit the year of journal article publication, however, I included journal articles published in English or Nepali language.

As a search result of journal articles on the electronic database, I obtained a total of 246 hits in stage 1. I checked all the search results to remove any duplicates and non-English and/or non-Nepali references. In stage 2, I checked the title and abstract of articles that were screened from stage 1 (n=129) to assess the relevance of the topic. In stage 3, the full text of articles screened from stage 2 (n= 99) was read to check against the inclusion/screening

criteria mentioned above. I included a total of 22 journal articles for the narrative review WTP for health insurance (Table 3).

Table 3 List of reviewed articles on WTP for health insurance

S. N	Citation	Country	Year	Elicitation method	Survey location	Sample size	Objective (s)	Results
1	Asenso-Okyereet et al., 1997 (81)	Ghana	1992	Bidding game	Rural and urban	306 (households)	To assess WTP of a proposed national health insurance scheme.	Over 90% of the respondents agreed to participate in the scheme and up to 63.6% WTP premium of 5000 cents (US $3.03/month/household of five persons.
2	Dror et al., 2007 (132)	India	2005	Bidding game	Rural and urban	3024 (households, individuals)	To assess WTP for micro health insurance.	About 2/3rd of the sample agreed to pay at least 1%; about 1/2 the sample was willing to pay at least 1.35%; 30% was willing to pay about 2.0% of annual household income as the health insurance premium.
3	Asgary et al. 2004 (133)	Iran	2001	Bidding game	Rural	2139 (households)	To assess WTP for health insurance.	Average WT was 22044 Rials (US$ 2.77) / month.
4	Mathiyazaghan. 1998(134)	India	1995	Open-ended questions	Rural	918 (households)	To assess willingness to join and pay for rural health insurance scheme.	Around 86% sample was willing to pay; Rs (Indian Rupee) 163.48/ year.
5	Bärnighausen et al., 2007 (135)	China	2000	Payment card	Urban	651 (households)	To assess WTP for basic health insurance among informal sector workers.	Average WTP for basic health insurance 30 Renminbi and 4.6% of their income among informal sector workers.

6	Onwujekwe et al., 2010 (136)	Nigeria	2007	Bidding game	Rural and urban	3070 (individuals)	To assess WTP for CBHI across socio-economic status and geographic locations.	Less than 40% of the respondents were willing to pay for CBHI membership. The average WTP for CBHI was 250 Naira (US$1.7) in a rural community to 343 Naira (US$2.9) in an urban community.
7	Gustafsson-Wright et al.., 2009 (137)	Namibia	2008	Double bounded	Urban	1750 (individuals)	To assess WTP for newly introduced health insurance	Around 87% of respondents were willing to pay for the insurance, and the average WTP was US$ 80 per person per month
8	Lofgren et al., 2008 (138)	Vietnam	2004	Bidding game	Rural	2063 (household and individuals)	To assess WTP for health insurance among the rural population.	Average WTP was 22000 Vietnamese Dong.
9	Dong et al., 2003 (139)	Burkina Faso	2001	Bidding game	Rural and urban	2414 (individuals)	To examine inequalities in WTP for CBHI.	The mean and median individual WTP for CBHI was significantly higher for higher spending quintiles.
10	Dong et al., 2004 (140)	Burkina Faso	2001	Bidding game	Rural and urban	698 (individuals)	To examine compares household heads' WTP for CBHI for themselves for other household members.	Mean WTP by the heads of households for insurance for themselves (3575 CFA) was twice their mean WTP per capita for the household as a whole (1759 CFA).

11	Binam et al, 2004 (141)	Cameroon	2002	Bidding game	Rural	471 (individual)	To assess WTP for health insurance.	The mean value of the WTP was equal to CFA F 7230/person/year with a median of CFA F 6000/person/year.
12	Shafie et al., 2013 (142)	Malaysia	2009	Bidding game	Urban	472 (households)	To assess WTP for CBHI	Average WTP was Int$114.38 per month per household.
13	Babatunde et al., 2013 (143)	Nigeria	2009	Double-Bounded Dichotomous	Rural and urban	360 (households)	To assess WTP for CBHI.	The mean amount respondents were willing to pay was 522.0 ± 266.3 Naira per annum per household member (3.26 ± 1.66 US$).
14	Bonan et al., 2014 (144)	Senegal	2010	Bidding-game	Urban	360	To assess WTP for CBHI.	Approximately 93% of respondents were willing to pay at least 100 CFA francs.
15	Kumar et al., 2015(145)	India	2008	Open-ended	Urban	500 (individuals)	To assess WTP for health insurance among rickshaw pullers in Delhi.	Around 83% of respondents were willing to pay for insurance.
16	Ahmed et al., 2016 (146)	Bangladesh	2011	Bidding game	Urban	557 (individuals)	To assess WTP for CBHI among informal sector workers.	Weekly average WTP was 22.8 Bangladeshi Taka or 0.32 US$.
17	Nosratnejad et al., 2014 (147)	Iran	2013	Double bounded	Urban	300 (individuals)	To assess WTP for social health insurance	The average WTP per person per month was 137000 Rial (5.5 US$)

18	Jain et al., 2014 (148)	India	2012	Open ended (qualitative)	Urban and rural	33 (individuals)	To assess WTP for CBHI.	Average WTP was Rs 1500 (US$27) per year for CBHI.
19	Adams et al., 2013 (149)	St. Vincent and the Grenadines	2012	Bidding game	Urban and rural	400 (individuals)	WTP for a proposed national health insurance plan.	Around 69% of respondents were willing to pay EC$77.83 (US$28.83) per month for each person to enroll in the national health insurance plan.
20	Obse et al., 2016 (150)	Ethiopia	2012	Discrete choice experiment	Urban	250 (individuals)	To assess WTP for social health insurance among formal sector employees in Ethiopia.	On average, the respondents were willing to contribute 1.5% of their salary to a social health insurance scheme.
21	Nguyen et al., 2017 (151)	Vietnam	2014	Payment card technique	Urban	331 (individuals)	To assess WTP for social health insurance.	Around 73%, 72%, and 71%, respondents were willing to pay an annual premium of 578,926 VND (27.1 US$); 473,222 VND (22.1 US$); and 401,266 VND (18.8 US$) at the co-payment levels of 0, 10, and 20%, respectively.
22	Jofre-Bonet et al., 2018 (152)	Sierra Leone	2016	Double-Bounded Dichotomous	Rural and urban	1400 (households)	To assess WTP for health insurance among informal sector workers in Sierra Leone.	Average WTP for the HI was 20,237.16 SLL (3.6 US$).

As the CVM approach directly elicits what monetary value a potential consumer gives to goods or services (76), this method has gained popularity to explore WTP for health insurance in LMICs (Table 3). From the review of articles on WTP for health insurance, I found that WTP studies were utilized in setting CBHI premium (81), revealing whether or not informal sector demands health insurance (135), identifying acceptability of premium among households (133).

The review of the literature on WTP for health insurance shows that the sample size of studies varied widely, for instance, from 200 to 3000. The unit of sample survey was either household or individual. Different techniques to elicit the respondent's WTP were used. WTP studies were widely used to reveal demand of various insurance schemes (social health insurance, CBHI) among different target population (formal sector employee, informal sector workers, rural household, and urban household).

The review shows that LMICs in Africa have used WTP studies to inform demand for health insurance among individuals/households. The study in Ghana was carried out to examine WTP for proposed national health insurance (81), where 64% would sign up for the national health insurance scheme and results of which were believed to support policymakers to set premium up front to improve acceptability and coverage of national health insurance. Similarly, a Nigerian study found that rural community had a lower WTP for health insurance than its counterpart (136). That study recommended policymakers for a tailor-made intervention to extend health insurance in those two different places, especially to the rural community. WTP studies are growing even in low-income African countries. For instance, WTP for health insurance studies in Sierra Leone (152) and Ethiopia (150) give some evidence to draw on regarding consumers' demand for health insurance.

In the context of Asia, WTP for health insurance studies are concentrated in middle-income countries, for instance; India (132, 134, 145, 148, 153), Vietnam (138, 151), Iran (133, 147), Bangladesh (146), China (135), Malaysia (142). In those studies, socioeconomic parameters are shown to be responsible for explaining consumers' decision to purchase health insurance. A probability of illness (132, 133), an income of a consumer (138), education level of a consumer (132) were found to influence the demand for health insurance positively.

Despite the importance of evidence of WTP for health insurance for policy formation, none of the above-listed evidence come from Asian low-income countries including Nepal. The review of academic articles in electronic databases suggests that Nepal has an evidence gap in understanding the demand for health insurance.

Apart from the electronic databases, I attempted to acquire grey literature from Nepal as Nepal being the field of this study. In doing so, I was able to assess one study on WTP for CBHI in Nepal (154). The study was conducted in rural locations in *Dhading* and *Banke* districts in Nepal in 2010. The study measured WTP for voluntary, contributory; contextualized CBHI was NRs 11.2 per person per month. As this study was done in the rural setting and for CBHI, findings of this study might not well represent WTP of all households for SHSP.

Although WTP for health insurance studies demonstrate that socioeconomic parameters influence insurance policy purchasing decision, the marked difference in those parameters across countries and over time make it challenging to generalize average WTP for health insurance from reviewed studies. Furthermore, it is a conventional assumption that consumers' value of WTP for health insurance is also nuanced by the cost of premium and coverage of insurance. This necessitates a WTP for health insurance study in Nepal which

could uniquely reveal demand for the SHSP and estimate coverage of SHSP in the Nepalese context.

To my knowledge, Nepal does not have any empirical studies demonstrating demand for SHSP probably because understanding WTP for health insurance needs the creation of a plausible hypothetical market. The literature on methodological implications of WTP for goods or services cites that WTP surveys require a special series of questions to elicit consumers' WTP and those WTP surveys are considered to be challenging both to administer and analyze (82).

2.2.3 Summary of empirical study review

From the empirical review of the relevant literature, it can be summarized that CHE is widely used to monitor financial protection across countries. Similarly, WTP for health insurance studies is increasingly being done in LMICs before scaling-up voluntary health insurance schemes. Evidence shows that CHE can be lowered if the population is covered by health insurance (131). CHE and health insurance are closely linked. Evidence on CHE and the potential coverage of health insurance aiming to mitigate CHE are pre-requisite for policymakers to design health financing system that focuses on notion of equity explained by UHC. Nepal has introduced SHSP with a promise to provide financial protection by covering everyone in the nation. Nepalese health financing literature was found to have a gap in understanding who are mostly affected by CHE and whether those affected by CHE would be covered by a national (voluntary) health insurance. So, with an intention to understand these two closely linked phenomena and to fill the data gap in the Nepalese health financing literature, this thesis was set-up to achieve an overarching aim of accessing equity implications of CHE and demand of SHSP in Nepal by uniquely integrating findings of the

following objectives; first) to measure the nation-wide incidence, and determinants of CHE in Nepal; and second) to examine the coverage of SHSP by estimating demand and determine the factors influencing demand for SHSP.

CHAPTER 3. EMPIRICAL STUDY 1[4]

Empirical analysis of situation and determinants of catastrophic health expenditure in Nepal: results from the national living standards survey

[4] The empirical study 1 has been published in a peer-reviewed journal article https://equityhealthj.biomedcentral.com/articles/10.1186/s12939-018-0736-x

EMPIRICAL STUDY 1

The empirical study 1 is the study that exhibits health financing scenario of Nepal before the introduction of SHSP in 2016. This chapter, empirical study 1, presents a detailed overview of the method used to answer the first objective of the thesis. This chapter also justifies the use of the NLSS dataset in the study and presents results obtained, discussions in the light of findings, and conclusions of the study.

3.1 Objective

Evidence on CHE offers an opportunity to assess if health financing system of the country has provided financial protection into policy discussions. In a country with limited risk-pooling mechanism, it is likely that a significant proportion of the population is exposed to risk of CHE as a result of seeking health care services (2). UHC embeds the goal of equity in its core. UHC mandates to reduce CHE risk, especially among the poor and marginalized population (3). For this, importance of measuring the national incidence of CHE and its subnational disaggregation across regions and income strata is underscored (71). However, a shortcoming of evidence reflecting the national CHE scenario in Nepal limits policymakers' capacity to locate and protect the vulnerable population from CHE. Thus, this study was aimed to generate empirical evidence on who is not financially protected in health. The objectives of this study were to examine a nation-wide CHE incidence, its distribution, and determinants of CHE.

3.2 Method

For the attainment of the study objective as mentioned above objectives, this study employed an empirical investigation by utilizing secondary data from the NLSS made available by the

Central Bureau of Statistics (CBS), GoN. The following section justifies use of the NLSS dataset in this study. Furthermore, the method section also contains a section on variable description, extraction, and computation.

3.2.1 Data requirement

As mentioned in chapter 2, this study defined CHE using the CTP approach. The following variables were essential for CHE computation;

Household consumption expenditure or income data. Both household consumption and/or income are widely used monetary indicator of welfare. Consumption, rather than income, is considered more stable and reliable in agriculture economies, such as Nepal (88). OOP in health was another crucial data needed to compute CHE. OOP is expenses made by the service user at the point of service use for any services provided by any health care providers and financed from household income, or savings, or loans net of a third-party payment (87).

Since the research question also wanted to examine the determinants of CHE in Nepal, another set of data required were "health-related." "Health-related" in this study was defined as the individual or household data indicating types of illness (chronic and acute) and a number of illness episodes.

In addition to these, a description of household characteristics and composition was also required in this study. Household characteristics were defined as a gender of the household head, education of the household head, settlement location of the household. Household composition was defined as a variation in household members' age, variation by the count of children, adults, elderly in the household.

3.2.2 Data source

Target dataset was the quantitative dataset which would enable computation of CHE in Nepal. Since I intended to find a nation-wide CHE incidence, I was in search of a country-wide secondary dataset. I targeted to acquire household information from secondary dataset because such dataset would increase the generalizability of results. A nation-wide household survey data is recommended in analyzing financial protection in health (20) and used by the past studies (78, 80, 93, 112). In search of a nation-wide secondary dataset, I came across three secondary datasets; first, annual household survey; second, demographic and health survey; and third, living standards survey. The annual household survey did not have information on the health-related data. Whereas, demographic and health survey did not have information on household consumption and OOP. The living standard survey had information on consumption, OOP in health, and other required data. In this regard, of three initially chosen datasets, living standards survey dataset was the best fit to this study. Living standards measurement surveys are multitopic surveys designed to monitor poverty, measure living standards, measure household behavior and welfare (20). Household questionnaires are the crux of these surveys. Health section is included in these surveys, and therefore, these surveys are recommended and utilized to measure health-related expenditure (20). I used the NLSS dataset because it was able to cater the data requirements as mentioned earlier to achieve the objectives of the study.

The NLSS-III is a nation-wide sample household survey undertaken by the CBS Nepal in 2010/11 with the aim to measure household welfare. Welfare can be referred to as the quality used to indicate the well-being of society (73). The NLSS-III is the latest publicly available living standards survey in Nepal.

The NLSS-III micro data was acquired from the CBS Nepal. The NLSS-III micro data is accessible to all users for statistical and research purposes via CBS Nepal. For this, the formal procedure issued by the CBS Nepal needs to be completed. Procedures include filling in 'NLSS dataset buying' application form issued by the CBS Nepal and paying the scheduled payment. Complying with the procedure, I filed an application explaining the nature of research work to the CBS Nepal. After reviewing the application, I was provided with the NLSS-III data by the CBS Nepal. A scheduled fee was charged for the data.

The NLSS-III divided the total districts of Nepal into 14-strata, and each stratum was assigned to primary sampling units (PSU). The PSUs were selected with probability proportional to size, where a number of the household was the measure of size. The PSUs were either a ward or a sub-ward in the village development committee. The household was a survey unit. Data collection for the NLSS-III was done in 12 months which was divided into 4 phases to capture the seasonal variation. The survey covered all the administrative regions and geographical belts of the country. Data were collected by; a) face-to-face interview, b) observation notes by trained research assistants, and c) anthropometric measurements. Spot-checks and re-checks maintained data accuracy of the survey. A total of 5988 household data collected from 499 PSUs was included in the dataset for the public use.

3.2.3 Survey contents

The NLSS-III household questionnaire contained 21 sections and 9 appendices. I chose five sections among those for this study. First, the household roster section was used to gather household demography information. Second, the housing section for information on a household's housing expenses. Third, access to the facilities section to compute accessibility to the nearest health facility. Fourth, food and non-food expenditure section for the estimation

of household consumption expenditure. Final, the health section to analyze acute and chronic illness episodes; treatment costs of illness and injuries. Monetary and in-kind payments made by households on food and non-food items were aggregated to obtain household consumption as recommended (89). Recall period was 7 days, 30 days, and 12 months for food expenditure, non-food expenditure, and infrequent non-food expenditure, respectively. I adjusted all data into a 30-days figure as I aimed to measure monthly expenses of households. In the health section, respondents were asked to report the latest episode of acute illness and injury they suffered during 30 days before the interview. Their responses were coded into 14 categories. Chronic illness was defined as an illness lasting for more than a year. The primary chronic illness suffered and reported by respondents was coded into 13 groups. Any cost, monetary and in-kind, spent for the treatment of chronic illness (in the last 12 months) and acute illness and injuries (in the last 30 days) was recorded. Incurred expenses by households were recorded in NRs.

3.2.4 Variable extraction and computation

Variables were extracted at the individual and household level. Raw survey data were used to extract information on individuals reporting chronic illness, acute illness and injuries, seeking care for their acute illness and injuries. A number of individuals reporting both illnesses were computed. At the household level; gender, education of household head, settlement area, and commute time to the nearest health facility was extracted from the raw data. OOP, OOP share of household expenditure, and CTP were computed. CTP is the expenditure a household is left with after spending on necessities (for example, food). Computation of CTP is shown in section 3.2.6. Expenditure quartile was ranked by the equivalized per capita household consumption within the sample size. I also calculated household illness ratio for the analysis.

3.2.5 Description of variables

3.2.5.1 Independent variables

Published studies from LMICs offered some guidance in the selection of independent variable in the search for determinants of CHE for this study. Poorer households (79, 92), household demography (≤ 5-year children, ≥ 60-year elderly) (110, 155), urban location (80), female household head (78), chronic illness (114, 116) and illness episodes (125) were positively associated with CHE. However, households with educated household head were less likely to have CHE (114). I also extracted variables such as geographical belts and administrative regions, which are unique to Nepal, with the intention to explore the distribution of CHE. From a policy perspective, evidence of the regional distribution of CHE could be of importance to Nepal as it would assist in locating the most CHE vulnerable region. Mainly, I was interested to see the variation of CHE by household demography, illness and injury burden, regional and geographical location, settlement area, and economic condition.

Existing studies have shown that catastrophic health expenditure depends on the household's socio-demographic and economic factors, particularly, household demographic composition, literacy and economic status (116, 155). However, it is essential to know if those socio-demographic and economic variables interact with each other to produce a biased result. In this study, I introduced three sets of interaction terms to see how those socio-demographic and economic factors mediate with each other and with the dependent variable, CHE. "Household with at least one under 5-years child x Household reporting acute illness and injuries" was the first interaction term. Similarly, "Household with at least one 60-years and above elderly x Household reporting chronic illness" was another pair of the interaction

term. Finally, “Expenditure quartiles x Literate household head” was the last pair of the interaction term included in the model.

3.2.5.2 Dependent variable

CHE was the dependent variable in this study.

Table 4 Key ideal variables and used variables in the empirical study 1

Citations	Ideal variables	Used variables
Sociodemographic and economic		
Xu et al., 2003 (4); Wagstaff et al., 2003 (90); Xu, 2005 (71); Onwujekwe et al., 2012 (120); Rahman et al., 2013 (125); Brinda et al., 2014 (116); Buigut et al., 2015 (96); World Health Organization and World Bank, 2017 (8)	Equivalent household size	Equivalent household size (computed)
	Under 5 children	Under 5 children
	Elderly members	Elderly members
	Household head’s gender	Household head’s gender
	Household head’s education status	Household head’s education status
	Urban/rural location of household	Urban/rural location of household
	Regional location	Administrative regions
	Household income/expenditure	Household expenditure
	Food and non-food expenditure	Food and non-food expenditure
	Income or Expenditure quintiles or quartiles	Expenditure quartiles (computed)
Health and health expenditure variables		
Xu, 2005 (71); Saksena et al., 2010 (130); Wagstaff et al., 2003 (90); Gotsadze et al., 2009 (114); Chuma et al., 2012 (92); Yardim et al., 2010 (80); Li et al., 2012 (78); World Health Organization and	Illness episodes	Illness episodes (computed)
	Total household out-of-pocket payment (OOP) in health.	Total household out-of-pocket payment (OOP) in health.
	Registration fee (optional health expenditure data)	Not used (No data)
	Consultation and diagnostic charges (optional health expenditure data)	Not used (No data)

World Bank, 2017 (8); Wagstaff et al., 2018 (6)	Hospitalization charges (optional health expenditure data)	Not used (No data)
	Health care subsidy used	Not used (No data)
	Health insurance coverage	Not used (No data)

Computed= variables computed from raw NLSS dataset; Optional health expenditure data= data not mandatory but preferred where available; No data= data not available in NLSS dataset

3.2.6 Measurement of the dependent variable, CHE

I used the 40% CTP threshold approach (OOP referred to as CHE if total OOP is equal to or more than 40% of household CTP). This approach was first used by Xu *et al.* in their seminal article and is a widely accepted approach to measure the incidence of CHE (4).

