DOCTORAL THESIS

COMMUNITY-BASED HEALTH INSURANCE IN ETHIOPIA:

ENROLLMENT, MEMEBRSHIP RENEWAL, AND EFFECTS ON HEALTH SERVICE UTILIZATION

에티오피아의 지역사회기반 건강 보험: 보험가입, 자격갱신, 의료서비스 이용 효과

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Abstract

Community-Based Health Insurance in Ethiopia: Enrollment, Membership Renewal, and Effects on Health Service Utilization

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Background: Community-Based Health Insurance (CBHI) received a considerable attention as a mechanism of health care financing and a potential alternative for a user fee in many low and middle-income countries. The Ethiopian government has introduced different measures to implement pre-payment schemes including CBHI as of 2010. In this dissertation, three sub-studies were designed and implemented to explore 1) The determinants of CBHI enrollment, 2) the magnitude and factors associated with CBHI membership renewal, and 3) the association between CBHI enrollment and health service utilization in Northwest Ethiopia.

Methods: The main research design of the study was a case-comparison community based cross-sectional household survey linked to the health facility survey supplemented with a concurrent qualitative component. The study populations were all eligible households for CBHI in 15 selected clusters in five districts. A multi-stage cluster sampling was employed to obtain a representative sample for the three sub-studies. Applying a structured questionnaire, 2,008 households and 7 health centers were surveyed. Additionally, 8 focus group discussions (four with CBHI members and four with non-members) and 5 in-depth interviews were conducted to supplement

the quantitative findings. A classical multivariate logistic regression, mixed-effect logistic regression, and bivariate-probit regression along with a thematic analysis of the qualitative data were used for the data analysis.

Results: The findings from the enrollment study showed that household-related factors such as age, education, self-rated health status, perceived quality of health services, household size, knowledge and information (awareness) about CBHI were the main influential factors affecting enrollment into CBHI in the study area. Additionally, participation in informal associations, such as local credit associations, and health facility factors in terms of availability of laboratory tests significantly influence probability of enrollment.

The findings from the membership renewal study showed that 36% of the participants were not willing to renew their membership for the next period. The results confirmed that once the households are enrolled in CBHI, factors related to institutional trusts, such as trust in public health facilities and trust in CBHI schemes, and inconvenience of the premium collection were the main influential factors to renew membership. Moreover, poor self-rated health status and perceived quality of healthcare services are correlated with membership renewal. Hence, there is a possibility of adverse selection with regard to CBHI enrollment and membership renewal in the study area.

The third study revealed that CBHI enrollment is positively associated with adult outpatient use, inpatient care, and sick children health services visits. CBHI membership shows 0.50 (50%), 0.22 (22%), and 0.44 (44%) points higher probability of health service visits for adult outpatient, inpatient, and sick children's health problem in the study area, respectively.

Conclusion and recommendation: The study results in this thesis demonstrated important factors affecting CBHI enrollment and membership renewal. Moreover, it also revealed the link between CBHI enrollment and health service utilization.

Therefore, multifaceted policy interventions need to be considered before the nationwide rollout of CBHI and implementation of Social Health Insurance (SHI) in Ethiopia. Strategies such as compulsory enrollment, differential premiums, and group enrollment are essential to tackle adverse selection. Provision of continuous education and social marketing activities to increase enrollment and maintain the sustainability of the schemes are crucial. Policy interventions that enhance the capacity of health facilities and CBHI schemes to provide the promised services to the members and build trust are also necessary. Benefit package expansion and other supply-side interventions are required to strengthen the positive effect of CBHI on health care utilization.

Keywords: Adverse selection, Bivariate probit model, CBHI enrollment, Ethiopia, Health care use, Institutional trust, Membership renewal, Mixed-effect model, Mixed method

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ABBREVIATION/ACRONYMS

OR	Odds Ratio
CBHI	Community-based Health Insurance
DHS	Demographic and Health Survey
EDHS	Ethiopian Demographic and Health Survey
EHIA	Ethiopian Health Insurance Agency
EU	Expected Utility
FFS	Fee for Service
FGD	Focus Group Discussion
FMOH	Federal Ministry of Health
GDP	Gross Domestic Product
HFR	Healthcare Financing Reform
HEP	Health Extension Program
HF	Health Facility
HFC	Health Facility Characteristics
HH	Household
HHC	Household Characteristics
HSTP	Health Sector Transformation Plan
IPT	Inpatient Treatment
IRB	Internal Review Board
IV	Instrumental Variable
KI	Key Informant

KGSP	Korean Government Scholarship Program
Lao PDR	Lao Peoples' Democratic Republic
LMICs	Low and middle-income Countries
LR	Likelihood Ratio
NHA	National Health Account
NHSDP	National Health Sector Development Program
OOP	Out-of-Pocket
OPT	Outpatient Treatment
PCA	Principal Component analysis
RD	Regression Discontinuity
SEC	Socio Economic Condition
SHI	Social Health Insurance
SNNPR	Southern Nations Nationalities and People's Region
SNU	Seoul National University
SRH	Self-rated Health
SSA	Sub-Saharan Africa
UHC	Universal Health Coverage
UN	United Nation
UoG	University of Gondar
US	United State
USAID	United States Agency for International Development
WTP	Willingness to Pay

Dissertation Outline

The dissertation is structured in 8 chapters. It begins with an introduction which includes general background information, problem statement, and the purpose of the study.

Chapter 2 presents a literature review on two major topics that are related to the study. The first section of the literature review focuses on the information on the health system and financing mechanisms in Ethiopia. The second part presents empirical literature on the factors affecting CBHI enrollment and the effect of CBHI on various health services utilization, followed by empirical literatures on CBHI membership renewal/ dropouts.

Chapter 3 presents the theoretical foundations, research objectives, and the conceptual framework of the study. This chapter covers the theoretical foundations of demand for health and health insurance that helps for conceptualizing the decision-making process of enrolling in and using health insurance as well as health services utilization. Chapter 4 presents the overall methods of the study.

Chapters 5-7 present the results of each sub-study. Chapter 5 presents the first result about factors affecting CBHI enrollment. Chapter 6 presents the result of sub-study 2, the magnitude and determinants of CBHI membership renewal. Chapter 7 presents the result of sub-study 3, the effect of CBHI on health services utilization. Each chapter of the sub-studies describes the methods used in the analysis, presents the descriptive findings and results, and discusses the findings in relation to other empirical findings. Additionally, the limitations of the analytical approach are discussed followed by concluding remarks.

The final Chapter (**Chapter 8**) summarizes the findings from the three (sub-studies) results, examine the limitations and strengths of the methodology, and discusses the overall contribution to the literature.

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Chapter 1: Introduction

1.1. Backgrounds

Health risks seriously affect the lives and livelihoods of poor households (World bank Institute 2005; Dekker et al. 2010). Thus, health protection and promotion through a strong and comprehensive health care financing system are crucial for human welfare, sustainable economic, and social development (Jutting 2004; World Health Organaization 2010; Bachelet 2012). Recognizing this, Universal Health Coverage (UHC) has been the center of policy debates in many low and middle-income countries (LMICs) (World Health Organaization 2010). UHC promotes health care financing systems designed to give all people the required services of sufficient quality to be effective and ensure that the use of the services does not expose the users to financial hardship (World Health Organaization 2010; Kutzin 2013).

Financing health care system through general tax and/or social health insurance (SHI) contributions with risk pooling principles are recommended to achieve UHC (WHO 2005). However, lack of robust tax base, weak institutional capacity, a large proportion of self-employed and informal sector population in developing countries makes it difficult to achieve UHC (WHO 2005). As a result household's out-of-pocket-payment (OOP) are becoming a major source of funds for healthcare in many LMICs. OOPs are a known barrier to demanding health care and exacerbates the health and poverty connection (Ansah et al. 2009). Globally, about 100 million people suffer a financial catastrophe of ill-health annually and are pushed below the poverty line (World Health Organaization 2010). Nearly, 9.3% of the global population spend 10% or more of their income for OOP health expenditure (World Health Organaization 2017).

Since the 1990s, many LMICs have introduced micro or Community-Based Health Insurance (CBHI) to strengthen their healthcare financing system as a means to increase access to healthcare and reduce the use of costly risk coping strategies (use of savings, sell assets, and borrow many from friends and families) (Dekker 2004; Dekker et al. 2010; Yilma et al. 2015). Since then, CBHI receive considerable attention as a mechanism of health care financing and a potential alternative to user fee (Dong et al. 2004; Ekman 2004; De Allegri et al. 2006a). CBHI is a kind of community financing by mobilizing additional resources for healthcare and provides financial security for target population with a voluntary not-for-profit participation (Onwujekwe et al. 2009). Pre-payment for health, community control, and voluntary participation are the essential features of CBHI (Wang et al. 2012). It is considered as a bridge to achieve UHC in LMICs similar to past experiences of some European countries and Japan (Mladovsky et al. 2008).

CBHI schemes are usually designed by and for the people in the informal and rural sector who are unable to obtain adequate public, private, or employer-sponsored health insurance (Onwujekwe et al. 2009). They are considered as effective in terms of reaching low-income groups (Jakab et al. 2001; Preker et al. 2002). However, CBHIs are recommended to be a complementary to other more effective financing systems because they are criticized for a low rate of cost-recovery, a low effect on quality of care provided, and serve only a limited section of the population (Ekman 2004). Hence, public funding to subsidize premiums for the poor, strategies to promote increased revenue collection from the "healthy and wealthy", and improved CBHI management and quality of care are essential to enhance CBHI's contribution to health care financing (Mladovsky et al. 2014).

Ethiopia has experienced high economic growth over the past 2 decades, however, remains a poor country with a high burden of disease (Federal Ministry of Health Ethiopia April 2014). Government tax funds are assumed to be equitable health care financing mechanism (Eastern Africa National Networks of AIDS Service Organizations (EANNASO) 2015). But, the Ethiopian Government expenditure on health is about 4.88 % of the GDP, which is low as compared to other LMICs in East Africa (World Health Organaization 2016; Federal Ministry of Ethiopia October 2015). In Ethiopia, prepayment mechanisms to health are underdeveloped and representing only less than 1.25% of healthcare expenditures (World Health Organaization 2016; Ministry of Health Ethiopia Aprill 2014). Health care financing mainly relies on foreign donation and private OOP payments. Reports showed that foreign donation accounts nearly 50%, followed by household's 33 %, and the domestic government covers 17% (Asmamaw Atnafu Ayalneh et al. 2017). Resource shortage and other demand and supply side factors in Ethiopia results in a low utilization of health services. According to the Ethiopian Demographic and Health Survey report (EDHS), outpatient health care utilization per capita per year was only 0.3 visits/year with a huge reliance on the OPP spending (33.7%) (Federal Ministry of Ethiopia October 2015). However, there has been a growing interest in the improvement of healthcare financing through the insurance system as of 2010.

The Government has introduced several measures to implement Social Health Insurance (SHI) for formal sector employees and their families and CBHI to reach and cover the very large agricultural sector and small informal sector in urban settings (Agago et al. 2014; Ethiopian Health Insurance Agency 2015). In July 2011, the Government of Ethiopia piloted CBHI scheme in selected rural households and urban informal sector workers of 13 districts across four main regions of the country

(Amhara, Oromia, Southern Nations and Nationalities (SNNPR) and Tigray). The pilot was expanded to an additional 161 districts in 2013 (Ethiopian Health Insurance Agency 2015).

1.2. Problem Statement

Low enrollment in CBHI remains a challenge in many African countries. Out of the total 900 million catchment population, only 2 million people are participating in the CBHI scheme, which accounts for only 0.2% of the catchment population (Adebayo et al. 2015). Studies in many parts of Africa revealed that enrollment into CBHI is low and threaten the sustainability of the schemes (Criel et al. 2003; Basaza et al. 2007; Dong et al. 2009; Mebratie et al. 2013; Mladovsky 2014). Demand and supply-side factors have been identified as a barrier to enrollment (Schneider 2004; Chankova et al. 2008; Gnawali et al. 2009; Kiplagat et al. 2013; Fenenga et al. 2015; Panda et al. 2015).

Moreover, studies revealed adverse selection as one of the main concerns about voluntary health insurance enrollment (Wang et al. 2006). Information asymmetry induces individuals' with high-risk characteristics (e.g., chronic illness and poor self-rated health status) more likely to enroll in health insurance (Folland et al. 2007). Additionally, adverse selection is common when households with a larger members are more likely to join when the schemes have a fixed premium irrespective of household size (Arhin 1994).

Many studies have been conducted about CBHI in West Africa and Asia, whereas studies in East Africa are limited except in Uganda and Rwanda. Moreover, the majority of studies have overlooked the effect of institutional trust and social capital issues in their analysis. Besides, adverse selection in an early implementation

of CBHI's is not well-studied. Additionally, many of the studies missed the importance of mixed (qualitative and quantitative) approaches and used either quantitative or qualitative method of investigation.

In addition to the initial uptake of CBHI, scheme sustainability requires membership renewal (Jed Friedman 2013; Panda et al. 2016). A qualitative study conducted in Guinea-Conakry (Criel et al. 2003) revealed high dropout rate, and a quantitative study in Burkina Faso (Dong et al. 2009) showed dropout rate increases up to 45.7 %. Given the low development of CBHI in Ethiopia, to the best of our knowledge, there is a single study about CBHI drop-out during the pilot CBHI implementation period (Mebratie et al. 2015). The majority of existing studies on CBHI membership renewal mainly overlooked the effect of institutional trust, such as trust in a public health facility and insurance schemes, and the importance of mixed effect analytical approaches for data analysis.

The effect of CBHI enrollment on health care use has a mixed result in different studies depending on the contexts of the countries. There are findings that suggest CBHI increases utilization of health services for the members (Ekman 2004; Gnawali et al. 2009; Aggarwal 2010) and other findings in Africa revealed no association between participation in CBHI and health service utilization (Parmar et al. 2014). Studies about the effect of CBHI on health services utilization mainly examine its effect either on inpatient or outpatient health care utilization, largely neglecting its effect on sick children's health care use (Saksena et al. 2011; Lu et al. 2012; Mebratie et al. 2013).

Studies on the factors affecting CBHI enrollment, the motive of membership renewal, and its effect on healthcare utilization are scarcely conducted in Ethiopia. Reports by development partners have provided a few points about the pilot Ethiopian

CBHI. Some of the information shows that CBHI brought improvements in health care utilization. However, independent research free from the potential conflict of interests is required to assess and confirm the factors affecting CBHI enrollment, membership renewal, and the effect of CBHI on health services utilization. An existing study that addressed the issue of CBHI enrollment and its effect on health service utilization in Ethiopia (Derseh et al. 2013; Ethiopian Health Insurance Agency 2015) was conducted during the pilot implementation, however, the results might suffer from high promotional campaign effects and could lead to a biased conclusion. Moreover, it failed to assess the long-term determinants of CBHI enrollment, CBHI membership renewal, and its effect on health services utilization using a pilot implementation data.

To overcome the limitations of the previous studies this study aimed to identify main factors affecting CBHI enrollment, CBHI membership renewal, and the effect of CBHI on different health services utilization using a rich primary data set (household survey, health facility survey, focused group discussions, and in-depth interviews) with a range of analytical approaches that provides better estimates (multi-level and bivariate-probit regression models).

1.3. Purpose of the Study

Public pre-payment scheme in developing countries is essential to increase healthcare utilization and minimize the impoverishing effect of healthcare expenditure. Many researchers have examined the determinants of enrollment in CBHI at household level in different LMICs' context. However, the majority of the studies face important limitations. Most importantly, they overlooked the correlation between institutional trusts (trust in public health facilities and CBHI schemes) and social capital issues on CBHI enrollment and membership renewal.

Given the fact that the concept of health insurance is underdeveloped in Ethiopia and CBHI schemes have been expanded to many regions, there rarely have been systematic attempts to understand the factors affecting enrollment and membership renewal in Ethiopia. Moreover, very little is known about whether the schemes are meeting the government's objectives of promoting utilization of health services. Therefore answering the question of the main determinants of CBHI enrollment, the magnitude and determinants of CBHI membership renewal, and the effect of CBHI on different types of health services utilization will provide essential information for policymakers before the nationwide rollout of CBHI and SHI in Ethiopia. This study is expected to contribute to health care financing policy in developing countries. Additionally, it also expected to contribute to the limited empirical evidence about the CBHI determinants and its effect on healthcare use in Ethiopia using mixed method approaches.

Chapter 2: Literature Review

2.1. Health Sector Policy and Health Care Financing in Ethiopia

The Federal Ministry of Health of Ethiopia (FMOH) has formulated a 20 years National Health Sector Development Program (NHSDP) in the 1990s (Federal Ministry of Ethiopia 2014). In 2015, the sector successfully concluded the NHSDP (HSDP I to HSDP IV) and launched the Health Sector Transformation Plan (HSTP) (Federal Ministry of Ethiopia October 2015). Health Extension Program (HEP) is the country's flagship program through HSDP I to HSDP IV aimed to provide cost-effective basic services to all Ethiopian mainly to women and children. It underpinned by the core principle of community ownership that empower communities to manage health problems specific to their community. After the HSDP IV mid-term review in 2015, the Ministry of Health launched long-term health sector transformation roadmap titled 'Envisioning Ethiopia's Path towards Universal Coverage through Strengthening Primary Health Care', and this envisioning exercises help to define framework for subsequent strategic actions which will enable Ethiopia to achieve the best health outcomes that would be expected of lower middle-income country by 2025 and to achieve at least median outcomes of an upper middle-income country by 2035 (Federal Ministry of Ethiopia October 2015) .

Several reforms have been implemented to improve the limited availability of resources to the Ethiopian healthcare system. However, the 1998 Healthcare and Financing reform (HFR) was the key decision to address healthcare financing related resources in the country. The Council of Ministers approved a comprehensive healthcare financing strategy in June 1998 to identify resources for the health sector, enhance efficiency in the use of available resources, promote sustainability, improve

the quality and coverage of health services, and ensure equitable distribution (USAID 2011; Ali 2014). Many related health financing reforms were being implemented including allowing public health facilities to keep and use their revenue for health service quality improvement, increase health facility autonomy, improving fee waiver system, and subsequently the reform helps to establish pre-payment schemes as CBHI for the informal and SHI for the formal sectors (Ethiopian Health Insurance Agency 2015). As a result, since 2010, the Government has put hallmarks in order to address the challenge of high out-of-pocket (OOP) spending during the use of health services by introducing CBHI and SHI for the informal and formal sector population, respectively.

Despite several reforms aimed to increase financing resources to health care, the Ethiopian health care system is still highly reliant on household's expenditure and donations from rest of the world. The 2010/11 National Health Account (NHA) report showed that foreign donation accounts almost 50 % of the financing source of the general healthcare, followed by households (33 %), and the domestic government covers only 17 % of the finance. The government is the major manager of health resources and government health facilities are the major recipients of health spending (more than 84 %). Moreover, Curative services are the major target of health expenditure (51.6 %) (USAID 2011; Federal Ministry of Health Ethiopia April 2014).

Health systems in Ethiopia are organized in a three-tier delivery system: level one is district health systems comprised of a primary hospital (to cover 60,000-100,000 people), health centers (15,000 – 25,000 population), and their satellite health posts (3,000- 5000 population) connected each other by a referral system. Level two is a general hospital covering a population of 1-1.5 million people and

level three is a specialized hospital covering a population of 3-3.5 million people (Federal Ministry of Ethiopia 2010).

2.2. Health Insurance and CBHI Scheme in Ethiopia

In order to achieve Universal Health Coverage (UHC), Ethiopia has designed a comprehensive and sustainable risk protection system with health financing mechanisms adapted to the country's need (Ethiopian Health Insurance Agency 2015).

The Ethiopian health insurance strategy was developed through a series of technical, policy consultation, and dialogue process (Ethiopian Health Insurance Agency 2015). Based on the technical recommendations of the committee the country endorsed two separate health insurance programs to strengthen the move towards UHC. CBHI intends to reach and cover the very large rural agricultural sector and urban informal sectors and the SHI for the formal sector employee and their families (Solomon Feleke et al. 2015). Though not yet implemented, the legal framework for the formal sector SHI scheme has been put in place and final preparations are being made to fully implement the initiative (Ethiopian Health Insurance Agency 2015; Federal Ministry of Ethiopia October 2015).

Following the health insurance strategy endorsement, the federal ministry of health took a first step forward starting the CBHI pilots by preparing a roadmap and identifying key stakeholders from top to grassroots (cluster) level and defining their roles. CBHI is being piloted since 2011and expanded in 2013 in many parts of the country (Derseh et al. 2013; Ethiopian Health Insurance Agency 2015). To coordinate and regulate health insurance in the country and to lead the implementation of SHI

and CBHI, the Ethiopian government established the Ethiopian Health Insurance Agency (EHIA) in 2011 (Ethiopian Health Insurance Agency 2015).

The pilot districts were chosen by the regional administrative bodies based on directives of the Federal Ministry of Health. The essential considerations for the selection of the districts were an accessibility of health centers in the districts, prior health financing reform to increase cost recovery, and retention of locally raised revenues. International organizations include USAID, Abt Associate Inc., and CARE Ethiopia in collaboration with Ethiopian Federal Ministry of Health were involved during the piloting. The CBHI scheme was part of the government's broader health care financing reform strategy. Feasibility study on scheme design and scheme promotion were conducted by Abt associates and CARE Ethiopia which later used as a base for benefit package design, registration fee, and premium payments (Mebratie et al. 2015). The benefit-packages, registration fees, and premium are the same within each pilot region, however, differ slightly across regions (Mebratie et al. 2015; Ethiopian Health Insurance Agency 2015).

2.2.1. Management, Participation, and Premium of CBHI

The FMOH decides not to leave the CBHI's management to the members only, but rather integrated with formal government structures at the district/woreda and cluster/Kebele level (Ethiopian Health Insurance Agency 2015). Additionally, the FMOH decided that participation in the pilot should be collectively at a cluster/kebele level and schemes are prohibited charging copayment to reduce barriers to access (Solomon Feleke et al. 2015). The participation of the clusters in the scheme was decided by the general assembly at the cluster level. But, the decision of participation at the household level is based on the individual household decision. Unit of

membership is household level rather than an individual so as to minimize adverse selection (Ethiopian Health Insurance Agency 2015).

Based on the feasibility study monthly premiums were determined by regions and it ranges from Birr 10.50 (US$ 0.56) to Birr 15 (US$ 0.80) per month per household (Solomon Feleke et al. 2015). The premium was set by the regional administrative body and the Amhara region set 144 Birr, SNNP 126 Birr, Oromia 180 for core family and 30 Birr for additional noncore family, and Tigray 132 birr for core family and additional 30 Birr for dependent above 18 years per year. Moreover, the registration fees were also vary from region to region. The Amhara region has the lowest registration fee which is Birr 3 per household and the other regions set Birr 5 per household (Ethiopian Health Insurance Agency 2015).

The overall premiums were estimated to be about 2-3 % of household monthly income. The Ethiopian CBHI contribution (premium) to household income ratio is the lowest compared to other schemes in Africa (Mebratie et al. 2015; Ethiopian Health Insurance Agency 2015). The Ethiopian CBHI have a general and targeted subsidy. The federal government covers a quarter of the premium and the regional and district government involves in the coverage of fee waiver to the poorest 10% of the members. Indigents are eligible to be a member of CBHI schemes. The clusters/Kebele screens applications from poor households and the District/Woreda makes the final decision on eligibility (Ethiopian Health Insurance Agency 2015).

Officials at the local level and representatives of the community are able to adjust the premium collection period but they cannot change the premium amount (Ethiopian Health Insurance Agency 2015). To enable community engagement every village is expected to select three delegates/CBHI members who will be part of the village CBHI administration body and participate in the general assembly at the

district level. The woreda/district CBHI board oversees the initiative and woreda administration is responsible for the scheme staff employment (Solomon Feleke et al. 2015).

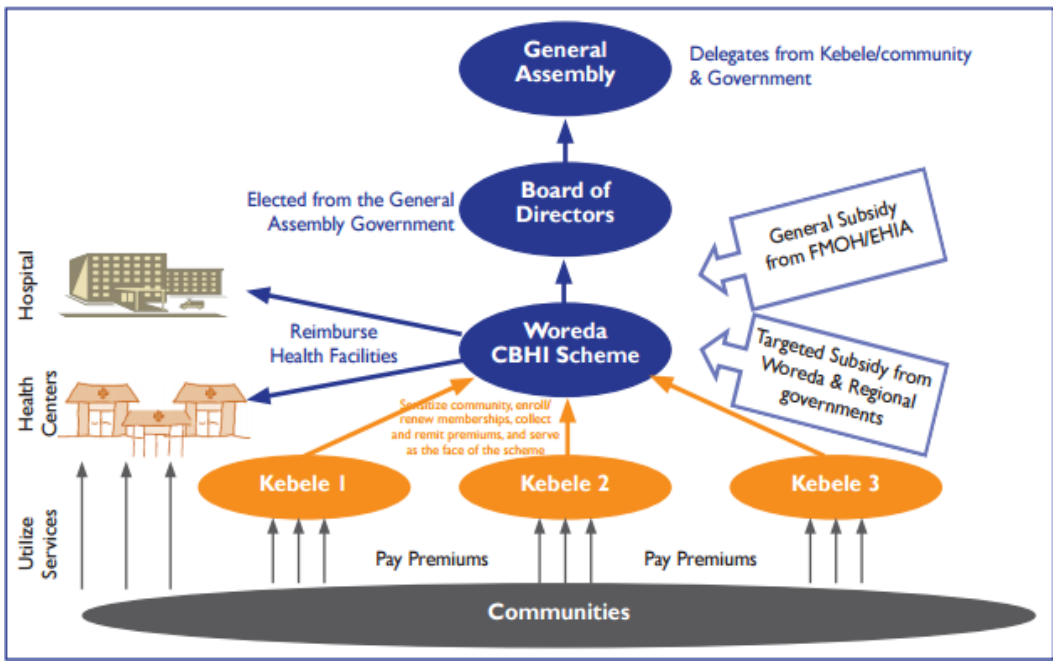

Figure 1: Flow of Finance, Governance, and Organizational Structure of CBHI Schemes of Ethiopia, adopted from USAID, January 30/2015

2.2.2. Benefit Coverage

The scheme covers both outpatient and inpatient health care services in public facilities. All service available in health centers and district hospital excluding tooth implantation and eyeglasses are supposed to be covered. While private healthcare usage, treatment outside the country and transportation cost are not included.

Moreover, Medical treatments which have largely cosmetic values (artificial teeth and plastic surgery) are excluded.

As a risk management mechanism after joining the CBHI scheme members have a one-month waiting period before they use covered services. The scheme signed a contract agreement with selected health centers and hospitals and members of CBHI are obligated to access only those health providers at district-level. CBHI members are allowed to access hospitals without penalty with a health center referral. As long as the members follow the scheme's referral procedure co-payments are not required. However, if they breach the referral procedure they need to cover 50% of their costs (Ethiopian Health Insurance Agency 2015). When they seek higher level care, scheme member's first need to visit a health center and can subsequently access higher level care at a district or regional hospitals by obtaining referral letters from the health center. Access to tertiary-level care hospital differs across regions. In Amhara region, CBHI members can visit any public hospital within the region but not outside the region. The provider's payment mechanism is set to be fee-for-service (FFS) in all the regions (Ethiopian Health Insurance Agency 2015).

2.3. Determinants of CBHI Enrollment

Determinants of enrollment in CBHI, and low rate of enrollment have been a topic of policy discussion for a long period of time. As a result, many literature investigated the demand and supply side factors as a determinant of enrollment into CBHI. For instance: Educational status of household head, access to social networks, perceptions regarding the scheme, knowledge (understanding) of the scheme, and distance to the contracted health facility have been identified as a determinant to enroll (Chankova et al. 2008; Gnawali et al. 2009; Kiplagat et al. 2013; Fenenga et al. 2015). Moreover,

household head age, sex, household size and financial resource scarcity, poor health care quality were discovered as a determinant factor for enrollment and willingness to join CBHI (Ahmed et al. 2016). Several studies in Africa and Asia found household economic status as a main influential factor whether or not to enroll into CBHI (Chankova et al. 2008; Defourny et al. 2008; Bendig et al. 2011). Studies in Burkina Faso and Ghana revealed poor's are significantly less likely to enroll (Ekman 2004; Gnawali et al. 2009; Jehu-Appiah et al. 2012). Furthermore, studies in Rwanda reflected visible differences between the poor and wealthiest group enrolment (Schneider et al. 2001; Chao et al. 2009). Perceptions of quality of care were identified as a factor for participation into CBHI in Burkina Faso and Ghana (Dong et al. 2009; Gnawali et al. 2009; Jehu-Appiah et al. 2012). Studies in Burkina Faso, Sri Lanka and Senegal showed a higher number of children in the household, distance to health facilities, and social capital influences participation into CBHI (Chankova et al. 2008; Bendig et al. 2011; Mladovsky 2014).

There are mixed evidences in the literature regarding the relationship between existing illness and enrollment decision. Studies from West Africa and Asia revealed that the positive relationship between existing illness and enrollment into CBHI (Wang et al. 2005; Wang et al. 2006; Chankova et al. 2008; Zhang et al. 2008). However, other researches from Burkina Faso, Rwanda, Ghana, and Vietnam found no relationship between illness and enrollment (Schneider et al. 2001; Nguyen et al. 2010; Jehu-Appiah et al. 2012). Studies in Uganda (Basaza et al. 2007; Basaza et al. 2008) showed that better awareness (information) regarding insurance scheme, and perception of quality of health care affects enrollment into CBHI.

Moreover household head occupation and satisfaction with the status quo health services found to be associated with participation decision in India, China and

Vietnam (Barnighausen et al. 2007; Buckley et al. 2012; Nosratnejad et al. 2014; Adams et al. 2015). Having a large number of household member in Tanzania identified as a determinant factor of participation into CBHI (Macha et al. 2014). Furthermore, study conducted in Lao Peoples' Democratic Republic (Lao PDR) indicates that enrollment is concentrated among the better-offs, and presence of adverse selection (Alkenbrack et al. 2013).

As the best of our knowledge single study is found regarding CBHI enrollment in Ethiopia, which was conducted during the pilot CBHI implementation (Mebratie et al. 2015) the study result showed no relationship between CBHI enrollment and socio-economic status. However, food-insecure household, quality of health care in terms of both availability of equipment and waiting time to see medical professional influences enrollment. Another study on willingness to join for the proposed Social Health Insurance among selected teachers showed information (awareness), inability to pay for medical bill, and higher educational level were found to be associated with willingness to join to insurance (Agago et al. 2014). Moreover, another study on the feasibility of health insurance schemes for community based group (Iddirs) showed, household income, household size, education, health status, and formal employment have a positive and significant effect on households willingness to join (Fekade 2010). Another study on WTP for CBHI in Ethiopia showed that income, frequent health center visit, education and insurance premium were significant determinants of household WTP for CBHI (Entele et al. 2016). Based on the above reviewed literature almost the effect of institutional trusts, and social capital issues on insurance enrollment were overlooked. Additionally, most of the studies utilized either quantitative, or qualitative data for the investigation of enrollment.

2.4. Effects of CBHI on the utilization of health services

Several studies and systematic reviews examined the effect of insurance on health care utilization and financial protection (Ekman 2004; Carrin et al. 2005; Alkenbrack et al. 2015).

Study findings in Burkina Faso and India suggest that community-based health insurances increases utilization of health care for the member's (Gnawali et al. 2009; Aggarwal 2010). A study conducted in Ethiopia regarding the effect of pilot CBHI on health services utilization revealed that CBHI improved out-patient health services utilization in Ethiopia's pilot CBHI (Mebratie et al. 2015). Studies among Mutual health insurances in Rwanda identified that membership in mutual health insurances significantly associated with increased utilization of health services and higher degree of financial risk protections (Saksena et al. 2011; Lu et al. 2012). However, studies in Burkina Faso revealed that no health care utilization difference between members and non-members if they are living far from health facilities (Parmar et al. 2014).

The effect of CBHI on child health care service utilization has not been well studied in Ethiopia as well in in other developing countries. There are evidences of a negative correlation between health insurance and neonatal death(Comfort et al. 2013) . Study conducted in South Korea revealed that private health insurance enrollment of parents exerted a significant effect on child outpatient cost, inpatient cost, and number of admissions (Shin et al. 2015). Study conducted in Burkina Faso showed strong positive effect of community based health insurance enrollment of parents and reduction in child mortality as a result of increased utilization of health services (Schoeps et al. 2015). Study conducted in the Philippines also revealed that child health outcomes and insurance coverage have positive relation (Quimbo et al.

2011). Health insurance and access to primary care for children also showed positive relation in studies of the United states (Newacheck et al. 1998). Medicaid insurance improved utilization of medical services (Fisher et al. 2007).

As we can see from the literatures the effect of CBHI on health services utilization especially on child health services utilization has not been well studied in Africa. Moreover, majority of the studies utilized simple logistic regression to assess the association.

2.5. Determinants of CBHI Membership Renewal Intention (Drop-Out)

Despite the importance of initial uptake of CBHI, scheme sustainability required membership renewal (Panda et al. 2015). In spite of low renewal rates in community-based health insurances in low and middle-income countries, few studies have been examined the determinants factors of membership renewal in CBHI schemes.

Studies on renewing membership in three community-based health insurance schemes in India (Panda et al. 2015) revealed that greater understanding of the scheme has a positive association to remain in the scheme than socioeconomic status. As the best of our knowledge, there is a single study in Ethiopia that showed that socioeconomic status, a greater understanding of health insurance and experience with and knowledge of CBHI schemes are associated with lower drop out in pilot Ethiopia's CBHI (Mebratie et al. 2015). Active participation of members found to be positively correlated with to remain in the scheme, however, perception of poor quality of care negatively associated to remain in the scheme in Ethiopia, Senegal, and Tanzania (Macha et al. 2014; Mladovsky 2014; Mebratie et al. 2015). Whereas, financial factor does not seem to affect drop-out (Mladovsky 2014; Mebratie et al. 2015). Moreover, adverse selection in terms of poor health status was identified as

one major factor of membership renewal in Ghana (Duku et al. 2016). Another study from Ghana indicates that non-affordability of premium, limited benefits of the scheme and poor quality of health services induce drop out from insurance system (Atinga et al. 2015). A study in Guinea-Conakry Crieel and Waelknes (2003) identified that failure to understand the scheme was not an influential factor of drop out. On the other hand, premium affordability, poor quality of health care prevents contract renewal (Criel et al. 2003). Lack of trust on CBHI schemes and the services provided by the scheme are other factors hampering re-enrollment into CBHI (Sinha et al. 2007; Carrin et al. 2008). Despite quite a few studies conducted regarding the factors affecting CBHI membership, the majority of the studies ignored the effect of institutional trusts (trust in public health facilities and insurances schemes) on CBHI membership renewal.

In summary, several studies have been conducted to assess determinants of CBHI uptake, the effect of CBHI on the utilization of health care services, and the determinant of dropout from CBHI. Findings reveal that mixed factors influence insurance uptake, its effect on health care utilization, and renewal of membership. However, studies in East Africa including Ethiopia are limited. Therefore, country specific analysis are essential for policy makers in the region and can contribute to the limited empirical evidence in the region.

Chapter 3: Theoretical Foundations, Objectives, and Conceptual Framework of the Study

Different theories have been used to develop empirical models to study health insurance. However, it is not straightforward to develop empirical counterparts for all theoretical concepts and there is an overlap in the concepts emphasized by different theories. For this study a mix of theoretical concepts such as theories related to demand for healthcare, demand for health insurance, and health care utilization models were considered as a basic foundation. Some of the basic concepts behind the above-mentioned theories are presented below.

3.1. Theoretical Foundations

3.1.1. The Demand for Healthcare

Health is vital to achieve and maintain the desired activities so that its' demand resulted in a demand for healthcare (Grossman 1972; Folland et al. 2007). Human capital theories have been applied to explain the demand for healthcare and health. It considers health as an investment good (good health can be gained through individuals investment on healthcare, healthy behavior, and education), and as a consumption good (good health increases productivity, lifetime earnings, and time spent in activities that maximize utility) (Grossman 1972**)**. Medical care utilization is not the only investment on health but also diet, exercise, and time are the investments help to maintain and improve the consumers' health stock (Folland et al. 2007). Similar to other commodities health care is considered as a "normal good" with a positive income elasticity of demand, explaining why the poor are less likely to use the health services. This theory assumes that consumers have perfect information

when in reality individuals cannot predict the timing of illness, future health care, or financial implications of illness.

3.1.2. The Demand for Health Insurance

Theories about decision-making under-uncertainty are generally used to describe insurance enrollment (Schneider 2004). Expected Utility(EU) theory has been widely used to explain individuals' decision making of whether or not to join insurance scheme (Marquis et al. 1996; Schneider 2004). Individuals maximize utility by reducing financial uncertainty and risk caused by possible illness and/or medical expenditures. Consequently, in deciding whether or not to enroll, households weight the expected utility of having health insurance with the expected utility of not having health insurance. Thus if having health insurance provide higher expected utility the households opt to enroll (Cutler et al. 2000). Given the uncertainty of health care needs in the future, risk-averse individuals (households) are more likely to enroll in health insurance due to the desire to protect themselves from an unexpected health-related financial loss in the future **(**Arrow 1963**).** However, EU theory has been criticized for not considering the association between income and insurance **(**Schneider 2004**),** societal context (Schoemaker 1982), status quo bias (Cumming et al. 2000), prospects of gain or loss (Kahneman et al. 1979; Marquis et al. 1996)**,** and the long-term implication of risk management (Dercon 2004). Despite these all critics of EU theory it has provided better results according to empirical findings on individuals' and real market decision (Schneider 2004).

Demand for health insurance in low-income context among the poor can also best explain by theories other than EU. For instance, the theory of expected payoffs (Manning et al. 1996) suggests that households will join insurance only if they

perceive the benefit of enrollment is higher than the costs compared to uninsured. The expected benefits are assessed not in terms of risk rather in terms of the advantage of being enrolled, i.e., access to better quality care, reduced waiting times, lower cost of care, etc. (Schneider 2004). If individuals are uncertain about whether or not insurance will bring these better outcomes, they will fail to join insurance. In addition, the status-quo theory suggests that consumers prefer the status-quo to something new unknown, especially when alternatives become more complicated (Cumming et al. 2000). This theory suggests that decision for poor and illiterate groups to enroll may be influenced by the extent to which the groups have clear information about a health insurance scheme, especially if the concept of insurance is new (Schneider 2004). The decision to enroll will also depend on differences in the ability to finance insurance, the relative values of current or future protection, and the ability to smooth consumption in the face of unexpected illness (e.g., by selling assets, borrowing, accessing savings, diversifying income etc.)(Wagstaff et al. 2000; Schneider 2004)**.** As insurance is a difficult concept to understand and purchasing insurance may actually increase uncertainty in low-income context. The upfront insurance costs may also explain the reluctance of the enrolment of the poor (Dercon et al. 2007)**.**

3.1.3. Healthcare Utilization Model

In understanding and determining healthcare service use existing literature suggest to consider several factors. One of the most widely used model is Ronald M. Anderson model which was first developed in 1968 and has been used modified and tested in different health service research (Andersen 1995; López-Cevallos et al. 2010; Babitsch et al. 2012). The model divides determinant factors of health care services utilization into three major components as predisposing, enabling, and need factors.

Predisposing factors: includes the demographic characteristics age and sex as a "biological imperative", social factors such as education, occupation, ethnicity, social relationships (family status), and mental factors in terms of health beliefs (e.g., attitudes, values, and knowledge related to health and health services) (Babitsch et al. 2012).

Enabling factors: mostly this includes financing and organizational factors affecting health service utilization. Income, household wealth status, insurance status, and cost sharing level serve as individual financing factor for the health service utilization. Organizational factors involve the availability of a regular source of care and nature of the resource, means of transportation, travel time and waiting time to obtain health care (Babitsch et al. 2012).

Need factors: are mentioned as perceived and evaluated need factors. Perceived need factors for health service (i.e., how people view and experience their own general health, functional state, and illness symptoms). Whereas, evaluated need refers to professionally assessed and objectively measured potential health status and need for medical care (Andersen et al. 2007).

3.2. Research Objectives

3.2.1 General Objective of the Study

Examination of CBHI enrollment, membership renewal and its effect on health service utilization in Northwest Ethiopia.

3.2.2. Specific Objectives of the Study

1. Determine factors affecting CBHI enrollment in Northwest Ethiopia; (Paper one)
2. Assess the magnitude and factors associated with willingness to renew CBHI membership in Northwest Ethiopia; (Paper two)
3. Examine the association between CBHI enrollment and health service utilization in Northwest Ethiopia (Paper three).

3.3. Conceptual Framework of the Study

The conceptual framework in Figure 2 below integrates concepts of the economic theories and information from the empirical literature about enrollment in health insurance, membership renewal, and healthcare seeking behavior.

The top left of the framework demonstrates the demand for CBHI enrollment and membership renewal is influenced by demand-side factors at the household level. These factors include individual household head and household factors such as age, educational status, sex, occupation, perceived quality of health services, participation in the informal association, awareness of CBHI, knowledge of CBHI, trust in public health facilities of the household head. Moreover, factors at the household level such as household size, wealth status, self-rated health status, elderly, children's, and chronic disease in the households are included.

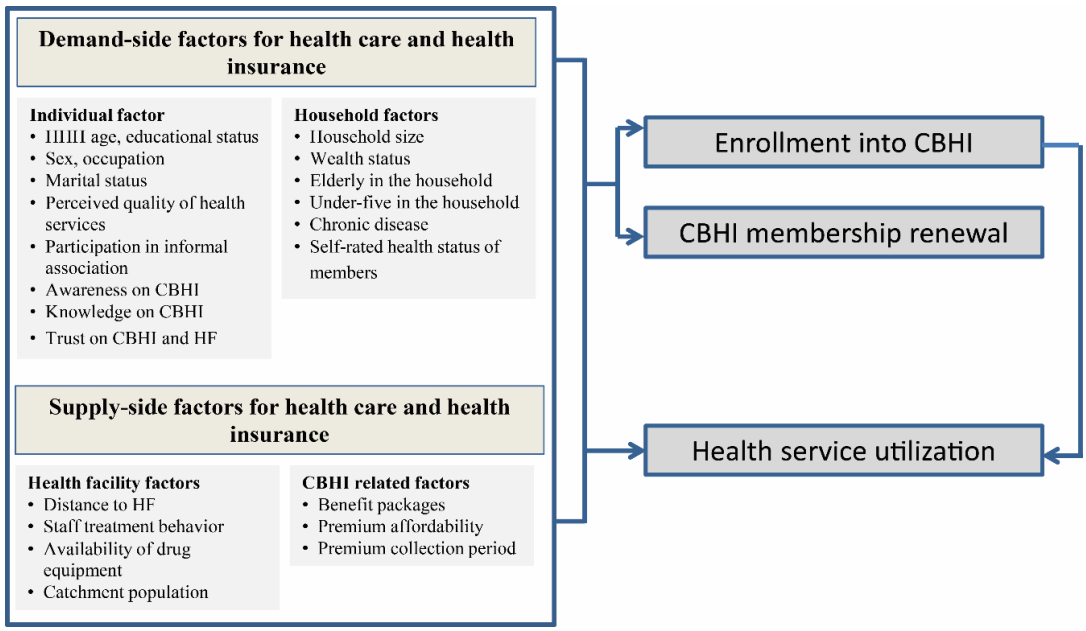

Figure 2: Conceptual framework of the study adapted from different literatures.

Theories and literature suggested that the older the household head the higher the perceived risk will be for his/her family. As human capital economic theory explains the degree of risk aversion increases with age. Moreover, expected utility theory supports household's head with better education is supposed to have a better understanding of their need for healthcare and higher risk aversion tendency on which influences their likelihood of enrolling in CBHI. Thus, this information asymmetry and the voluntary nature of CBHI contributes to adverse selection. As a result, households with an ill family member, elderly, children, and poor self-rated health status assumed to be more likely to participate in health insurance and renew membership and it allows them to reduce uncertainty due to illness and increase the utility gain from insurance. It also assumed that wealth status as a relative measure

of household income increases the chance of enrollment and membership renewal. Households with large household size are also expected to have an adverse selection, if insurance premium is flat-rate irrespective of family size and lead to higher chance of insurance participation and membership renewal. Moreover, as (Schneider 2004) presented in developing countries knowledge and awareness level of household heads assumed to positively influence enrollment and membership renewal. Literatures also demonstrated the influence of trust in health facilities and insurance scheme on the enrollment in CBHI and the decision whether to renew membership or not, if the household has a better trust in the services that have provided by the health facilities and insurance schemes it assumed to increase their chance of participation and membership renewal. The role of participation in informal association as a social capital also assumed to give more experience and information about social solidarity and that will influence them to participate and renew membership in insurance.

The bottom left of the framework demonstrates the supply-side factors that influence CBHI enrollment and membership renewal. These factors include the health facility and CBHI scheme related characteristics.

Factors related to health facilities such as distance to health facility is expected to influence participation in insurance and membership renewal. It assumed that the shorter the distance to health facility may increase the chance of the participation and membership renewal since it decreases other indirect costs. Additionally, provider's behavior is one of the main factors whether to join or not to join and to renew their membership or not. Availability of essential drugs, laboratory tests, and equipment assumed to positively influence to join and renew membership of insurance. The scheme related characteristics also expected to influence the decision to enroll and renew membership. Especially, benefit packages, premium

affordability, and convenience of the premium collection is assumed to influence the decision to join and stay in the scheme. In general, supply-side factors in both healthcare systems (e.g. Quality) and within the CBHI schemes influence the demand for health care among households: at a given price improved quality, trust, and promotion of schemes can increase the demand for healthcare and insurance.

Once the households joined insurance, it is expected to have an increased demand for healthcare by minimizing the healthcare costs (OOP) at the point of service delivery. Thus, this lowered cost of the healthcare increase the demand for healthcare among the insured. Therefore, CBHI participation is expected to increase health service utilization after controlled for demand and supply factors. Moreover, as Anderson behavioral model presented health insurance is one of the enabling factors that determine health care utilization. As a result, enrollment in CBHI is assumed to increase health care use. As we presented in chapter two regarding the covered benefits, Ethiopia's CBHI is providing outpatient and inpatient health services in the contracted public health facilities. Additionally, there is no co-payment at the point of health service delivery. Thus, it is expected that among those who use the service the insured will incur less out-of-pocket expenditures than the uninsured and that may lead to better health service utilization for the CBHI members.