In the 40% CTP approach, a series of steps are involved in the measurement of CHE. These steps were recommended in a multi-country study (4). The multi-country study was based on the household survey data of 59 countries. In the same study, the value of β (a household scale multiplier) used was 0.56 (95% CI 0.556–0.572), and was obtained in from a regression equation based on those 59 countries;

$$ln(food\ expenditure) = ln(k) + \beta\ ln(household\ size) + \sum \gamma icountry$$

I used $\beta = 0.56$ as the part of the recommendation of the multi-country study. Steps involved in CHE calculations;

First, I computed the household's total OOP. It was done by adding direct payment made by each member of a household at the point of service use. OOP comprised fee for registration, diagnosis, consultation, surgery; medicine and transportation cost.

Next, as recommended, I identified household consumption expenditure *(hh_exp)*. Household consumption expenditure included both monetary and in-kind payment on all goods and services and the money value of the consumption of home-made products.

Then, I identified food expenditure *(foodh)*. Food expenditure included food expenses and the value of own production by the household. Household expenses on alcoholic items were dropped from food expenditure.

I estimated equivalent scale *(eqsize)*. Since some goods and services (for instance- household utilities) are shared among household members, the consumption measure needs to take equivalent scale into account. The equivalent scale was calculated as,

$$eqsize = hhsize^{\wedge} \beta \text{ (where, hhsize = household size).}$$

Similarly, I estimated equivalent food expenditure *(eqfoodh*) as,

$$eqfoodh = foodh/eqsize$$

I identified the food expenditure shares of total household expenditure that are at the 45^{th} (named it foodh45) and 55th (named it foodh55) percentile across the whole sample. I used household weight *(wh)* in the percentile calculation. I further calculated the average food expenditure of the households in the 45th to 55th percentile range to obtain the subsistence expenditure per (equivalent) capita, which is also the poverty line *(pl)*.

$$pl = \sum 45th \text{ to } 55th * (eqfoodh / \sum wh \text{ (45th to 55th)})$$

$$\text{where } foodh45 < eqfoodh < foodh55$$

Next, I computed subsistence spending as,

$$se = pl * eqsize$$

{A household was regarded as poor (poorh) when its total household expenditure was smaller than its subsistence spending. *Poorh = 1 if hh_exp < se, otherwise Poorh = 0*}

I then calculated CTP, non-subsistence expenditure by households (for households reporting food expenditure lower than se, CTP was defined as total expenditure minus food expenditure), as;

$$CTP = hh\_exp - se \quad if\ se <= foodh;\ CTP = hh\_exp - foodh \quad if\ se > foodh$$

In a final step, I calculated CHE as,

$$CHE = 1 \text{ if } OOP/CTP >= 0.4, \text{ otherwise } CHE = 0$$

3.2.7 Statistical analysis

I summarized descriptive statistics of extracted and computed variables. Descriptive statistics results were used to see the distribution of the cumulative incidence of CHE among the expenditure quartiles and administrative regions.

I employed logistic regression to find out the characteristics of households related to CHE. The basic form of logistic regression was;

$$y = \alpha + \sum \beta_i X_i + \delta$$

$$y = ln(p/1-p)$$

where, y = dependent variable, α = constant, X_i = one of the independent variables, β_i = coefficient of independent variable X_i, p = probability of a household facing catastrophic expenditure.

The dependent variable, CHE, was a dummy variable on catastrophic expenditure (1, with CHE and 0, without CHE). Independent variables are socio-economic indicators such as administrative location, household demographic composition, socio-economic status, illness episodes.

I assessed the relationship between independent and dependent variables by univariate logistic regression. To determine the determinants of CHE, I performed multivariable logistic regression. All variables were taken for univariate logistic regression and then subsequently fed into multivariable logistic regression analysis (156). I saw acute illness and injury ratio and chronic illness ratio of a household separately as I was interested to see their influence on

CHE. Household weight was used for the data analysis. All analysis was performed using STATA® 13.1 (StataCorp, College Station, Texas, USA).

3.3 Results

Table 5 gives the summary statistics of extracted and computed variables from the NLSS-III. Around 10.2% of individuals reported chronic illness while 18.7% reported acute illness. The mean monthly household expenditure was approximately NRs 30000 (414.1 US$), and the OOP was NRs 1187 (16.4 US$). The average household size was 4.9 ± 2.3. Less than half of households had ≤5-year children, and so were households with elderly members. Almost three-fourths of household heads were male, and only one-fourth of the household heads were literate. Geographically, the proportion of households in mountain, hill and tarai belt consisted of 6.9%, 47.4%, and 45.7%, respectively. Region-wise, the central region consisted the highest proportion of households (35.7%) while the far-western region consisted the least proportion of households (8.5%). Likewise, 73.1% of households commuted less than 60 minutes to reach the nearest health facility. Of the total households, 43.0% reported chronic illness, 59.4% reported acute illness, and 27.2% households reported both illnesses. The household burden of acute illness and injuries was higher than that of chronic illness. The proportion of households incurring CHE was 10.3% per month.

Table 5 Descriptive statistics of variables extracted and computed from the Nepal Living Standards Survey (NLSS)- Third, 2011

Variable description	Frequency (N)	Weighted			Unweighted		
		Proportion	Mean	SD	Proportion	Mean	SD
EXTRACTED VARIABLES							
Individual Level							
Individuals reporting chronic illness (yes=1; otherwise,0)	28474	10.2%			11.4%		
Individuals reporting acute illness [a] (yes=1; otherwise,0)	28474	18.7%			19.4%		
Individual who sought care for their acute illness (yes=1; otherwise,0]	5518	70.7%			69.3%		
Individual weights	28670					5891.5	3717.9
Household Level							
Household expenditure [b] (NRs [c]) (in 1000)	5988		30	82		33	99
Out of pocket health expenditure (NRs)	5988		1187	4657		1175	4743
Household size	5988		4.9	2.3		4.8	2.3
Household has under 5-years children (yes=1; otherwise,0)	5988	41.7%			39.9%		
Household has elderly (60 years and above) population (yes=1; otherwise,0)	5988	33.2%			31.8%		
Household head is male (yes=1; otherwise,0)	5988	73.4%			73.3%		
Households having the literate household head (yes=1; otherwise,0)	5988	22.8%			25.9%		
Settlement area is Urban (yes=1; otherwise,0)	5988	20.9%			34.9%		
Geographical belts	5988						
Mountain		6.9%			6.8%		
Hill		47.4%			53.5%		

Tarai		45.7%			39.7%		
Administrative regions	5988						
Eastern		23.5%			21.3%		
Central		35.7%			38.1%		
Western		20.1%			19.2%		
Mid-western		12.2%			12.6%		
Far-western		8.5%			8.8%		
The nearest health facility of a household ≤60 minutes (yes=1; otherwise,0)	5988	73.1%			63.4%		
Households reporting chronic illness (yes=1; otherwise,0)	5988	43.0%			41.7%		
Households reporting acute illness (yes=1; otherwise,0)	5988	59.4%			56.9%		
Household weights	5988					964.6	348.3
COMPUTED VARIABLES							
Individual Level							
Individuals reporting both chronic and acute illness (yes=1; otherwise,0)	28670	30.5%			26.3%		
Household Level							
Capacity to Pay (NRs) (in 1000)	5988		18	82		22	99
OOP share of household expenditure (%)	5988		3.9	8.0		3.7	7.8
OOP share of household capacity to pay	5988		44.6	17.4		42.1	17.2
Equivalent household size for each household	5988		2.4	0.6		2.3	0.6
Households reporting both chronic and acute illness (yes=1; otherwise,0)	5988	27.2%			25.6%		
Number of family members with chronic illness	5988		0.6	0.7		0.5	0.7
Number of family members reporting acute illness episodes	5988		1.0	1.1		0.9	1.1

Ratio of acute illness episodes to household size	5988		0.2	0.2	0.2	0.2
Ratio of chronic illness episodes to household size	5988		0.1	0.2	0.1	0.2
Expenditure quartiles [d]	5988					
1		25.0%		22.6%		
2		25.0%		22.8%		
3		25.0%		24.9%		
4		25.0%		29.7%		
Households with CHE (>=40% of CTP) (yes=1; otherwise,0) [e]	5988	10.3%		9.1%		

[a] recall period was 30 days and only one episode was reported. [b] expenditures were adjusted in a monthly figure. [c] in February 2011, 1US$ was 72.5 NRs. [d] quartile 1 represents the poorest while 4 represents the wealthiest. [e] Cumulative incidence of catastrophic health expenditure (CHE) per month.

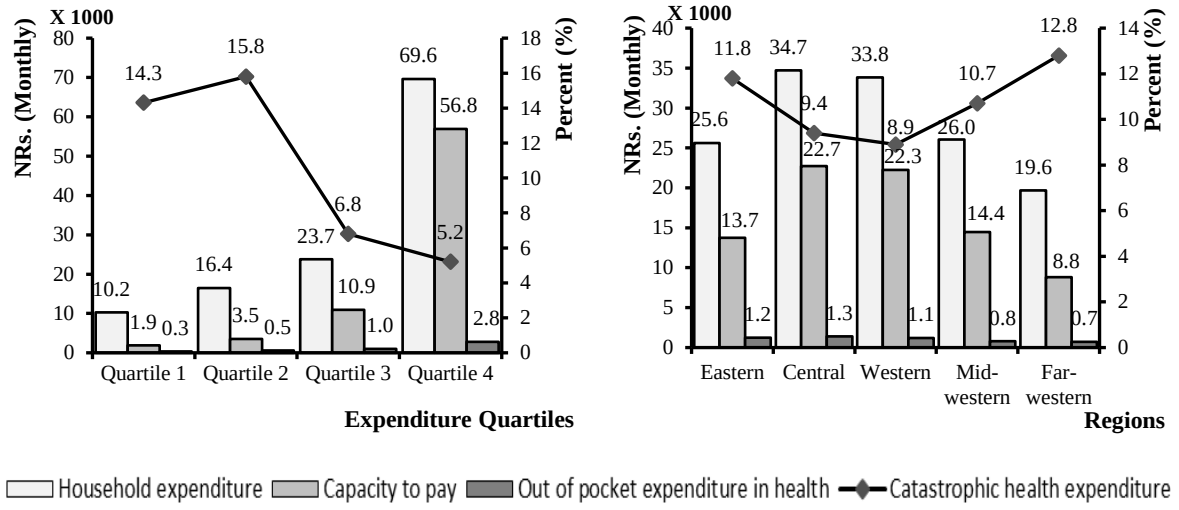
CHE at 60% and 80% of the household's CTP as was calculated in addition to recommended 40% of the households' CTP (Table 6). Households in the poorest and poor quartiles had higher CHE than the wealthier and wealthiest households at all threshold levels. Similarly, households from the far-west had the highest CHE at all CTP threshold. However, it has to be noted that the primary focus of this study is 40% CTP threshold as the main CHE threshold as suggested by the global community (4).

Table 6 Distribution of CHE at 40%, 60% and 80% household CTP threshold across economic quartiles and administrative regions of Nepal in 2010/11

Economic quartiles and regions	CHE at ≥ 40% CTP	CHE at ≥ 60% CTP	CHE at ≥ 80% CTP
Quartiles: 1st quartile (poorest)	14.3	8.3	5.5
2nd quartile	15.8	9.4	5.9
3rd quartile	6.8	2.7	0.9
4th quartile (wealthiest)	5.2	2.8	1.5
Regions: Eastern	11.8	6.5	3.9
Central	9.4	5.4	3.0
Western	8.9	5.2	3.3
Mid-western	10.7	5.9	3.3
Far-western	12.8	7.1	4.7
Overall	10.3	5.8	3.5

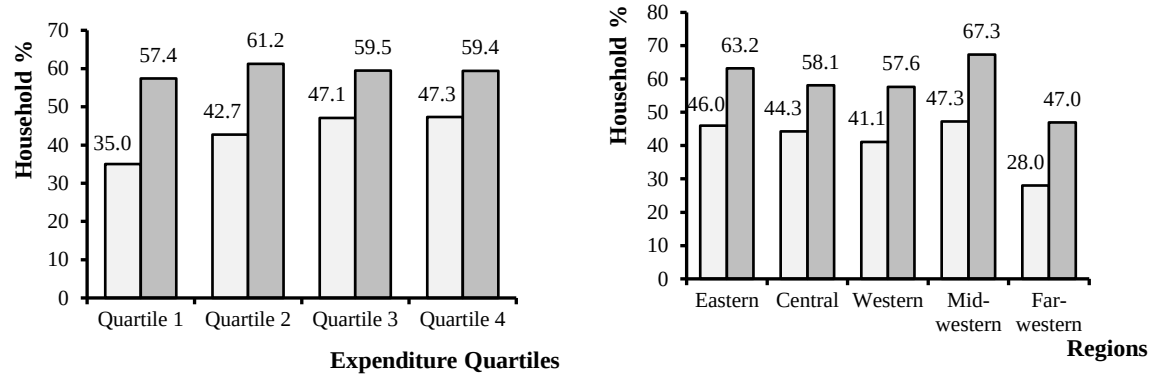
Figure 5 is a multi-panel figure and consists of six figures, a to f. Figure 5 shows a distribution of financial characteristics, illness, and CHE across expenditure quartiles and administrative regions. Figure 5-a shows that the increasing order of household expenditure, CTP, and OOP from the 1st quartile (poorest) to the 4th quartile (wealthiest). CHE was highest (15.8) in the 2nd quartile. Figure 5-b demonstrates that the far-western region had the lowest CTP and OOP but the highest CHE (12.8). Figure 5-c shows that the households in the 2nd quartile and 4th quartile reported the highest percentage of acute illness (61.2) and chronic illness (47.3) respectively. Figure 5-d presents the regional distribution of illness. Households in the eastern and mid-western regions reported a higher proportion of illness and

injuries. Figure 5-e further shows that the far-western and mid-western regions mostly consisted of households belonging to the poor quartiles in comparison to other regions. Figure 5-f shows the proportion of reported household illness with and without CHE. Of the total, 75.1% of households reported illness and 10.3% of those illness episodes were with CHE. Similarly, for the households reporting chronic illness episodes only, 1.5% experienced CHE. This proportion was higher (3.8%) in the case of households reporting acute illness and injuries. Likewise, 5.0% of episodes were with CHE in the households reporting the double burden of illness.



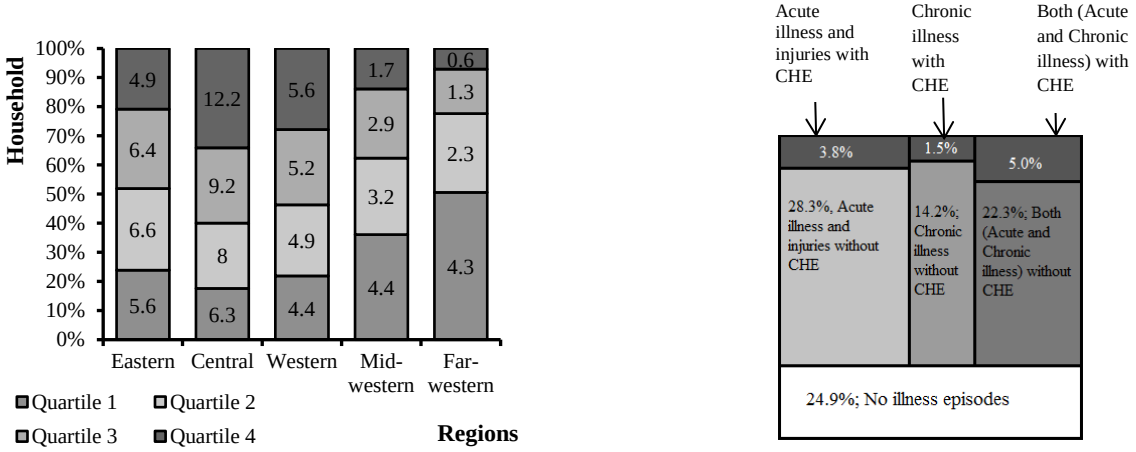
5-a

5-b



5-c

5-d



5-e

5-f

Figure 5 Distribution of financial characteristics, illness, and CHE across expenditure quartiles and administrative regions in Nepal, 2011. This figure consists of six sub-figures, 5a-5f, to reflect the nationwide distribution of CHE. Each sub-figure has a unique title
5-a Distribution of financial characteristics and CHE across expenditure quartiles
5-b Distribution of financial characteristics and CHE across administrative regions
5-c Distribution of illnesses across expenditure quartiles
5-d Distribution of illnesses across administrative regions
5-e Distribution of expenditure quartiles across administrative regions
5-f National picture of reported household illness episodes with and without CHE

Table 7 shows univariate logistic regression of independent variable against dependent variable, CHE. Households having elderly member(s) and children were vulnerable to CHE. However, households in urban and households with educated heads were less likely to incur CHE. Households reporting chronic illness, acute illness and injuries, and a higher ratio of illnesses, in the hilly belt, in 1st and 2nd quartiles, were more likely to suffer from CHE. All variables from univariate logistic regression were fed into multivariable logistic regression.

Table 7 Univariate logistic regression of household characteristics with CHE (N=5988)

Household Characteristics	CHE	
	OR (95% CI)	p-value
Equivalent household size	0.97(0.83-1.14)	0.736
Household has under 5-years children (yes=1; otherwise,0)	1.22(1.00-1.49)	0.048
Household has elderly (60 years and above) population (yes=1; otherwise,0)	1.60(1.34-1.92)	<0.001
Household head is male (yes=1; otherwise,0)	0.90(0.72-1.11)	0.334
Settlement area is Urban (yes=1; otherwise,0)	0.46(0.35-0.60)	<0.001
Literate household head (yes=1; otherwise,0)	0.51(0.39-0.68)	<0.001
Commute time the nearest health facility ≤ 60 minutes (yes=1; otherwise,0)	1.85(1.46-2.34)	<0.001
Households having member with chronic illness (yes=1; otherwise,0)	2.48(2.04-3.03)	<0.001
Households having member with acute illness (yes=1; otherwise,0)	4.68(3.64-6.01)	<0.001
Chronic illness ratio	4.14 (2.89-5.77)	<0.001
Acute illness and injuries ratio	6.49 (4.94-8.52)	<0.001
Expenditure quartiles		
1 (poorest)	3.02(2.24-4.08)	<0.001
2	3.40(2.59-4.47)	<0.001
3	1.16(0.52-1.64)	0.374
4 (wealthiest)	1.00	
Geographical belts		
Mountain	1.00	
Hill	0.66(0.45-0.98)	0.040
Tarai	0.98(0.67-1.44)	0.925
Administrative regions		
Central	1.00	
Eastern	1.28(0.97-1.69)	0.075
Western	0.94(0.69-1.29)	0.718
Mid-western	1.14(0.83-1.57)	0.398
Far-western	1.40(0.99-2.00)	0.055

CHE is the dependent variable (CHE = 1 if OOP/CTP>=40%, otherwise CHE = 0).

Table 8 presents the determinants of CHE. Model 1 is the multivariable logistic regression without any interaction terms. Model 1 shows that households with elderly members (33.2%) were more likely to experience CHE. Whereas, households with a literate household head (22.8%) were less likely to incur CHE. Households with chronic illness, acute illness were all highly likely to face CHE. The acute illness burden of a household was

catastrophic (OR = 2.33, 95% CI = 1.48, 3.67) than the chronic illness burden. Households with poor economic condition incurred CHE. The findings revealed that households in the far-western region were vulnerable to CHE (OR = 1.46, CI = 1.02, 2.11) in comparison to households in the central region. Model 2 in Table 6 introduces three sets in interaction terms. None of the interaction terms were statistically significant. Selected interaction terms did not significantly influence either independent variables used in this study or their main effect on dependent variable as presented in model 1.