Chapter 4: Data and Research Methods

4.1. Study Area

These studies were conducted in Northwest of Ethiopia, Amhara region (Figure 3). The region is the second populous regions of Ethiopia with an estimated land area of 170,000 square kilometers with an estimated population of 20,401,000 (Ethiopian Statistical Agency 2014). The majority of the inhabitants are rural dwellers (88 %). Bahir-Dar is the capital city of the Amhara Regional State. At the time of the study, the region contained 11 provinces (Zone), 167 districts, and 3429 Kebeles (clusters). Decision-making power has been decentralized to the district thus they are responsible for all development activities in their area's (Save the Children 2013).

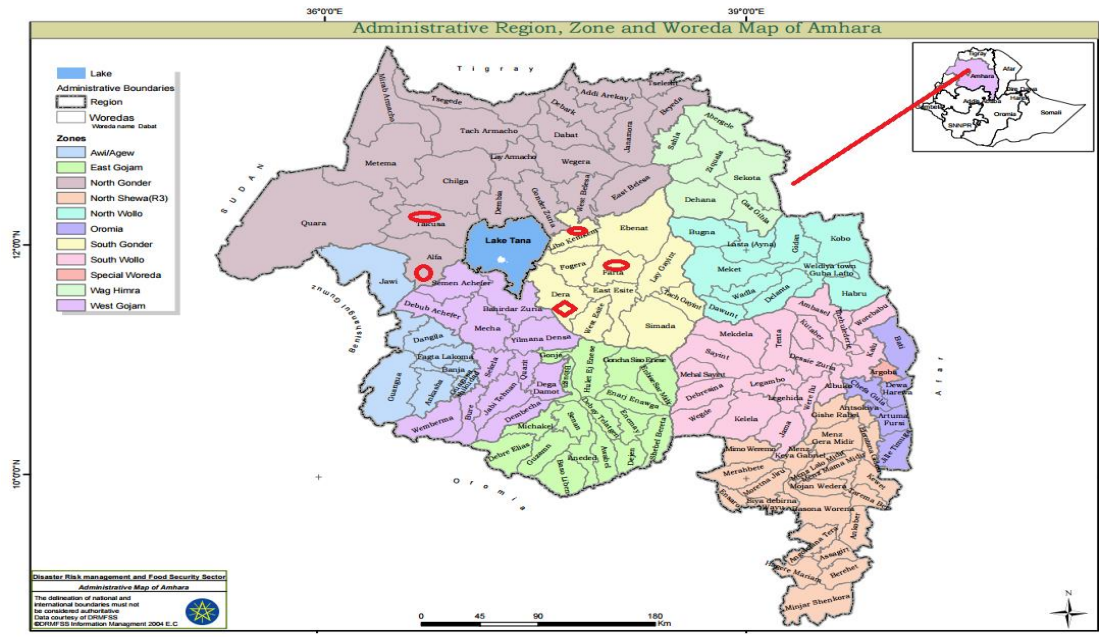

Figure 3: Administrative Region, Zone, and District/Woreda Map of Amhara

CBHI implementation started in 2011 as a pilot in 3 districts as part of the national pilot implementation. In 2013, the national overall enrollment rate in pilot CBHI schemes was 48% whereas the regional enrollment rate was 57.9% (Ethiopian Health Insurance Agency 2015). In 2013, the pilot CBHI scheme expanded to 161 districts nationally. Out of 161 districts, 39 districts were found in Amhara region. According to the Amhara regional health Bureau report the CBHI enrollment rate has declined during the expansion period compared to the pilot (39 %[1]). Due to resource limitation, two provinces of the region based on their land and population size were selected and included in these studies. Namely, North and South Gondar Administrative Zones.

North Gondar has a population of 3,514,247 with an area of 45,944 square kilometers. More than 84 % of the population dwell in the rural area. North Gondar further subdivided into 22 districts and 546 clusters/Kbeles. CBHI implementation started in 2013 during the expansion period in North Gondar Zone. As of 2013, 2 districts have been implementing CBHI and 4 districts finished their preparation and ready to execute CBHI. The coverage of CBHI in the selected districts of the North Gondar zone is reported 9.5% and the renewal rate is around 60%.

The South Gondar Administrative Zone has a total population of 2,406,088 with an area of 14,095 square kilometers. More than 90 % the population dwell in the rural area. South Gondar Zone has 11 districts. One district of south Gondar was the part of the national CBHI pilot implementation site. Enrollment in the pilot scheme of South Gondar was 38%. However, it was one of the financially fragile scheme. Since 2013, a total of 7 districts have been participating in CBHI implementation.

[1] Figures obtained from regional USAID CBHI coordinator report

After the expansion of CBHI implementation enrollment rate reported as 35% with a renewal rate of 80%.

Table 1: Population and area information of North Gondar, South Gondar, and Amhara region in 2014.

Indicators	North Gondar Zone	South Gondar Zone	Amhara region
Population	3,514,247	2,406,088	20,401,000
Area in square Km	45,944	14,095	170,000
Rural inhabitant proportion in %	84	90	88
Districts	22	11	167
CBHI involved districts since 2013	2	7	39
CBHI implemented clusters	50	209	923
CBHI eligible household	392,965	351,199	1,222,995
CBHI enrolment rate in %	9.5	35	39
Membership renewal rate in %	60	80	62

4.2. Research Methods and Design

Based on the objectives of the dissertation a mix of quantitative (linked household and health facility survey) and qualitative (Focus group discussion and in-depth interview) research methods were designed. The main research design is a case comparison (case-control) community-based cross-sectional household survey linked to the health facility survey supplemented with a concurrent qualitative component. The cases were those households enrolled in CBHI and the comparison groups (controls) were those households who do not enroll into CBHI and live in the same cluster with enrolled households.

4.2.1 Research Methods and Design for Objective One and Two

The first two objectives of the dissertation were an examination of the determinants of enrollment into CBHI among households and an assessment of the magnitude and determinants of CBHI membership renewal among CBHI-members for the following year. In order to assess the first two objectives, a cross-sectional case comparison (case-control) study design with a mix of quantitative and qualitative methods were applied. This mixed approach is expected to yield more information on the determinant of CBHI enrollment and membership renewal.

Quantitative Method

The main research method of the first and second objectives of the dissertation was the quantitative method with a case comparison design. Data was collected using a structured questionnaire from households of CBHI members and nonmembers and linked to the health facility survey. The survey was conducted between February 15-March 20/2017. These two surveys used to analyze potential factors operating at different perspective simultaneously. Since membership in Ethiopia's CBHI is at the household level the unit of analysis for this study was households.

Qualitative method

Since our quantitative data is cross-sectional it would have been difficult to infer results. Thus, supplementing the findings with the qualitative component is essential. The qualitative part is supposed to strengthen the quantitative findings through a better understanding of how CBHI have implemented in the area and which factors are expected to affect CBHI enrolment and membership renewal. A total of 8 FGDs (6-12 individuals in a group) four of CBHI members and four with nonmembers were

conducted across 5 districts of the study area. Moreover, 5 in-depth interviews with health center head, health extension worker, cluster (Kebele leader), district CBHI coordinator, and the regional CBHI coordinator were conducted in order to obtain supportive information regarding CBHI participations and membership renewal. These mixed qualitative ways of information exploration are considered as essential in order to support the quantitative findings of the study.

4.2.2. Research Methods and Design for Objective Three

The third objective of this dissertation was to assess the effect of CBHI participation on different healthcare services utilization. This study utilized a quantitative method from the cross-sectional household survey for CBHI enrollment and membership renewal. Sub-sample for adult outpatient, inpatient, and sick children's healthcare utilization were extracted from the household survey. The association between CBHI enrollment and healthcare uses were assessed using bivariate probit regression method.

4.3. Source and Study Population

4.3.1. Source/Target Population

The source/target population of these studies were all eligible households for CBHI found in North and South Gondar Provinces/ administrative Zones. According to the report of North and South Gondar Zone insurance offices, there were 744,264 eligible households for CBHI in these two zones in 2016. Out of these total eligible households almost 53% (392,965) were found in North Gondar and the rest 47% were found in South Gondar.

4.3.2. Study Population

Study Population for Objective One (CBHI enrollment)

The study populations were all selected eligible households for CBHI (Member and non-member) found in the 15 selected clusters in five districts.

Inclusion criteria's**:** Households who have been living at least for 6 months in the study area, the household head who do not involve in the formal sector employment, households without another form of prior health insurance, payer CBH-members, and non-members.

Exclusion criteria's: Households who lived less than 6 months in the study area, households involved in the formal sector employment, households with another form of health insurance, and non-payer CBHI members.

Study Population for Objective Two (Membership Renewal)

The study populations of this sub-study were all selected CBHI members found in 15 clusters of the selected five districts found in North and South Gondar Administrative Zone.

Inclusion criteria's: Households with CBHI membership at present, households who have been living for at least 6 months in the study area, the household head who do not involve in the formal sector employment, households without another form of prior health insurance, and payer CBHI members.

Exclusion criteria's: households without current CBHI membership, households who lived less than 6 months in the study area, households involved in the formal sector employment, households with another form of health insurance, and non-payer CBHI members.

Study Population for Objective 3 (the Effect of CBHI on Different Health Service Utilization)

Selected (CBHI member and non-member) households found in the 15 selected clusters in the five districts who reported an episode of illness for adult and children were considered as a study population for this sub-study.

Inclusion criteria's: Households who have been living for at least 6 months in the study area, household head who do not involve in the formal sector employment, households without another form of prior health insurance, and participation in CBHI at least for one year (cases), and payer CBHI-members.

Exclusion criteria's: Households who lived less than 6 months in the study area, households involved in the formal sector employment, households with another form of health insurance and participation in CBHI for less than one year, and non-payer CBHI members.

4.4. Sampling

4.4.1. Sampling and Sample Collection Procedure for Quantitative Data

A multi-stage sampling was employed to obtain a representative sample for the three sub-studies. North and South Gondar provinces had 9 districts that implemented CBHI in 2016. Five districts, one from North Gondar and 4 from South Gondar were included in this study. A total of 15 clusters three clusters per each district were randomly selected and included in the study.

The selected five districts contain a total 130 clusters and 188,759 households. The clusters and households were served as a primary and secondary sampling units, respectively. Due to lack of proper registration of households in the rural districts we applied a segmentation method in multistage sampling of the data collection. The

clusters were segmented to smaller villages, and using systematic random sampling villages were selected, in the selected villages all the CBHI member households were interviewed until we obtain the required sample size. The control groups or CBHI non-members were selected using a random-rout method to choose households living in close proximity to the CBHI members randomly. Samples were proportionally allocated to each district and clusters based on their population size.

4.4.2. Sample Size Calculation for the Quantitative Data

The sample size was determined using a guideline on the design of household survey sample, practical guideline by United Nation in 2005 (United Nations Statistical Division 2008). Different sample sizes were computed for all the outcome variables using different estimates of different predictor variables. Various demand and supply-side determinants of CBHI enrollment and membership renewal from previous studies were used for the calculation of sample sizes. Moreover, sample size for the assessment of the effect of CBHI on health service utilization was calculated using different expected differences in estimates for health service utilization. The following formula was used to compute sample size for each outcome variable.

Equation 1: Sample size calculation

$$\mathbf{nh} = (\mathbf{z2})\frac{(\boldsymbol{r})(\mathbf{1}-\boldsymbol{r})(\boldsymbol{f})(\boldsymbol{k})}{(\boldsymbol{p})(\dot{\eta})(\boldsymbol{e2})} \quad \mathbf{-----------1}$$

$$\mathbf{nh} = \frac{(\mathbf{85.5})(\mathbf{1}-\mathbf{r})}{(\mathbf{r})(\mathbf{p})} \quad \mathbf{----------2}$$

Where:

- n_h the sample size in terms of number of households to be included in this study,
- **z** is the statistics that define the level of confidence desired,(1.96, 95 % confidence level)

- **r** is an estimate of the key indicator to be measured by the survey (key variables affect enrollment into CBHI (Household size, household head education level, perceived health service quality, renewal rate, distance to a health facility), expected health service utilization difference between enrolled and un-enrolled),
- ***f*** is the sample design effect, de*ff,* assumed to be 2.00 (default value) to allow intra-cluster correlation)
- **K** is the multiplier to account for the anticipated rate of non-response (10%)
- **p** is the proportion of the total population accounted for by the target population and upon which the parameter , r, is based; (0.35)
- **ṅ** is the average household size (number of people per household) (4.3 for Amhara region),
- **e** is the margin of error to be attained (0.1) based on the assumption that there would be 90% power to detect a difference between insured and un-insured household of one visit.

Based on the above formula different sample sizes were computed for all the three outcome variables. Then the sample for enrollment in CBHI yields 2,008 households, health care utilization differences yields 1,120 households and for membership renewal yields 722 households. Therefore, larger sample size that can be used for the three sub-studies 2008 households were used as the choice of sample for the dissertation. Out of 2008 total samples 58 % were nonmembers and the rest were CBHI members. The proportion of samples in the study districts were allocated as follow:

D1 = N. Gondar Alefa district 44,324 HH = (44,324/188,759)*2,008 = 470 HH

D2 = S. Gondar Fogera 34,274 HH = (34,274/188,759)* 2,008 = 363 HH

D3= S. Gondar Farta district 57,025 HH = (57,025/188,759)* 2,008 = 604 HH

D4 = S. Gondar Woreta district 7,571HH = (7571/188,759)* 2,008 = 80 HH

D 5 = S. Gondar Libo Kemkem district 45,565 HH = (45,565/188,759) * 2,008 = 483 HH

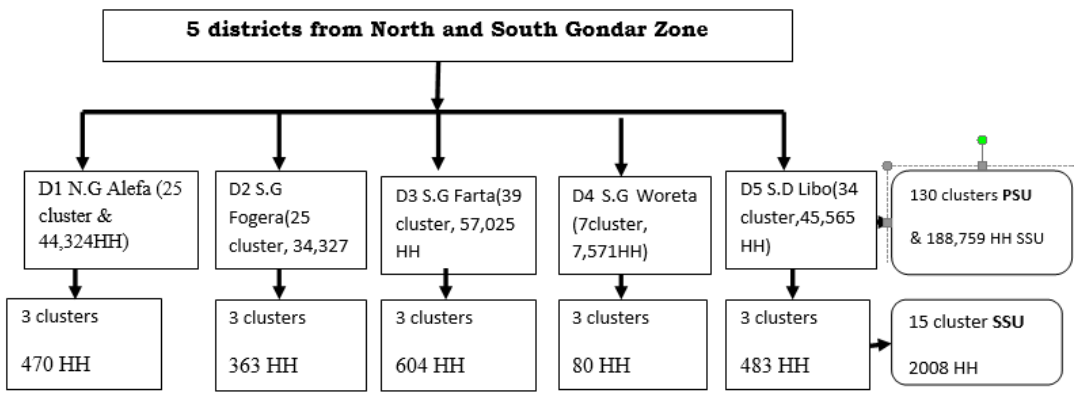

Figure 4: Diagrammatic presentations of the sampling procedure

4.5. Data Collection Tools and Procedures

4.5.1. Quantitative Data Collection Tool

An interviewer lead pre-tested structured questionnaire was designed and administered to the head of the household to collect relevant information about household and associated characteristics. The questionnaire was prepared based on different prior literatures and Demographic and Health Survey (DHS) questionnaires. It includes necessary information about household heads, household's characteristics, health facility, and insurance scheme characteristics.

The questionnaires organized in two parts as household and health facility part. The household questionnaire was contain four main categories. Category one, socio-demographic and economic characteristics. Category two, health status, health

care seeking and health care use. Category three, formal and informal networking and membership association, and category 4 CBHI membership, CBHI related knowledge, perception, and experience. The second part of the questionnaire was designed to collect information about the contracted health facilities. The questionnaire was first developed in English and then translated into Amharic language then translated back to English for data entry and analysis.

Training and Pilot Testing

Training and pilot testing were conducted early February (February 6 to 10/2017) at the University of Gondar college of medicine and health sciences, at that time the survey instrument was translated into Amharic and back translated into English and validated by the research team. Training was provided to 30 data collectors, 5 filed coordinators, and 5 supervisors for a total of 40 participants. The training includes a mix of classroom sessions and field piloting. During the classroom sessions, the research team and the field supervisor reviewed the questionnaires clearly with the trainees to make sure each question was clear and the translation was accurate. Pre-test was carried out with ~5 % (120) of the total sample households in selected districts that were not included in the study. All data collectors were expected to conduct 4 pilot interview (2 for CBHI member and 2 non-members). After the data collection interviewers returned to the classroom to discuss any problem encountered. The field supervisor and the research team checked the questionnaire for accuracy.

Data Collection Procedure

Data collectors were divided into five teams based on the study districts. Each team contains 6 data collectors, one supervisor, and one field coordinator. The supervisor directed all the activities of their team and checked all questionnaires within 24 hours of completion, and send information to the research team. Data collection takes place over 5 weeks from February 15 to March 20/2017. Prior to the data collection interviewers verbally briefed participants in the study area and request informed consent from participants. Interviews were made with household head or representatives. All interviews were carried out in Amharic language. After questionnaires are completed they were checked by supervisors and stored in a locked box until they returned to the research team at the University of Gondar, at which the questionnaire is processed for data entry.

Quality Assurance Procedure

The main expected factor affecting quality of the data was the skill of the data collectors. As a result proper training was provided. In addition the pilot test was conducted to check the accuracy of the questionnaires and the capability of data collectors. Moreover, random checks were made in order to cross check the validity of the collected data. Daily communication were maintained to solve problems in a daily manner.

Data Preparation

Data analysis plan for the relevant outcome variables were prepared during the questionnaire preparation period. The data were first transferred into STATA 14

statistical software and cleaned and recoded when necessary. For all the analysis the household data and health facility data were merged. Some variables like wealth index, knowledge, trust in health facility, and trust in CBHI scheme were created using principal component analysis (PCA) and factor analysis.

4.5.2. Qualitative Data Collection Tool

Design and Implementation of Focus Group Discussion

Eight focus group discussions (FGDs) were held in 4 four villages of the four districts where CBHI is implemented. Four of the FGDs included the CBHI members and four included non-members so as to maintain a relative homogeneity in terms of their CBHI status. This encourage free flowing conversation among FGD participants.

Sampling Procedures for Qualitative Data Collection

Villages for FGD were purposively selected from the list of villages where the quantitative survey was already carried out. One FGD with members and one with non-members were conducted in each of the four districts. One FGD contain a group of people from 6-12 and a total of 72 household heads were participated. Participants were selected purposefully with the help of village leaders and other local administrators. Most of the participants were aware of the survey because it was conducted in the villages they lived in. Greater effort was exerted to include participants with a range of characteristics in order to obtain a broad representation of the community. Moreover, five in depth interview were conducted with village leader, district CBHI focal person, regional CBHI focal person, health extension coordinators, and health center head in order to support the findings from FDG and the quantitative survey.

Description of the Qualitative Guide

Two FGD guides for CBHI members and non-members were prepared with slight differences. The main topic of the FGD guides include factors affecting CBHI enrollment (Knowledge of CBHI, Motivation for enrollment), experiences and perceptions of CBHI, and health care facilities (CBHI Management/ contribution collection process, experiences and perceptions of the Healthcare System). The FGD guide was first prepared in English and translated into local language Amharic then translated back to English for data analysis. In order to obtain additional information KIs were conducted.

Training for qualitative data collectors

Two experienced, local moderators from university of Gondar, Institute of public health, and one coordinator in each district were recruited for qualitative data collection. Training was provided to all moderators and coordinators for two days at Gondar University from March 9 to 10/2017. On the first day the moderators were briefed on the CBHI scheme and the study. On the last day, two FGDs were carried out as a pilot, one with CBHI members and one with non-members. Then potential concerns were cleared-out and the guide was amended based on the pilot FGDs.

Data Collection Procedure for the FGDs

FGDs and in depth interviews were take place over 8 days from March 11 to 19/2017. Prior to the FGDs, the field managers traveled to the selected district to brief the village leaders on the study and to ask for informed consent. All district leaders agreed to allow their villages to participate. Focus group participants were recruited

on the day of the FGDs. The discussion time was set with the convenience of all FGD participants. The village leaders and coordinators assisted the moderator with the recruitment of the participants. The moderator briefed the participants on the study and obtain verbal informed consent. The moderator then briefed the participants on the rules of the FGD and discussed the need to keep all aspects of the discussion confidential. All discussions were audio recorded and transcribed and lasted between 1 and 1.5 hours.

4.6. Variables of the Study

Outcome variables for Objective 1

Current CBHI status: Household heads were asked as "What is the current status of your household in CBHI and there were two responses "0 not enrolled (no)" and "1 enrolled (yes)".

Outcome variable for Objective 2

CBHI membership renewal intention for the following year: CBHI member households were asked regarding their intentions of membership renewal as "When the current membership expires would you be willing to renew your CBHI membership for the following year? "1 ready to renew" and "0 not ready to renew".

Outcome variables for Objective 3

Health service utilization for sick children: The question was asked for the mothers or caregivers as first "in the last 1 month, did anyone whose ages under-five years old have got any sickness?", if yes "Did the household seek advice or treatment from

a public health facility for the sick child?" If treatment or advice sought labeled as "(yes) 1" and "otherwise 0".

Adult outpatient health visit: the second outcome variable of result 3, the question was asked as "Did anyone whose age above 18 years old in your household falls ill in the last 3 months?" if yes "Did he/she visit a public health facility for the illness?" if "yes 1" and "otherwise 0".

Inpatient health service utilization: The questions was asked as "Has someone in the household fall ill and stay at least one night in public health facility in the last 12 months?" if "yes 1" and "otherwise 0".

4.7. Independent Variables

The following table shows list of independent variables for the three sub-studies.

Table 2: List of independent variables of the study

Variable name	***Label***
Household socio-demographic variable	
Sex of household head	Male Female
Age of household head	Years in number
Place of residence	Rural Urban
Educational status of household head	Illiterate/no education Read and write Elementary school (grade 1-4), Elementary school (grade 5-8) Secondary school and above
Religion of household head	Orthodox Christian Muslim, Protestant Other
Marital status of household head	Single Married Divorced Widowed and Other
Occupation of household head	Farmer Merchant Day laborer Petty trader Other
Household size	<5 ≥5
Number of households above 18 year	Number of household members above 18 years old
Household member above 64 years	No 1. Yes

Variable name	*Label*
Under-five child in the household	No
	Yes
Pregnant women in the household	No
	Yes
Number of under-five	Number
Wealth status of the household	Poorest
	Poorer
	Middle
	Rich
	Richest
Health status, health care seeking and use related variables	
Chronic disease in the household	No
	Yes
Self-rated health status of the household	Very poor
	Poor
	Medium
	Good
	Very good
Perceived quality of public healthcare facilities	Very poor
	Poor
	Medium
	Good
	Very good
House distance to hospital	Travel time in minute
Distance to health center	Travel time in minute
Sick under-five children in the household in the last 4	No
weeks	Yes
Sick children public health facility visit	No
(treatment/advice)	Yes
Adult household member fall ill in last 3 months	No
	Yes
Sick adult household member visit health facility	No
(treatment/advice/OPD)	Yes
Household member fall sick and stay at least one night	No
in health facility last one year	Yes
Number of days stay in facility	Number of days

Variable name	*Label*
Variables related to informal networking/social capital	
Household's participation in any solidarity group	No
	Yes
Household participation in any local informal credit	No
association	Yes
Household participation in any religious group	No
	Yes
Saving accounts by household members	No
	Yes
Official position holder among household member	No
	Yes
CBHI related knowledge, experience, and expectations	
CBHI membership status	Not enrolled
	Enrolled
Membership renewal intention	Not ready/ not willing
	Ready/ willing
Prior information about CBHI(Awareness)	No
	Yes
Knowledge of CBHI	Score (factor analysis)
Trust in CBHI scheme	Score (factor analysis)
Trust in contracted health facilities	Score (factor analysis)
Health facility characteristics	
Health facility catchment population	Population
Number of available beds at HC	Number of beds
Separate inpatient room for children and adult	Not available
	Available
Examination table	Not available
	Available
Blood pressure apparatus (sphygmomanometer	Not available
	Available
Stethoscope	Not available
	Available
Thermometer	Not available
	Available
Availability of Hemoglobin test	Not available

Variable name	*Label*
	Available
Blood glucose test	Not available
	Available
Malaria Diagnostic tests	Not available
	Available
Urine dipstick (Protein) tests	Not available
	Available
Urine dipstick-glucose	Not available
	Available
Microscope	Not available
	Available
Hematology analyzers	Not available
	Available
Chemistry analyzer	Not available
	Available
Oral rehydration solution	Not available
	Available
Salbutamol inhaler	Not available
	Available

4.8. Operational Definition

Outpatient visit (any health care use): Defined as having at least one household member whose age above 18 years old reported an illness episode during the past three months and visit public health facility as an outpatient at least once.