Multicollinearity was not identified in multivariable logistic regression model 1 and model 2. This conclusion was reached after calculating the variance inflation factor (VIF). The mean VIF was 2.01 for model 1 and 2.38 for model 2. Besides that, the goodness of fit test the model 1 was $p = 0.102$ and model 2 was $p = 0.106$.

Table 8 Determinants of CHE in Nepal, 2011

Household Characteristics	Model 1	Model 2
	OR (95% CI)	OR (95% CI)
Equivalent household size	0.87(0.71-1.07)	0.88(0.72-1.08)
Household has under 5-years children (yes=1; otherwise,0)	1.11(0.87-1.41)	0.87(0.54-1.41)
Household has elderly (60 years and above) population (yes=1; otherwise,0)	1.37(1.13-1.66) **	1.34(0.96-1.87) *
Household head is male (yes=1; otherwise,0)	1.00(0.79-1.27)	1.00(0.79-1.27)
Settlement area is Urban (yes=1; otherwise,0)	0.79(0.58-1.06)	0.79(0.58-1.06)
Literate household head (yes=1; otherwise,0)	0.73(0.54-1.00) *	0.61(0.34-1.10) *
Commute time the nearest health facility ≤ 60 minutes (yes=1; otherwise,0)	1.05(0.79-1.38)	1.03(0.78-1.36)
Households having member with chronic illness (yes=1; otherwise,0)	2.40(1.78-3.24) ***	2.37(1.72-3.29) ***
Households having member with acute illness (yes=1; otherwise,0)	3.41(2.53-4.58) ***	3.07(2.15-4.37) ***
Acute illness ratio	2.33(1.48-3.67) ***	2.39(1.52-3.76) ***
Chronic illness ratio	1.27(0.65-2.48)	1.25(0.64-2.44)
Expenditure quartiles		
1 (poorest)	3.15(2.21-4.49) ***	2.91(1.98-4.27) ***
2	3.29(2.42-4.49) ***	3.14(2.23-4.45) ***
3	1.05(0.73-1.52)	1.07(0.71-1.59)
4 (wealthiest)	1.00	1.00
Geographical belts		
Mountain	1.00	1.00
Hill	0.92(0.62-1.38)	0.92(0.62-1.38)
Tarai	1.21(0.81-1.80)	1.21(0.81-1.80)
Administrative regions		
Central	1.00	1.00
Eastern	1.02(0.76-1.37)	1.03(0.77-1.37)
Western	0.93(0.68-1.27)	0.93(0.68-1.27)
Mid-western	0.86(0.63-1.16)	0.86(0.63-1.16)
Far-western	1.46(1.02-2.11) *	1.47(1.02-2.11) *
Interaction terms		
Household with at least one under 5-years child x Household reporting acute illness and injuries		1.32(0.78-2.21)
Household with at least one 60-years and above elderly x Household reporting chronic illness		1.02(0.67-1.57)
Expenditure quartiles x Literate household head		
Poorest (1) x Yes		1.89(0.02-4.38)
Quartile 2 x Yes		1.20(0.57-2.54)
Quartile 3 x Yes		0.83(0.34-2.06)
Wealthiest (4) x Yes		1.00

Model 1: without interaction terms. N=5988, LR χ^2 = 599.1, Pseudo R^2 = 0.1524, Mean VIF= 2.01. Model 2: with interaction terms. N=5988, LR χ^2 = 564.6, Pseudo R^2 = 0.1539, Mean VIF= 2.38
CHE is the dependent variable (CHE = 1 if OOP/CTP>=40%, otherwise CHE = 0).
*p<0.10; **p<0.01; ***p<0.001

3.4 Discussions

This study was based on nationally representative data and the findings are important as they provide a complete national scenario on CHE in Nepal. The study answers its research questions. First, the cumulative incidence of CHE was 10.3% per month at the national level in Nepal. Second, CHE was distributed unevenly across expenditure quartiles and administrative regions. Third, CHE was determined by household illness, economic condition, and location. For instance, households with chronically ill member(s), higher episodes of acute illness, located in the poorer quartiles and the far-western region were more likely to face CHE.

3.4.1 Incidence of CHE in Nepal

The national cumulative incidence of CHE was 10.3% per month at a threshold of 40% or greater household's CTP. Forty three percent (43.0%) of households reported chronic illness. Similarly, the incidence of acute illness and injury was 59.4%. In the poorly developed risk-pooling system, seeking treatment to this staggering burden of illness might have imposed high healthcare cost to households. Evidence shows that risk-pooling mechanism such as insurance offers financial protection against CHE (131). UHC targets to achieve 100% financial protection against CHE (1). In this context, 10.3% cumulative incidence of CHE per month is high and needs immediate attention.

3.4.2 Distribution of CHE in Nepal

CHE was distributed disproportionately in the poor quartiles and regions. Across expenditure quartile, CHE was concentrated in the 1st and 2nd quartiles in comparison to others. Household CTP could explain this concentration. The 4th quartile had a higher average CTP, almost 28 times, as compared to the 1st. Due to low CTP, OOP for illness carried potential to be the catastrophic to those households. A similar trend was shown by previous studies (78, 80). However, between 1st and 2nd quartile, CHE was slightly higher in 2nd quartile instead of 1st. Finding signposts that the healthcare service utilization in the poorest quartile (1st quartile) could be low. Region-wise, the highest incidence of CHE was seen in the far-western followed by the eastern. However, households in the far-western region were hit hardest by CHE as 77.6% of households in the far-western belonged to the poorer quartiles compared to 51.9% in the eastern region.

CHE may prevent those vulnerable households from accessing health care services in future. As shown earlier, in Nepal, CHE is incurred by the poorer income strata and disadvantaged regions, such as far-west in comparison with the wealthiest strata and better-off region, respectively. Majority of those CHE vulnerable households may not be able to afford to pay for health care services when they fall ill due to which they are less likely to use health care services or may forgo treatment, all together. Consequently, a wide gap in access to health care may exist between the poorer household and the wealthier household and between household located in disadvantaged region and better-off region.

3.4.3 Determinants of CHE in Nepal

Illness episodes and CHE

Illness burden in household determined CHE in Nepal. Households with chronically ill member(s) were 2.4 times more likely to suffer CHE. Chronic illness often needs continuous treatments and consultations. This puts households in constant pressure to finance such treatment which invites financial ruins. The result supports the findings of previous studies (88, 92). This reason also explains the increased risk of CHE among households with elderly member(s). Households reporting at least one member with acute illness and injuries were 3.4 times more likely to incur CHE. Households with an increased burden of acute illness and injury episodes were likely to face CHE by 2.3 times compared to those who did not have such a burden. The treatment cost could easily exceed the CTP of households, especially of households with poor economic condition, when they unexpectedly purchase healthcare by OOP. The household illness episode was considered in this study. This consideration holds an explanation that the cost of each illness episode ultimately falls into the household healthcare expenditure as pointed out by Sauerborn et al. (157).

Household income and CHE

International studies show that improving the government's share to finance health care is considered as obvious policy to combat catastrophic OOP in health (158). Due to limited share of government in health financing, households have to pay for health care on their own. In this study, the household economic condition was another critical driver of CHE in Nepal. Households located in 1st and 2nd quartiles were almost equally vulnerable to CHE compared to the 4th quartile. Households from 4th quartile reported not only more episodes

of illness but also greater CTP for their illness. However, even smaller healthcare expenditure was catastrophic to the poor households. This finding is consistent with earlier studies (92). A large share of population living below the poverty line in Nepal (36) are constantly exposed to risk of CHE. An intervention focused to those population is of utmost need so as to lower the incidence of CHE. Such intervention can also ensure the equity in access to health care of those vulnerable population.

CHE across administrative regions

Households in the far-western region were more likely to incur CHE. This unique finding for Nepal holds two possible explanations. First, the far-western region has low development indicators in comparison to other regions (159). In this study, more than three-quarters of households in the far-western region belonged to the poor quartile. This shows the economic status of the far-western region is not strong. This finding with some variation can be compared to the finding from the Chinese study (93). Second, as this region is near to the Indian border, people might often commute to the Indian side for their treatment. This practice could potentially increase OOP of their households.

CHE and household head's education status

Households with an educated household head were 27% less likely to incur CHE while households with children had no significant effect on CHE in Nepal. This study showed that households with literate head were less likely to incur CHE. Two reasons could explain this finding. First, a household with a literate household head might be aware of their health behavior. Grossman theorizes that education brings health awareness (74). Educated household heads are more cautious about their health behavior and that of their family

members. In the long run, such households are likely to practice preventive behavior to avoid illness which would further prevent catastrophic expenses in healthcare. This finding is consistent with a Tanzanian study (116). An Indian study also reported that increasing literacy, especially among female member of a household, was advantageous in reducing catastrophic OOP (160). Second, improved literacy could also lead to higher income generation. Improved income potentially leads to improved health as described in the published literature (161). However, in this study literate household were less likely to incur CHE even after adjusting for household wealth.

Nonetheless, households with children (≤ 5-year) had no significant association with CHE. Maternal-and-child health program is a priority program of the GoN. Services like immunization, treatment of childhood illness are provided free of cost (162). Although the effects of maternal-and-child health programs were not analyzed, it is likely that those free services might have contributed to reducing childhood related healthcare expenditure.

3.5 Conclusions

The cumulative incidence rate of CHE was 10.3% per month in Nepal. CHE was concentrated in the poorer quartiles and far-western region. Furthermore, this study demonstrated that increased illness episodes in a household triggered CHE. CHE was also influenced by household's regional location, economic status, chronic illness, acute illness, and education of household head. Findings of this study underscore the importance of incorporating efforts to effectively prioritize the vulnerable households and improve literacy with the current endeavors of the GoN. An extra care to ensure equity in access to health care services of the poor and disadvantaged populations could be beneficial to Nepal. Nepal's

journey to UHC can start by protecting the population most affected by CHE and extending the protection to others.

CHAPTER 4. EMPIRICAL STUDY 2

Measuring demand for health insurance using the contingent valuation method/willingness to pay approach: evidence from cross-sectional household survey in two districts of Nepal

EMPIRICAL STUDY 2

This chapter presents the method used, results obtained, discussions, and conclusions of the empirical study 2. Method section is sub-divided into distinctive parts to explain sampling procedures, instrument design, data collection logistics, data management, and data analysis. The result, discussions, and conclusions are presented after the method section.

4.1 Objective

The GoN has begun the journey towards UHC. In the context of UHC, health insurance is seen as a powerful means to offer financial protection from CHE to all, particularly to the vulnerable communities (3). Progress towards this journey, for Nepal, involves expansion of coverage of SHSP (31). The SHSP coverage in 15 SHSP implemented district is around 5% (61). Coverage of voluntary health insurance schemes, such as SHSP, is influenced by households' demand for health insurance. The potential coverage of a health insurance scheme when it is yet to be available in the market can be estimated by measuring households' WTP for such health insurance scheme. Estimates of future coverage can be valuable inputs for the health system planning process to move towards UHC. This study was undertaken to facilitate the GoN's initiative to cover everyone with SHSP by estimating potential coverage of SHSP in the districts where SHSP is yet to be launched. More specifically, the following were objectives of this study;

i. To estimate demand for SHSP using the CVM/WTP approach.
ii. To determine factors influencing demand for SHSP.

4.2 Method

This study utilized primary data obtained from the cross-sectional household survey to achieve the objectives mentioned above. The primary data study was carried out in two districts- Kathmandu and Kanchanpur in Nepal.

4.2.1 Study settings

WTP studies are conducted for hypothetical goods or services in a hypothetical market (76). This implies that WTP for SHSP study had to be undertaken in the sites where SHSP was not yet been rolled-out by the GoN. As WTP for SHSP study was undertaken after the empirical study 1 which gave a national picture to understand the patterns of OOP in health, findings of the empirical study 1 helped to locate the region hard hit by CHE which is why Kanchanpur was chosen. Kanchanpur is in one of the most disadvantaged regions (far-west) of Nepal with limited access to health care services, among others (36). Estimating WTP for SHSP in Kanchanpur would reflect potential coverage of SHSP in similar (disadvantaged) regions of Nepal. In addition to Kanchanpur, an estimation of SHSP coverage in the most advanced district such as Kathmandu would be valuable information for policymakers to facilitate equity in SHSP coverage and UHC progress in Nepal. For this reason, two districts, Kathmandu and Kanchanpur, were purposefully chosen with an intention to reflect the diversified regions, populations, and their characteristics of Nepal. The section below briefs on two study sites of this study. (Appendix 3-Map of Nepal and the study districts.)

4.2.1.1 Kathmandu site

Kathmandu district consists of Kathmandu, the capital city of Nepal, and is located in Province 3. Kathmandu district has a total of 435544 households spread in 130 wards (163).

The district has a high literacy rate (86%) (163) and is considered as the financial hub of the nation. Of 32809 public health workforce in Nepal, almost half (45%) are concentrated in this region (50). Kathmandu has the highest share of both public and private hospitals in the country. As of 2014, out of 301 registered private hospital in Nepal, 67 were in Kathmandu (50). The number of beds in private hospitals (19580) easily surpasses those in public hospitals (5644) (50). Three-quarters of private hospital beds are located in this region (45). These private hospitals mainly cater to the need of people from wealthier income quintiles (50). OOP is a principal way to finance health care expenses.

4.2.1.2 Kanchanpur site

Kanchanpur district, located in Province 7, was another field site of this study. This region is economically backward and mostly consisting of a marginalized community. It is characterized by a low literacy rate (40%) and a high poverty rate (45%)- higher than a national average (36). Kanchanpur district borders India in the south and west. The district has a total of 92 wards and 82134 households (163). Acute illnesses are still the primary threat (40) however, the rising trend of chronic illness cannot be ignored. Both public and private health facilities provide health services. However, public health facilities often face challenges such as drug shortage and poor retention of health workers (64). Of 32809 public health workforce, only 7% are present in the whole region (50). Out of the total 21638 private health workers, only 2% are available in this region (50). Residents of this region are increasingly being attracted to private health care services provided by pharmacies and clinics (50). OOP is the primary method to finance health care.

4.2.2 Sampling method

A cross-sectional two-stage cluster sample household survey was performed. The PSU was a *ward*, the lowest administrative unit of districts in Nepal. The following procedures chose the sample households;

In the first stage,

Kathmandu site: 22 clusters were randomly selected from 130 eligible PSU with probability proportional to size (pps).

Kanchanpur site: 20 clusters were randomly selected from 92 eligible PSU with pps.

In the second stage,

Kathmandu site: A fixed number, 30, was selected by simple random sampling from each chosen cluster based on the municipal housing list.

Kanchanpur site: A fixed number, 32, households were selected by simple random sampling from each chosen cluster based on the municipal housing list.

In this way, the target sample size of 1300 household was reached. The sample size of those two study sites was calculated individually (Table 9) due to the differences in socio-cultural and economic characteristics between those districts. The sample size was calculated using OpenEpi Version 3.01 Software (164).

Table 9 Summary table of the sample size calculation

Parameters for the sample size calculation	Kathmandu	Kanchanpur
Total household (population) number in the target area (N)	435544	82152
Hypothesized % frequency of outcome factor in the population (p)*	48	48
Confidence limits as % of 100(absolute +/- %)(*d*)	95	95
Design effect (for cluster surveys-*deff*)	1.5	1.5
Sample size	573	575
Non-response rate (%)	10	10
Total sample size	~631	~632
Final sample size of the study	1263~ 1300 (for logistic simplicity)	

*Hypothesized % frequency of outcome factor in the population (p) was set at 48%. This number is used from a Vietnamese study (138) in the absence of any previous study from Nepal. In that study, 48% of household were willing to pay for health insurance in Vietnam.

4.2.3 Survey instrument development process

To create a survey instrument, I adapted the following survey design steps (165).

i. Reviewed literature on household surveys and questionnaire design in general from both developed and developing countries setting.

ii. Gathered copies of WTP studies focusing on health care and health insurance study instruments from around the globe with special attention with countries with similar socio-political context with Nepal. In doing so, I communicated with authors of those literature.

iii. Obtained survey instrument information from national studies and remaining items of interest (tested and verified in Nepal) were extracted from other disciplines.

iv. Developed the first draft of the questionnaire divided into five distinct sections; i) household roster; ii) household illness; iii) WTP for health insurance; iv) household income and expenditure, and v) durable goods.

v. Various rounds of consultation were done with local experts followed by the supervisor to check content validity and reliability. Necessary modifications were done to make the questionnaire easy to read and follow.

vi. The questionnaire was then translated to local language (Nepali) from English and then back-translated, carefully.

vii. Piloted survey instrument among 40 households in Kathmandu to further check validity and reliability of the survey tool. The finding of piloting was also useful to determine the sequencing of sections and to determine starting bids for health insurance.

viii. The revised instrument for the final time before rolling-out the main survey.

As this cross-sectional household survey study is first of its kind in Nepal, the survey instrument had to be uniquely constructed to fit in the Nepalese context. Survey instrument development was also benefitted from instruments of national-level surveys, for instance, NLSS (35). Information was gleaned from the published studies on demand or WTP for health insurance (82, 132, 136, 138, 139).

Information on section 1 "Household Roster," section 4 "Household Expenditure," and section 5 "Durable Goods" were pulled-in and modified directly from the NLSS (35). Similarly, questions of section 2 "Household illness episodes of chronic and acute illness and injuries" were taken from the Nepal demographic and health survey (160) and NLSS (35).

WTP studies are designed to extract information on hypothetical goods or services. Since those services are not available in the market, the WTP survey questionnaires require special attention concerning instrument construction and administration. To cater this requirement, this study had a unique design specific to the need of this research and context.

Section 3 “Willingness to pay for health insurance” consisted crucial setup, i.e., hypothetical set up of SHSP aimed at eliciting households’ maximum WTP for that health insurance scheme. The hypothetical health insurance scenario used was amalgamated with the pictorial illustration of the hypothetical scenario to keep participants at ease. Questions for section 3 were constructed after extensively reviewing health insurance documents released by the GoN (31, 61, 65, 66), previous literature on WTP for health insurance (81, 132, 133, 135-137, 139, 142-144, 146, 149, 150, 153, 166), studies pertaining to WTP for health service (109, 167-169). Questions from previous literature were available online. If questionnaires were not found online, authors of previous literature were contacted directly to obtain copies of the instruments used by them.

The first draft thus developed was checked by the supervisor. After series of revisions, the survey instrument was piloted in 40 households in Kathmandu in September 2017 before the formal survey data collection. A few amendments were done in the survey instrument after the pilot study results were analyzed. Modifications included;

i. The inclusion of household consumption expenditure questionnaires as a surrogate of household income as a lot of missing data was found in income related question during piloting- potentially because a majority of households pre-tested were from the informal sector. A well-established tradition of collecting expenditure data in less developed economies (89) validates the attempt of this study to collect consumption expenditure data over income data.
ii. Starting bid for SHSP was decided and added to the survey instrument.
iii. Minor modifications in the household roster and household illness section.

4.2.4 Survey content

Survey questionnaire (Appendix 4) consisted of a cover page and five distinct sections.

Cover page

The cover page had sections where initial information on household, survey, interview date, result code had to be filled out. The date for the next visit was also included in the cover page to make sure the selected households were not missed out in the survey at least until the second attempt. The cover page also contained part on the primary respondent's information which was filled out by the household head or spouse of household head or the most educated member of the family over 18 years of age.

Section 1- Household roster

The head of the household or spouse of the household head or the most knowledgeable person above 18-years age had answered questions asked in this section. The section consisted questions about the family members, their relation to the household head, age, education, religion, ethnicity, occupation, marital status, and economic classification of the household.

Section 2- Household illness: healthcare seeking and payment mechanism

This section aimed to find any episodes of acute illnesses and injuries (and deliveries) in the past 30-days and the episode of chronic illness in the past 12-months in households. The section had a series of question on the type of illness and the payment made to treat that illness.

Section 3- WTP for SHSP

The main objective of this section was to measure WTP for SHSP. This WTP for SHSP study elicited household's willingness to pay through the bidding game approach. The bidding game approach might be subjected to the starting point bias. Starting point bias is a condition where respondents are likely to be influenced by starting number of the bid (76). Random allocation of the starting bids was done in this study to mitigate potential starting point bias, as recommended (170). Additionally, the starting bids used by this study were decided from a pilot study. Five sets of opening bids were;

NRs. 2500; NRs. 3500; NRs. 4500; NRs. 5500; NRs. 6500.

Section 4 and 5- Household expenditure and durable goods

Section 4 contained 25 items. Contents of this section were aiming at finding out what share of total household expenditure goes into health care expenditure. So, the information on the expenditure on food, and non-food expenditure such as healthcare, education was recorded in this section. Both 30 days and 12 months expenditure were recorded. In the food expenditure section, the information of both 7 days and 30 days were recorded. The main aim of the durable goods section was to find out the ownership of durable goods of the households. The information was used to compute household asset.

4.2.5 Survey data collection

The interviewer-administered semi-structured questionnaire was used to collect survey data. Hypothetical health insurance scenario was explained to respondents, and their WTP for the health insurance programs was noted. The interview was conducted in Nepali language and filled out in Nepali (and/or in English) by 20 research assistants.

All 20-research assistant had either public health or nursing background and had prior experience of household survey data collection. All of them participated in a two-day training workshop. Training was followed by mock interview sessions (done at a training site) and an actual interview- practice session before heading out in the field for the main survey data collection. Data were collected from September to October 2017 by all research assistants. Each research assistant was provided with the observation note-book (to fill-in any distinct observation seen during the interview).

An attempt was made to reduce non-response rate in the survey sample. If a household was not available to participate in the survey on the day the household was initially approached, an attempt was made to return once more the following day before moving onto the neighboring household. All respondents had to give written consent before the interview. Any missing data found were checked on-spot to minimize missing and invalid data.

4.2.6 Study participants

The sampling unit of this study was a household.

Inclusion criteria of study participants

i. Households registered in the local municipality.

Exclusion criteria of study participants

i. The institutional households (like people living in school hostels, prisons, army camps, and hospitals)
ii. The households of diplomatic missions.

4.2.7 Eliciting WTP for SHSP

This survey used the CVM bidding game approach to elicit respondents' WTP for SHSP. WTP section was placed in the 3rd section, after the household roster and household illness section. Hypothetical SHSP scenario was explained to respondents. Hypothetical SHSP scenario consisted sub-sections – introduction of SHSP, SHSP's benefit package (explained in chapter 1), and the ceiling (maximum monetary benefit offered by SHSP for its members). List of services included in benefit package (referred from the government document (66)) was also explained to respondents (see appendix 4- section 3). Interviewers answered any questions respondents had on SHSP to facilitate respondents' understanding of the SHSP provision. Right after explanation, respondents were asked how much they would be willing to pay for SHSP. A starting bid was presented to respondents. With this approach, the price increased each time by NRs 250 when the respondent accepted the first-bid until the respondent said "No." WTP corresponded to the last amount before saying "No." Similarly, if the respondent said "No" to the first bid, the price lowered and stopped until the respondent said "Yes." The last sum of "Yes" price was WTP for SHSP. To minimize starting point bias, starting bids were randomly selected from the five sets of the starting bids as mentioned earlier bids.

4.2.8 Data management

All data were entered in EpiData 3.1. Data were entered in two levels, household and individual level in a database created for this research. The database did not allow for a free response for any of the questions with pre-coded response categories. All data were checked before being transferred to STATA 13.1 for data cleaning and analysis.

4.2.9 Ethical considerations

Ethical approval for this study was obtained from the Nepal Health Research Council; reference number: 321/2017 and the ethical approval committee of the University of Tsukuba (Appendix 5). Before each interview in the field, respondents were explained about the study objectives, methods, possible findings, risks, and benefits in the informed consent (Appendix 6). Participation in this study was entirely voluntary, and respondents were allowed to withdraw their participation. Respondents were even allowed to discontinue the interview at any point should they chose to do so once the interview had started.

4.2.10 Funding

The fieldwork of this study was funded by Fuji Xerox Co. Ltd.- the Kobayashi Fund; Grant number 945 and Open Society Institute: Civil Society Scholar Award; Grant number IN2017-37273.

4.2.11 Data analysis

Of 1300 households approached in 42 wards of two districts, data obtained from 80 households had either missing information or deemed illegible. A total of 1220 household had complete survey information resulting survey response rate of 93.8%. The response rate in Kathmandu was 88.6% and in Kanchanpur was 99.2%. Out of 1220, 69 households stated zero WTP for SHSP. The number of households in Kathmandu and Kanchanpur stating zero WTP was 50 and 19, respectively.

4.2.11.1 Data analysis- regression model specification

All analysis was performed in STATA® 13.1.

I did tabulation, bivariate, and multiple regression to get the results. I performed descriptive analysis to compute mean WTP for SHSP. I used Tobit regression to examine factors influencing household's WTP for SHSP. I carried out a link test for model specification, variance-covariance matrix of the estimators, and predicted marginal effects and average marginal effects after the Tobit regression.

WTP values obtained from the bidding game are likely to have a density at zeros because nature of WTP questions is open-ended and nature of dependent variable (obtained WTP value) is continuous with censoring at zero. The Tobit is designed to estimate linear relationships between variables when there is censoring in the dependent variable (171). The dependent variable in this context is called a limited dependent variable (171). The ordinary least square (OLS) is an available alternative. However, the OLS fails to differentiate between limit observation (observations with WTP = 0) and non-limit observation (observations with WTP > 0) resulting in biased estimates of the coefficient (172). So, most appropriate regression, in this context is the Tobit regression analysis for the limited dependent variable (107).

The Tobit regression can be expressed as follows (172);

$$Y_t = x_t\beta+\mu_t \qquad if\ X_t\beta + \mu_t > 0$$

$$if\ X_t\beta + \mu_t \leq 0$$

$$t = 1, 2, \ldots, N$$

$$\mu_t \text{ equivalent } N\ (0, \delta^2)$$

Where, N is the number of observations, Y_t is the dependent variable, X_t is a vector of independent variables, μ_t is an error term which follows a normal distribution.

Table 10 Independent variables specification, their attributes, and hypothesis with the dependent variable, WTP for SHSP

Description of variable	Variable notation	Hypothesis
Surveyed districts;1 for Kanchanpur, 0 for Kathmandu	DIST	Residents of Kathmandu district will be willing to pay more than residents of Kanchanpur district.
Household size, continuous	HHSIZE	Greater the family size, more the WTP for SHSP.
Household head's education level	EDUCATION	
Illiterate 1, otherwise 0	HHEDUIL	Educated households will be willing to pay more.
Up to primary education 1, otherwise 0	HHEDUPR	
Up to secondary education 1, otherwise 0	HHEDUSEC	
Higher secondary and above 1, otherwise 0	HHEDUHIG	
Household head's occupation	OCCUPATION	
Unemployed 1, otherwise 0	HHOCPUE	A household with professional occupation will be willing to pay more.
Professional 1, otherwise 0	HHOCPPE	
Sales and service 1, otherwise 0	HHOCPSS	
Farmer (agriculture) 1, otherwise 0	HHOCPAG	
Other occupation 1, otherwise 0	HHOCPOH	
Monthly household expenditure, continuous	EXP	The wealthier household will be willing to pay more.
Household used at least one public subsidy for health care service in last year; 1 for 'yes', otherwise 0	SUBSIDY	Difficult to hypothesize.
Household had at least one chronic illness episode last year; 1 for 'yes', otherwise 0	CHRONICEPI	Households with chronic illness episodes will be willing to pay more.

Household had at least one acute illness episode last year; 1 for ‘yes,’ otherwise 0	ACUTEEPI	Households with acute illness episodes will be willing to pay more.
Preferred health facility for future illness treatment; 1 for a private facility, otherwise 0	PREFHF	Difficult to hypothesize.
Whether household has insurance (of any kind); 1 for ‘yes,’ otherwise 0	INSURANCE	Households with any insurance experience will be willing to pay more.

4.2.11.2 Data analysis- estimation of SHSP's annual revenue

A shift towards pooled financing is a crucial step for a country pursuing the goal of UHC. Estimation of the SHSP pool size (total revenue of SHSP by totaling premium paid by the enrollees in a year) can inform Nepalese policymakers about the potential flow of funds and mobilization of funds in an efficient method.

I assumed that the SHSP coverage rate in Nepal is the same as the one estimated by this study in order to compute SHSP's annual revenue and its contribution to the currently available government pool. Till date, data from 15 SHSP implemented districts is available. I regarded those 15 SHSP districts ineligible for this annual revenue analysis as households in those districts have already whether or not to enroll in the scheme. Remainder districts were included in the analysis. I used the Nepalese Ministry of Finance Red Book to extract the current government pool from the domestic resources (foreign grants/aid, loans were excluded) (173).

4.3 Results

Findings of this study are presented in three levels; i) results from pooled data (i.e., combined data of both surveyed district- Kathmandu and Kanchanpur), ii) results from Kathmandu, and iii) results from Kanchanpur.

4.3.1 Summary statistics

Table 11 outlines characteristics of households surveyed, of pooled data and both surveyed districts. Almost half of the surveyed households were from Kathmandu, and another half were from Kanchanpur. The mean household size was 4.8 (± 1.7), and that of Kathmandu was 4.2 (± 1.7) while of Kanchanpur was 5.3 (± 1.7). Majority of household (40.8%) had

heads with college and above education level in the pooled data. Most of the household heads in Kathmandu had sales and services employment (32.3%) followed by professional employment (27.5%) whereas most of the household heads in Kanchanpur were engaged in agriculture (26.8%). Similarly, more than half of the households had at least one chronic illness episode in both districts. Strikingly high proportion (89.1) household (in the pooled data) reported that they have never used any public health care subsidy, the proportion was higher in Kathmandu (94.5) than in Kanchanpur (83.9). Overall, 51.5% of household cited that they would prefer to get treated in private health facilities in future.

Table 11 Summary statistics of households surveyed, 2017

Variables	Pool			Kathmandu			Kanchanpur		
	N	Summary	Value	N	Summary	Value	N	Summary	Value
DIST	1220								
Kathmandu	585	%	47.9						
Kanchanpur	635	%	52.1						
HHSIZE	1220	Mean (SD)	4.8 (1.7)	585	Mean (SD)	4.2 (1.7)	635	Mean (SD)	5.3 (1.7)
EDUCATION	1220			585			635		
Illiterate (HHEDUIL)	275	%	22.5	88	%	15.0	187	%	29.5
Primary (HHEDUPR)	123	%	10.1	44	%	7.5	79	%	12.4
Secondary (HHEDUSEC)	324	%	26.6	156	%	26.7	168	%	26.5
College and above (HHEDUHIG)	498	%	40.8	297	%	50.8	201	%	31.6
OCCUPATION	1220			585			635		
Unemployed (HHOCPUE)	90	%	7.4	36	%	6.2	54	%	8.5
Professional employment (HHOCPPE)	292	%	23.9	161	%	27.5	131	%	20.5
Sales and services (HHOCPSS)	296	%	24.3	189	%	32.3	107	%	16.9
Manual labor (HHOCPML)	220	%	18.0	121	%	20.7	99	%	15.6
Agriculture (HHOCPAG)	193	%	15.8	23	%	3.9	170	%	26.8
Other (HHOCPOH)	129	%	10.6	55	%	9.4	74	%	11.7

Monthly household expenditure (EXP)	1220	Mean (SD)	39574.1 (23967.9)	585	Mean (SD)	51857.8 (25152.0)	635	Mean (SD)	28257.7 (15947.0)
At least one chronic episode (CHRONICEPI)	1220	%		585	%		635	%	
Yes	646		52.9	314		53.7	332		52.3
No	574		47.1	271		46.3	303		47.7
At least one acute episode (ACUTEEPI)	1220	%		585	%		635	%	
Yes	672		55.1	321		54.9	351		55.3
No	548		44.9	264		45.1	310		44.7
Prior utilization of subsidy (SUBSIDY)	1220	%		585	%		635	%	
Yes	134		10.9	32		5.5	102		16.1
No	1086		89.1	553		94.5	533		83.9
Preferred health facility (PREFHF)	1220	%		585	%		635	%	
Private	628		51.5	303		48.2	325		51.2
Public	592		48.5	282		51.8	310		48.8
Prior insurance experience (of any kind) (INSURANCE)	1220	%		585	%		635	%	
Yes	594		48.7	224		38.3	370		58.3
No	626		51.3	361		61.7	265		41.7

N = number of observations

4.3.2 WTP for SHSP

Table 12 shows that the mean WTP for SHSP was higher and statistically significant among - households in Kathmandu, highly educated household heads, households with professionally employed household head, wealthier households, households with chronic illness episodes, and households with insurance experience.

Table 12 Mean WTP for SHSP values according to household's characteristics

Variables	Pool		Kathmandu		Kanchanpur	
	Mean WTP* (SD)	p-value[+]	Mean WTP* (SD)	p-value[+]	Mean WTP* (SD)	p-value[+]
DIST		<0.001				
Kathmandu	3462.6 (1800.9)					
Kanchanpur	2249.9 (1102.4)					
EDUCATION		<0.001		<0.001		<0.001
Illiterate (HHEDUIL)	2278.5 (1495.2)		2954.5 (1887.1)		1960.4 (1144.6)	
Primary (HHEDUPR)	2369.9 (1440.6)		2681.8 (1901.9)		2196.20 (1080.1)	
Secondary (HHEDUSEC)	2824.4(1537.9)		3458.9 (1776.7)		2235.1 (958.8)	
College and above (HHEDUHIG)	3255.2 (1606.5)		3730.6 (1712.9)		2552.7 (1113.3)	
OCCUPATION		<0.001		0.014		<0.001
Unemployed (HHOCPUE)	2743.2 (1654.7)		3486.1 (2061.5)		2248.1 (1080.1)	
Professional employment (HHOCPPE)	3322.6 (1544.4)		3850.9 (1669.4)		2673.3 (1066.9)	
Sales and services (HHOCPSS)	2953.0 (1611.2)		3325.4 (1806.8)		2304.7 (921.4)	
Manual labor (HHOCPML)	2596.8 (1650.9)		3198.3 (1846.7)		1861.6 (960.2)	
Agriculture (HHOCPAG)	2022.8 (1277.9)		2869.6 (1902.3)		1908.2 (1128.6)	
Other (HHOCPOH)	3103.8 (1439.8)		3610.9 (1672.9)		2727.0 (1107.8)	
At least one chronic episode (CHRONICEPI)		0.055		0.452		0.021
Yes	2913.9 (1544.5)		3514.7 (1688.1)		2345.8 (1134.8)	
No	2738.5 (1652.2)		3402.2 (1924.7)		2144.9 (1057.6)	

At least one acute episode (ACUTEEPI)		0.422		0.222		0.681
Yes	2798.2 (1570.9)		3380.1 (1776.7)		2229.9 (1083.8)	
No	2872.1 (1630.7)		3562.9 (1828.2)		2266.1 (1118.4)	
Prior utilization of subsidy (SUBSIDY)		0.018		0.709		0.867
Yes	2524.6 (1335.2)		3346.9 (1356.7)		2266.7 (1225.3)	
No	2869.3 (1623.2)		3469.3 (1823.9)		2246.7 (1078.5)	
Preferred health facility (PREFHF)		0.369		0.821		0.198
Private	2871.3 (1588.5)		3478.9 (1776.3)		2304.9 (1129.2)	
Public	2789.0 (1607.9)		3445.0 (1829.9)		2192.2 (1072.3)	
Prior insurance experience (of any kind) (INSURANCE)		<0.001		<0.001		<0.001
Yes	3042.5 (1502.9)		3993.8 (1651.1)		2466.2 (1048.9)	
No	2631.3 (1659.5)		3132.9 (1813.2)		1947.9 (1106.1)	

*Non-contributors (WTP for SHSS= 0) were included in the calculated means (N= 1220)

+p-value calculated from t-test for DIST, SUBSIDY, CHRONICEPI, ACUTEEPI, PREFHF, INSURANCE, and ANOVA for EDUCATION and OCCUPATION.

All WTP values are expressed in NRs (Nepali Rupees). 1USD= NRs 103.53 (as of October 2017)

Table 13 shows a correlation between continuous variable, household size and monthly household expenditure, on WTP for SHSP. Monthly household expenditure was strongly correlated with WTP for SHSP in both districts, and pooled data.

Table 13 Spearman's correlation between household size, expenditure, and WTP

Variables	Pool	Kathmandu	Kanchanpur
	WTP for SHSP	WTP for SHSP	WTP for SHSP
Household size	-0.0760**	0.0621	0.0621
Monthly expenditure	0.4296***	0.2352***	0.0332***

***p<0.001, **p<0.01, *p<0.05

Table 14 presents the distribution of WTP for SHSP across districts. A total of 94.3% of households were willing to pay for SHSP. The average WTP for SHSP was NRs 2831.4 (±1597.8) per year. Households in Kathmandu were willing to pay NRs 3462.6 (±1800.9) and in Kanchanpur were willing to pay NRs 2249.9 (±1102.4) per year for SHSP.

Table 14 Mean WTP for SHSP in the surveyed districts in Nepal, 2017

Annual WTP for SHSP	Pool		Kathmandu		Kanchanpur	
	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)
WTP = 0	69 (5.7)	0	50 (8.5)	0	19 (2.9)	0
WTP > 0	1151 (94.3)	3001.1 (1482.0)	535 (91.5)	3786.1 (1522.9)	616 (97.1)	2319.3 (1044.7)
WTP ≥ 2500	791 (64.8)	3713.0 (1196.5)	470 (80.3)	4116.2 (1302.1)	321 (50.6)	3122.7 (679. 1)
Average WTP (including WTP = 0)	1220 (100.0)	2831.4 (1597.8)	585 (100.0)	3462.6 (1800.9)	635 (100.0)	2249.9 (1102.4)
WTP per person	1220 (100.0)	670.0 (496.5)	585 (100.0)	892.6 (581.4)	635 (100.0)	464.9 (273.9)

Figure 6-a is the demand curve reflecting SHSP demanded by respondents in the surveyed district. A supply curve is a graphic illustration of the relationship between price, shown on the vertical axis, and quantity, shown on the horizontal axis (73). The supply curve of SHSP shown in this study is a flat supply curve, where the premium of SHSP is shown on the vertical axis. As explained in the section 1.8.3.2 in chapter 1, SHSP premium is based on family size. The family of 5 is a fundamental unit of SHSP. NRs 2500 is the starting premium of SHSP for a unit, i.e., the family size of 5. For each additional member, an additional premium of NRs 425 should be paid on the top of NRs 2500 to enroll into SHSP. Maximum family size in this study was 11. So, premium to be paid for the family size of 11 is NRs 2500 plus 6 * NRs 452 which resulted to NRs 5050. Therefore, the supply curve in this study started at NRs 2500 and ended at NRs 5050. However, it should be noted that different households with different size face different supply curve. For simplicity, the supply curve used by this study is a flat curve starting at NRs 2500. This curve shows that, overall, almost 35% of household were below the supply line reflecting that they might not be covered by SHSP when SHSP rolls out in survey districts. Similarly, figure 6-b shows the variation in demand curve between the surveyed districts. It also shows that nearly half of the households in Kanchanpur district were below the supply line.