Sick children's health service visit: It defined as a household having a sick child whose age is under 5 years old and when at least one child in the household reported to have an illness in the past one month and visit public health facility at least once.

Inpatient healthcare: It defined as an admission of a household member whose age is above 18 years of age fall ill and stay in a healthcare facility for at least one night in the past one year.

CBHI awareness: It refers to the prior information of the household head about CBHI existence and participation of awareness creation campaigns. It was assessed by asking whether the household head has prior information as yes or no question. If responded as yes considered as informed or aware of that.

Trust in health care facilities: It used to assess the effect of institutional trust (trust in a public health facility) on enrollment and CBHI membership renewal. Participants were asked five questions with a 5 Likert scale (trustworthiness of contracted health facility, competency of health professional, trust in professional equal treatment of members and nonmembers, trust in availability of sufficient professional, and trust in availability of sufficient drugs and supply) then the composite score was computed using factor analysis and the score used as a continuous variable during the analysis. Internal consistency of the variables was checked by Cronbach's alpha computation and it was above 75%.

Trust in CBHI schemes: It used to assess the effect of institutional trust as CBHI scheme trust in CBHI enrollment and CBHI membership renewal. Participants were

asked three questions with a 5 Likert scale (Trustworthiness of local CBHI management, premium used for CBHI purpose only, and provision of the promised services by the schemes).Then, the composite score was computed using factor analysis and used as a continuous variable during the analysis. Internal consistency of the variables was checked by Cronbach's alpha and it was above 76%.

Knowledge in CBHI: It used to assess the different dimensions of the knowledge of household heads about CBHI. Participants were asked 13 questions with yes/no response (requirement of registration and monthly premium, only sick people required insurance, refund of contribution, and other concepts like the difference between saving and insurance, and the services provided by the scheme etc.). Finally, the questions were aggregated into two factors; those factors were used as a continuous variable in the regression analysis. Internal consistency of the variables was checked by Cronbach's alpha and it was above 84%.

Convenience of premium collection: This variable used to assess the association between convenience of premium collection period and CBHI enrollment and membership renewal. Participants were asked one yes/no question whether the premium collection period was convenient or not. Answering yes considered as an indication of convenient and no used as inconvenient.

Wealth index: It used to measure the household's relative income. It was computed using a principal component analysis from 15 household asset and living condition variables, by assigning a larger weight to assets that vary most across the households. The wealth index was divided into 5 quintiles for the analysis. The lowest 20% were considered as poorest and the top 20% considered as richest quintile.

Perceived quality of public health facility: this variable was measured on a five-point Likert scale (1=very poor; 5= very good). Later, the data were regrouped into three categories as “poor, medium, good” for numerical significance.

Self-rated health status: this variable was measured on a five-point Likert scale (1 = very poor; 5= very good). Later, the data were regrouped into three categories as “poor, medium, good” for numerical significance.

4.9. Ethical Clearance

Ethical clearance for this study was obtained from the graduate school of public health at Seoul National University and the University of Gondar upon submission of the proposal to the internal review board (IRB). Further support letters were obtained from University of Gondar, Ethiopia.

Chapter 5-7. Study Results

Chapter 5: Adverse Selection and Enrollment in Community-Based-Health Insurance in Northwest Ethiopia, a Mixed Methodology

Abstract

Background: Since 2010, the Ethiopian government introduced different measures to implement Community-Based Health Insurance (CBHI) schemes to improve access to health service and to reduce the catastrophic effect of healthcare costs. The aim of this study was to examine the determinants of enrollment into CBHI in Northwest of Ethiopia.

Methods: The study utilizes a mix of quantitative (multivariate logistic regression applied to population survey linked to health facility survey) and qualitative (focus group discussion & in-depth interview) methods to better understand the factors that affect Community-Based Health Insurance enrollment.

Results: This study revealed important demand and supply-side factors as a barrier of CBHI enrollment. Age and educational status, self-rated health status, perceived quality of health services, knowledge, and information (awareness) about CBHI were among the individual household head determinants of enrollment. Household size and participation in an informal association including local credit associations were also household factors positively induced CBHI enrollment. Additionally, this study demonstrated health facility factors like unavailability of laboratory tests that hinder CBHI enrollment.

Conclusions: Even though health insurance implementation is in its early stage in Ethiopia, the scheme is suffering from an adverse selection which will be a challenge for further expansion and sustainability the schemes. Additionally, perceived quality of health services, knowledge, and information (awareness) are factors hindering CBHI enrollment. Therefore, policy interventions to mitigate adverse selection and continuous and organized awareness creation activities regarding the concept and

importance of insurance are essential. Furthermore, efforts to improve the quality of health services provided by the contracted health facilities are essential.

Keywords: Adverse selection, Community-Based Health Insurance, Enrollment, Ethiopia, Out-of-pocket payment (OOP)

5.1. Introduction

Health services have encountered shortage of funds in many low and middle-income countries (LMICs) (Mills et al. 2012; Adebayo et al. 2015). They mainly rely on households direct out-of-pocket (OOP) payments (Knaul et al. 2006; Ataguba 2012). However, OOP payments are an inefficient, inequitable, and known barrier to health service utilization for the poor's (Mills et al. 2012). In response to the adverse effects of OOP payments, the World Health Organization (WHO) has been advocating Universal Health Coverage (UHC) to curtail the effect of OOP payments to access health services and financial catastrophes (World Health Organaization 2010). General tax and/or social health insurance (SHI) contributions with risk pooling principles are the recommended equitable healthcare financing mechanisms (WHO 2005). However, Lack of robust tax-base, weak institutional capacity, a large proportion of self-employed and the informal sector population pose a challenge for UHC in developing countries (WHO 2005).

In the last two decades, many developing countries have introduced micro or community-based health insurance (CBHI) to strengthen the financing system to increase access to health care and to reduce the use of costly risk-coping strategies (use of savings, sell assets, and borrow money from friends and family) (Dekker 2004; Dekker et al. 2010). Since then, CBHI has received more attention as a mechanism of health financing and a potential alternative to the user fee in LMICs (Dong et al. 2004; Ekman 2004; De Allegri et al. 2006a; Yilma et al. 2015).

Ethiopia has experienced high economic growth over the last few decades, however, remains a poor country with a high burden of disease (Federal Ministry of Health Ethiopia April 2014). The Ethiopian health care financing system is highly reliant on foreign donations and households' OOP expenditure (Federal Ministry of

Ethiopia 2010). The shortage of resources in the health care system leads to low utilizations of health services. Outpatient health care utilizations per capita per year was reported only 0.3 visits/year in 2011, accompanied by huge reliance on the OOP spending (33.7%) (Ministry of Health Ethiopia 2015).

In spite of, chronic under-financed health care system and low healthcare utilization, formal and informal health insurances in Ethiopia have not been popular so far, represented only less than 1.25% of the healthcare expenditure and the government spend nearly 1% of its health expenditure for insurance activities (World Health Organaization 2016; Ministry of Health Ethiopia Aprill 2014). However, since 2010, there has been a growing interest to improve the healthcare financing through the insurance system. The Ethiopian Government has been undertaking different measures to implement Social Health Insurance (SHI) for the formal sector employees and their families, along with CBHI to reach and cover the very large agricultural sector and informal sector in urban settings (Agago et al. 2014; Ethiopian Health Insurance Agency 2015). In July 2011, The Government has implemented a pilot CBHI scheme in 13 rural districts of four main regions of the country (Amhara, Oromia, Southern Nations and Nationalities (SNNPR) and Tigray). The pilot was expanded to an additional 161 districts in 2013 (Ethiopian Health Insurance Agency 2015).

Despite the fast move to implement CBHI in many parts of Africa, low enrollment is threatening the sustainability of the schemes (Criel et al. 2003; Basaza et al. 2007; Dong et al. 2009; Derseh et al. 2013; Mladovsky 2014). Demand and supply-side factors have been identified as an influential factors of CBHI enrollment in many of the literature. For instance, educational status of household head, perceptions related to scheme factors (e.g., benefits and convenience of scheme

administration, location, and timeliness of premium collection), understanding of the CBHI scheme, and distance to health facilities are documented as a barrier (Jütting 2003; Schneider 2004; Chankova et al. 2008; Gnawali et al. 2009; Kiplagat et al. 2013; Fenenga et al. 2015; Panda et al. 2015). A recent review of 25 literatures on factors affecting CBHI enrollment in LMICs by (Adebayo et al. 2015) showed that bulk of the previous studies are either quantitative or qualitative in method (18 quantitative studies, six qualitative and only one mixed method study).

Moreover, some studies revealed adverse selection as one of the main concern about voluntary health insurance enrollment (Wang et al. 2006). Adverse selection is a situation whereby often only people who have existing health problem purchase health insurance and lead to insufficient risk pooling and threaten the financial viability of the insurance scheme (Morris et al. 2007). Studies have demonstrated presence of adverse selection in a voluntary insurance system with a proxy measures of self-rated health status (Wang et al. 2006). Information asymmetry favors individuals' with high risk characteristics (e.g., chronic illness and poor self-rated health status) more likely to enroll in health insurance (Folland et al. 2007). Additionally, household adverse selection is common when households with larger members are more likely to join when the schemes have a fixed premium irrespective of household size (Arhin 1994).

In Ethiopia the concept of health insurance is under-developed. Studies about CBHI are very limited except for one study in the determinants of enrollment into the Ethiopia's pilot CBHI (Mebratie et al. 2015). However, this study has utilized a data from pilot implementation of CBHI, which is highly suffered from biases due to campaign effect and it failed to show the long-term association between predictor variables and the outcome of interest.

Many of the existing studies on CBHI scheme in Africa faces important limitation that most of them are based either qualitative or quantitative method of investigation and they overlooked important predictors like institutional trust (trust in public health facilities and CBHI schemes) and social capital variables in CBHI enrollment. Moreover, adverse selection problems in an early implementation of CBHI's are not well assessed.

Thus, studying the factors associated with CBHI enrollment by considering factors related to institutional trust, social capital, and adverse selection are expected to contribute to the limited empirical evidence and policy decision about CBHI uptake and its expansion. Therefore, the aim of this study was to examine the determinants of enrollment into CBHI in Northwest of Ethiopia using a community-based household survey linked with a health facility survey (quantitative) as well as qualitative data set.

5.2. Methods

5.2.1. Overview of the methods and Design

The present study utilizes a mix of quantitative (Population survey linked to health facility survey) and qualitative (focus group discussion (FGD) & In-depth interview) methods to better understand factors that affect CBHI enrollment. It uses a cross-sectional, case comparison design of CBHI-enrolled households and unenrolled (comparison) households both from districts where CBHI has been implemented. The household survey covered 2,008 households across 15 clusters in five districts. Additionally, a total of 8 focus group discussions four with enrolled and four with un-enrolled household were conducted in the same study area where the quantitative study was employed. Besides, 5 in-depth interviews with health extension worker,

district CBHI coordinator, health center head, cluster/Kebele leader and, regional CBHI coordinator were conducted. The FGDs and in-depth interviews were intended to complement the surveys by providing more detailed explanation about the determinants of enrollment. In addition, seven selected health centers were surveyed and merged with the household data in order to assess the effect of contracted health facility characteristics in CBHI enrollment.

5.2.2. Quantitative Data Analysis and Modeling

After appropriate data cleaning and coding, the data entered to EpiData Entry Client (v.2.0.8.24) and transferred to Stata version 14 [STATA/SE 14, StataCorp LP, 4905 Lakeway Drive, College Station, Texas 77845], and then re-cleaned before analysis. The level of analysis for this sub-study is household as enrollment in CBHI is at household level in Ethiopia. Enrollment in CBHI is treated as a binary outcome variable (1 for enrolled and 0 for the un-enrolled household). The association between the predictor variables and the outcome variable was first assessed by multilevel (random effect) logistic regression, and then classical multivariate logistic regression was employed.

The motive for multilevel modeling was that participation into CBHI is influenced by the characteristics at different levels (individual household and health facility levels). Multilevel model allows us to consider the individual and the group level characteristics in the same analysis rather than having to choose one or the other. Then, due to the multistage cluster sampling procedure, individual households are nested in different health facilities. Therefore, to examine whether there is a health facility effect to join CBHI or not, it tested the two-level logistic regression. The household characteristics were taken as individual level and characteristics related to

health facility considered as level-2 (random variable). It began by fitting a null or empty two-level logistic model, a model with only an intercept and health facility (group) variable.

$$log(\frac{\pi ij}{1-\pi ij}) = \beta o + \mu oj$$

Equation 2: Equation for the intercept only/null model for the determination of CBHI enrollment

The intercept **βo** is shared by all the participant/households while the random effect μ**oj** is specific to households clustered in a specific health center. The random effect is assumed to follow a normal distribution with variance σ^2_{uo}. Stata have different commands for fitting a multilevel models with binary and continuous outcome variables. The main command for binary response variables is the *xtmelogit* command which is similar to *xtmixed*.

Table 3: Null model indicates role of health center (group) variances on CBHI enrollment in Northwest Ethiopia

CBHI2	**Odds Ratio**	**Std. Err.**	**P-value**	**95 % Conf. Interval**
_cons	0.71	0.03	0.00	.642-.77
Random-effects Parameters	Estimate	Std. Err.		95 % Conf. Interval
HF: Identity var(_cons	.0016	.008		6.96e-09- 243.6685
LR test vs. logistic model: chibar2(01) = 0.03			**Prob >= chibar2 = 0.43**	

From Table 3 above, we can see that the log-odds of CBHI enrollment in an average in the study community (with $\mu\mathbf{oj} = \mathbf{0}$) is estimated as $\beta_0 = 0.71$. The intercept for health facility J is $0.71 + \mu\mathbf{oj}$, where the variance of $\mu\mathbf{oj}$ is estimated as $\sigma^2_{u0} = 0.0016$. The likelihood ratio (LR) statistics for testing the null hypothesis that $\sigma^2_{u0} = 0$ is reported in the final line of the output. The test statistics is 0.03 with a corresponding p-value of 0.43, there is no evidence that the between health facility variance is non-zero. Therefore, estimating the predictors using multi-level model will not have a different estimate with a traditional logistic regression.

In another way, the intercept only model allows us to evaluate the extent of the group variation influencing enrollment into CBHI. The intra-class correlation coefficient **ρ (Rho)** can be calculated to evaluate whether the variation in the score is primarily within the population or between health centers. In logistic distribution, level-1 residual variance **εij**, is standardized and fixed with the mean of zero and variance of $\boldsymbol{\pi^2/3}$ (Worku et al. 2013)**.** Therefore, for a two-level logistic random intercept model with an intercept variable of $\boldsymbol{\delta^2 u0}$ the intra-class correlation coefficient (Rho) is given by

$$\boldsymbol{\rho = \delta^2 \mu_0 / \delta^2 \mu_0 + \pi^2/3}$$

Equation 3: Intra-class correlation calculation

For the above intercept only model $\boldsymbol{\delta^2_{u0}} = \mathbf{0.0016}$ and $\boldsymbol{\pi 2/3}$ is equal to **3.29,** hence the intra-class correlation coefficient is **0.0016/ 0.0016+ 3.29= 0.004** meaning there is no evidence that the between health facility variance is non-zero. Then, we can apply binary logistic regression as follows.

$$\log\left(\frac{\pi ij}{1-\pi ij}\right) = \beta 0 + \beta 1 SECij + \beta 2 HHCij + \beta 3 IASij + \beta 4 CBHI + \beta 5 HFCj + \varepsilon ij$$

Equation 4: logistic regression to predict the probability of CBHI enrollment

Where **πij** is the CBHI enrollment status of household **i** at health facility **j**, a binary variable with a value of 1 if the household enrolled into CBHI and 0 otherwise. **SEC** (socioeconomic condition) a set of variables that include age, sex, educational status, occupation, and marital status of household head. It also includes wealth status of the household as a relative measure of household economic status. Wealth index was computed using principal component analysis from different household assets and household characteristics. **HHC** includes some of the household characteristics, such as perceived quality of public health facilities, self-rated health status of the household members, household size, presence of the elderly, under-five children, and pregnant women. **IAS (social capital)** indicates involvement in informal association like religious groups and credit and savings associations. **CBHI** includes characteristics related to CBHI such as knowledge of CBHI, awareness related to CBHI, trust in CBHI, convenience on premium collection and others. **HFC** includes health facility characteristics, such as availability of essential medicines, basic diagnostic tests, and availability of basic laboratory equipment.

Three multivariate logistic regression models were fitted. The first model includes household related factors, the second includes household and informal association factors, and the third contain household, informal association participation, and health facility and CBHI related factors. Diagnostic tests like multicollinearity using variance covariance matrix was performed. Goodness-of-the models fits were checked using Hosmer-Lemeshow tests asking for groups, then the model with higher chi-square and p-value considered as a better model. The adjusted

odds ratio (OR) with a 95 % confidence interval and a p-value < 0.05 used to determine the statistical significant association between enrollment into CBHI and the independent variables.

5.2.3. Qualitative Data Analysis

The main aim of the qualitative analysis was to confirm and check consistency with the quantitative results and to present findings in richer detail, with a deeper understanding of the relationship that shown in the quantitative analysis, leading to the confirmation of the relationship between the independent variables and CBHI enrollment. The analysis followed a two-step process. First, the moderator, who conducted the FGDs and in-depth interviews transcribed the interviews and prepared summary notes in local language Amharic and translated into English. The summary notes contained all the essential information generated by the discussion. Responses were quantified and possible quotes from participants were included. Results are organized by themes that correspond to each of the research questions. Quotes that most useful in explaining the quantitative finding are presented under each quantitative finding as a supplement or as a contradiction.

5.3. Results

5.3.1. Descriptive Findings on Enrollment in Community–Based Health Insurance

As table 4 below illustrates, out of the total (2008) respondents, 832 (42%) were enrolled and the rest 1,176 (58%) not enrolled into CBHI. Male-headed households were predominant for both groups. The mean age of the CBHI members was higher

(46.4, SD 12.9) than un-enrolled households (43.1, SD 14.3). The majority of CBHI participants (92%) and non-participants (90%) were rural dwellers. Illiterates were predominant in CBHI un-enrolled households than enrolled households 56% and 46%, respectively. More than 80% of the respondents from both sides were married household heads. More than 85% of the respondents of both groups was a farmer by occupation. The mean household size of the CBHI participants was higher than the non-participants (5.4 SD 2.0 and 4.51 SD 1.9), respectively. The proportion of chronic disease among the CBHI participants was higher than non-participants 22.4%, and 16.2%**,** respectively. Moreover, the proportion of respondents with a prior information (awareness) about CBHI was higher for CBHI members than non-members (94% vs 81%). CBHI member respondents had a lower proportion of good self-rated health status than unenrolled members 39 and 67%, respectively. Furthermore, the perceived quality of health services in public health facilities were higher for CBHI participants than non-participants (85 and 80%). According to their wealth status distribution, unenrolled households have a higher proportion of poorest and poorer population (44%) than CBHI members (34%). In the contrary, CBHI members had a higher proportion of the richest population (46%) than the non-members (36%). Elderly household members above 64 years of age account 12% of CBHI participants and almost 10% of non-participants.

With regard to participation in local associations as a measure of social capital, CBHI members have a slightly higher participation rate than non-members. Nearly 92% of CBHI members and 88% of non-members participated in local solidarity groups. Roughly 53% of the CBHI members and 46% of non-members were participating in the local credit association. Almost 88% of the CBHI members and 83% of the non-members have religious memberships in the locality. Around 53% of

CBHI participants and 45% of the non-participants have a saving account by one of the household members. CBHI members have a higher proportion of official position holder members than non-members, 25 and 18%, respectively (Table 4).

As mentioned above, the majority of the respondents reflected as having prior information about CBHI. The main sources of the information were identified as CBHI Kebele representatives house-to-house visiting (30.4%), followed by public meetings 27%, health professional during health facility visit 21%, and neighbors/friends and mass-media (TV and Radio) contributes for 16.7 and 4.9%, respectively **(Figure 4)**.