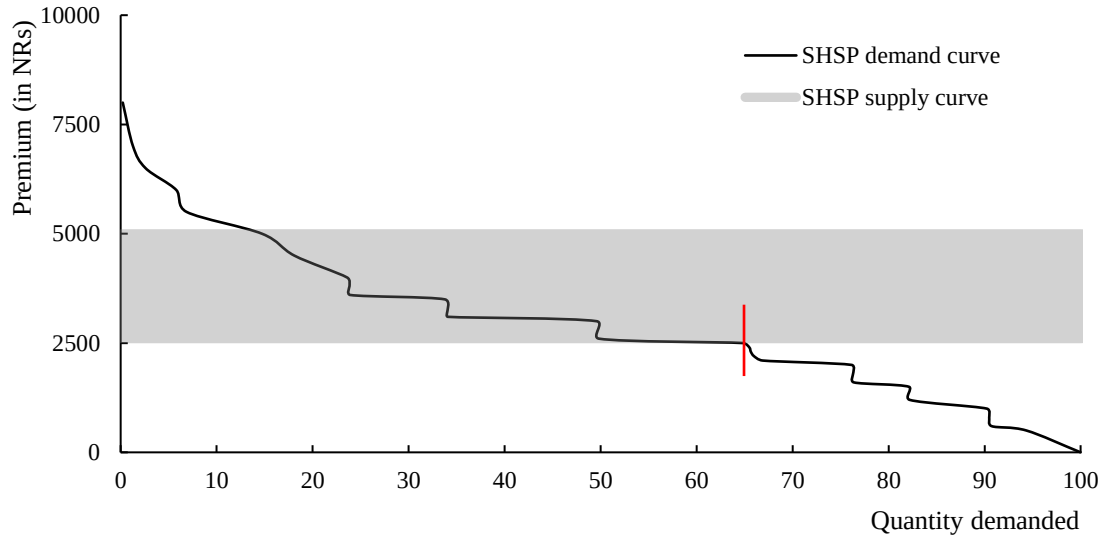


Figure 6-a The SHSP demand curve

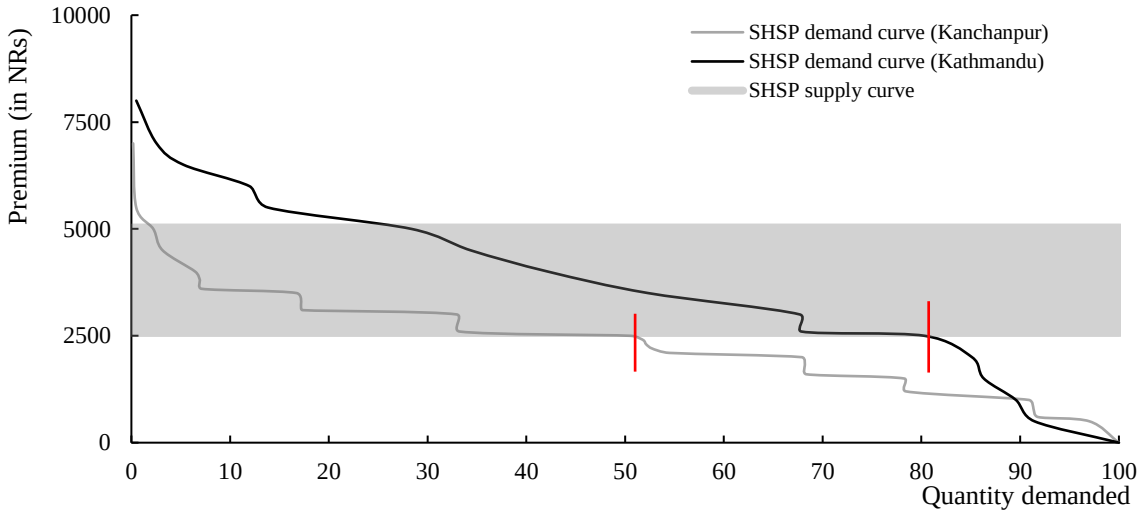


Figure 6-b The SHSP demand curve, district-wise

4.3.3 Determinants of WTP for SHSP in Nepal

Table 15 presents results from the Tobit regression. Table 15 is divided into three parts, 15-a, 15-b, and 15-c illustrating determinants of WTP for SHSP in pooled data, in Kathmandu, and in Kanchanpur, respectively. Separate illustration via separate tables is done to reflect the difference in markets of surveyed districts. Tables outline factors affecting willingness to contribute for SHSP. The Tobit regression estimates the coefficients which explain expected WTP for SHSP and shows the variance of WTP for SHSP values by households' character.

Table 15-a shows that the coefficient of variable DIST is -891.11 NRs ($p<0.001$) reflecting lower WTP among households in Kanchanpur when compared to households in Kathmandu. Similarly, households with educated heads were willing to pay more than their illiterate counterpart, as shown by values of HHEDUSEC and HHEDUHIG, 428.04 NRs ($p=0.002$) and 484.31 NRs ($p=0.002$), respectively. Occupation also influenced the WTP values for SHSP. When compared to the household whose head is professionally employed, households employed in informal sector employment as indicated by HHOCPSS, HHOCPML, and HHOCPAG were willing to pay -388.25 NRs, -444.01 NRs, and -468.68 NRs, respectively for SHSP (at $p<0.001$). Household monthly expenditure (EXP) (0.0132 NRs, $p<0.001$) and presence of chronic illness episode(s) (CHRONICEPI) (207.33 NRs, $p=0.023$) influenced WTP for SHSP value. Households preferring private health facility for future illness treatment (PREHF) be willing to pay lower (-195.66 NRs, $p=0.026$) than of those preferring public health facilities. Prior insurance experience (INSURANCE) of a household improved household's WTP for households, significantly (470.27 NRs, $p<0.001$) than its counterpart.

Table 15-a Factors influencing WTP for SHSP (pool) in Nepal- results from the Tobit regression

Variables	Coefficient	SE	p-value	95% Confidence Interval	
DIST (1 for Kanchanpur, 0 for Kathmandu)	-891.11	112.14	<0.001	-1111.1	-671.08
Household size (HHSIZE)	46.976	29.370	0.110	-10.646	104.59
EDUCATION: Illiterate (HHEDUIL)	Reference				
Primary (HHEDUPR)	69.020	164.21	0.674	-253.15	391.19
Secondary (HHEDUSEC)	428.04	136.86	0.002	159.51	696.57
College and above (HHEDUHIG)	484.31	159.19	0.002	171.98	796.63
OCCUPATION: Professional employment (HHOCPPE)	Reference				
Unemployed (HHOCPUE)	-101.62	218.98	0.643	-531.25	328.00
Sales and services (HHOCPSS)	-388.25	145.28	0.008	-673.29	-103.21
Manual labor (HHOCPML)	-444.01	161.92	0.006	-761.70	-126.33
Agriculture (HHOCPAG)	-468.68	179.52	0.009	-820.90	-116.46
Other (HHOCPOH)	-79.385	177.23	0.654	-427.11	268.34
Monthly household expenditure (EXP)	0.0132	0.0022	<0.001	0.0088	0.0175
At least one chronic episode (CHRONICEPI) (1 for 'yes', otherwise 0)	207.33	91.404	0.023	28.004	386.66
At least one acute episode (ACUTEEPI) (1 for 'yes', otherwise 0)	8.1567	85.543	0.924	-159.67	175.98
Prior utilization of subsidy (SUBSIDY) (1 for 'yes', otherwise 0)	-72.196	143.26	0.614	-353.27	208.87
Preferred health facility (PREFHF) (1 for 'private health facility', 0 for 'public health facility')	-195.66	87.696	0.026	-367.71	-23.606
Prior insurance experience (of any kind) (INSURANCE) (1 for 'yes', otherwise 0)	470.27	90.676	<0.001	292.378	648.180
Constant	2224.3	239.13	<0.001	1755.17	2693.51
Sigma	1450.1	30.761		1389.78	1510.49
Number of observation	1220				
Number of censored observation	69				
Log likelihood	-10105.98				
Probability > chi^2	0.0000				
Pseudo R^2	0.0161				
RESET (Probability > F)	0.1179				

SE = Standard Error

Table 15-b shows determinants of WTP for SHSP in Kathmandu district. The Tobit regression results reflect that educated households were showed a higher WTP for SHSP ((HHEDUSEC, 634.12 NRs, p=0.018) (HHEDUHIG, 695.34 NRs, p=0.014)) than their illiterate counterpart. Likewise, in Kathmandu, wealth significantly influenced WTP value. Wealthier households were willing to pay more. Also, households with prior insurance experience were willing to pay higher (673.03 NRs, p<0.001) than households without such experience.

Table 15-b Factors influencing WTP for SHSP in Kathmandu- results from the Tobit regression

Variables	Coefficient	SE	p-value	95% Confidence Interval	
Household size (HHSIZE)	105.01	59.303	0.077	-11.471	221.48
EDUCATION: Illiterate (HHEDUIL)	Reference				
Primary (HHEDUPR)	-353.05	358.13	0.325	-1056.4	350.37
Secondary (HHEDUSEC)	634.12	268.16	0.018	107.40	1160.8
College and above (HHEDUHIG)	695.34	282.54	0.014	140.39	1250.2
OCCUPATION: Professional employment (HHOCPPE)	Reference				
Unemployed (HHOCPUE)	45.254	398.26	0.910	-736.98	827.49
Sales and services (HHOCPSS)	-398.55	230.29	0.084	-850.87	53.770
Manual labor (HHOCPML)	-300.45	260.51	0.249	-812.13	211.22
Agriculture (HHOCPAG)	-473.43	450.30	0.294	-1357.8	411.02
Other (HHOCPOH)	-164.95	324.36	0.611	-802.05	472.15
Monthly household expenditure (EXP)	0.0111	0.0034	0.001	0.0043	0.0179
At least one chronic episode (CHRONICEPI) (1 for 'yes', otherwise 0)	169.13	165.56	0.307	-156.05	494.32
At least one acute episode (ACUTEEPI) (1 for 'yes', otherwise 0)	-56.415	155.68	0.717	-362.19	249.36
Prior utilization of subsidy (SUBSIDY) (1 for 'yes', otherwise 0)	-510.71	352.38	0.148	-1202.8	181.41
Preferred health facility (PREFHF) (1 for 'private health facility', 0 for 'public health facility')	-245.86	157.17	0.118	-554.57	62.852
Prior insurance experience (of any kind) (INSURANCE) (1 for 'yes', otherwise 0)	673.03	163.75	<0.001	351.39	994.66
Constant	1934.4	413.65	<0.001	1122.0	2746.9
Sigma	1819.0	57.082		1706.8	1931.1
Number of observation	585				
Number of censored observation	50				
Log likelihood	-4839.01				
Probability > chi^2	0.0000				
Pseudo R^2	0.0080				
RESET (Probability > F)	0.5613				

SE = Standard Error

Table 15-c shows determinants of WTP for SHSP in Kanchanpur district. Unlike Kathmandu, in Kanchanpur, the occupation of household head determined WTP for SHSP values. Households heads engaged in sales and services (HHOCPSS), manual labor (HHOCPML), and agriculture (HHOCPAG) were willing to pay -455.45 NRs ($p=0.007$), -730.69 NRs ($p<0.001$), and -657.45 NRs ($p<0.001$), respectively, compared to their professionally employed counterpart. In Kanchanpur, too, wealthier households were willing to pay more. Additionally, households with chronic illness episodes had higher WTP (245.71NRs, $p=0.006$) than households without chronic illness episodes. Households preferring private health service in the future were willing to pay lesser than those preferring public health services. Households with insurance experience were willing to pay more than households without insurance experience.

Table 15-c Factors influencing WTP for SHSP in Kanchanpur- results from the Tobit regression

Variables	Coefficient	SE	p-value	95% Confidence Interval	
Household size (HHSIZE)	13.495	26.480	0.610	-38.506	65.498
EDUCATION: Illiterate (HHEDUIL)	Reference				
Primary (HHEDUPR)	228.26	141.33	0.107	-49.294	505.81
Secondary (HHEDUSEC)	200.69	126.87	0.114	-48.454	449.85
College and above (HHEDUHIG)	173.54	166.47	0.298	-153.38	500.47
OCCUPATION: Professional employment (HHOCPPE)	Reference				
Unemployed (HHOCPUE)	-366.80	221.91	0.099	-802.60	68.996
Sales and services (HHOCPSS)	-455.45	167.67	0.007	-784.73	-126.17
Manual labor (HHOCPML)	-730.69	183.35	<0.001	-1090.7	-370.61
Agriculture (HHOCPAG)	-657.45	175.17	<0.001	-1001.4	-313.44
Other (HHOCPOH)	-6.9245	180.01	0.969	-360.42	346.58
Monthly household expenditure (EXP)	0.0161	0.0028	<0.001	0.0106	0.0217
At least one chronic episode (CHRONICEPI) (1 for 'yes', otherwise 0)	245.71	89.928	0.006	69.116	422.31
At least one acute episode (ACUTEEPI) (1 for 'yes', otherwise 0)	70.335	84.995	0.408	-96.578	237.25
Prior utilization of subsidy (SUBSIDY) (1 for 'yes', otherwise 0)	29.819	120.01	0.804	-205.87	265.51
Preferred health facility (PREFHF) (1 for 'private health facility', 0 for 'public health facility')	-179.74	86.925	0.039	-350.44	-9.0385
Prior insurance experience (of any kind) (INSURANCE) (1 for 'yes', otherwise 0)	308.5071	89.264	<0.001	133.20	483.80
Constant	1711.4	240.34	<0.001	1239.4	2183.4
Sigma	1010.01	29.027		953.00	1067.0
Number of observation	635				
Number of censored observation	19				
Log likelihood	-5160.68				
Probability > chi^2	0.0000				
Pseudo R^2	0.0136				
RESET (Probability > F)	0.3525				

SE = Standard Error

Table 16 shows the Tobit model marginal effects. β^{+} represents marginal effects for a probability of being censored and β^{++} represents marginal effects for the expected value of WTP conditional on being censored: E (WTP for SHSP | WTP for SHSP > 0) for all 3 Tobit regressions, i.e., pooled, Kathmandu, and Kanchanpur.

In the Tobit regression marginal effect of pooled data, the location of the household was significantly associated with WTP for SHSP. In the marginal effect results, the negative sign of the coefficient of variable DIST shows that probability that households in Kanchanpur district would be willing to pay for SHSP was lesser (-3.8% and -777.62NRs; $p<0.001$) than that of households in Kathmandu district. The probability of households with HHEDUSEC heads willing to pay for SHSP was 1.6% higher than HHEDUIL head. WTP for SHSP of households with HHEDUHIG heads was 1.9% greater than that of HHEDUIL household head. HHEDUSEC and HHEDUHIG households were willing to pay 379.07 NRs and 425.30 NRs more for SHSP. As the marginal effect result shows, households head with sales and services (HHOCPSS), unskilled labor (HHOCPML), and agriculture (HHOCPAG) employment changed their WTP for SHSP, i.e., -1.9% ($p=0.021$), -2.3% ($p=0.024$), and -2.4% ($p=0.034$), respectively than their professionally employed counterparts. Also, household wealth was seen to be significantly associated with the household's stated WTP values for SHSP.

Household illness episodes and the preference of the future treatment seeking facility also affected household's willingness to pay for SHSP. As the result shows, the probability that households reporting chronic illness episode(s) would be willing to pay for SHSP was 0.8% greater than households without chronic illness episodes. Moreover, households with chronic illness episodes were willing to pay 180.81 NRs more to SHSP. However, households stating that they would prefer to seek health care at a private health facility

(PREFHF) in the future stated a lower WTP for SHSP (0.8%, -170.8 NRs) than those preferring public health facility. Finally, the household's experience with insurance (of any kind) (INSURANCE) played a significant role in determining a household's WTP for SHSP. Households with previous experience of insurance had a higher probability of contributing to SHSP (2.0%, 410.5 NRs; $p<0.001$) compared to households without previous insurance experience.

Table 16 also presents marginal factors influencing WTP values in Kathmandu and Kanchanpur in separate columns.

Table 16 Marginal effects of factor influencing WTP for SHSP

	Pooled				Kathmandu				Kanchanpur			
Variables	β^{+}	p-value	β^{++}	p-value	β^{+}	p-value	β^{++}	p-value	β^{+}	p-value	β^{++}	p-value
DIST	-0.0387	<0.001	-777.62	<0.001								
HHSIZE	0.0020	0.113	41.013	0.11	0.0040	0.083	90.336	0.077	0.0005	0.611	12.440	0.610
HHEDUPR	0.0028	0.663	60.515	0.676	-0.0158	0.395	-297.33	0.313	0.0064	0.061	212.96	0.110
HHEDUSEC	0.0161	0.001	379.07	0.002	0.0211	0.010	555.31	0.020	0.0061	0.092	186.25	0.116
HHEDUHIG	0.0197	0.002	425.30	0.002	0.0272	0.022	597.00	0.014	0.0055	0.274	160.70	0.299
HHOCPUE	-0.0046	0.661	-88.116	0.64	0.0017	0.908	39.033	0.910	-0.0174	0.224	-329.00	0.088
HHOCPSS	-0.0190	0.021	-333.31	0.007	-0.0165	0.114	-339.43	0.080	-0.0218	0.052	-408.36	0.005
HHOCPML	-0.0230	0.024	-378.38	0.005	-0.0126	0.294	-255.30	0.243	-0.0443	0.015	-640.20	<0.001
HHOCPAG	-0.0248	0.034	-398.09	0.007	-0.0227	0.391	-394.60	0.276	-0.0326	0.011	-588.16	<0.001
HHOCPOH	-0.0035	0.667	-68.965	0.653	-0.0067	0.635	-140.60	0.608	-0.0002	0.969	-6.3804	0.969
EXP	5.67e-06	<0.001	0.0115	<0.001	4.27e-07	0.002	0.0095	0.001	5.27e-07	<0.001	0.0149	<0.001
CHRONICEPI	0.0089	0.028	180.81	0.023	0.0065	0.315	145.36	0.306	0.0085	0.013	226.19	0.006
ACUTEEPI	0.0003	0.924	7.1209	0.924	-0.0021	0.717	-48.550	0.717	0.0024	0.416	64.795	0.408
SUBSIDY	-0.0032	0.627	-62.751	0.613	-0.0247	0.242	-425.03	0.133	0.0009	0.800	27.530	0.804
PREFHF	-0.0083	0.028	-170.85	0.026	-0.0094	0.124	-211.59	0.118	-0.0061	0.049	-165.69	0.039
INSURANCE	0.0201	<0.001	410.59	<0.001	0.0241	<0.001	584.26	<0.001	0.0112	0.004	283.02	0.001

β^{+} represents marginal effects of probability of being censored and β^{++} represents marginal effects for the expected value of WTP conditional on being censored: E (WTP for SHSP | WTP for SHSP > 0)

4.3.4 Annual revenue of SHSP

Table 17 presents the annual revenue of SHSP. Under the assumption that the national coverage rate is similar to the one calculated by this study, findings show that SHSP can increase the current government pool size by approximately 3%.

Table 17 Estimated annual revenue of SHSP

Attributes	
Total households in Nepal	5427302
Total households in 15 SHSP implemented districts	1056587
Households in remaining districts	4370715
Estimated SHSP coverage	64.8%
Number of households expected to enroll into SHSP	4370715 * 64.8% = 2832223.3
SHSP Premium	NRs 2500
Expected annual revenue of SHSP (in '000000)	NRs 7081 (NRs 2500 * 2832223.3)
Current Government pool* (in '000000)	NRs 222516
Expected increment in the current pool due to SHSP's revenue	3.18%

*Current Government pool is budget made available for the MoHP from the Government source (excludes foreign grants and loans). Data from the GoN Ministry of Finance Red Book 2075/76 (2018/19) (173).

4.4 Discussions

This study informs about the potential coverage of SHSP by estimating demand for SHSP using the CVM/WTP approach in Nepal. The tipping points on the household's demand for SHSP and the equity implication of SHSP are also simultaneously discussed in this section. The section also discusses the estimated annual revenue of SHSP in a year.

Demand for SHSP between two regions

This study found substantial variation between regional demand for SHSP as estimated by the CVM/WTP approach. Although the mean WTP for SHSP was NRs 2831.4 per year, households in Kathmandu and Kanchanpur were willing to pay an average of NRs 3457.4 and NRs 2249.9, respectively. Kanchanpur's WTP was lower than the average WTP measured by this study and the starting premium of NRs 2500 forwarded by the GoN for the

purchase of SHSP. Almost 20% and 50% of households in Kathmandu and Kanchanpur, respectively, stated their unwillingness to pay NRs 2500 or to be enrolled in SHSP.

Findings indicate that SHSP potentially might have a higher coverage in Kathmandu and a lower coverage in Kanchanpur when SHSP is launched in these districts. When this result is seen through equity in access to health care lens, SHSP potentially can be regionally inequitable. Equity in access is defined as equal access for equal need (86). In the context of UHC, equity in access to health care is the crucial component as UHC seeks to provide all people with access to quality health care (3). Equity in access can be interpreted as the geographical access or as the financial access to health care (174).

In Nepal, significant equity gap in access to health care services persists owing to the regional locations, keeping other factors (such as income) constant as can be seen from the following example. Women living in the rural area are almost twice less likely to get skilled birth attendance compared with women living to the urban area (50). Regional inequity in health care access can also be attributed to the sparsely located health facilities, under equipped and understaffed health facilities in rural areas when compared with urban areas (7% versus 45% of total public health workforce available in Kanchanpur versus Kathmandu (50)). Risk-pooling mechanisms, such as SHSP, are designed to reduce such inequities in access to health care services. SHSP commits to improving the accessibility to health care services for everyone (31). However, findings of this study are not in line with the SHSP commitment. SHSP ends up leaving behind the same group of the population from the disadvantaged region, such as Kanchanpur, who are already at risk of systemic exclusion due to regional location and covers the population from the urban areas such as Kathmandu.

Contrary to expectation, SHSP might not improve equity in access to health care of the rural residents. Strides in expanding SHSP coverage with persisting inequities might not

help Nepal achieve UHC because equity in access is central to UHC (3). As the finding of this study showed, SHSP must also take into consideration that attainment of UHC will require that vulnerable population from the rural regions have access to its entitlements.

Demand for SHSP across income quintile

Household income was a significant determinant influencing demand for SHSP. Regression analyses showed that increase in income significantly increased WTP for SHSP. The study findings as demonstrated that are likely to be the poorer households. Almost 60 % of households in the poorest quintile, on average, were willing to pay much lower than NRs 2500/year as a SHSP premium; meaning this staggering proportion of households may be left out by SHSP coverage.

Although the GoN has free health care policies targeting the vulnerable population at the national level, not all those vulnerable populations have been benefitted equally from such policies (45). It is evident from the past studies that population from the poor income strata have been excluded from the access to health care services due to various circumstance, such as their inability to pay for health care (51). For instance, utilization of public health facilities by the poorest quintile is less than one-third than that of the wealthiest quintile (51). Also, this gap of health care utilization is expected to increase as the wealthier also seek care from expensive private health care providers which is not captured in this figure.

SHSP is the national insurance policy designed to correct current inequity in health care (65) meaning that, in principle, SHSP should reduce inequity in access to healthcare on its journey to UHC. However, findings of this study exhibited that more than three-fifths households in the poorest quintile are not covered by SHSP implying inequity in access to health care services offered by the SHSP, potentially due to the unaffordable SHSP premium.

These poor households do not have any guaranteed pathways to access SHSP in free of cost or subsidization. In contrast, poorer households are the ones most likely to be affected by CHE and in need of financial protection in health (57). Given the larger proportion of uninsured households in the poorest and poor income quintiles, SHSP does not necessarily seem to reduce inequity in access to health care unless tailored interventions to improve the accessibility of such households are implemented.

Equity in financing suggests that health insurance premium should be based on ability to pay (20). SHSP is based on the community-rated premium. The community-rating operates under the principle that everyone purchasing the same health insurance pay the same premium regardless of income status or health risk status (14). In Nepal's SHSP case, the flat premium is not working well for all communities. Such premium is preventing the poorer households' enrolment. Role of health insurance designed to progress towards UHC should ensure that it covers all by making its premium affordable to those who cannot purchase it (77). The community-rating seems to impose a relatively higher burden on the low-income households as those households have lower ability to pay compared to the better-off households.

Demand for SHSP among health risk households

The health-related attribute also determined the demand for SHSP. Households reporting chronic illness episodes have a significantly higher demand for SHSP than their counterparts. SHSP is attracting high health risk population. As the risk selection theory explains, high risk population tend to enroll into insurance scheme (73). Households with chronic episodes want to ensure their financial sustainability by subscribing into health insurance schemes which entitle them to use health care services benefits. In the context of UHC where all population

should be protected against OOP (3), health risk population wanting to be enrolled in SHSP signposts the potential reduction of future health expenses, to some extent.

Demand for SHSP across occupational statuses

Occupational status of a household head also influenced demand for SHSP, significantly. Households whose head were involved in informal sector employment were willing to pay lesser than those whose heads were professionally employed. Informal sector employment encompasses those jobs that generally lack basic social or legal protections or employment benefits (175). Conventionally, agriculture is not included in informal employment. In this study, however, agriculture, sales and services, and manual workers are cited as the informal sector employment. In fact, in this study, the number of household heads involved in agriculture has the highest share (approximately 27%) in Kanchanpur district. Nepal's economy is predominated by subsistence agriculture, and around 70% workforce are engaged in an informal sector economy. Informal sector workers receive lower wages than equivalent formally employed workers (175). Farmers in Nepal, for example, have fluctuation in income, if any.

On top of that, SHSP requires one-time premium payment for a year (66). There might be several occasions where informal sector workers may not have access to cash to buy SHSP even if they want to due to fluctuation in their income. This might create the psychological barrier and negative connotations towards SHSP and thus low demand than their professional counterpart. This finding could be unique to Nepalese setting. Studies in China (135) and Bangladesh (146) have, however, shown that informal sector workers were willing to pay for national health insurance and CBHI schemes, respectively.

Demand for SHSP and preferred health care facility

Households choosing private health facilities rather than public health facilities for the treatment of their future illness showed a lower demand for SHSP. SHSP mainly contracts public health facilities to provide health services to the insurers (66). In contrast, private health care service providers have a greater share in the Nepalese health care provision system. In addition to that, the perceived quality of care of patients (evaluation based on their opinion) about the service provided by private providers is higher than public providers in Nepal (52). The public facilities, especially in rural areas, suffer from a chronic shortage of human resource for health in public hospitals, shortage of essential medicines, shortage of health products such as vaccines and syringes, and other health facilities management issues (176). This finding suggests SHSP to consider improving the management of public providers and/or contracting private providers to improve coverage.

Demand for SHSP and insurance experience

Households having at least one insurance (of any type) were demanding SHSP significantly higher than the households without any previous insurance experience. The obvious explanation for this finding would be risk averting nature of the household. Households with any other insurance, for instance, property insurance, livestock insurance or business insurance, would want to purchase SHSP to avert the financial risk from arising health care payment. This finding is in line with studies done in LMICs (132).

Demand for SHSP across the level of educational attainment

Better education of household head had a positive effect on demand for SHSP. Households with secondary and higher education expressed higher WTP for SHSP by 2.1% and 2.7%,

respectively. Educated households have a better understanding of health-related issues, uncertainty of illness occurrence, and the importance of health insurance. Educated household heads also have access to information on health insurance operating procedures which gives them the confidence to engage in discussions and facilitate them in the decision-making process (138). This result reinforces the importance of promoting post-primary education to the general population to see improvements in SHSP enrolments. The educational intervention in a WTP study by Khan et al. (166) showed that WTP for health insurance was 33.8% higher among workers who joined the educational intervention in comparison with who did not. This finding is comparable to findings from other studies (133, 136, 139, 145).

4.5 SHSP pool and the UHC goal

Progress to UHC depends on raising adequate funds. Given the unwillingness of poor and informally employed households to voluntarily enroll into SHSP, the attainment of universal coverage is likely to require significant subsidization of SHSP premium by the GoN. This means creation of additional fiscal space for health is required to cover those vulnerable population with SHSP. Findings show that SHSP could generate around 3% of additional resource in the government's current pool, after taking into account the premium-paying population proportion. In this study, the proportion of premium-paying population was slightly larger (65%) than the rest of the population potentially needing subsidization of SHSP premium. As this study showed, households from urban location and higher income strata were willing to pay for SHSP against the background where they have access to private providers. However, an additional resource created by the contribution of the SHSP premium-paying population solely may not be viable to expand SHSP coverage by

subsidizing premiums to population likely to be uninsured. One natural reason would be the adverse selection, i.e., households with higher health risk, for instance, a household with chronic illness episodes willing to join SHSP than the households without such episodes. In this case, a health care service resource utilization rate is higher. However, for UHC perspective, equity in access to health care is imperative. To be consistent with the notion of UHC, equity in access and financing should be of the utmost consideration. In this context, SHSP pool can be augmented with other ways to generate resources for health, such as mobilizing external (donor) resources or increasing in the share of government budget (177) to exempt or subsidize SHSP premium for a vulnerable population. If SHSP covers the vulnerable population from rural areas and low income, cross-subsidization, for instance from wealthier to poorer individual can take place.

4.6 Conclusions

This study provides evidence in understanding the demand for SHSP in Nepal using the CVM/WTP approach. Variation of WTP across socio-economic statuses and location of household suggests that a flat premium is likely to leave behind the almost half of the households from the poorer quintiles and disadvantaged regions, which is against the equity notion of UHC. Nepal might consider introducing different community-rated premium for different regions to ensure equity and improved coverage. Administrator of SHSP in Nepal needs to have a decentralized focus to create the demand for SHSP among illiterate and informally employed households to cover all segments of a community to achieve UHC in Nepal.

CHAPTER 5. CONCLUSIONS

CONCLUSIONS

This chapter integrates findings generated by two empirical studies of this thesis and views those integrated findings form the equity lens. Policy implications, strengths and limitations, and priorities for future research are discussed in this chapter.

5.1 Integrating findings of two empirical studies

Two empirical studies were undertaken by this thesis to assist Nepal's quest for UHC. Nepal embarked the journey towards UHC by establishing SHSP with a promise to provide financial protection in health to everyone. UHC financial protection is monitored by its official indicator, CHE (8). SHSP is voluntary national health insurance designed to improve financial protection in health by mitigating CHE (65). For Nepal, progress towards UHC involves coverage expansion of SHSP (31). SHSP is also expected to correct the current inequities in access to health care and health financing owing to regional and income differences, among others (65). This section brings two empirical studies, 1 and 2, together to answer from equity viewpoint whether SHSP offers financial protection against CHE to households identified as at risk of CHE in a nation-wide study by covering them by its program.

The empirical study 1 utilized 2010/11 NLSS dataset to measure the nation-wide incidence of CHE, its distribution, and determinants in Nepal. Findings of this study reflected the national picture of CHE and located households vulnerable to CHE.

The empirical study 2 used the cross-sectional household survey undertaken in 2017 for this study to estimate potential coverage of SHSP. This study estimated coverage of SHSP by estimating the demand for SHSP utilizing the CVM/WTP approach. The study also

identified households likely to be covered by SHSP and households likely to be missed by the SHSP coverage.

These two empirical studies are independent of each other and are based on data taken almost six years apart. This thesis assumes that CHE measured by the empirical study 1 is relevant even in the current Nepalese context because of the following two reasons. First, since the provision of the free health policy (EHCS) in 2007, the establishment of SHSP in 2016 (31) is considered as a landmark movement to pursue UHC goal by the Nepalese health system. Second, the median year of the global CHE estimates is 2010 (6). These reasons give leverage to discuss findings from both the studies in integration.

Since UHC framed by the SDGs aims to 'leave no one behind' (1), this thesis disaggregated CHE incidence and SHSP coverage by regions, income strata, educational status, and other health-related and non-health variables in Nepal in those two independent studies. The following section focuses on a few critical integrated findings of two empirical studies of this thesis.

SHSP coverage and CHE: regions

Findings of the empirical study 1 showed that the incidence of CHE varied by regions. It showed that CHE in Nepal is distributed disproportionately among households in the far-west region (or Province 7 in a revised administrative system). Households in the far-west region were likely to incur CHE 1.5 times more than that of the households in the central region. Two study sites of the empirical study 2 were Kanchanpur and Kathmandu. Kanchanpur is a district in the far-west whereas Kathmandu is the district in the central region. Findings of the empirical study 2 exhibited that almost 50% of households were likely not to be covered by SHSP in Kanchanpur while this number was around 18% in Kathmandu.

Evidence of systemic exclusion to accessing health care service due to regional differences is acknowledged in Nepal as discussed in chapter 1 and 4 (50). The households from the far-west not only suffer from the inequitable access to health care services they need but also findings of the study 1 exhibited that in the course of accessing the needed health care service they spend more significant proportion of their households' CTP via OOP than any other regions in Nepal. SHSP, which promises access in of needed health care services and financial protection while accessing those services to all in its policy, tends to miss covering almost half of those vulnerable households in Kanchanpur. Households in Kanchanpur may not be protected against CHE even after SHSP rolls out in that district as SHSP fails to reach out households in the disadvantaged areas, such as Kanchanpur. SHSP seems to miss out taking regional variation into its account while designing the insurance scheme. In this context, findings of two empirical study, when seen together, clearly suggests that SHSP suffers from inequitable coverage as it falls short in the breadth of population coverage to provide financial protection in health to the population in the far-west (rural areas, generally) region where CHE is concentrated.

SHSP coverage and CHE: income

The empirical study 1 found that CHE was concentrated in the poorer and the poorest income strata than their high-income counterparts. The high-income households reported not only greater episodes of illnesses but also a higher CTP for their illness treatment. However, for low-income households, even a smaller health care expenditure was catastrophic. CHE can be lowered when OOP at the point of service use can be replaced by risk-pooling mechanisms, such as SHSP (3). The empirical study 2 attempted to find how likely the low-income households are to be covered by SHSP in SHSP's current institutional arrangements.

Findings of the study 2 showed that SHSP excludes the majority of households from the low-income strata from its coverage. Demand for SHSP was directly associated with household's income. SHSP covered more than 80% of the households from the high-income strata while this number was merely 35% in the low-income strata. Majority of the low-income households those have a higher likelihood of incurring CHE remain uninsured even after the establishment of SHSP, exposing themselves to risk of OOP and subsequent CHE.

Should Nepal's SHSP be rolled out through the country it may not be significantly different from Ghana's NHIS on the equity front as Ghana's NHIS covered only 18% of the population from the poorest income strata in its pool compared to more than 50% from the high-income strata due to poor households' inability to pay for premium (29). The gain in SHSP coverage should ensure to shrink, rather than to widen, existing inequities in Nepal.

SHSP coverage and CHE: health risk households

Analysis of OOP in health from study 1 showed that households reporting chronic illness episodes were vulnerable CHE in Nepal. On top of that, as a finding of the empirical study 1 showed, Nepalese households reporting increased burden of acute illness and injury episodes were more like to face CHE than household those did not have such illness burden. The treatment cost could easily exceed the household's CTP when they unexpectedly buy health care services by OOP. The Tobit regression, in the empirical study 2, showed that the household reporting chronic illness episodes had a higher demand for SHSP compared to households without such episodes. SHSP showed a tendency to attract health risk population. High health risk populations are those that are constantly exposed to risk of CHE as shown by the nation-wide data in the empirical study 1.

This integrated finding is encouraging in the context of UHC because UHC financial protection demands countries pursuing the goal of UHC to cover the high health risk population by risk-pooling mechanisms to protect them from undue financial hardship as a result of seeking health care services they need (3). This finding can be the substantial positive side of SHSP as the majority of the health risk households are covered by SHSP and can utilize SHSP to protect themselves from CHE in future.

SHSP coverage and CHE: education

Households headed by educated heads were less likely to incur CHE than their illiterate counterparts as found by the empirical study 1. Similarly, in the empirical study 2, households headed by better-educated heads (post-primary education) were likely to be covered by SHSP than the illiterate and less educated counterparts. This finding reiterates that households with no or little education are likely to be left behind by SHSP coverage.

High burden of CHE is likely to prohibit illiterate households in utilizing health care services in future. Previous studies suggest that Nepal has inequity to health care services access owing to educational status, i.e., illiterate population less likely to utilize health care services (63). Amid this existing inequity, SHSP does not seem to be inclusive in its coverage as it misses out attracting educated and illiterate households, alike.

5.2 Main contributions to knowledge

Two empirical studies of this thesis contribute uniquely to knowledge in financial protection in the context of UHC in Nepal and in countries with similar socio-economic background beyond just providing corroboration.

- The empirical study 1 sets out to be the first ever CHE study in Nepal offering extensive details on the national CHE incidence, distribution, and determinants of a country. This study contributes to the national efforts of tracking households suffering from undue financial hardship as a result of seeking health care services by providing robust evidence.
- The empirical study 2 is one of the pioneer WTP studies to estimate coverage of health insurance in low-income South Asian countries including Nepal. This study contributes by bridging the evidence gap on demand for health insurance literature in Nepal and elsewhere by answering significant policy questions about the voluntary health insurance coverage.
- Most of the other studies on UHC financial protection studies either measure CHE as an impact of OOP or estimate the coverage of insurance schemes in isolation. This thesis embeds both types of studies in it, and therefore findings of this thesis offer a detailed understanding of household-level attributes influencing CHE and demand for health insurance and look explicitly if there are intersections among those households' attributes.
- Most of WTP studies focus only on measuring the mean WTP values and individual (or household) level determinants affecting the WTP value. This thesis contributes to knowledge of demand for health insurance using the CVM/WTP approach by taking into consideration of equity issues in the context of UHC.

5.3 Policy implications and recommendations

Nepali policymakers aspire that SHSP will contribute to Nepal's UHC journey. Establishment of health insurance based on households' voluntary contribution can be a good

start, but establishment alone cannot guarantee attainment of universal coverage. The agenda for universality in financial protection cannot be attained if SHSP does not cover those vulnerable population at risk of incurring CHE. Reluctance of Kanchanpur residents, poor households, and households headed by illiterate heads to voluntarily enroll to SHSP implies that the administrator of SHSP should re-design the current institutional arrangements to cover those population as they are the ones at high risk of CHE. As Nepal is pursuing its UHC goal, the findings of this thesis can introduce following agendas into the forefront of ongoing policy discussions to facilitate the UHC journey.

First policy recommendation; equity. Aspiration of UHC with the introduction of SHSP presents a unique opportunity to Nepal to feature equity in its health policy. The way health system is financed is a critical determinant for reaching universal coverage since they determine whether health services exist and are available and whether people can afford to use health services when they need them (3).

It is essential for SHSP to ensure equity as it gains its coverage to ensure it does not leave the disadvantaged population behind. Findings of this thesis showed that SHSP might not be able to correct prevailing inequities owing to regional and income differences in Nepal. On the one hand, the empirical study 1 showed that households from the rural regions and low-income strata suffer from CHE. On the other hand, results of empirical study 2 implies that households from the same rural region and low-income strata could be missed by SHSP coverage. On the path to UHC, care must be taken so as not to miss CHE vulnerable households, households that are poor or marginalized, or the situation of "inverse equity hypothesis" – as stated by Rodney and Hill (178) – ((health) interventions reaching to the privileged group first and then to the less privileged or marginalized) may come true. Indeed, evidence of coverage not being equitable is not less common (29).

For SHSP to ensure equitable coverage, from findings of this thesis, it must establish equity in financing as a clear priority within its policy. Equity in financing is unequal health insurance premium for households with unequal ability to pay (20). Equity in financing can be done in two ways; first, exemption or subsidization of SHSP premium to the poor households; and second, region targeted SHSP premium.

First; exemption or subsidization of premium to poor households. SHSP premium of eligible poorer households can be partially subsidized or even exempted after means testing (targeting process to identify the poor, based on income, with reasonable accuracy (179)) at the household level. The GoN has stated on providing subsidized premium to poor households and this thesis reiterate the importance of subsidized premium policy to cover poor households. Subsidization or exemption of premium altogether can ensure that SHSP reaches to the vulnerable population who are otherwise excluded from the coverage. There are examples of countries those started their insurance coverage from the poor and disadvantaged population rather than conventional easy to reach population. For instance, *The Seguro Popular*- Mexican's health insurance initiative first offered a subsidized premium coverage to the poor people (180). Then, the initiative was gradually extended to high-income groups, with premium adjusted to their income levels (180). Mexico's health insurance is one of the successful initiatives to reduce inequity with an exciting coverage of the poor and disadvantaged population in its scheme. Nepal's SHSP can also target the poor and disadvantaged population in its initial phase by offering premium subsidization or exemption options. However, to make the expansion of coverage effective among poor households, it is necessary to regulate poor household identification process or else, ad hoc enrolment may result in inclusion bias where no such households might be included (7). For the accurate identification of the poor or disadvantaged households, more often, the health

ministry is suggested to collaborate with other line ministries working in poverty reduction, for instance, the ministry of co-operatives and poverty alleviation in case of Nepal, or development partners involved in poverty reduction initiatives (178).

Another option to achieve the equity in health financing mentioned above can be the region targeted premium. Currently, SHSP treats the whole nation as one community, and thus community-rated premium is the same across the nation irrespective of individual's income and health status. Instead of implementing the same community-rated premium across the country, SHSP can introduce different premium for the different community (or region). As shown by this thesis, households from the disadvantaged regions were likely to incur CHE and likely to remain uninsured than the households from better-off regions. To improve its coverage, SHSP can revise its national flat fixed premium policy and make variations according to the regions. For instance, an annual premium of NRs 2500 covered 50% of households from Kanchanpur. Reduction of premium to NRs 1000, would improve coverage to 90%. Targeting regions (or geographies) has been established as a useful mechanism to transfer benefits to the poor and disadvantaged population (181). China's New Rural Cooperative Medical Scheme is a highly subsidized insurance scheme that targets rural population (182). Brazil extended its coverage of family health program by targeting rural and deprived municipalities first and then gradually to the better-off regions (183). These initiatives have a record of reaching to the rural, poor, and disadvantaged populations (184). Nepal's SHSP can also implement region targeted premium where rural and deprived regions are provided subsidized premiums. If done, it can generate demand for SHSP and expand the coverage in those regions. However, it is imperative that SHSP should ensure a minimum quality service guarantee across the regions and providers to achieve improved coverage. In

an SHSP pool, thus constructed, cross-subsidization from wealthier to poorer individuals can take place.