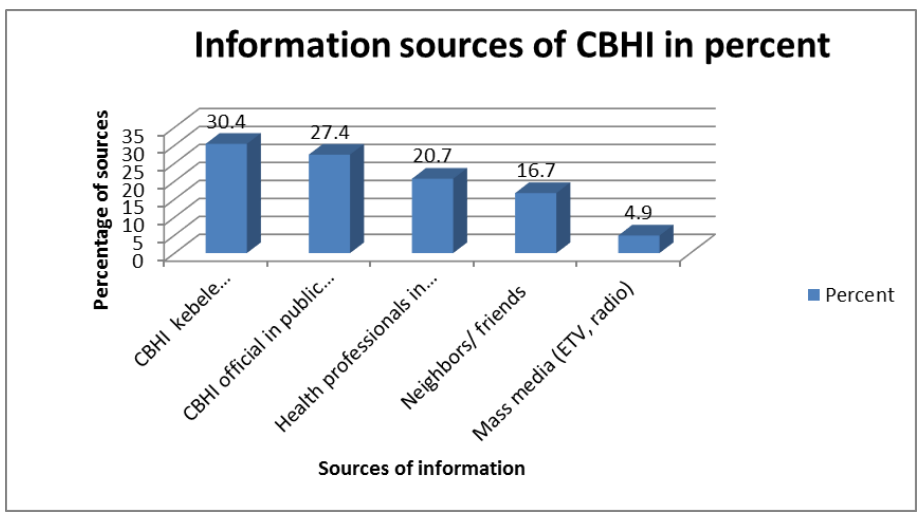

Figure 5: Source of information about CBHI

Table 4: Descriptive results for CBHI participants and non-participants, Northwest Ethiopia

Predictor variables		Total	CBHI members (832) N (%)	Non-Members (1176) N (%)	P-value
Socio-demographics					
Sex	Male	1478(73.6)	665(79.9)	813(69.1)	
	Female	530(26.4)	167(20.1)	363(30.9)	0.00
Age	18-30	421(20.9)	114(13.7)	307(26.1)	
	31-40	500(24.9)	206(24.8)	294(25.0)	0.00
	41-50	483(24.1)	241(28.9)	242(20.6)	
	50+	602(29.9)	271(32.6)	333(28.3)	
Residence	Rural	1821(90.7)	763(91.7)	1058(89.9)	
	Urban	187(9.3)	69(8.3)	118(10.0)	0.18
Education	Illiterate/No education	1038(51.7)	382(45.9)	656(55.8)	
	Read & write	587(29.2)	305(36.6)	282(23.9)	
	Elementary school (grade 1-4)	197(9.8)	78(9.4)	119(10.1)	0.00
	Elementary school (grade 5-8)	119(5.9)	53(6.4)	66(5.6)	
	Secondary school (9-12)	67(3.3)	14(1.7)	53(4.5)	
Marital status	Single	94(4.7)	41(4.9)	53(4.5)	
	Married	1632(81.3)	702(84.4)	930(79.1)	
	Divorced	157(7.8)	42(5.1)	115(9.7)	0.00
	Widowed	125(6.2)	47(5.6)	78(6.6)	
Occupation	Farmer	1761(87.7)	755(90.7)	1006(85.5)	
	Merchant	83(4.1)	38(4.5)	45(3.8)	
	Day laborer	51(2.5)	9(1.1)	42(3.6)	0.00
	Petty trader	113(5.6)	30(3.6)	83(7.1)	

CBHI awareness	No	274(13.6)	47(5.6)	227(19.3)	0.00
	Yes	1732(86.4)	784(94.3)	948(80.6)	
Self-rated health status	Poor	121(6.0)	53(6.4)	68(5.8)	0.00
	Medium	766(38.1)	451(54.2)	315(26.7)	
	Good	1121(55.8)	328(39.4)	793(67.4)	
Perceived quality health service	Poor	348(17.3)	124(14.9)	224(19.1)	0.00
	Medium	555(27.6)	210(25.2)	345(29.3)	
	Good	1105(55.0)	498(59.8)	607(51.6)	
Household characteristic					
Household size		Mean 4.9 SD 1.9	Mean= 5.4, SD 2.0	Mean= 4.5, SD 1.9	0.00
Chronic disease	No	1631(81.2)	646(77.6)	985(83.7)	0.00
	Yes	377(18.8)	186(22.4)	191(16.2)	
Wealth index	Poorest	402(20.0)	128(15.5)	274(23.4)	0.00
	Poorer	399(19.9)	155(18.7)	244(20.8)	
	Middle	400(19.9)	161(19.4)	239(20.4)	
	Richer	409(20.4)	195(23.5)	214(18.3)	
	Richest	390(19.4)	189(22.8)	201(17.2)	
Pregnant	No	1854(92.3)	778(93.5)	1076(91.7)	0.13
	Yes	151(7.5)	54(6.5)	97(8.3)	
Under five	No	1261(62.8)	507(61.0)	754(64.1)	0.16
	Yes	746(37.2)	324(39.0)	422(35.8)	
Elderly HH member	No	1794(89.3)	732(87.0)	1062(90.0)	0.09
	Yes	214(10.7)	100(12.0)	114(9.7)	
Participation in local associations					
Enrollment Solidarity group	No	214(10.7)	68(8.2)	146(12.4)	0.00
	Yes	1794(89.3)	764(91.8)	1030(87.6)	
Local credit membership	No	1019(50.7)	384(46.2)	635(54.0)	0.00
	Yes	989(49.3)	448(53.9)	541(46.0)	
	No	314(15.6)	103(12.4)	211(17.9)	

Religious group Membership	Yes	1694(84.4)	729(87.6)	965(82.6)	0.00
Saving account	No	1038(51.7)	389(46.7)	649(55.2)	
	Yes	927(48.30	443(53.3)	527(44.8)	0.00
Official position holder	No	1587(79.0)	624(75.0)	963(81.8)	
	Yes	421(21.0)	208(25.0)	213(18.1)	0.00
Health facility related factors					
Time to hospital(minute)		Mean 264.2 SD 284.2	Mean 247.3 SD 273.8	Mean 276.0 SD 290.7	0.06
Time to health center(minute)		Mean 75.1 SD 80.4	Mean 73.7 SD 69.7	Mean 76.1 SD 87.2	0.07
Blood glucose test availability	No	460(22.9)	182(21.9)	278(23.6)	0.03
	Yes	1584(77.1)	650(78.1)	898(76.4)	

5.3.2. Determinants of Enrollment in Community-Based Health Insurance

Three multivariate logistic regression models were fitted. First with household related factors (sex, age, education, occupation, perceived quality of health services, self-rated health, elderly in the household, under-five children, pregnant women, chronic disease, CBHI knowledge and awareness, household size, and wealth index). In the second model we include local credit and religious association membership to assess the effects social capital factors as an informal association participation. Finally to assess the effect of supply side factors we include variables related to health facility and CBHI scheme (trust in health facility, trust in CBHI scheme, time to health center, availability of hematology and chemistry analyzer, ORS availability, and blood glucose test). We checked the estimates from all the three models before result interpretation. The last model (model 3) provides better estimate and we interpreted and discussed estimates from this model.

Household Level Determinants CBHI Enrollment [Table 5 model 3]

The results showed that household head in the age category of 31-40 , 41-50 and 50 + nearly have 1.4 , 1.8, and 1.4 times higher odds of participation than respondents in the age group of 18-30 years of age (OR= 1.44 (1.05 - 1.98)), (OR= 1.81 (1.27 - 2.53)), & OR=1.41 (0.94 - 1.96)), respectively. In addition, household head who can read and write have almost 1.5 times higher odds of enrollment than illiterate ones (OR= 1.51 (1.18 - 1.93)).

The result of this study confirmed that perceived quality of health services as a significant determinant of CBHI enrollment. Those with a good perceived quality of public health service nearly have 1.7 times higher odds of participation than those with a poor perception (OR= 1.72 (1.25 - 2.34)). This result is supported by qualitative findings from the FGD participants. The majority of the CBHI member

respondents confirmed that they had a positive perception of the quality of health services provided by the surrounding health care facilities before they joined the insurance. ” *We had been receiving good health services at health post and health centers according to the standard before we joined to CBHI and we had a positive insight/perception towards the quality of the services. However, services at the hospital are not good enough in the provision and waiting time” (**A 55 years old male CBHI member FGD participant from Farta).***

Self-rated health status showed a significant negative association with CBHI enrollment, those with poor self-rated health status have almost a 3.4 times higher odds of enrollment than the counterpart good self-rated health status (OR 3.39 (2.19 – 5.25)) suggesting a possibility of adverse selection in participation. Moreover, chronic disease in the household also associated with CBHI enrollment. Those households who have a member with chronic disease almost have 1.4 times higher odds of enrollment than the counterpart (OR 1.38, (1.02 - 1.88)).

Another essential finding of this study was the significant association between knowledge and awareness level of household head and CBHI enrollment. As the knowledge score about insurance increased by one unit controlling for several characteristics, CBHI participation increased by 1.8 points (OR= 1.81 (1.56 – 2.15)). Moreover, awareness regarding insurance or having information is highly correlated with enrollment; an informed household head has almost 2.5 times higher odds of participation than non-informed one (OR=2.56 (1.80 -3.62)). This finding was supported by the FGDs that indicates non-CBHI members were complaining about the awareness creation activities of CBHI campaigns. “*The main reasons that prevent us from joining CBHI are lack of awareness about the importance of insurance and*

financial scarcity" ***(A 58 years old male CBHI unenrolled FGD participant from Addis Zemen).***

Many of the FGD participants from non-CBHI member's revealed that their understanding and awareness of CBHI were low, which might be an indication of insufficient awareness creation campaigns in the study area. *"I have not participated in any formal awareness creation meetings regarding CBHI, but I have got information about CBHI from friends, families, and in the churches" (A* ***38 years old female CBHI unenrolled FGD participant from Farta).***

Some FGD participants' response clearly indicate that the concept of insurance with regard to its risk and income pooling effect is low in the study area *"Health insurance is about keeping personal hygiene and preventing disease transmission" (****A 45years old male CBHI member FGD participant from Farta).***

*"I do not have an experience and information about health insurance, but I feel that it is about receiving free health service" (****A 56 years old male*** **CBHI** ***unenrolled FGD participant from Addis Zemen).***

Institutional trust towards health care facilities and the insurance scheme were not significantly associated with CBHI enrolment. However, household size has a significant association with CBHI participation. Household with five members and above have nearly 1.4 times higher odds of participation than those with below five members (OR=1.35 (1.07 - 1.72)).

Household wealth-status as an indirect measure of income was not significantly correlated with participation in CBHI in the quantitative analysis but this finding was contradicted with a qualitative responses that income was one of the main factors that FGD participants mentioned as a barrier to join CBHI**.** ***"****The main reasons that prevent us from joining CBHI are lack of awareness about the*

importance of insurance and financial scarcity" ***(A 42 years' old female CBHI unenrolled FGD participant From Addis Zemen).***

Informal Association Factors Affecting CBHI Participation

Household's participation in local informal associations showed a positive association to insurance enrollment. Such as participation in local credit and saving associations has almost 1.3 times higher odds of enrollment in CBHI than those without participation (OR=1.30 (1.03 - 1.64)).

Health Facility Characteristics Affects CBHI Participation *[Table 5 model 3]*

Health facility characteristics were assessed to check whether they are associated with CBHI enrollment. Availability of laboratory tests like blood glucose test showed a significant association with CBHI enrollment, availability of the test increases the chance of enrollment almost by 1.5 times (OR = 1.51, (1.11 - 2.11)). However, other health facility factors such as time to health center, time to hospital, ORS availability, blood hematology and chemistry analyzers were not significantly associated with enrollment. [Table 5 model 3].

In this study we examined the effect of each districts on the enrollment of the households using woreda dummy, the result showed that some woredas have lower odds of enrollment, for example Farta and Alefa districts/Woreda's have 56 % and 78 % lower odds of participation than woreta. This finding is an indication for further researches in the study area with related to Woreda factors that hinders participation in CBHI.

Table 5: Logistic regression results: Probability of CBHI enrollment in Northwest Ethiopia

Explanatory variables		Model 1			Model 2			Model 3		
		OR	**P-value**	**[95% CI]**	**OR**	**P-value**	**[95% CI]**	**OR**	**P-value**	**[95% CI]**
		Household related factors								
Sex	Male	Ref.			Ref.			Ref.		
	Female	0.72 (0.10)	0.02	0.56-0.94	0.72 (0.10)	0.01	0.55 - 0.94	0.77 (0.11)	0.05	0.58-1.00
Age	18-30	Ref.			Ref.			Ref.		
	31-40	1.51 (0.24)	0.01	1.19-2.17	1.45 (0.24)	0.02	1.05 - 2.00	**1.44 (0.24)**	**0.03**	**1.05 - 1.98**
	41-50	1.99 (0.34)	0.00	1.42-2.78	1.89(0.33)	0.00	1.34 - 2.67	**1.81(0.32)**	**0.00**	**1.27 - 2.53**
	50+	1.54 (0.28)	0.02	1.08-2.21	1.47(0.27)	0.04	1.02 -2.12	1.41(0.25)	0.09	0.94 - 1.96
Education	Illiterate	Ref.			Ref.			Ref.		
	Read & write	1.55 (0.19)	0.00	1.22-1.97	1.56(0.19)	0.00	1.22 -1.98	**1.51(0.19)**	**0.00**	**1.18 - 1.93**
	Elementary school (grade 1-4)	1.18 (0.22)	0.37	0.82-1.71	1.16(0.22)	0.44	0.79 - 1.77	1.11(0.21)	0.57	0.77 - 1.62
	Elementary school (grade 5-8)	1.61 (0.35)	0.03	1.04-2.48	1.62(0.36)	0.03	1.05-2.49	1.54(0.34)	0.05	0.99 - 2.38
	Secondary school (9-12)	0.60 (0.21)	0.15	0.29-1.21	0.63(0.23)	0.20	0.31 - 1.27	0.56(0.20)	0.11	0.28 - 1.14
Occupation	Farmer	Ref.			Ref.			Ref.		
	Merchant	1.12(0.31)	0.69	0.65-1.91	1.09(0.31)	0.77	0.63- 1.89	0.96(0.28)	0.90	0.55 - 1.69
	Day laborer	0.32(0.14)	0.01	0.14-0.73	0.32(0.13)	0.01	0.14 - 0.73	0.29(0.12)	0.00	0.12 - 0.67

Explanatory variables		Model 1			Model 2			Model 3		
		OR	P-value	[95% CI]	OR	P-value	[95% CI]	OR	P-value	[95% CI]
		Household related factors								
	Petty trader	0.66(0.19)	0.14	0.38-1.15	0.68(0.19)	0.17	0.39- 1.18	0.59(0.17)	0.07	0.34 - 1.05
P. quality health	Poor	Ref.			Ref.			Ref.		
	Medium	1.07(0.18)	0.70	0.77-1.47	1.08(0.18)	0.65	0.78-1.49	1.10(0.18)	0.56	0.79 -1.53
	Good	1.65(0.25)	0.00	1.22-2.21	1.66(0.25)	0.00	1.23- 2.23	**1.72(0.28)**	**0.00**	**1.25 - 2.34**
Self-rated health	Poor	3.15(0.69)	0.00	2.05-4.84	3.18(0.70)	0.00	2.16 - 4.88	**3.39(0.76)**	**0.00**	**2.19 - 5.25**
	Medium	3.83(0.45)	0.00	3.04-4.83	3.93(0.47)	0.00	3.11-4.97	**4.04(0.49)**	**0.00**	**3.19 - 5.12**
	Good	Ref.			Ref.			Ref.		
Elderly_above_64	No	Ref.			Ref.			Ref.		
	Yes	1.08 (0.19)	0.68	0.76-1.53	1.11(0.20)	0.55	0.78-1.59	1.10 (0.20)	0.60	0.78- 1.57
Under-five member	No	Ref.			Ref.			Ref.		
	Yes	1.12 (0.13)	0.34	0.89-1.41	1.11(0.13)	0.38	0.88-1.40	1.10 (0.13)	0.42	0.87 - 1.39
Pregnant women	No	Ref.			Ref.			Ref.		
	Yes	0.59 (0.13)	0.01	0.39-0.89	0.59(0.13)	0.01	0.39-0.89	0.59(0.13)	0.01	0.39 - 0.89
Chronic disease	No	Ref.			Ref.			Ref.		
	Yes	1.34(0.20)	0.06	1.03-1.80	1.32(0.20)	0.06	0.98-1.78	**1.38(0.22)**	**0.04**	**1.02 - 1.88**
CBHI-Knowledge		1.77 (0.13)	0.00	1.54-2.03	1.75(0.12)	0.00	1.52-2.01	**1.81(0.14)**	**0.00**	**1.56 - 2.15**
CBHI_awareness	No	Ref.			Ref.			Ref.		
	Yes	2.69(0.47)	0.00	1.90-3.79	2.65(0.47)	0.00	1.87-3.74	**2.56(0.45)**	**0.00**	**1.80 -3.62**
	<5	Ref.			Ref.			Ref.		

Explanatory variables		Model 1			Model 2			Model 3		
		OR	P-value	[95% CI]	OR	P-value	[95% CI]	OR	P-value	[95% CI]
					Household related factors					
Household size	≥5	1.32(0.15)	0.02	1.06-1.66	1.29(0.15)	0.03	1.03-1.63	**1.35(0.16)**	**0.01**	**1.07 - 1.72**
Wealth index	Poorest	Ref.			Ref.			Ref.		
	Poorer	1.09(0.20)	0.65	0.76-1.56	1.06(0.20)	0.75	0.73-1.53	1.09(0.21)	0.64	0.76 - 1.58
	Middle	1.01(0.19)	0.94	0.70-1.46	0.98(0.18)	0.91	0.68-1.41	1.01(0.19)	0.95	0.69 - 1.47
	Rich	1.14(0.21)	0.48	0.79-1.65	1.10(0.21)	0.62	0.76-1.60	1.19(0.23)	0.36	0.82 - 1.74
	Richest	1.16(0.22)	0.43	0.80-1.68	1.09(0.21)	0.67	0.74-1.59	1.19(0.24)	0.38	0.80 - 1.77
					Informal association related factors					
Localcredit_membership	No				Ref.			Ref.		
	Yes				1.19(0.13)	0.04	0.75-0.96	**1.30(0.15)**	**0.03**	**1.03 - 1.64**
Religiousgroup_Membership	No				Ref.			Ref.		
	Yes				1.21(0.20)	0.26	0.87-1.68	1.35(0.21)	0.06	0.97 - 1.79
					Health facility and CBHI related factors					
Trust_healthfacility								0.96 (0.08)	0.65	0.82 - 1.13
CBHI_trust								1.08 (0.09)	0.33	0.92-1.27
Time_to_HC								0.99 (0.01)	0.19	0.99 - 1.00
	No							Ref.		

Explanatory variables		Model 1			Model 2			Model 3		
		OR	P-value	[95% CI]	OR	P-value	[95% CI]	OR	P-value	[95% CI]
		Household related factors								
Analyzer hematology	Yes							0.89 (0.93)	0.91	0.11 - 6.58
Ananlyzer_ chemistry	No							Ref.		
	Yes							1.04 (1.08)	0.97	0.14 - 7.96
ORS_availa blity	No							Ref.		
	Yes							1.18(0.27)	0.46	0.75 - 1.86
Blood glucose	No							Ref.		
	Yes							**1.51(0.24)**	**0.01**	**1.11 - 2.11**
Woreda	Woreta							Ref.		
	Fogera							0.89(0.25)	0.67	0.52 - 1.53
	Alefa							**0.22(0.14)**	**0.02**	**0.07 - 0.76**
	Libo							2.12(2.36)	0.50	0.24 - 18.8
	Farta							**0.44(0.14)**	**0.01**	**0.23- 0.81**
_Cons		0.05(0.02)	0.00	0.03-0.09	0.04(0.01)	0.00	0.02-0.07	0.02(0.01)	0.00	0.01 - 0.03
Number of observation		1,994			1994.00			1985.00		
Wald chi2		339			347.87			362.13		
Prob > chi2		0			0.00			0.00		

Notes: Outcome variable is CBHI enrollment status in 2017, explanatory variables are at household and health facility level and standard errors in parenthesis. OR=Adjusted odds ratio

5.4. Discussion

This study identified an important household, social capital, and health facility characteristics as a barrier of enrollment into CBHI. Household head educational status, age, knowledge and information (awareness) about CBHI, self-rated health status, perceived quality of health services, and household size were among the household characteristics influence CBHI enrollment. Additionally, participation in local credit associations and health facility characteristics like availability of basic laboratory tests in the health facility affect CBHI enrollment.

Household head educational status have a significant effect on the decision of enrollment in CBHI. This result is in line with study findings about willingness to join CBHI in Ethiopia (Haile et al. 2014), enrollment studies in Kenya (Kiplagat et al. 2013), Bangladesh (Ahmed et al. 2016), Vietnam (Lofgren et al. 2008) , India (Panda et al. 2014), Burkina Faso (De Allegri et al. 2006) , and Lao PDR (Alkenbrack et al. 2013) that indicates the relationship between educational status of the household head and health insurance enrollment. This can be justified as educational status increase the knowledge and perception of household head towards risk-minimizing strategies which help them to decide enrollment into insurance. Moreover, an educated household head is expected to have a better knowledge and awareness about the effects of illness on health care expenditure, which lead them to join insurance to minimize out of-pocket payments.

This study discovered a positive relationship between household head age and insurance participation, as age of the household head increases probability of CBHI enrollment also increases. This result is in line with study findings from Kenya, Vietnam, India, and Cameron (Lofgren et al. 2008; Donfouet et al. 2013; Kiplagat et al. 2013; Panda et al. 2014; Adebayo et al. 2015) which reveals as the age of

household head increases the demand for health insurance increases. This can be justified by using the human capital economic theory that predicts the depreciation of health stocks with ageing. As a result, older individuals have a tendency to increase their investment on health, thus they can reduce the rate of health depreciation. Furthermore, as age increases, there is a growing sense of the risks involved in life and increase awareness of risk minimizing strategies like insurance. Moreover, older household head might have more life experience and therefore most likely to imagine the effect of illness or injury on their household.

Knowledge and awareness regarding insurance positively affect the decision of enrollment. This result is similar to study findings in different African countries like Uganda, Kenya, Nigeria (Basaza et al. 2007; Basaza et al. 2008; Banwat et al. 2012; Kiplagat et al. 2013) which shows limited information and understanding of the principles of CBHI limits participation.

Self-rated health status showed a significant relationship with insurance participation. Those with poor self-rated health status have higher odds of enrollment into CBHI than those with good health status. This finding is in line with other previous studies in China (Zhang et al. 2008), Lao PDR (Alkenbrack et al. 2013), and a willingness to join study in Ethiopia (Haile et al. 2014). This result supports the presence of adverse selection in the insurance scheme. However, it was inconsistent with a study finding in Ethiopia's pilot CBHI implementation (Mebratie et al. 2015) which showed self-rated health status was not a contributing factor in enrollment during the pilot CBHI implementation. This disagreement might be due to the difference in the research periods of the two studies, i.e., the above study was conducted during the early stage of insurance piloting in Ethiopia, when the concept of insurance was very new. But, the current study is conducted 6 years after the pilot

implementation, so that through time communities might develop their understanding towards the insurance principles and related risks, then the risk-averse households (households with a larger number and poor self-rated health status) are more likely to enroll than the healthy households.

In this study perceived of quality of health services provided by the public health facilities have a positive significant association with participation into CBHI. This finding is in agreement with study results in Nigeria, Lao PDR, and Burkina Faso (Ataguba 2008; Dong et al. 2009; Alkenbrack et al. 2013) which identified the perceived quality of health care services as a main factor to participate in CBHI. However, due to the cross-sectional nature of the data, the relationship between quality and participation might be questioned; it might be considered that CBHI member perceived higher quality since they are enrolled and non-members feel the reverse. But the study finding is supported by qualitative findings. It could also be justified using expected utility economic theory, if the household head perceived that the quality of the services provided by the public health care systems is of low quality, they may not expect utility to gain by joining CBHI, then, they decide not to enroll. Moreover, quality of health services is identified as a major challenge to increase universal health coverage in Africa and Asia (Gina Lagomarsino et al. 2012).

Household size was another factor affecting enrollment into CBHI; households with larger sizes have higher odds of participation than those with a smaller number of members. The finding was in line with the studies about willingness to join insurance conducted in Ethiopia (Haile et al. 2014) and Nigeria (Ataguba 2008). The local contexts in Ethiopia showed that the amount of premium for a family with one member and five is similar, it seems beneficial for families with larger number of household members to join CBHI.

The other important finding of the study is the positive effect on enrollment of the participation in local informal association as a social capital; we found that prior participation in local credit association shows higher odds of participation in health insurance. This result is consistent with study findings in Cameroon and Senegal (Binam et al. 2004; Donfouet et al. 2013; Mladovsky 2014) that indicates household who have more involvement in informal associations are more willing to join and pay for health insurance. Participation in those groups helps to obtain more knowledge and develop the idea of social solidarity which can be used as a basis for formal insurance system in developing countries.