Nepal may have to trade-off between SHSP premium level and SHSP coverage. Lowering premium, i.e., subsidization or even exemption of premium to the rural, poor and marginalized population may improve the coverage as evident in other countries (182) however a lowered premium yields a limited revenue. In the context of UHC, coverage of the insurance scheme, especially to the poor and disadvantaged group of community, is prioritized (57). Similarly, SHSP also aims to gain its coverage to move closer to UHC (31). For subsidization of premium to take place additional resources are needed. Revenue generated from SHSP scheme alone may not be sufficient to afford expenses incurred in exempting or subsidizing premium to a poor and vulnerable population. SHSP (revenue) pool, in this case, can be complemented with another source of resources such as general government revenue or donor financing.

Second policy recommendation; promote (health) education. This thesis reaffirms the importance of promoting education for Nepal to mitigate CHE and achieve equitable SHSP coverage. The empirical study 1 showed that educated households are less likely to face CHE when compared with illiterate households. Similarly, the empirical study 2 showed that illiterate households are less likely to demand health insurance when compared with their educated counterpart. Promoting literacy to general population also promotes their health literacy (74). Education level of an individual has significant impact his/her health. Educated households are more likely to be aware of their health behaviour, adopt practices that promote their health and wellbeing (162). Similarly, since educated households understand the uncertainty of illness occurrence, they are more likely insure themselves against such uncertain events than their illiterate counterpart. Promoting general education can be regarded

as a long run strategy to mitigate CHE and improve equity in SHSP coverage. Similarly, in a short-run, Nepal can run targeted educational program to improve demand for SHSP among illiterate and less-educated households in Nepali and local languages. Programs such as campaigns, TV and radio advertisements, and other public advertisements that disseminate importance of health insurance schemes such as SHSP, its enrolment procedures, benefit packages, and other SHSP related information is beneficial to improve SHSP literacy among illiterate and less-educated households.

Next policy recommendation; public sector strengthening. The study 2 of this thesis showed that households preferring private health facilities for health service use in the future were willing to pay significantly lower than that of their counterparts. Similarly, although not statistically significant, households those had used at least one public subsidy for health care in the preceding year were willing to pay less than households those household which had not. Nepalese public health care service providers are often cited of not improving the quality of health care services to retain patients at public health facilities (185). An international study also showed that WTP for health insurance increases with the increase of quality in care (81). In UHC, improvement in coverage and quality of service delivered should be synergistic. Assurance of a minimum quality guarantee from the service providers could retain its service users and facilitate the goal of SHSP coverage expansion and financial protection in health.

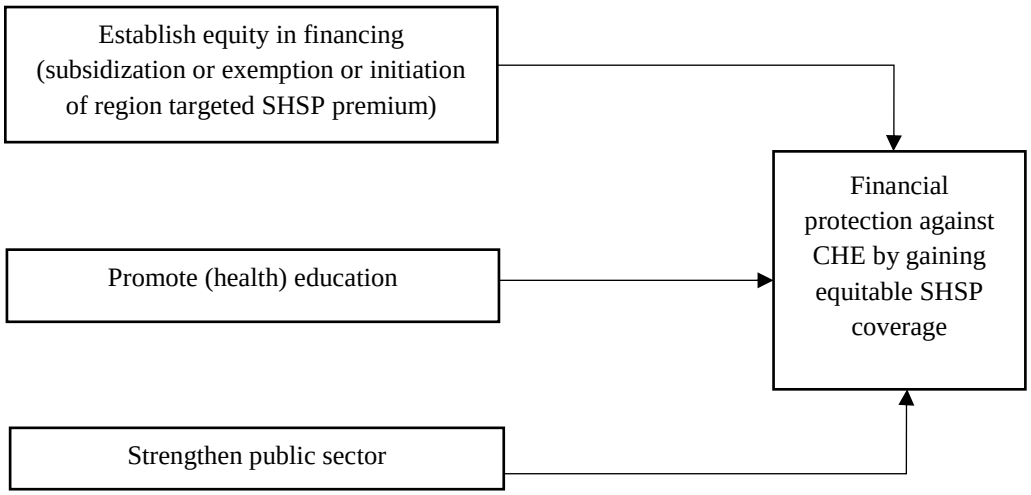


Figure 7 Policy recommendations to achieve equity within SHSP coverage

5.4 Strengths and limitations

5.4.1 Strengths

Both the studies of this thesis are pioneer studies in Nepal. Both the studies facilitate the change introduced by the GoN by illustrating the national scenario of CHE and potential coverage of SHSP. The following are the unique strengths of this thesis.

First; the use of multiple datasets. This thesis used both the nation-wide dataset (secondary dataset) and cross-sectional household survey data collected for this thesis (primary dataset) to achieve thesis objectives. The use of the only dataset would set the variable limitation. Use of two datasets had a unique strength in answering the research questions of this thesis, which leads to second and third strengths of this thesis.

Second; this thesis responds to the global call of measuring financial protection in a country. This thesis measured nation-wide CHE and its subnational disaggregation for the first time in Nepal. The evidence produced by this study bridged the evidence gap in

Nepalese health financing literature by providing a detailed understanding of the multiplicity of variables at the household level influencing CHE incidence in Nepal.

Third; the second study of this thesis evaluated the coverage of SHSP among Nepalese households. By using a robust statistical analysis, this study found household level attributes influencing demand for SHSP in Nepalese context. Findings of this study help SHSP build a valuable foundation to create better health financing policies to attain UHC. Findings of this study can also be utilized by other low-income countries with similar socio-political context as this study sets out to be the pioneer study in low-income countries in South Asia.

5.4.2 Limitations

This thesis has several limitations.

First, in the first study, measurement of CHE is based on the CTP approach. The competing approach and threshold to measure CHE might have yielded different values of CHE. However, the CTP approach is considered as the most appropriate method to measure CHE incidence, and the study applied this approach to measure CHE.

Second, the empirical study 1 did not analyse OOP in health in separate headings such as OOP in medicine, laboratory services, outpatient service, in patient service due to lack of variables. Instead, the empirical study 1 used the total household OOP which is regarded as the crucial variable in CHE studies by the global community.

Third, in the second study, demand for SHSP was elicited by the CVM/WTP bidding game approach. The CVM/WTP studies are forecast study done to estimate demand for the goods or services in the absence of a real market of those goods or services (14). The result obtained from the CVM/WTP approach may vary from observations in the real market. The

"estimated" (overall) coverage of SHSP in surveyed districts, as presented by the study 2, was around 65%. This result differs from the "experienced" coverage rate shown by a preliminary report which stated that the coverage rate of SHSP in early SHSP implemented districts was around 5% (in 2016/17) (61). This difference in coverage rate can be attributed to the regional difference. However, the gap between estimated coverage and experienced coverage can be explained as follows;

The CVM/WTP studies rely on the respondents' ex-ante judgment of a hypothetical commodity based on the scenario described to them during an interview (76). A well-designed WTP hypothetical scenario contains a detailed description of the hypothetical commodity in question so that the respondents can make an informed decision (82). In this study, in order to estimate households' demand for SHSP, attention was given to providing adequate details of SHSP without overloading respondents with information. Explanation of the SHSP scenario might have created (to some level) awareness among the respondents about the importance of health insurance which in turn created a higher demand for SHSP. Evidence shows the demand for health insurance is affected by lack of health insurance knowledge (166). Whereas in SHSP implemented districts, households may not have access to information on SHSP. The annual report issued by the administrator of SHSP acknowledge that adequate awareness raising programs have not been run (31). Existing international studies also state that knowledge on enrolment option and procedure had significant influence in health insurance uptake (186).

Logistical difference between the real market and interview scenario might also have attributed to the coverage gap. Although a household head might state a higher WTP for health insurance in an interview, however, in the real market travel cost to the place to sign up for health insurance may be high which might prevent household from buying health

insurance scheme. As introduced in chapter 1 and explained in chapter 2, there are multiple factors other than premium influencing demand for health insurance. It has to be acknowledged that SHSP has a provision of enrolment assistants at community who visit potential households and help households with enrolment procedures (66). However, households utilizing service from the enrolment assistants might be low as the government report accepts that knowledge of SHSP is low among households in SHSP implemented districts (31).

Another explanation on the gap in the estimated and experienced coverage can be attributed to the regional difference between this study's sites and SHSP implemented districts. This study estimated WTP among the households in Kathmandu and Kanchanpur. Kathmandu consists of households with a higher income than any other city in Nepal (36). As the demand theory puts, the demand for health insurance is also influenced by the income of a consumer (98). In this study too, the households in Kathmandu had a higher demand for SHSP contributing to the higher coverage rate. However, in SHSP implemented districts several other variables which are not under consideration in this study might have affected demand for SHSP. For instance, a few SHSP districts such as *Jumla* and *Jajarkot* are mountainous districts with difficult terrain and with sparsely located health care providers, unlike Kathmandu which has the highest share of health care providers (50). Evidence shows, proximity to health service provider influence demand for health insurance (187). This might have created the gap in estimated and experience coverage of SHSP.

The final explanation on the gap possibly could be the presence of biases in this study. The CVM/WTP approach might suffer for potential bias which Mitchell and Carson refer to as "Potential Response Bias" (76 p. 236-37). This class of bias this study potentially might have suffered is strategic bias where a respondent states WTP amount that is different from

his/her true WTP because respondent in his/her self-interest attempts to influence WTP study results. Another bias might be a compliance bias where the respondent gives a WTP amount that is different from his/her true WTP to please the interviewer.

Similarly, "Implied Value Cues" (76 p. 236-37) may be another class of bias this study potentially may have suffered. The starting point bias is commonly noticed in the bidding game approach where the WTP values stated by the respondents are influenced by the first bid introduced by the interviewer. Nevertheless, this study was carefully designed, and adequate precautions were taken to limit starting point bias by computing starting bids from the pilot study and randomly assigning those bids to the respondents.

Previous WTP studies acknowledge, and that true WTP in the real market might be lower than the WTP stated in the study (138) and attribute a lower WTP (in the real market) to an individual's ability to pay (169). However, none of the prior studies have explicitly mentioned and discussed the experienced coverage and estimated coverage gap as done by this study.

Despite this coverage gap, this thesis's findings are important to estimate potential coverage of SHSP in districts were SHSP is not yet implemented.

Fourth and most importantly, the primary analyses of both the studies considered only the demand side. Both the studies do not carry out supply side (i.e., provision side) analyses in detailed. One important reason for this is a variable limitation in the NLSS dataset.

5.5 Priorities for future studies

This thesis did the groundwork in establishing evidence that; a) the incidence of CHE is high in Nepal; and b) the SHSP coverage might leave population at risk of CHE behind. Although

this study offered the first step in understanding financial protection in Nepal, it left a lot to be still explored.

First, future study can perform similar exercise of measuring a nation-wide CHE with updated data. That would be helpful to track the progress of UHC financial protection in Nepal over the years. Second, future research could make an effort to measure CHE in tandem with health service coverage. Both can be measured together to get a better picture of the population those are unable to access health care and population facing CHE while using health care. Both indicators would be helpful to monitor UHC progress. Third, future study should pick variables such as, OOP expenses in medicine, laboratory services expenses, outpatient spending, in patient spending, transport expenses, separately. Separate analyses of these OOP would give an understanding of what variable impacts most to make the health service catastrophic. Fourth, a qualitative study is preferred to explore household coping strategies. Strategies adopted by households to cope CHE can inform about the financial decision-making process of the households in utilizing health care services. This thesis warrants future studies to explore the strategies adopted by households to cope CHE. Fifth, in this study, not all low-income households demanded subsidized SHSP premium for themselves. They were willing to contribute some amount of their income to SHSP rather than relying on the government subsidy. A qualitative study can be done in future to explore why and what makes those low-income population not want to use the government subsidy. Final, a future study might consider measuring an actual uptake of SHSP including both demand side and provision side variables in SHSP implemented districts.

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APPENDICES

Appendix 1 Key global and local universal health coverage initiatives

Table A1 Origin of universal health coverage concept in the global level

Year	Key policies, plans, and practices
1948	The World Health Organization (WHO) in its constitution state 'highest attainable standard of health for all'. Universal declaration of '…health as the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.'
1978	Alma-Ata declaration of health for all by the year 2000.
1993	The World Bank's world development report focused on importance of investing in health for the overall economic development.
2008	WHO world health report emphasized that the primary health care should be available, accessible, and affordable to all.
2010	WHO world health report focused on universal health coverage (UHC) and pathways to achieve UHC
2012	The United Nations General Assembly adopted the resolution where it called its member nations to follow the path towards UHC.
2013	WHO world health report focused on the scientific evidence generation to move towards UHC
2015	The United Nations General Assembly adopted the Sustainable Development Goals (SDGs) agenda.
2016	UHC became the global agenda. United Nations resolutions on indicators for the SDGs agenda included UHC as target for health sector.

Information compiled from WHO World Health Reports (1-3,8,57)

Table A2 Key universal health coverage initiatives in Nepal

Year	Key policies, plans, and practices
1950s and 60s	The first 5-year plan in Nepal (1956) was initiated. The malaria eradication program supported by the WHO and the American Government (1958) was started. Small pox control program was started. Family planning support programs were initiated. Maternal and child health support programs were started (1962).
1975	The first long-term health plan (1970-1995) was operationalized. The primary objective was community health development through primary health care.
1978	Nepal had official delegation at the Alma Ata conference and was a signatory of the 1978 declaration. The Alma Ata conference identified primary health care as the key to the attainment of the goal of Health for All by 2000.
1988	Female Health Community Volunteers Program was started to improve the outreach of basic health services through local community female volunteers.
1991	National Health Policy 1991 was adopted in Nepal. The primary objective of the National Health Policy 1991 was to upgrade the health standards of the majority of the rural population by extending Basic Primary Health Services up to the village level.
	(The Maoist Revolution (Nepalese Civil War) 1996-2006.)
1997	The second long-term health pan (1997- 2017) was started. The main objective of this plan was to improve health status of the vulnerable population: women and children, rural population, the poor, and the marginalized.
2003	Pilot of community-based health insurance scheme by the Ministry of Health and Population.

2005	Started in 2005, the Safe Motherhood Program, was fully implemented since 2009. It provides delivery services free of cost from public as well as selected private institutions. Additionally, cash incentives ranging from NRs 500 to NRs 1500 are provided to mothers who received delivery services.
2007	Establishment of the free health care policy or free essential health care service (EHCS) to improve the access of health care services of all including the poor and marginalized population in public health facilities. By 2009, the policy was revised and covered all outpatient, inpatient, and emergency services, as well as essential medicine up to district level public health facilities.
2009	Antenatal care programme (provides cash incentives to women upon completion of four antenatal care visits and one postnatal care visit at district or lower level public health facility). Uterine Prolapse Treatment Program (provides universal free treatment services to women as well as cash incentives to women requiring surgery for uterine prolapse).
2012	Establishment of the *Bipanna Nagarik Kosh* to provide financial subsidies to the vulnerable group of population (poor, elderly, children) to pay for disease treatment in facilities specified by the Ministry of Health and Population. These include subsidies for treatment for head and spinal injuries, all cancers, kidney diseases, Alzheimer's and Parkinson's disease.
2014	Addition of 30 free essential drugs to the list of essential drugs to be provided under the free health policy. Formation of- National Health Policy 2014 National Health Insurance Policy 2014 (to ensure UHC by increasing access to and utilization of necessary quality health services).
2015	Establishment of Social Health Security Development Committee to implement Social Health Security (Health Insurance) Program (SHSP) which aims to achieve UHC by increasing access to quality health services. Initiation of Nepal Health Sector Strategy 2015-2020 to lay out the necessary service delivery arrangements to move towards universal health coverage.

2016	Adoption of the United Nation's SDGs including goal 3, target 3.8 that aims to achieve UHC by 2030. SHSP piloted in three districts.
2017	Introduction of the Health Insurance Act 2017.

(Information compiled from reports by the GoN and development partners (41, 43, 44, 47, 48, 59, 61, 62)

Appendix 2 SHSP's institutional arrangement and enrolment process

Table A3 SHSP's institutional arrangement and enrolment process

Administrative level	Responsible entities	Description of responsibilities
Central	Social Health Security Development Committee (SHSDC)	Decision making- premium schedule and benefit package. Other decision making- selecting service providers, payment mechanisms to service providers, developing mechanisms to provide premium subsidy to the vulnerable population.
District	(District) manager	Coordinating SHSP implementation in the respective district.
	Enrolment officers	Collecting the filled-out enrolment forms and premiums collected by enrolment assistants. Verifying information entered in health insurance management system. Coordinating with other logistics necessary for the enrolment assistants.
	Accountants	Responsible to manage premium and renewal amount.
	SHSDC committee at district level	Coordinating for the smooth operation of SHSP in districts. Monitoring of all SHSP related activities in district.
Community	Health facility management committee	Coordinating the implementation of SHSP in each health facility.
	Enrolment assistants	Enrolling households and collecting premiums.
	Health facilities	First point of service use. Providing health care services to SHSP members. Referring patients to higher level health facilities. Collecting co-payments for drugs.
Information compiled from the SHSP Standard Operating Procedures (66).		

Appendix 3 Map of Nepal and the study districts

Map of Nepal

Kanchanpur site

Kathmandu site

Appendix 4 WTP survey questionnaire – English version

HOUSEHOLD SURVEY QUESTIONNAIRE

Household Identification
District name: 1. Kathmandu 2. Kanchanpur Name of city/village: _ _ _ _ _ _ _ _ _ _ _ _ _ Settlement location: 1. Urban 2. Rural Ward number _____ _____ Household identification number_____ Telephone number: _____

Survey Information				
	1	2	3	Final visit
Interviewer's code				
Date of Interview				
Result code*				
Date for the next visit				Total visits
Time				

Code	Primary respondent's (PR) information
PR_1	Status: 1. Household head/Spouse of the household head 2. Other family member
PR_2	Main income earner of the household. 1. Yes 2. No
PR_3	Do you consider yourself to be the main decision-maker in your household about what your household spends money on? 1. Yes 2. No

Result codes*		Supervisor
1	Completed	
2	Not at Home	
3	Postponed	
4	Refused	Code: ___ ___
5	Dwelling not found	Name _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
6	Other _ _ _ _ _ _ _ _ _ _ _ _	Date:

Section 1: Household Roster

[Respondent's code _____]

CODE	HR1.01 Residents [NAME]	HR1.02 Relationship to household head	HR1.03 Gender	HR1.04 Age	HR1.05 Education	HR1.06 Occupation	HR1.07 Ethnicity	HR1.08 Religion	HR1.09 Marital status	HR1.10 Economic Condition of HH
	How many members are in your family? (with whom you share the kitchen) *(including yourself)* Number: _____	What is the relationship of members to the head of household? ***Refer to the codes below**	What is the gender of [NAME]? ***Male=1, Female=2 Other=3***	How old is [NAME]? Write in years. *For infants, write 00.*	What is the highest class [NAME] attended at the current age? ****Refer to the codes below**	What is the occupation of [NAME]? ***Occupation codes in table E***	What is [NAME's] ethnicity? ***Ethnicity codes in table F***	What is [NAME's] religion? ***Religion codes in table G***	What is [NAME's] marital status? *****Refer to the codes below**	Economic condition of your house as classified by the government. ***##Refer to the codes below***
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										

*Relationship to household head codes	* *Education codes		***Marital status codes	## Economic Condition
Head= 01; Husband/Wife= 02; Son/Daughter= 03; Grandchild= 04; Father/Mother= 05; Brother/Sister= 06; Nephew/Niece = 07; Son/Daughter-In-Law= 08; Brother/Sister-In-Law= 09; Father/Mother-In-Law= 10; Adopted /Step Child= 11; Not Related= 12; Don't Know =98	Illiterate =01 Less than a year=02 Class 1=03 Class 2=04 Class 3=05 Class 4=06 Class 5=07 Class 6=08	Class 7=09 Class 8=10 Class 9=11 Class 10=12 Class 11-12= 13 Bachelor's degree= 14 Master's degree and higher= 15 Don't know=98	Never-married=01 Married=02 Divorced=03 Separated=04 Widow/Widower=05	Non-poor= 01 Ultra-poor=02 Poor=03 Marginalized=04 Don't know= 98

Section 2: Household illness- Healthcare seeking and payment mechanisms

We will ask you about illness episodes among household members and treatment cost for the illnesses and injuries. Please state multiple medical treatment for the same disease as one episode. For example, if a child went to the hospital for the diarrhea and then after two days for a follow-up visit, those two visits will be considered as one episode of illness.

Please list different illness episodes in different rows.

i. Chronic illness [Respondent's code _____]

Code	HI1.01	HI1.02	HI1.03	HI1.04	HI1.05	HI1.06	HI1.07			
	Does [NAME] has any of the ***listed**** disability? Physical=01 Visual=02 Hearing=03 Visual and Hearing=04 Mental=05 Multiple=06 None=00	Has anyone in your household suffered from any chronic illnesses in the past **12 months**? *Yes=1* *No=0****[Go to HI1.13]***	What was the diagnosis? Heart conditions = 01 Respiratory = 02 Asthma = 03 Epilepsy = 04 Cancer = 05 Diabetes = 06 Kidney/Liver diseases= 07 Rheumatism related = 08 Gynecological problems= 09 Occupational illness = 10 High/Low blood pressure = 11 Gastrointestinal problems= 12 Others (Specify) = 13	Onset duration of chronic illness. *(Write in months)*	Did [NAME] seek any treatment for chronic illness? ***Yes=1[Go to HI1.07]*** ***No=0 [Go to HI1.06 and HI1.13]***	Why [NAME] did not seek for treatment? ***Please refer to the list*** Illness/injury not serious enough =01 Health facility too far = 02 No transport= 03 Health care too expensive =04 Transport too expensive =05 Health workers unfriendly= 06 Health workers not present=07 Health care not good quality= 08 Other (specify_ _) = 09 [Multiple answers are allowed]	Where did [NAME] seek treatment for chronic illness? Please answer in order [R-CODE] visited. GOVT.HEALTH INST. HP =01 PHC =02 Hospital= 03 Mobile Clinic =04 Ayurved Centre= 05 PVT. HEALTH INST. Pharmacy =06 Clinic =07 Pvt. Hospital= 08 Health worker's home= 9 Traditional healer = 10 Other (Specify) =11			
							1	**2**	**3**	**4**
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										

Code	HI1.08	HI1.09	HI1.10	HI1.11	HI1.12	HI 1.13
	Had doctor (or paramedics) prescribed [NAME] medicines in the past 12 months? **Yes= 1** **No= 0**	Had [NAME] ever not fill or refill prescribed medicine to this illness because medicine cost was too much high? **Yes=01** **No =02** **Medicine was free of charge=03** **Don't know =04**	Did [NAME] use any subsidies? **Yes=1*[Go to HI1.12]*** **No=0**	If the [NAME] did not use any subsidies, why [NAME] did not use? ***Please refer to the list below*** We have ability to bear the treatment cost to this illness=01 Subsidized services and products do not have quality =02 Not aware of any subsidies= 03 Government subsidy is not enough =04 Due to administrative difficulties in getting subsidies=05 Other (Specify_____) = 06 [Multiple answers are allowed]	If yes, what kind of subsidy did [NAME] use? Government = 01 Civil service employee subsidy= 02 Private = 03 Community = 04 Others (Specify)= 05	When you fall sick, what health institution do you prefer to get treated in? Private= 01 Government=02 Others (Specify)= 03
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						

ii. Acute illnesses and injuries

[Respondent's code _____]

Code	HI2.01	HI2.02	HI2.03	HI2.04	HI2.05	HI2.06			
	Has [NAME] any acute illnesses or injuries in the past **30 days**? **Yes=1** **No=0** ***[Go to next section]***	What was the diagnosis? Diarrhea = 01 Dysentery = 02 Respiratory problems = 03 Malaria = 04 Cold/Fever/Flu= 05 Other fever = 06 Skin disease = 07 Tuberculosis = 08 Measles = 09 Jaundice = 10 Parasites = 11 Injury = 12 Dental problems = 13 Others (Specify)= 14	Duration of illness onset. *(Write in days)*	Did [NAME] seek treatment for this illness or injury? **Yes=1** ***[Go to HI2.06]*** **No=0** ***[Go to HI2.05 and the next section]***	Why [NAME] did not seek for treatment. ***Please refer to the list*** Illness/injury not serious enough =01 Health facility too far = 02; No transport= 03 Health care too expensive =04 Transport too expensive =05 Health workers unfriendly = 06 Health workers not present =07 Health care not good quality= 08 Other (specify_ _) = 09 [Multiple answers are allowed]	Where did [[NAME] seek treatment for chronic illness? Please answer in order [R-CODE] visited. ***Please refer to the list*** <u>GOVT.HEALTH INST.</u> HP =01 PHC =02 Hospital= 03 Mobile Clinic =04 Ayurved Centre= 05 <u>PVT. HEALTH INST.</u> Pharmacy =06 Clinic =07 Pvt. Hospital= 08 Health worker's home= 09 Traditional healer = 10 Other (Specify) =11			
						1st	2nd	3rd	4th
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									

Code	HI2.07	HI2.08	HI2.09	HI2.10	HI2.11
	Had doctor (or paramedics) prescribed [NAME] medicines in the past 30 days? Yes= 1 No= 0	Had [NAME] ever not fill or refill prescribed medicine to this illness because medicine cost was too much high? Yes=01 No =02 Medicine was free of charge=03 Don't know =04	Did [NAME] use any subsidies? Yes=1 ***[Go to HI 2.11]*** No=0	If the [NAME] did not use any subsidies, why [NAME] did not use? ***Please refer to the list below*** We have ability to bear the treatment cost to this illness=01 Subsidized services and products do not have quality =02 Not aware of any subsidies= 03 Government subsidy is not enough =04 Due to administrative difficulties in getting subsidies=05 Other (Specify_____) = 06 [Multiple answers are allowed.]	If yes, what kind of subsidy did [NAME] use? Government = 01 Civil service employee subsidy= 02 Private = 03 Community = 04 Others (Specify)= 05
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					

Section 3: Willingness to pay for health insurance

[Respondent's code _____]

In this section, we will introduce you to health insurance. We will also put forward a hypothetical scenario of the health insurance.

Anyone can be ill at any point of time. We seek to treat that illness to recover and return to our normal life as soon as possible. Generally, in course of treating illness, we incur certain cost. Such costs can be paid by a) out-of-our-pocket to health service providers or health institutions which are not reimbursed; b) through pre-payment mechanisms such as health insurance. Have you heard of 'health insurance'? If 'no,' health insurance is a mechanism to pay for healthcare that reduces the uncertainty which might arise due to inability to pay at the time when the healthcare is needed. Healthcare can be expensive. That is why, in health insurance mechanism, financial risk of healthcare treatment can be spread over several people which can make healthcare affordable. Health insurance can be either be operated by the government at the national level or managed by the community (with or without the help of the government.)

Now we would like to explain the following hypothetical scenario.

Social Health Security (Scheme) Program (SHSP):
This scenario is of health insurance program run by the government. In this scheme, households can choose voluntarily to join health insurance program. Households wanting to enroll in health insurance program should pay yearly health insurance premium. Family members should join to this health insurance program as a group. Premium, however, depends on the size of family.
Household can be benefitted from this insurance scheme starting from either of the date; Bhadra 1st, Mangsir 1st, Falgun 1st, and Jestha 1st. Interested households should be enrolled at least 1 month before these dates to enjoy services. Once the premium is paid, insured members will get medical insurance card which is valid for one year. The membership to this insurance program can be renewed. Whenever the insured household member gets ill, s/he can go to the nearby government health facility and get treated with subsidy upon showing the medical insurance card.

Once enrolled to this insurance program, family members are entitled to the following ***benefit package***;
Free essential healthcare services such as immunization, child, and maternal healthcare services from health post and primary health care center as usual. Besides, the enrolled family can also enjoy free healthcare services from other listed primary health care center, district and central hospitals. At designated pharmacies, essential medicines are provided free of cost and for other medicines enrolled families should make 15% copayment. For family members above 40 years of age, a whole-body check-up is provided free of cost once a year at the nearest health center.

Referral services: Referral services are also available. The enrolled family can choose either primary health care center or 25- bedded hospital in their settlement area as the first referral facility. When the treatment cannot be proceeded in the chosen health facility, the patient is referred to the higher level designated government hospitals at regional or central level. However, referral

algorithm is not strictly followed during emergency. Ambulance service is also available in this health insurance benefit package.

- (To interviewer: Please ask if interviewee has any questions before explaining ceiling of health insurance.)

***Ceiling (Maximum monetary benefit)*:** For the family-size of 5 members or smaller than 5 members, insured members can get free healthcare services up to NRs. 50,000 at the nearby government health facility. For the family-size larger than 5 members, treatment costs worth NRs. 50,000/year/family plus NRs. 10,000/year/additional member can be utilized. However, the maximum ceiling of treatment cost offered cannot exceed NRs. 100,000 in a year.
Please be aware that you will be free to continue receiving health care as you presently do without necessarily signing-up social health insurance program.

Now, we would like you to consider the following situation.

We would now like to know the maximum amount of money that you will be willing-to-pay for health insurance.

Code	Questions	Response
WTP_1.1	The premium of social health security scheme premium is [NRs. --------] per year. Are you willing to pay this amount?	Yes=1 No=0
WTP_1.1a	What if the premium is [NRs. ---------] per year, will you be willing to pay?	Yes=1 No=0
WTP_1.1b	If so, what is the final amount you are willing to pay per year as premium of SHSP? (This question will be repeated until the maximum premium is reached.)	NRs. _____
WTP_1.2	Can you afford to pay the final stated amount without going into the debt? If 'no,' please state the amount you can afford to pay without going into debt.	Yes=1 No=0 NRs. _____
WTP_1.3	How do you prefer to pay the insurance premium (for a year)?	Yearly = 01 Bi-annually= 02 Quarterly= 03 Monthly= 04

Additional Questions:

Code	Questions	Options
WTP_3.1a	Do you or your household members have any insurance?	Yes=1 No=0 [Go to 3.2a]
WTP_3.1b	If 'yes.' Could you please state the type of insurance?	Life Insurance= 01 Livestock insurance = 02 Property/casualty Insurance= 03 Health and Disability Insurance= 04 Business and Commercial Insurance= 05 Other (Specify) = 06
WTP_3.1c	Have you ever experienced any (insurance) reimbursement?	Yes=1 No=0

Section 4: Household Expenditure

[Respondent's code _____]

We would like to ask you about household expenditure. Please state income or expenditure of a normal 30-day period (avoid month with special expenditure such as weddings, festivals, or funerals)
(To interviewers: Write expenditure in **Nepali Rupees (NRs).** If none, write zero '0'. If don't know, write DK. Do not leave any blank space.)

Code	Expenditure	30 days	12 months
HE 1.0	**Housing Expenses:**		
HE1.01	Is this dwelling yours? Yes=1 *[Go to **HE 1.04**]* No=0		
HE1.02	If no, what is your present occupancy status? Renter = 01 Provided free of charge by relative or employer or landlord = 02 *[Go to **HE 1.04**]* Squatting = 03*[Go to **HE 1.04**]* Other = 04		
HE1.03	What is the rent per month? (cash plus value of in-kind payments)		
HE1.04	If you wanted to rent your dwelling, how much money would you receive for it?		
HE1.05	Have you rented any part of your dwellings? Yes= 1 No= 0 *[Go to **HE 1.07**]*		
HE1.06	If yes, how much is the monthly (or yearly) rent?		
HE1.07	How much do you pay for water?		
HE1.08	How much do you pay for garbage disposal?		
HE1.09	How much do you spend on electricity?		
HE1.10	How much do you pay for telephone or mobile recharges?		
HE1.11	How much do you pay for cooking gas or fuel?		
HE1.12	How much has your household spent for schooling or education?		
HE1.13	How much has your household spent for health services and medicine?		
HE 2.0	Other Frequent/ In frequent Expenditure		
HE 2.0	How much money did your household spend on the following items:		
HE2.01	Clothes and footwear		
HE2.02	Personal care items (shampoo, soap, combs, cosmetics, toothpaste, toothbrush, haircuts, shaving, shoe shine, and so on.)		
HE2.03	Household cleaning items (dish washer, dry cleaning and washing expenses, soap, bleach, washing powder, and so on)		
HE2.04	Transportation (Public and private)		

HE2.05	Social gathering and entertainment (do not include wedding, dowries, and funerals)		
HE2.06	Debt repayment		
HE2.07	Did your household buy any durables (such as furniture, wall-clock) in the past 30 days? If so, how much did it cost?		
HE2.08	Any other expenditure? (Specify)		

HE3.0	**Food Expenses:**	**7 days**	**30 days**
HE3.01	How much money did your household spend on food brought from market or outside (in cash and in-kind) (For example rice, wheat, lentils, cooking oil, vegetable, meat, and so on)?		
HE3.02	Did your household consume food produced (or grown) by your household? Yes= 1 No=0 *[Go to **HE 3.04**]*		
HE3.03	If yes, what would be the market price of that food you consumed?		
HE3.04	What is the <u>total value</u> of the food consumed by your households in last 7 days (or 30 days)? (Please include the market value of <u>gifts received</u>, in-kind, and cash payment.)		

Section 5: Durable Goods

I would like to ask about the ownership of durable goods in your household regardless of which person owns them.

[Respondent's code _____]

Code	DG1		DG2	DG3	DG4	DG5	DG6
	Does your household own any of the following items?		How many [ITEM] does your household own?	How many years ago, did you acquire [ITEM]? If more than one item owned, ask about most recently acquired item.	Did you purchase it, receive it as a gift or payment for services, or receive it as dowry or inheritance?	How much was it worth when you acquired it?	If you wanted to sell this [ITEM] today, how much money would you receive for it? [If your household has more than one item, please mention total value of all items.]
	Items	**Yes/ No**	**Number**	**Years (0 is less than a year)**	Purchase =01 Gift = 02 Others (Specify) = 03	**NRs.**	**NRs.**
DG_01	Radio/cassette/ CD player	**Y/N**			**1 2 3**		
DG_02	Camera (still/movie)	**Y/N**			**1 2 3**		
DG_03	Bicycle	**Y/N**			**1 2 3**		
DG_04	Motorcycle/scooter	**Y/N**			**1 2 3**		
DG_05	Motor car/ tractors/ Jeep	**Y/N**			**1 2 3**		
DG_06	Refrigerator or freezer	**Y/N**			**1 2 3**		
DG_07	Washing machine	**Y/N**			**1 2 3**		

DG_08	Fans/ Heaters	**Y/N**			**1 2 3**		
DG_09	Television/VCR/VCD Player	**Y/N**			**1 2 3**		
DG_10	Telephone sets / cordless/mobile	**Y/N**			**1 2 3**		
DG_11	Sewing machine	**Y/N**			**1 2 3**		

Occupation Codes E
Government job/employee = 01
NGO job = 02
Business = 03
Teacher = 04
Professional (Doctor/Engineer/Lawyer) = 05
Farmers/ Agriculture workers = 06
Garment workers = 07
Drivers = 08
Skilled workers = 09
Unskilled workers = 10
Rickshaw puller = 11
Retired = 12
Household work = 13
Household work helper/ Maid = 14
Student = 15
Others (Specify)= 16

Religion Codes G
Hindu = 01
Bouddha =02
Islam = 03
Kirat = 04
Jain =05
Christian = 06
Others (Specify) =07

Ethnicity Codes F
Chhetri = 01
Brahman =02
Magar = 03
Tharu = 04
Tamang =05
Newar = 06
Muslim = 07
Kami= 08
Yadav = 09
Rai= 10
Gurung = 11
Thakuri = 12
Limbu= 13
Kumal= 14
Thakur= 15
Marwadi = 16
Dhimal = 17
Sharki = 18
Dalit = 19
Others (Specify) = 20

Appendix 5 Ethical approval from University of Tsukuba

様式３（第１２条関係）

医の倫理委員会審査結果通知書

通知番号　第　　1228　　号
平成　29　年　8　月　23　日

申請者（研究責任者）
近藤　正英　　殿

医学医療系長
原　　晃

平成29年8月4日付けで審査申請（新規）のありました研究の実施について、審査の結果、下記のとおり判定しましたので通知します。

記

1　研究題目　「ネパールにおける家計の破滅的保健医療支出に対する対処戦略と医療保険に対する支払意思額に関する研究」

2　判　定

■　承　認
□　条件付承認
□　変更の勧告
□　不承認
□　中　止
□　非該当

3　理由（判定が承認以外の場合）、留意点、改善点等

4　その他

Appendix 6 Ethical approval from the Nepal Health Research Council

Government of Nepal

Nepal Health Research Council (NHRC)

Estd. 1991

Ref. No.: 564.

17 September 2017

Ms. Mamata Ghimire
Principal Investigator
University of Tsukuba

Ref: **Approval of thesis proposal** entitled **Households' strategies to cope with economic consequences of catastrophic health expenditure and their willingness-to-pay for health insurance: evidence from Nepal**

Dear Ms. Ghimire

It is my pleasure to inform you that the above-mentioned proposal submitted on **17 August 2017** (**Reg. no. 321/2017** please use this Reg. No. during further correspondence) has been approved by Nepal Health Research Council (NHRC) Ethical review board on **13 September 2017**.

As per NHRC rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit the detail of such changes intended or desired with justification prior to actual change in the protocol. Expiration date of this proposal is **December 2017.**

If the researcher requires transfer of the bio samples to other countries, the investigator should apply to the NHRC for the permission. The researchers will not be allowed to ship any raw/crude human biomaterial outside the country; only extracted and amplified samples can be taken to labs outside of Nepal for further study, as per the protocol submitted and approved by the NHRC. The remaining samples of the lab should be destroyed as per standard operating procedure, the process documented, and the NHRC informed.

Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of their project proposal and **submit progress report in between and full or summary report upon completion.**

As per your thesis proposal, the total research amount is **NRs. 560,000.00** and accordingly the processing fee amounts to **NRs-10,000.00**. It is acknowledged that the above-mentioned processing fee has been received at NHRC.

If you have any questions, please contact the Ethical Review M & E Section at NHRC.

Thanking you,

Prof. Dr. Anjani Kumar Jha
Executive Chairman

Appendix 7 Informed consent- English version

Hello! My Name is _____. I represent University of Tsukuba in Japan.

I would like to brief you about this study. This research study is aimed to explore the willingness of households to pay for health insurance in Nepal. This study is the part of a Ph.D. research project under the supervision of the University of Tsukuba, Japan.

This study involves household survey and interviews to explore the willingness of households to join and pay for the health insurance in Kathmandu and Kanchanpur district. Two main objectives of this study are; a. to access households willing to pay for health insurance and b. Determine factors influencing the WTP for health insurance.

The results from this study will be useful to understand the demand of health insurance and the amount they are willing to contribute for the health insurance. The findings of this study might also be useful to reconsider the premium for health insurance to make health insurance accessible and affordable to all households irrespective of household location and socioeconomic condition.

Upon agreeing to participate, the interviewer will explain you two hypothetical scenarios on health insurance. You are asked to state your opinion on which type of health insurance would you prefer for your household members. You will also be asked what amount you will pay for that health insurance. Also, there are handful of questions on household income and expenditure.

Risks of participation are minimal. You might be asked about your recent illness experience. However, personal such as household head's name will not be used in this survey. Confidentiality will be maintained throughout the study. This interview might take approximately 30 to 45 minutes.

Approximately 1300 households across Kathmandu and Kanchanpur district will participate in this study. The participation is completely voluntary. The participation is on your free will, and you can withdraw your participation. You are even allowed to discontinue the interview at any point should you choose to do so once the interview has started.

Consent Form

To: Provost, Faculty of Medicine, University of Tsukuba, Japan.

I got sufficient explanation on the objective, method, and potential results of the survey mentioned above. I hereby agree to participate in this survey.

The participation is on my own free will and can withdraw my participation at any point should I choose to do so once the interview has started.

(If you agree to participate, please follow one of the following procedures;
Please tick off the 'written consent' checkbox and put the signature.
If you are unable to sign your name, please pick off 'oral consent' check box.)

☐ Written consent Signature: _____
☐ Oral consent

Date: ____ Year ___ Month ___ Day

I confirm that the research entitled 'Households' strategies to cope with economic consequences of catastrophic health expenditure and their willingness-to-pay for health insurance: evidence from Nepal.' was well explained and the written consent was obtained as shown above.

Elucidator's name: _____
Signature: _____
Date: ____ Year ___ Month ___ Day

Withdrawal Form

To: Provost, Faculty of Medicine, University of Tsukuba, Japan.

I got sufficient explanation on the objective, method, and potential results of the survey mentioned above. I hereby withdraw to participate in this survey.

The withdrawal to participate in this survey is on my own free will.
Name: _____
Date: ____ Year ___ Month ___ Day

I confirm that the research entitled 'Households' strategies to cope with economic consequences of catastrophic health expenditure and their willingness-to-pay for health insurance: evidence from Nepal' was withdrawn as shown above.

Elucidator's name: _____
Signature: _____
Date: ____ Year ___Month __ Day