The other essential finding of the study is the impact of availability of services in health facility such as availability of blood glucose test and participation in health insurance. This finding is in line with studies conducted during the pilot implementation of CBHI in Ethiopia, Lao PDR and Senegal (Alkenbrack et al. 2013; Mebratie et al. 2013; Mladovsky 2014). Lack of service and poor quality care remains a source of dissatisfaction for both members and non-members of CBHI and the result is supported by focus group discussion.

However, in this study factors related to institutional trust, like trusts related to health facility and CBHI schemes were not significantly associated with CBHI enrollment. It might be justified as the concept of insurance is new in Ethiopia so that factors related household could influence the first decision to enroll. But, once they enrolled they can think about those trust issues and this can be an avenue for future research.

5.5. Contributions and Limitation of the Study

The first limitation of the study might be the cross-sectional nature of the data that prevents the inference of causation between the explanatory variables and outcome of interest (CBHI enrollment). However, the combination of qualitative and quantitative methods could minimize the limitations and increases the contribution of the study. The majority of the findings were supported by the focus group discussion and in-depth interview results, which supports the direction of the associations. The second limitation of the study could be omitted variable bias. Despite the comprehensiveness of the questionnaires, it is likely that some important variables such as direct relative income of households and detail individual information of each household members are excluded. The third limitation of the study might be the external validity of the findings given the study is regional study in Ethiopia. However, we believed that the majority of the Ethiopian community in the rural area have more or less similar socioeconomic and institutional arrangements so that the result can be representative of Ethiopia and some part of other African countries which follow the Ethiopian model of CBHI.

5.6. Conclusions and Policy Recommendations

This sub-study revealed factors related to household, informal association and, health facility that influence the enrollment into CBHI in Ethiopia and shed light on the potential challenges of enrollment using a mixed methodology. It demonstrated the possibility of adverse selection in the early stages of Ethiopia's CBHI scheme as households with large members, poor self-rated health status, and chronic disease have higher odds of joining CBHI. Therefore, multifaceted policy interventions are required.

Voluntary participation in insurance and flat-rate regressive premium in the households led to adverse selection and it threatens the sustainability of the insurance schemes. Therefore, strategies such as enforcing mandatory enrollment, differential premium, and group enrollment are essential to tackle adverse selection. Literatures also recommended that group insurance enrollment minimize adverse selection by improving average health status of the risk pool relative to voluntary individual insurance schemes.

Continuous and organized community education and awareness creation activities, particularly about insurance are essential to increase the level of understanding of the risk sharing mechanism which is essential for CBHI uptake and sustainability. Community education and awareness creation activities need to be supported by Mass Medias.

Moreover, the local government needs to use informal associations for communication and social marketing because this informal association as a social capital can be used as a base for further formal associations like CBHI.

Strategies to improve services at public health facility need to be implemented to enhance the quality of health care services as an important determinant of enrollment into CBHI. Several short and long-term measures have to be implemented to ensure health care providers are accountable and responsive to the needs of clients. In the short term, measures to increase awareness of health professional on health insurance need to be implemented. Additionally, continuous availability of essential laboratory tests, medicines, and equipment should be maintained. As a long-term strategy, assigning quality assurance representatives to monitor service delivery in health facilities can help to improve the quality of care.

Chapter 6: Factors Associated with Willingness to Renew Community-Based Health Insurance Membership in Northwest Ethiopia, a Multilevel Analysis

Abstract

Background: Membership renewal plays a key role in the sustainability of Community-Based Health Insurance (CBHI) schemes. Since 2010, the Ethiopian government introduced different measures to implement CBHI to improve access to healthcare use and minimize the financial burden of health care costs. This study intended to examine the factors associated with willingness to renew CBHI membership in Northwest of Ethiopia.

Methods: The study utilizes a mix of quantitative (two-level mixed-effect logistic regression applied to household survey linked to health facility survey) and qualitative (focus group discussion and in-depth interview) methods to better understand factors associated with willingness to renew CBHI membership.

Results: In this study, 36% of CBHI member households were not willing to renew their membership for the next period. Lack of trust in public institutions such as lack of trust in public health facilities and insurance schemes and inconvenience of the premium collection were the main factors associated with the willingness to renew CBHI membership. Additionally, Households with poor self-rated health status have higher odds of willingness to renew CBHI membership.

Conclusion and recommendations: The findings of the study clearly demonstrated the role of institutional trusts in the willingness of membership renewal. Moreover, adverse selection could be a challenge for sustainability of the schemes. Therefore, policy interventions that strengthen health facilities and insurance schemes to provide the promised services to build trust and strategies to tackle adverse selection are essential.

Keywords: Adverse selection, CBHI, Drop-out, Developing country, Institutional trust, Membership renewal, Willingness to renew

6.1. Introduction

Universal healthcare coverage (UHC), access to adequate health care services without financial hardship has been the center of the health policy debate (Raza et al. 2016). As a result, in the 1990s many low and middle-income countries (LMICs) have introduced micro or community-based health insurance (CBHI) to attain the goal of UHC (Dekker 2004; Dekker et al. 2010; Mebratie et al. 2015). Since then, CBHI has received considerable attention as a mechanism of health financing in LMICs and a potential alternative to user fee (Dong et al. 2004; Ekman 2004). Low enrolment and membership renewal have been challenging many of the CBHI schemes in Sub-Saharan Africa (SSA) (Basaza et al. 2007; De Allegri et al. 2009; Atinga et al. 2015). Membership renewal provides continuous financial protection for the members and contributes positively to the sustainability of the schemes (Atinga et al. 2015). Despite membership renewal's positive effect for scheme sustainability and member's financial protection, empirical evidences are very limited in LMICs (Dong et al. 2009; Panda et al. 2015).

In recent years, Ethiopia has introduced various measures to implement Social Health Insurance (SHI) for the formal sector employees and their families, along with Community-Based Health Insurance (CBHI) to reach and cover the very large agricultural and urban informal sectors (Agago et al. 2014; Ethiopian Health Insurance Agency 2015). However, empirical evidence on CBHI membership renewal is almost none except a single study on dropout during the first year of the pilot implementation of CBHI (Mebratie et al. 2015).

Few studies have examined the high drop-out rates and its associated factors from voluntary health insurance in SSA. However, majority of these studies utilize either qualitative or quantitative method of examination. For instance, a qualitative

study in Guinea-Conakry showed that initial enrolment rate was 8% in 1998 then dropped to 6% a year later (Criel et al. 2003). In the Nouna district scheme in Burkina Faso, a quantitative study showed that enrollment lay between 5.2% and 6.3% in the years 2004 to 2006 with a drop-out rate of 30.9% in 2005 and 45.7% in 2006 (Dong et al. 2009). In Senegal, three schemes set up between 1997 and 2001 (Mladovsky et al. 2014) reported that in 2009 scheme drop-out rates ranged between 58 and 83%. However, an exceptionally low drop-out rate (18%) was reported (Mebratie et al. 2015) in Ethiopia's pilot CBHI. We argue that the Ethiopian study was conducted in the first year of CBHI pilot implementation and the study may be biased due to high promotional campaign effect and it failed to show the long-term association between the predictor variable and outcome of interest.

In many of the literature demand and supply-side factors that inhibit membership renewal are identified. The demand-side factors include age and sex of household head, the number of household members, self-rated health status, and poor awareness and understanding of insurance in general and CBHI in particular. Moreover, membership renewal is also influenced by supply-side factors such as scheme affordability, benefit packages, and poor quality of health care that may be accessed through insurance.

However, the majority of the previous studies overlooked the effect of institutional trusts such as trust in public health care facility and insurance scheme in CBHI membership renewal. Besides, they overlooked the effect of health facility level variables during the analysis and they employed classical regression rather than multi-level regression analysis to evaluate the correlation between the predictor variables and outcome of interest.

Thus, studies that consider the demand and supply-side factors affecting CBHI membership renewal using a mix of quantitative and qualitative methods with multi-level analytical approach are all important to provide clearer policy suggestions. This study aimed to assess the level of willingness to renew membership and factors associated with membership renewal, with special emphasis on institutional trust and health facility-related factors in Northwest of Ethiopia.

6.2. Methods

6.2.1. Overview of the Methods and design

This sub-study utilizes a mix of quantitative (a cross-sectional household survey linked to health facility survey) and qualitative (FGD & In-depth interview) methods to better understand factors associated with CBHI membership renewal in North-West Ethiopia. The study employed a quantitative survey of 810 CBHI member households across 15 clusters found in 5 districts. A qualitative information from 4 focus group discussions and 5 in-depth interviews with: - regional CBHI coordinator, district CBHI coordinator, health extension worker, health center head, and cluster/Kebele leader were extracted. The qualitative interviews were intended to complement the survey result by providing more detail explanation about the determinants of CBHI membership renewal. Moreover, seven selected health centers were surveyed and merged with the household survey to examine the effect of health facility characteristics in CBHI membership renewal.

6.2.2. Quantitative Data Analysis and Modeling

The detailed data collection procedure is presented in chapter 4 method part. After appropriate data cleaning and coding the data was entered into Epi-Data Entry Client (v.2.0.8.24) and transferred to Stata version 14 [STATA/SE 14, Stata-Corp LP, 4905 Lake-way Drive, College Station, Texas 77845], and then re-cleaned before analysis. The level of analysis for this sub-study is household as enrollment in CBHI is at household level in Ethiopia. Willingness of CBHI Membership renewal was treated as a binary outcome variable ("1 willing to renew" and "0 for not not-willing to renew"). The association between the predictor variables and the outcome variable was assessed using a mixed effect two-level logistic regression analysis.

The motive for mixed effect (multilevel) model econometric analysis was that CBHI membership renewal is influenced by factors at different levels (household and health facility levels). Mixed effect model allows us to consider the individual and group (health facility) level factors in the same analysis, rather than having to choose one or the other. Additionally, due to the multistage cluster sampling procedure, individual households are nested in different health facilities. Our data have a two-level hierarchical structure with 810 households at level-1 nested within 7 health centers at level-2. Hence, in order to examine whether health facility group characteristics affect the decision to renew membership or not, we applied a mixed effect two-level logistic regression considering health facilities as a group level variable. During the analysis, household factors were taken as fixed (individual level factor) and health facility group factors considered as level-2 (random variable). It began by fitting a null or empty two-level logistic model a model with only an intercept and health facility (community) effects.

$$log(\frac{\pi ij}{1-\pi ij}) = \beta o + \mu oj$$

Equation 5: Null or empty two-level logistic model for CBHI membership renewal

The intercept **βo** is shared by all the study participant households while the random effect **μoj** is specific to households in a specific health center that the CBHI schemes have a contract. The random effect is assumed to follow a normal distribution with a variance of σ^2_{uo}. Stata has different commands for fitting multilevel models for binary and continuous outcome variables. For this study purpose xtmelogit command was used.

Table 6: Parameter coefficient of the intercept only model using CBHI membership renewal, Northwest Ethiopia, 2017

Drop_2	Odds Ratio	Std. Err.	Z	P-value	95 % Conf. Interval
_cons	2.64	1.13	2.28	0.02	1.15- 6.10
Random-effects Parameters					
		Estimate	Std. Err.		95 % Conf. Interval
HF: Identity					
var(_cons)		1.19	0.71		0.36 - 3.85
LR test vs. logistic model: chibar2(01) = 98.08			**Prob >= chibar2 = 0.00**		

From (Table 6) above, we can see that the log-odds of willingness to renew CBHI membership in an average in the study participant households (one with **μoj = 0**) is estimated as $\beta_0 = 2.64$. The intercept for a community in a specific health facility J is 2.64 + **μoj**, where the variance of **μoj** is estimated as $\sigma^2_{u0} = 1.19$. The likelihood ratio statistics for testing the null hypothesis that $\sigma^2_{u0} = 0$ is reported in the final line

of the output. The test statistics is 98.08 with a corresponding p-value of 0.00 which indicates a strong evidence of the between health facility variance is non-zero. This implies that determining the association between the predictor and outcome variable using a classical logistic (fixed) model would have resulted biased estimates. Additionally, the extent of intra-health center correlation coefficient can be calculated to evaluate whether the variation in the score is primarily from within the household or between the group variable health centers. In logistic distribution, level-1 residual variance **εij** is standardized and fixed with the mean of zero and variance of $\boldsymbol{\pi^2/3}$ (Worku et al. 2013) . Therefore, for a two-level logistic random intercept only model with an intercept variance of $\boldsymbol{\delta^2_{u0}}$, the intra-health center correlation coefficient **ρ** (Rho) is given by $\boldsymbol{\rho=\delta^2\mu_0 \ / \ \delta^2\mu_0 + \pi^2/3,}$ so that in this sub-study the intercept only model appear as follows: δ^2_{u0} is equal to 1.19 and $\pi^2/3$ is equal to 3.29, thus, the intra-health center correlation coefficient is, 1.19 / 1.19+ 3.29, which becomes 0.27 Therefore, 27 percent of the variation is from the between or health facility difference and there is a strong suggestion to run multi-level (mixed effect) analysis rather than ordinary logistic regression.

Three two-level mixed effect logistic regression models were fitted. The first model is the null (intercept only) model, model two with household and informal association factors, and model three is the full model contain all the household, informal association and health facility and CBHI related factors. The Wald chi-square test was used to examine the significance of each model as a whole as well as to examine the significance of individual β coefficients. Moreover, likelihood ratio (LR) of the logit and mixed models were checked and results are interpreted using chi-square tests at a p-value less than 0.05. The adjusted odds ratio (OR) with a 95% confidence interval and a p-value < 0.05 were used to determine the statistical

significance of the association. The multivariate model was constructed as follows using **Xtmelogit** command:

$$\boldsymbol{log}\frac{(\pi ij)}{(1-\pi ij)} = \beta 0 + \beta 1SECiJ + \beta 2HHCiJ + \beta 3IASiJ + \beta 4CBHIF + \beta 5\, HFCj + \varepsilon iJ \ldots..$$

Equation 6: Two level logistic regression model to predict probability of CBHI membership renewal

Where **πij** is the probability of willingness to renew CBHI membership of household **i** at health center **j**, which is a binary variable with a value of 1 if the household intends to renew membership and 0 otherwise. **SEC** (socioeconomic characteristics) of the household is a set of variables include age, gender, educational status, the occupation of HH head. It also includes wealth status of the household as a relative measure of household economic status. Wealth status was computed using principal component analysis from different household asset and household characteristics. **HHC** includes some of the household characteristics such as perceived quality public health facilities, the self-rated health status of the household members, household size, the elderly, number of under-five member, and pregnant women in the household. **IAS (social capital)** indicates involvement in an informal association like religious groups and credit and savings associations. **CBHIF** includes factors related to CBHI like trust in CBHI scheme, the convenience of premium collection, affordability of premiums, and other factors. **HFC** includes health facility characteristics such as availability of essential medicine, basic diagnostic tests, availability of basic laboratory equipment. Therefore, from **β1-β4** are coefficients of estimates of each level-1 explanatory

variables and **HFC (**β5) is expressed in the amount of variance explained by the health facility(group) level-2 predictor factor and $\boldsymbol{\varepsilon}$ is the estimate of the random error.

6.2.3. Qualitative Data Analysis

The details of qualitative method design and data collection are presented in the method section of the dissertation (chapter 4). The main aim of the qualitative analysis is to confirm and check consistency with the quantitative results and to present findings in richer detail: a deeper understanding and confirmation of the relationship between the independent variable and outcome of interest. The analysis followed a two-step process. First, the moderator, who conducted the FGDs and in-depth interviews transcribed the interviews and prepared summary notes in local language Amharic and translated into English. The summary notes contain all the essential information generated by the discussions. Responses were quantified and possible quotes from participants were included. Results are organized by theme that corresponds to each of the research questions. Quotes that are most useful in explaining the quantitative findings are presented under each quantitative findings as a compliment.

6.3. Results

6.3.1. Descriptive Findings on the CBHI Membership Renewal

As Table 7 below illustrates, out of 810 participants, 294 (36%**)** were not willing to renew their CBHI membership for the next period. Male-headed households were predominant for both groups. The mean household head age of the willing group was higher than the not-willing to renew, namely 47.4 with SD of 12.5 and 45.4 years

with SD 13.5, respectively. Nearly 90% of the respondents were rural dwellers from both groups. The majority of the respondents from both groups were farmers in occupation. In addition, the majority of the study subjects were married. More than 45% of the study participants were illiterate and more than 36% can read and write. Only 17% of the participants had formal education from elementary to high school **(Table 7)**.

More than 90% respondents responded as having prior information about CBHI from both groups. Roughly 90% of the respondents had medium and good self-rated health status from both groups. However, the perceived quality of public health services were higher for willing (87%) than not-willing group (81%). The mean household size was fairly higher for those willing to renew than the counterpart (Mean =5.5 SD 2.1 & 5.1 SD 1.8), respectively. The proportion of chronic disease was also higher among willing to renew (23%) than not-willing one (20%), respectively. The proportion of the elderly aged above 64, pregnant women, and under-five children in the households were almost similar for both groups. According to the wealth status distributions, 44.6% of respondents of the willing group were from richer and richest wealth quintile, whereas the not-willing group accounts 49% **(Table 7)**.

With regard to participation in local informal associations, the majority both groups are engaged in local religious group associations such as 85% and 92% for willing and not willing groups, respectively. Almost 50% of the willing group respondents have been involved in the local credit association. Nearly 59% of the not-willing group participate in local credit association. However, 27% of the not-willing and 23% of the willing groups had at least one household member who holds official positions in the cluster. Premium collection was convenient for 87.7% of the willing

group but only 38% of the not-willing group felt it convenient. Moreover, 72% of the willing group agreed with premium affordability, however, only 32% of the not-willing group agreed on it **(Table 7)**.

In this study the single most important reasons for not willing to renew their membership was identified as limited and poor health service availability (164 respondents, 56%), followed by poor and unsatisfactory benefit package by the CBHI scheme (100 respondents, 34%), the registration fee and illness occurrence in the household (17 respondents, 6%) and (13 respondents 4%), respectively (Figure 6).

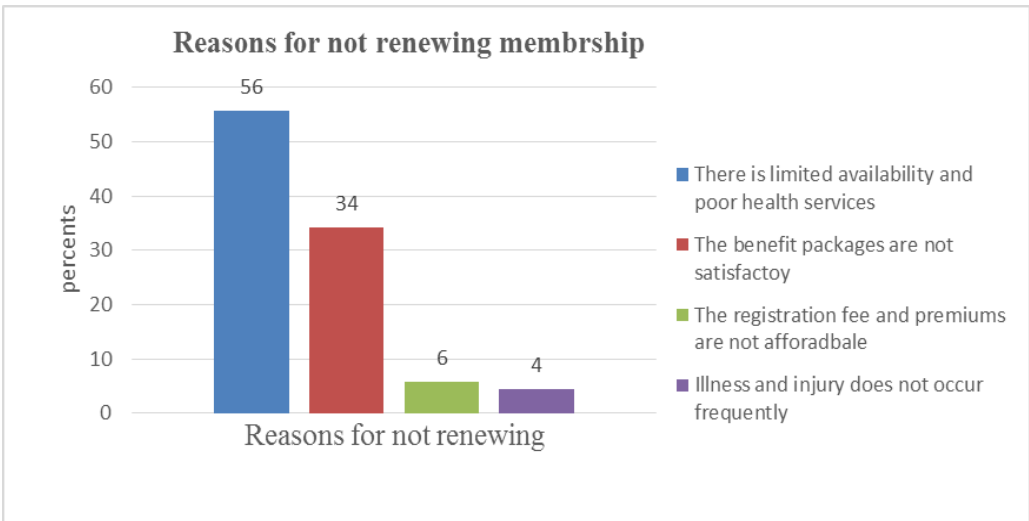

Figure 6: The single most reason for not renewing CBHI membership in Northwest Ethiopia

Table 7: Descriptive statistics for CBHI membership renewal among study participants

Predictor variables		**Total N (%)**	***Willing-to renew N= 516 (63.7 %)***	***Not-willing-renew N=294 (36.3%)***	**P-value**
Socio-demographics					
Sex	Male	647(79.3)	390(75.6)	257(87.4)	0.00
	Female	163(20.7)	126(24.4)	37(12.6)	
Age	18-30	111(13.6)	79(10.0)	32(15.0)	0.11
	31-40	201(24.9)	137(22.6)	67(26.6)	
	41-50	235(28.4)	141(32.0)	94(26.7)	
	50+	263(32.2)	162(34.4)	101(31.4)	
Age in years		Mean 46.4 SD 12.9	Mean 47.4 SD 12.5	Mean 45.4 SD 13.5	
Residence	Rural	740(90.6)	455(88.2)	285(97.0)	0.00
	Urban	70(8.4)	61(11.8)	9(3.0)	
Education	Illiterate/No education	374(45.8)	247(47.9)	127(43.0)	0.51
	Read & write	296(36.3)	180(34.9)	116(39.5)	
	Elementary school (grade 1-4)	76(9.3)	46(8.9)	30(10.2)	
	Elementary school (grade 5-8)	51(6.3)	33(6.4)	18(6.1)	
	Secondary school (9-12)	13(1.6)	10(1.9)	3(1.2)	
Marital status	Single	40(5.0)	31(6.0)	9(3.1)	0.20
	Married	683(83.7)	427(82.8)	256(87.1.)	
	Divorced	40(5.0)	25(4.8)	15(5.1)	

Predictor variables		Total N (%)	*Willing-to renew N= 516 (63.7 %)*	*Not-willing-renew N=294 (36.3%)*	P-value
	Widowed	47(5.7)	33(6.4)	14(4.8)	
Occupation	Farmer	732(90.4)	453(87.8)	279(94.9)	0.01
	Merchant	38(4.7)	31(6.1)	7(2.4)	
	Day laborer	10(1.3)	8(1.6)	2(0.7)	
	Petty trader	30(3.7)	24(4.7)	6(2.4)	
CBHI_awareness	No	45(5.4)	20(6.5)	25(4.9)	0.33
	Yes	765(94.6)	275(93.5)	490(95.1)	
Self-rated health stat	Poor	52(6.4)	24(4.7)	28(9.5)	0.02
	Medium	440(54.3)	282(54.6)	158(53.7)	
	Good	318(39.3)	210(40.7)	108(36.7)	
Perceived quality health service	Poor	117(14.4)	66(12.8)	51(17.4)	
	Medium	204(25.2)	134(26.0)	70(23.8)	0.01
	Good	489(60.4)	316(61.2)	173(58.8)	
Household characteristic					
Household size		Mean 4.9 SD 2.0	Mean 5.5 SD 2.1	Mean 5.1 SD 1.8	0.00
Chronic disease	No	632(78.0)	397(77.0)	235(80.0)	0.32
	Yes	178(22.0)	119(23.0)	59(20.0)	
Elderly above 64	No	711(87.8)	259(88.1)	452(87.6)	0.83
	Yes	99(12.2)	35(11.9)	64(12.4)	
Wealth index	Poorest	127(15.8)	95(18.5)	32(11.0)	
	Poorer	153(18.9)	94(18.3)	59(20.3)	0.07

Predictor variables		Total N (%)	*Willing-to renew N= 516 (63.7 %)*	*Not-willing-renew N=294 (36.3%)*	P-value
	Middle	152(18.8)	96(18.6)	56(19.2)	
	Richer	188(23.3)	119(23.1)	69(23.7)	
	Richest	186(23.1)	111(21.6)	75(25.8)	
Pregnant	No	754(93.1)	482(93.4)	272(92.5)	0.63
	Yes	54(6.9)	34(6.6)	22(7.5)	
Under five	No	494(61.1)	314(61.0)	180(61.2)	0.94
	Yes	316(38.9)	201(39.0)	114(38.9)	
Participation in local associations					
Enrollment Solidarity group	No	68(8.4)	52(10.1)	16(5.4)	0.02
	Yes	742(91.6)	464(89.9)	278(94.6)	
Local credit association membership	No	377(46.5)	256(49.6)	121(41.2)	0.02
	Yes	433(53.5)	260(50.4)	173(58.8)	
Religious group Membership	No	103(12.7)	80(15.5)	23(7.8)	0.02
	Yes	707(87.3)	436(84.5)	271(92.2)	
Saving account	No	379(46.8)	252(48.8)	127(43.2)	0.12
	Yes	431(53.2)	264(51.2)	167(56.8)	
Official position holder	No	609(75.2)	395(76.6)	214(72.8)	0.23
	Yes	201(24.8)	121(23.4)	80(27.2)	
CBHI scheme characteristics					
Premium Affordability	Agree	469(58.2)	375(72.0)	94(32.4)	0.00
	Disagree	331(41.8)	141(27.3)	196(67.6)	

Predictor variables		Total N (%)	*Willing-to renew N= 516 (63.7 %)*	*Not-willing-renew N=294 (36.3%)*	P-value
Premium collection convenient	Agree	566(69.7)	452(87.7))	110(38.0)	0.00
	Disagree	244(30.3)	64(12.0)	180(62.0)	
Accept similar premium	Agree	492(61.8)	386(74.6)	112(38.6)	0.00
	Disagree	318(38.2)	140(25.2)	178(61.4)	
Health facility related factor					
Time to hospital (minute)		Mean 264.2 SD 284.2	Mean 256.8 SD 279.6	Mean 229.2 SD 262.2	0.05
Time to health center(minute)		Mean 75.1 SD 80.4	Mean 67.3 SD 59.8	Mean 84.9 SD 84.2	0.04
Blood glucose test	No	176(21.8)	117(22.7)	589(20.7)	0.38
	Yes	634(78.3)	399(77.3)	235(79.9)	

6.3.2. Factors Associated with Willingness to Renew CBHI Membership

Three two-level mixed effect multivariate logistic regression models were fitted. The first model includes the (null model) a model with only the health facility group variable and intercept. The second model includes factors related to household and informal association. The third model includes factors related to the supply side (health facility and CBHI scheme). Results were interpreted after thorough examination of estimates of the model 2 and 3. Since there was no significant differences in estimates of the two models we used the third model for our result and discussion.

Household Level Determinants of Willingness to Renew CBHI Membership (Table 8 model 3).

As indicated below in Table 8 model 3, this study finding revealed that female-headed households have nearly 2 times higher odds of willingness to renew membership than male-headed households (OR = 1.93, (1.01-3.68)). Household heads with a poor self-rated health status have almost 2.6 times higher odds of willingness to renew membership than good self-rated health status (OR = 2.56, (1.25 – 5.26)). The perceived quality of public health services was strongly associated with willingness to renew membership. Respondents with medium and good perceived quality of health services had almost 4.3 and 3.3 times higher odds of willingness to renew membership than the poor perceived quality of health services (OR= 4.26, 3.26 (1.69 – 5.64, & 1.21-8.78)). But, household wealth status as a measure of relative household income, household size, household head age, and the occupation of household head were not significantly associated with willingness to renew membership (**Table 8 model 3**).

Health Facility and CBHI Scheme Related Determinants of Willingness to Renew CBHI Membership

As Table 8 model 3 below illustrates, it revealed important factors related to a health facility and CBHI scheme that significantly associated with willingness to renew CBHI membership. Those factors include trust in public health facility; a composite score computed from five interrelated variables using factor analysis (perceived health facility trustworthiness, perceived trust on professional competency, trust on health professional equal treatment of CBHI members and non-members, trust on the availability of sufficient professionals, and trust on availability of sufficient drugs). Trust in Community-Based Health Insurance; a score computed from three variables (CBHI trustworthiness, premium used only for CBHI purpose, and the promised services provision), and convenience of premium collection. However, similar premium for all members and premium affordability were not significantly associated with willingness to renew membership after controlled for several independent variables.

For a one unit increase in the trust score of the public healthcare facilities, the odds of willingness to renew membership increases almost by 5 points (OR = 5.25, (3.58 -7.68)). This quantitative finding was supported by many of the FGD and in-depth interviews, which indicates trust related to the healthcare facilities were the most significant problem identified during their discussion. *"The services provided by the health facilities are not fair enough. The professionals are discriminating CBHI members, and they give priority for non-member since they can pay at the spot. This is really not fair and makes us lose our trust on health facilities"* ***(A 45 years old male CBHI member FGD participant from Farta).***

Moreover, Focus group discussion participant from Fogera mentioned the problem related to health facilities as follows, *"We, as a CBHI member believe that*

we are not receiving proper service due to the misbehavior of health professionals. So that, if the scheme is not able to solve these problems, the members may not be able to renew their membership" ***(A 51 years old male CBHI member FGD participant from Fogera).***

Another community-based health insurance member focus group participant mentioned *"The government provides this great opportunity, but the professionals those serving at the health center are not good enough, rather disappointing. There are no enough drugs, no good services; they just have only the empty office"* ***(A 44 years old female CBHI member FGD participant from Fogera).***

The health extension worker as in-depth interview participant supported the problem of health care providers and its effect on the membership renewal as *"The services are not sufficient enough, and there is also a major problem in the health professional side, they are not providing proper health care to CBHI member patients"* ***(Health extension worker, In-depth interview participant).***

Furthermore, for each one unit increase in the trust score of the CBHI scheme, the odds of willingness to renew CBHI membership is increased by 1.4 points (40 %) (OR =1.43, (1.01 – 2.03)). This finding was supported by FGD and in-depth interview discussions*"As to me, the health insurance lacks fairness and trustworthiness because a family with one member and five members are paying similar premiums, which is not acceptable"* ***(A 40 years old Male CBHI member FGD participant from Alefa).***

Another in-depth interview participant mentioned the reasons why people are not joining and not renewing their membership is that: *"Some of the reasons to be a member of CBHI are to cover health care expenses. But the reasons for not joining and not renewing CBHI membership are lack of satisfaction or confidences on the CBHI scheme"* ***(CBHI district focal person in-depth interview participant).***

Another in-depth interview participant supported the association between trust in the CBHI scheme and the willingness to renew CBHI membership: *"The membership renewal fee is increasing from time to time and that makes the members to be disappointed and start to lose trust in the CBHI scheme, so that the majority of them are not ready to renew their membership"* ***(Kebele manager in-depth interview participant).***

This study also identified inconvenience of premium collection as one main determinant factor to renew membership, those respondents who agreed the premium collection period is convenient for them almost have 4.5 times higher odds of willingness to renew their membership than those disagreed with the premium collection period (OR = 4.52, (2.51 – 8.13)). This result was supported by focus group discussion participants *"The collection period is convenient to us, since the period is in the production and harvest period we can afford it and easily renew our membership for the next period of time"* ***(A 33 years old female, CBHI member focus group participant from Libo).***

This study also demonstrated that the health facility characteristics, such as availability of stethoscope, catchment area population, distance to health center, and essential drug like Salbutamol included in the model were not a direct significant predictor of willingness to renew CBHI membership, but they used as a control to minimize an unexplained variance due to group level health center factor.

Eventually, a substantial proportion of health facility variance was explained by the mixed effect logistic regression model given the between health facility variance has reduced from 1.19 in the intercept or null model to 0.55 in the random intercept mixed effect model, more-than a 50% reduction in an unexplained variance between the health facility & CBHI membership renewal was observed. This variance reduction suggesting that after controlling for individual household and health facility factors there is a low clustering effect of membership renewal at health facility level.

Table 8: Multi-level logistic regression results on the probability of Willingness to *renew CBHI* Membership

		Model 1(Null model)			Model 2			Model 3		
Explanatory variables		**OR**	**P-value**	**[95% CI]**	**OR**	**P-value**	**[95% CI]**	**OR**	**p-value**	**[95% CI.]**
Household and informal association participation related factors										
Sex	Male				Ref.			Ref.		
	Female				1.62 (0.41)	0.05	1.01 -2.64	**1.93(0.64)**	**0.05**	**1.01 - 3.68**
Age	18-30				Ref.			Ref.		
	31-40				0.69(0.30)	0.98	0.55 -1.79	0.69(0.28)	0.37	0.31 - 1.55
	41-50				0.66(0.20)	0.18	0.36 -1.20	0.43(0.18)	0.05	0.19 - 1.01
	50+				0.67(0.22)	0.21	0.36-1.26	0.52(0.23)	0.14	0.22 - 1.23
Quality health service	Poor				Ref.			Ref.		
	Medium				1.17(0.32)	0.56	0.68 -2.00	**4.24(1.99)**	**0.00**	**1.69 - 5.64**
	Good				1.47(0.39)	0.15	0.88-2.47	**3.26(1.65)**	**0.02**	**1.21 - 8.78**
Self-rated health	Poor				2.19(0.75)	0.02	1.12-4.28	**2.56(0.94)**	**0.01**	**1.25 -5.26**
	Medium				2.79(1.04)	0.01	1.34-5.79	**2.25(0.67)**	**0.01**	**1.26 -4.02**
	Good				Ref.			Ref.		
Occupation	Farmer				Ref.			Ref.		
	Merchant				1.05(0.56)	0.93	0.37-2.96	0.46(0.30)	0.24	0.12 - 1.69
	Day laborer				1.20(1.08)	0.84	0.21-7.04	0.51(0.53)	0.52	0.07 - 3.84
	Petty trader				0.61(0.36)	0.4	0.19-1.93	0.52(0.43)	0.43	0.10 -2.62

Wealth index	Poorest	Ref.			Ref.		
	Poorer	0.79(0.26)	0.47	0.42-1.50	0.76(0.33)	0.53	0.33- 1.78
	Middle	0.90(0.30)	0.76	0.47-1.74	0.65(0.28)	0.32	0.28 - 1.51
	Rich	1.29(0.42)	0.43	0.68-2.45	1.03(0.45)	0.94	0.44 - 2.41
	Richest	1.49(0.49)	0.22	0.79-2.84	1.32(0.57)	0.52	0.57 -3.11
Household size	<5	Ref.			Ref.		
	≥5	1.58(0.30)	0.02	1.09-2.28	1.38(0.35)	0.20	0.84 -2.34
Chronic disease	No	Ref.			Ref.		
	Yes	0.92(0.21)	0.7	0.59-1.43	0.66(0.20)	0.17	0.37 -1.28
Elderly_above_64	No	Ref.			Ref.		
	Yes	1.38(0.39)	0.26	0.79-2.39	1.21(0.45)	0.61	0.58 -2.53
Pregnant women	No	Ref.			Ref.		
	Yes	0.71(0.25)	0.33	0.36-1.40	0.53(0.25)	0.17	0.22 -1.31
Under-five	No	Ref.			Ref.		
	Yes	0.91(0.17)	0.63	0.63-1.33	0.83(0.21)	0.47	0.50-1.37
Knowledge on CBHI		1.47(0.21)	0.01	1.12-1.95	0.83(0.17)	0.37	0.56 -1.24
CBHI_awareness	No	Ref.			Ref.		
	Yes	1.40(0.48)	0.32	0.72-2.75	2.25(1.09)	0.09	0.87 -5.79
Localcredit_membership	No	Ref.			Ref.		
	Yes	0.82(0.15)	0.28	0.57-1.90	1.18(0.29)	0.51	0.72-1.92
Religiousgroup_Membership	No	Ref.			Ref.		
	Yes	0.87(0.28)	0.66	0.46-1.64	1.02(0.45)	0.97	0.43-2.41
Health facility and CBHI related factors							

Trust_healthfacility							**5.25(1.02)**	**0.00**	**3.58-7.68**
CBHI_trust							**1.43(0.25)**	**0.04**	**1.01-2.03**
Premium collection_convinency	Disagree						Ref.		
	Agree						**4.52(1.35)**	**0.00**	**2.51-8.13**
Premium_afordable	No						Ref.		
	Yes						0.98(0.29)	0.96	0.55 -1.76
Time_to_HC							0.99(0.01)	0.45	0.99 -1.00
Stethoscope avail	No						Ref.		
	Ye						6.78(4.61)	0.99	1.67-25.93
Inhaler salbutamol	No						Ref		
	Yes						0.79(1.23)	0.99	0.33-19.16
Analyzer hematology	No						Ref.		
	Yes						0.72(4.91)	0.96	1.22 -4.52
Ananlyzer_chemistry	No						Ref.		
	Yes						2.87(19.58)	0.88	2.10 - 18.12
Blood glucose	No						Ref.		
	Yes						1.89(1.21)	0.32	0.54 -6.6
_cons		2.6(1.13)	0.02	1.15-16.10	0.76(0.59)	0.72	0.16-3.53	0.02(0.002)	0.01	0.01 -0.30
Random effect parameters									
		Model 1(Null model)			**Model 2**			**Model 3**	

Random-effects Parameters	Estimate	[95% CI]	Estimate	[95% CI]	Estimate	[95% CI]
HF: Identity var(_cons)	**1.19**(0.71)	0.36-3.85	**1.15**(0.35)	0.63-2.10	**0.55**(0.22)	0.25-1.19
LR test vs. logistic model	chibar2(01) = 98.08 Prob- chibar2 = 0.00		chibar2(01) = 67.48 Prob- chibar2 = 0.00		chibar2(01) = 8.29 Prob -chibar2 =0.00	

Notes: Outcome variable is CBHI membership renewal, explanatory variables are at household and health facility level and standard errors in parenthesis. OR = adjusted odds ratio.

6.4. Discussion

Our analysis showed that willingness to renew membership by households depends on the joint effect of the demand (households) and supply-side determinant (health facility and CBHI schemes characteristics).

This study result revealed that 36% of the study participants were not willing to renew their CBHI membership for the next period. This finding is almost similar with a dropout study result from Ghana (Atinga et al. 2015). But, the finding in this study is almost 2 times higher than a dropout study conducted in Ethiopia and India during the pilot implementation of CBHI (Mebratie et al. 2015; Panda et al. 2015) this variation might be explained by the differences in the study periods and areas. The Ethiopian study was conducted during the pilot implementation of CBHI at the time when several promotional campaigns were undergone about CBHI. As a result, communities might be very eager to join and see the effect of CBHI. Moreover, they might be interested to see the effect of enrollment for the next period by renewing their membership. However, our study is conducted 6 years after the implementation of CBHI which is a long period of time to evaluate the benefits and drawbacks of CBHI by the members.

Female-headed households were more likely to renew their membership than males, as our finding indicates female-headed households have a 1.9 times higher odds of willingness to renew membership. This finding is in line with study result in India (Panda et al. 2015) that revealed women are more likely to renew membership. This might be due to high-risk aversion intention of females than males.

In this study trust in health facilities are the main hindering factors for willingness to renew membership. A one-point increase in the score of households head trust in health care facilities brings roughly a 5 points increase in the willingness

of membership renewal. This result is in line with study findings from Tanzania (Macha et al. 2014), Guinea-Conakry (Criel et al. 2003), Burkina Faso, and Senegal (De Allegri et al. 2009; Dong et al. 2009; Mladovsky 2014) indicates that poor public health services leads to low trust and that leads to low CBHI membership renewal. This can be explained by expected utility theory. If the trust in the public health facilities is low, the expectation of utility gain and risk minimization through insurance is low. Therefore they prefer not to renew their membership and find other ways of health risk coping mechanisms. In addition, better trust on quality of care can increase member's expectation of getting value for money in case of illness and it encourages to stay as a member.

Trust in health insurance scheme is also one main determinant of willingness to renew membership. As the score of trust in CBHI scheme increases by one point, the odds of the willingness of CBHI membership renewal increased by 1.4 points. This positive relationship is in line with study findings in India and Burkina Faso (Sinha et al. 2007; Mladovsky 2014) that indicates satisfaction and trustworthiness of CBHI scheme affect membership renewal. If the members have a positive experience and benefit from the scheme in terms of access to care it creates trust in the CBHI. It also encourages people to renew their membership and influence others to join the scheme.

Convince of the premium collection is identified as one main factor in the willingness of CBHI membership renewal. A respondent who agreed with the premium collection period has 4.3 times higher odds of renewing membership than disagreed ones. This result is in line with a study finding from Ghana (Jehu-Appiah et al. 2012) that indicates scheme factors including premium collection period and premium amount affect insurance enrollment and willingness of membership renewal.

Self-rated health status is also one of the determinants of whether households are willing to renew or not to renew their membership, which is an indication of the possibility of adverse selection. Household heads with poor self-rated health status almost have 2.5 times higher odds of renewing membership than those with good self-rated health status. This study finding is in agreement with findings from China (Zhang et al. 2008), Lao PDR (Alkenbrack et al. 2013), Ghana (Atinga et al. 2015), and a systematic review by (Mebratie et al. 2013) which showed poor self-rated health status as a proxy measure of adverse selection influence decision to be enrolled in CBHI and to renew membership. However, this study finding is in disagreement with a study finding in the Ethiopian Pilot CBHI implementation (Mebratie et al. 2015) that shows self-rated health status was not a factor for drop out from Ethiopian pilot CBHI. This disagreement might be due to the difference in the study periods of the two studies, the first one was conducted in the pilot period and the current study is conducted six years after the implementation of the pilot. When time goes, households are able to understand the value of insurance and the sick people may choose to stay as a member in order to cover their expenses than the healthy.

We also identified the association between perceived quality of health services and willingness to renew CBHI membership. Those respondents with the good and medium perceived quality of health services have 4.3 and 4.7 times higher odds of willingness to renew their membership than respondents with the poor perceived quality of health services. The finding is in line with study findings in Burkina Faso and Senegal (Dong et al. 2009; Mladovsky 2014) that indicates the main reason for not willing to renew membership is the poor perceived quality of healthcare services.

In summary, this study identified main factors that affect willingness to renew CBHI membership. Most importantly the study demonstrated once the households are enrolled into CBHI the supply-side factors like trust in public healthcare facilities, trust in CBHI scheme, and premium collection convenience are main hindering factors than household factors. Moreover, adverse selection as a proxy measure of poor self-rated health status is still demand-side factors affecting CBHI membership renewal.

6.5. Contributions and Limitation of the Study

The first limitation of the study might be the cross-sectional nature of the data that prevents the inference of causation between the independent variables and outcome of interest (CBHI membership renewal). However, the combination of qualitative and quantitative methods could minimize the limitations of the study. The majority of the findings were supported by the focus group discussion and in-depth interviews, which supports the direction of the relationship. The other limitation of the study might be the external validity of the findings because it is a regional study in Ethiopia. But, we believed that a majority of the Ethiopian community in the rural area has more or less similar socioeconomic and institutional arrangements so that the result can be representative of Ethiopia and some part of African countries. Overall, the strength of this study lies on the richer data set (mixed quantitative and qualitative) with richer variables in order to examine the determinant factors of membership renewal.

6.6. Conclusions and Policy Recommendations

Applying a mixed method and mixed-effect (multilevel) analytical approach this study shed light on the essential factors that are most likely to influence the willingness to renew membership in Ethiopia's CBHI and the possible challenges of CBHI sustainability. In this study 36 % of the participants were not willing to renew their membership.

The supply-side factors in-terms of lack of trust in public health facility, lack of trust in CBHI scheme, and inconvenience with premium collection were the main hindering factors for willingness to renewal CBHI membership. Moreover, demand-side factors like poor self-rated health status and perceived quality of health services were related to willingness to renew CBHI membership. Consequently, strong policy interventions are required to sustain and expand CBHI schemes in Ethiopia.

Voluntary participation into CBHI lead to adverse selection to renew CBHI membership and it threatens the sustainability of the insurance schemes. Therefore, enforcing mandatory enrollment, differential premiums based on the capacity to pay, and use of informal structures as a level of enrollment in the rural setting (such as farmer cooperatives and religious organizations) is essential. Additionally, policy-makers need to design a convenient premium collection strategy in order to minimize its negative effect on sustainable membership renewal. An in-depth analysis of quality of health care institutions and corrective measures are required before the nationwide rollout of CBHI and SHI.

Finally, since trust in health facilities and the insurance schemes are identified as a main deterring factor of CBHI membership renewal, there should be a continuous evaluation of the schemes and health care providers whether they are providing the promised services as per the standard is mandatory. Regular customer satisfaction

survey is also important in order to follow the customer's trust on health care facilities and CBHI schemes.

Chapter 7: The Association between Community-Based Health Insurance Enrollment and Health Services Utilization in Northwest Ethiopia

Abstract

Background: Many low and middle-income countries (LMICs) have been seeking ways to attain the goal of universal health coverage (UHC) through pre-paid health care financing mechanisms. Since 2010, the Ethiopian government has introduced various activities to implement Community-Based Health Insurance (CBHI) to reach and cover the very large agricultural society. The aim of the study is to examine the association between CBHI enrollment and different health service utilization measures in Northwest Ethiopia.

Methods: The study utilizes a cross-sectional case-comparison study design of CBHI enrolled and unenrolled households to examine the association between CBHI enrollment and the use of adult outpatient, inpatient, and sick children's healthcare services. Three independent bivariate-probit regression analysis were employed to account for the endogenous nature of insurance enrollment and healthcare visits.

Results: The results showed that CBHI enrollment has a positive association with adult outpatient, inpatient, and sick children's health-care utilization measures. CBHI membership shows a 0.50 (50%), 0.22 (22%), and 0.44 (44%) points more chance of healthcare visits for adult outpatient, inpatient, and sick children's healthcare services for CBHI enrolled households than unenrolled households in the study area.

Conclusions and recommendations: This study revealed that the Ethiopian CBHI has a promising positive effect on adult outpatient, inpatient, and sick children's health services utilization. Therefore, policy measures to expand benefit packages and supply-side interventions are essential to enhance the effects of CBHI on different health service utilization.

Keywords: Adult outpatient, bivariate probit model, CBHI, Inpatient healthcare, health service utilization, Sick child, Universal health coverage

7.1. Introduction

Many low and middle-income countries (LMICs) are seeking ways to attain the goal of universal health coverage (UHC) by securing access to adequate health care for all at an affordable price (Yu et al. 2010). Since the 1990s, many of the LMICs have introduced micro or Community-Based Health Insurance (CBHI) to strengthen the healthcare financing system (Dekker 2004; Dekker et al. 2010; Mebratie et al. 2015).

Since 2010, the Ethiopian government has introduced various measures to implement Social Health Insurance (SHI) for the formal sector workers and their families along with Community-Based Health Insurance (CBHI) to reach and cover the very large agricultural sector and urban informal sector, with the aim of improving access to health services and to reduce health-related out-of-pocket payments (OOPs) (Agago et al. 2014; Mebratie et al. 2015; Ethiopian Health Insurance Agency 2015). However, empirical evidence on the association between CBHI enrollment and different health services utilization is insufficient.

Many healthcare financing related literature in Africa have attempted to assess whether and to what extent CBHI schemes facilitate healthcare services utilization. Findings showed inconsistencies with the association between CBHI enrollment and different health service utilization; some revealed CBHI improves health services utilization and other revealed no effect.

Study findings from Burkina Faso and India suggested that community-based health insurances increase use of health service for the members (Gnawali et al. 2009; Aggarwal 2010). Moreover, a single study in the Ethiopia during the pilot CBHI implementation showed that participation improved out-patient health services utilization (Mebratie et al. 2015). Studies among Mutual health insurances in Rwanda identified that membership in mutual health insurances is significantly associated

with increased utilization of health services and a higher degree of financial risk protections (Saksena et al. 2011; Lu et al. 2012). Another study in Burkina Faso revealed no difference in healthcare utilization between members and non-members if they are living far from health facilities (Parmar et al. 2014).

Many of the existing studies about the effect of CBHI on health services utilization face important limitation that most of them mainly examine its effect either with inpatient or outpatient health care utilization and largely neglecting its effect on sick children's health care use (Saksena et al. 2011; Lu et al. 2012; Mebratie et al. 2013). Against this background, the objective of this study is to assess the association between CBHI enrollment and the utilization of different health services including sick children's healthcare services in Northwest Ethiopia.

7.2. Methods

This sub-study utilizes a quantitative (household survey linked with health facility survey) method to examine the association between CBHI enrollment and selected health service utilization measures. It employs a cross-sectional case comparison design of CBHI enrolled households and uninsured (control) households both from districts where CBHI has been implemented. The household survey covered 2008 households across 15 clusters in five districts. Out of a total of 2008 surveyed households, 454 households who had at least one adult household member who falls sick three months prior to the survey period were included in the analysis for outpatient healthcare visit. Moreover, 141 households who had at least one member who falls sick one year prior to the survey period and spent at least one night in public health facility included in the analysis for inpatient healthcare visit. Additionally, 226

households with at least one sick child 4 weeks prior to the sample collection period were included in the sample of analysis for a sick children's healthcare services visit.

7.2.1. Data Analysis and Modeling

After appropriate data cleaning and coding, the data was entered to EpiData Entry Client (v.2.0.8.24) and transferred to Stata version 14 [STATA/SE 14, StataCorp LP, 4905 Lakeway Drive, College Station, Texas 77845], and then re-cleaned before analysis. The level of analysis for this sub-study is households as enrollment in CBHI is at household level in Ethiopia. Outpatient, inpatient, and sick children's healthcare visits were treated as a binary outcome variables ("1 for healthcare visit" and "0 otherwise").

With respect to the association between health insurance enrollment and health care use, studies (Jütting 2003) reflect the potential endogenous nature of the choice of insurance and health care use as the main problem, leading to the potential selection bias. Individuals who self-select them-self to the insurance program may have unobservable characteristics related to preference or health status (adverse selection) that makes it more likely for them to join the program, and also influence their decision to use health care services. Therefore, an observed association between health insurance status and health care use may not be due to insurance but due to an underlying unobservable characteristics. Hence, classical logit/probit regression analysis may provide over/under estimated insurance effect.

Therefore, in this study bivariate probit regression analysis was employed in to account for endogenous nature of insurance enrollment. The model provides a convenient setting for estimating the effect of an endogenous binary regressor on a

binary outcome variable in non-experimental empirical studies (Arendt et al. 2006; Winkelmann 2012). In the case of bivariate probit regression, two binary response variables are varying jointly and we want estimated coefficients to account for the joint distribution. In this analysis, insurance enrollment and healthcare visit were a binary endogenous regressor and outcome variables, respectively. So that applying classical logistic/probit regression analysis may provide biased estimates and will end up with the wrong conclusion. In case of continuous outcome and predictor variable: instrumental (IV) variable and/or regression discontinuity (RD) methods can applied to deal with endogeneity problems (Nichols 2011). However, a regression with a binary outcome and binary regressor presents special difficulties and instrumental variables solution may not be apparent, particularly when the endogenous regressor is binary(Nichols 2011). The bivariate probit model is recommended in health economics studies when one wants to estimate the effect of treatment on a binary healthcare use (Winkelmann 2012). Therefore, in this study we applied bivariate probit model. Moreover, to control specifically for self-selection in insurance enrollment, proxies for self-rated health status and other socioeconomic factors of the households are included in the models. The first equation is constructed as follow;

$$\mathbf{y1 = 1/(\beta 0 + \beta 1 y2 + \beta 2 X's + \varepsilon 1)\ Equation\ 1}.$$

Where y1 is the households conditional probability of healthcare visit (outpatient, inpatient, and sick children's). Then, y2 is the households CBHI enrollment status and X's are other self-rated health and socioeconomic predictor variables used as a control. The $\boldsymbol{\varepsilon_1}$ is a latent error of the equation 1.

The second equation is:

$$\mathbf{y2 = 1/(\gamma 0 + \gamma 1 X's + \gamma z's + \varepsilon 2)\quad Equation\ 2}.$$

Where y2 is the conditional probability of enrollment to CBHI and X's are different supply and demand-side factors that affect CBHI enrollment, z's are variables that influence CBHI enrollment and not directly affect health care use, these variables include informal local association participation measures (participation in credit and saving and religious associations), and **ε2** is a latent error for equation 2. The biprobit model arises from the 2 equation structural latent variable framework from the above mentioned two equations (equation 1 & 2) as follow:

$$\text{. biprobit } ((y1 = 1/(\beta 0 + \beta 1 y2 + \beta 2 X's + \varepsilon 1)\ \ (y2 = 1/(\gamma 0 + \gamma 1 X's + \gamma z's + \varepsilon 2))$$

Equation 7: Equation for the bivariate probit model to predict the effect of CBHI enrollment on different healthcare services utilization.

The model is completed by assuming that the latent (unobserved) errors ε_1 and ε_2 have bivariate standard normal joint distribution with correlation coefficient ρ. If ρ = 0 the binary endogenous regressor (CBHI enrolment) considered to be an exogenous and separate estimation of the first structural equation by simple probit/logit model identifies the structural treatment effect of β_1 on health care use. However, if ρ is different from 0, the treatment (CBHI enrollment) is said to be "endogenous", and joint estimation is required. Then we can determine the marginal effect of the binary endogenous regressor after bivariate-probit regression using **margins** in Stata. The percent marginal effects as an average treatment effect with a 95% confidence interval and a p-value < 0.05 used to determine the statistically significant association between healthcare use indicators and the independent variables.

As presented below in Table 9, 11, and 13 the correlation coefficient ρ for outpatient, inpatient, and sick children healthcare visit in the bivariate probit models

are different from zero and statistically significant, which is an indication of the two equations are strongly associated (endogeneity problem of CBHI status), so that we would have been introduced bias if we determine the associations using a classical probit/logit model.

7.3. Results

7.3.1. Descriptive Results (Annex table 16)

Out of 2008 total surveyed households, 454 (22.6%) have at least one household member who fallen sick in the past 3 months. Out of 454, 372(82%) sought medical visit in public health facility as an outpatient and 82(18%) did not visit. Out of 372 outpatient visitors, 197(53 %) were from CBHI member households and the rest 175(47%) were from CBHI unenrolled households. Majority of outpatient care users were from male-headed households 269(72.3%). More than 70% of the outpatient users were from household heads with age of 40 years and above. More than 55% of the outpatient care users were illiterate and 60% of them were from middle and above wealth status. The mean household size for outpatient healthcare users was higher compared to non-users (5.3 SD 2.05 vs 4.08 SD 2.00) (Table 16).

Out of the total of 2,008 surveyed households, only 141(7%) households have at least one household member who fallen sick and spent at least one night in public health care facility one year prior to the survey period. Out of 141cases, 72 (51%) were from CBHI enrolled households and the rest 69(49%) were from CBHI unenrolled households. The predominant of inpatient healthcare visitors were from male-headed households 107(76%). Majority of the inpatient health care users were in the age category of 50’s and above years of age (48.9%). Illiterates and married households were predominant 86(61%), 111(78.7%), respectively. Majority of them

were from households with medium and poor self-rated health status. Moreover, their perceived health care quality was also good. With regard to wealth distribution, more than 50% of the users were from the middle and below wealth status. The mean household size for service user was higher compared to the non-user, 5. 5 with SD of 2.06 and 4.8 SD 1.97, respectively (Table 16).

Out of 2008 surveyed households, there were 226 (11.3%) sick children one month prior to the survey period. Out of 226 children, 194(86%) sought health care service at a public facility and the rest 32(14%) did not visit. Out of 194 sick children's who visited a health facility, 106(54%) were from CBHI enrolled households and the remaining 88(46%) were from CBHI unenrolled households. Around 46% of the sick children were from illiterate households and 54% were from those who can read and write. More than 60% of service user were from middle and above household wealth status. The mean household size of the sick children's healthcare users was lower compared to non-users 5.1 with SD of 1.82 and 5.6 with SD of 1.89, respectively (Table 16).

7.3.2. The Association between CBHI Enrollment and Adult Outpatient Healthcare Visit

As the result of the first equation of Table 9 below illustrates, CBHI enrollment increases the probability of outpatient healthcare visit. In addition to CBHI enrollment, wealth status of the household is another factor negatively correlated with outpatient healthcare visit. Moreover, good perceived quality of health care services shows a positive correlation with outpatient health care visit. Additionally, households with good self-rated health status shows negative correlation with outpatient healthcare visit. Besides, some kind of education (read and write) is

negatively correlated with outpatient health care visit. Having radio at household shows a positive probability of outpatient healthcare visit. Second equation of Table 9 presents several predictor variables that have a correlation with CBHI enrollment. The details of this findings are presented and discussed in result chapter 5.

Moreover, in this table, the final line shows, the correlation coefficient ρ of the joint distribution of equation one and two is different from zero and statistically significant, which is an indication of the presence of endogeneity in the joint distribution. Therefore, application of classical probit/logit regression analysis would have introduced bias and ended up with wrong conclusions.

Table 9: Biprobit regression results of outpatient health care visit and CBHI enrollment.

Outpatient visit		Coef.	Std.Err	P-value	[95% CI.]
Explanatory variables	**Equation for outpatient visit**				
CBHI2	No	Ref.			
	Yes	**2.16**	**0.23**	**0.00**	**1.71 , 2.61**
Wealth index	Poorest	Ref.			
	Poorer	-0.65	0.37	0.08	-1.37 , 0.06
	Middle	-0.61	0.36	0.09	-1.32 , 0.09
	Rich	**-0.82**	**0.37**	**0.02**	-1.54 , -0.11
	Richest	**-0.76**	**0.37**	**0.04**	-1.47, -0.04
Radio	No	Ref.			
	Yes	0.32	0.19	0.08	-0.05-, 0.69
Household size	<5	Ref.			
	≥5	-0.07	0.16	0.62	-0.33 , 0.33
Perceived quality HS	Poor	Ref.			
	Medium	0.21	0.2	0.28	-0.17 , 0.60
	Good	0.31	0.18	0.09	-0.05, 0.66
Self-rated HS	Poor	Ref.			
	Medium	0.28	0.19	0.16	-0.11 , 0.66
	Good	**-0.4**	**0.21**	**0.05**	**-0.82 , 0.01**
Sex	Male	Ref.			
	Female	0.01	0.17	0.94	-0.32 , 0.35
Age	18-30	Ref.			
	31-40	-0.1	0.26	0.69	-0.62 , 0.41
	41-50	-0.01	0.27	0.98	-0.54 , 0.52
	50+	-0.05	0.24	0.83	-0.53 , 0.43
Education	Illiterate	Ref.			
	Read & write	**-0.34**	**0.17**	**0.04**	**-0.67 , -0.02**
	Elementary school (grade 1-4)	-0.17	0.28	0.54	-0.71 , 0.37
	Elementary school (grade 5-8)	-0.07	0.36	0.84	-0.78 , 0.63

	Secondary school (9-12)	-0.21	0.43	0.62	-1.06, 0.63
_cons		0.46	0.46	0.32	-0.44 , 1.35
CBHI enrollment	**Equation 2 for CBHI enrollment**				
Age	18-30	Ref.			
	31-40	0.16	0.26	0.54	-0.35 , 0.67
	41-50	0.42	0.25	0.1	-0.08 , 0.91
	50+	0.23	0.24	0.33	-0.24 , 0.70
Sex	Male	Ref.			
	Female	-0.07	0.16	0.65	-0.38 , 0.24
Education	Illiterate	Ref.			
	Read & write	0.35	0.15	0.02	0.059 , 0.65
	Elementary school (grade 1-4)	-0.04	0.27	0.89	-0.58 , 0.49
	Elementary school (grade 5-8)	0.49	0.3	0.09	-0.085 , 1.07
	Secondary school (9-12)	-0.06	0.41	0.88	-0.87 , 0.74
Wealth index	Poorest	Ref.			
	Poorer	-0.43	0.25	0.08	-0.91 , 0.06
	Middle	-0.29	0.24	0.23	-0.76 , 0.18
	Rich	-0.28	0.23	0.23	-0.73 , 0.18
	Richest	-0.39	0.23	0.11	-0.85 , 0.07
HH size	<5	Ref.			
	≥5	0.16	0.13	0.02	-0.08 , 0.40
Radio	No	Ref.			
	Yes	0.131	0.16	0.41	-0.18 , 0.44
Self-rated health stat	Poor	Ref.			
	Medium	0.45	0.17	0.01	0.12 , 0.78
	Good	-0.23	0.19	0.25	-0.61 , 0.16
Perceived quality Hs	Poor	Ref.			
	Medium	0.28	0.19	0.13	-0.64 , 0.08
	Good	0.18	0.17	0.03	-0.51 , 0.16
Ananlyzer_chemistry	No	Ref.			
	Yes	0.16	0.19	0.39	-0.52 , 0.20

Thermometer_healthcenter	No	Ref.			
	Yes	0.13	0.2	0.53	-0.27 , 0.52
Localcredit_membership	No	Ref.			
	Yes	0.26	0.14	0.06	-0.01 , 0.52
Religiousgroup_Membership	No	Ref.			
	Yes	0.1	0.2	0.06	-0.30 , 0.49
_cons		-0.55	0.38	0.15	-1.29 , 0.19
/athrho		**-1.12**	**0.49**	**0.02**	**-2.07 , 0.16**
rho		-0.81	0.17		-0.97 , 0.16
Observation		452			
Wald test of rho=0	**chi2(1) = 5.22456**	**Prob > chi2 = 0.02**			

7.3.2.1. Marginal Effects of Predictor Variables on Outpatient Healthcare Visit

Table 10 below shows the marginal effects of the predictor variables on the probability of outpatient healthcare visit. The marginal effect of the result is the effect of a change from 0 to 1 of the predictor variable (CBHI membership) on the probability of outpatient healthcare visit. As presented in the table below, enrollment in CBHI increases the probability of household's outpatient visit by 0.50 (50%) points controlled for other predictor variables compared to unenrolled households. Moreover, the households in the richest wealth status have a 0.16 (16%) points lower probability of outpatient healthcare visit than the poorest groups. Households with medium self-rated health status shows a 0.16 (16%) points more probability of outpatient healthcare visits than the poor self-rated health status. Moreover, Household heads who can read and write also showed 0.08 (8%) points lower chance of outpatient visit than illiterates.

Table 10: Marginal effects of predictor variables on outpatient health care visit

Outpatient visit		dy/dx	Std. Err.	P-value	[95% CI.]
CBHI_enrollment	No	Ref.			
	Yes	**0.5**	**0.057**	**0.00**	**0.36 - 0.64**
Wealth index	Poorest	Ref.			
	Poorer	-0.14	0.07	0.04	-0.27 , -0.00
	Middle	-0.13	0.07	0.06	-0.26 , -0.00
	Rich	**-0.18**	**0.07**	**0.01**	-0.31 , -0.05
	Richest	**-0.16**	**0.07**	**0.02**	-0.29 , -0.03
Radio	No	Ref.			
	Yes	0.07	0.04	0.08	-0.01 , -0.15
Perceived quality Hs	Poor	Ref.			
	Medium	0.05	0.05	0.28	-0.04 , 0.14
	Good	0.07	0.04	0.09	-0.011 , 0.15
Self-rated Hs	Poor	Ref.			
	Medium	0.16	0.07	0.02	0.02 , 0.29
	Good	0.07	0.07	0.33	-0.07 , 0.22
HH size	<5	Ref.			
	≥5	-0.018	0.036	0.99	-0.08 , 0.07
Age	18-30	Ref.			
	31-40	-0.02	0.038	0.75	-0.14 , 0.09
	41-50	0.01	0.06	0.98	-0.12 , 0.12
	50+	-0.01	0.08	0.84	-0.11 , 0.98
Sex	Male	Ref			
	Female	-0.01	0.04	0.97	-0.08 , 0.08
Education	Illiterate	Ref.			
	Read & write	**-0.08**	**0.04**	**0.04**	**-0.15 , 0.03**
	Elementary school (grade 1-4)	-0.04	0.07	0.56	-0.17 , 0.09
	Elementary school (grade 5-8)	-0.02	0.08	0.85	-0.18 , 0.15
	Secondary school (9-12)	-0.05	0.1	0.63	-0.25 , 0.15

7.3.3. The Association between CBHI Enrollment and Adult Inpatient Health Service Utilization

As the result of first equation of table 11 below presents, CBHI enrollment showed a positive association with inpatient healthcare utilization. Educational status of household head shows a negative correlation with inpatient healthcare utilization. Additionally, a household with medium and good self-rated health status have shown a lower probability of inpatient healthcare utilization than those households with the poor self-rated health status. Additionally, availability of thermometer in health centers positively correlated with inpatient healthcare utilization. The second equation of table 11 shows factors affecting CBHI enrollment. The results are presented in detail in chapter 5. In this table, the final line shows, the correlation coefficient ρ of the joint distribution of equation one and two is different from zero and statistically significant, which is an indication of the presence of endogeneity in the joint distribution. Therefore, application of classical probit/logit regression analysis would have introduced bias and ended up with wrong conclusions.

Table 11: Biprobit regression results of inpatient health care visit and CBHI enrollment.

Inpatient service		**Coef.**	**Std. Err.**	**P-value**	**[95% CI.]**
Explanatory variables	**Equation 1: Inpatient Health Service use**				
CBHI2	No	Ref.			
	Yes	**1.22**	**0.17**	**0.00**	**1.01 , 1.56**
Age	18-30	Ref.			
	31-40	-0.14	0.15	0.35	-0.43 , 0.15
	41-50	0.02	0.15	0.91	-0.27 , 0.31
	50+	0.21	0.14	0.14	-0.07 , 0.47
Wealth index	Poorest	Ref.			
	Poorer	-0.02	0.14	0.89	-0.30 , 0.26
	Middle	0.09	0.14	0.51	-0.18 , 0.36
	Rich	0.11	0.14	0.44	0.16 , 0.38
	Richest	0.12	0.15	1	-0.29 , 0.29
Radio	No	Ref.			
	Yes	0.03	0.1	0.78	-0.16 , 0.22
HH size	<5	Ref.			
	≥5	0.013	0.08	0.88	-0.16 , 0.19
Education	Illiterate	Ref.			
	Read & write	**-0.34**	**0.1**	**0.00**	**-0.53 , -0.15**
	Elementary school (grade 1-4)	-0.23	0.15	0.13	-0.53 , 0.07
	Elementary school (grade 5-8)	-0.29	0.18	0.12	-0.65 , 0.07
	Secondary school (9-12)	-0.52	0.39	0.18	-1.29 , 0.25
Thermometer_ healthcenter	No	Ref			
	Yes	**0.45**	**0.12**	**0.00**	**0.22 , 0.68**
Self-rated health	**Poor**	Ref			
	Medium	-0.2	0.11	0.07	-0.42 , 0.01
	Good	**-0.47**	**0.11**	**0.00**	**-0.69 , -0.26**
_cons		-1.84	0.2	0.00	-2.25 , -1.44
CBHI2	**Equation 2 CBHI enrollment**				
Age	18-30	Ref.			
	31-40	0.24	0.09	0.01	0.05 , 0.42
	41-50	0.4	0.1	0.00	0.21 , 0.59
	50+	0.27	0.1	0.01	0.08 , 0.46

Sex	Male	Ref			
	Female	-0.23	0.07	0.00	-0.38 , -0.08
Education	Illiterate	Ref			
	Read & write	0.33	0.07	0.00	0.19 , 0.48
	Elementary school (grade 1-4)	0.13	0.11	0.23	-0.08 , 0.36
	Elementary school (grade 5-8)	0.33	0.14	0.02	0.06 , 0.60
	Secondary school (9-12)	-0.17	0.19	0.37	-0.56 , 0.21
Wealth index	Poorest	Ref.			
	Poorer	0.05	0.1	0.63	-0.15 , 0.25
	Middle	0.03	0.1	0.77	-0.17 , 0.23
	Rich	0.09	0.1	0.38	-0.11 , 0.29
	Richest	-0.01	0.11	0.95	-0.23 , 0.20
HH size	<5	Ref.			
	≥5	0.21	0.06	0.00	0.08 , 0.33
Radio	No	Ref.			
	Yes	0.14	0.07	0.06	-0.01 , 0.28
Self-rated health	Poor	Ref.			
	Medium	0.09	0.12	0.46	-0.15 , 0.33
	Good	-0.71	0.12	0.00	-0.94 , -0.47
Perceived quality_healthservice	Poor	Ref.			
	Medium	0.07	0.09	0.47	-0.12 , 0.25
	Good	0.33	0.09	0.00	0.15, 0.50
Ananlyzer_chemistry	Yes	Ref.			
	No	-0.1	0.08	0.23	-0.26 , 0.06
Thermometer_healthcenter	Yes	Ref.			
	No	-0.21	0.09	0.02	-0.37 , -0.41
Localcredit_membership	No	Ref.			
	Yes	0.21	0.06	0.00	0.09 , 0.33
Religiousgroup_Membership	No	Ref.			
	Yes	0.11	0.09	0.02	-0.07 , 0.29
_cons		-0.54	0.19	0.00	-0.91 , -0.17
/athrho		**-0.81**	**0.16**	**0.00**	**-1.13 , -0.49**
rho		-0.67	0.09		-0.81 , -0.46
Observation = 2,000					
Wald test of rho=0: chi2(1) 25.326 Prob > chi2 0.00					

7.3.3.1. Marginal effects of predictor variables on inpatient health service utilization

Table 12 below presents the marginal effect of predictor variables on the probability inpatient healthcare utilization. Enrollment in CBHI increases the probability of household's inpatient healthcare utilization by 0.22 (22%) points controlled for other predictor variables. Moreover, households with good self-rated health status have a 0.09 (9%) point's lower probability of inpatient visit than the poor self-rated health status. Additionally, availability of some essential supplies in the health facility like thermometer increase the probability of inpatient healthcare visit by 0.07 points (7%).

Table 12: Marginal effects of predictor variables on inpatient health care visit.

Explanatory variablest		dy/dx	Std. Err.	p-value	[95% CI.]
CBHI2	No	Ref.			
	Yes	**0.22**	**0.05**	**0.00**	**0.13 , 0.31**
Education	Illiterate	Ref.			
	Read & write	**-0.06**	**0.02**	**0.00**	**-0.09,-0.02**
	Elementary school (grade 1-4)	-0.04	0.02	0.11	-0.09 , 0.01
	Elementary school (grade 5-8)	-0.05	0.03	0.09	-0.11 , 0.01
	Secondary school (9-12)	-0.08	0.05	0.09	-0.17 , 0.01
Wealth index	Poorest	Ref.			
	Poorer	-0.01	0.02	0.88	-0.06 , 0.04
	Middle	0.02	0.02	0.52	-0.03 , 0.06
	Rich	0.02	0.02	0.44	-0.93 , 0.06
	Richest	-0.01	0.02	0.98	-0.05 , 0.05
Age	18-30	Ref			
	31-40	-0.02	0.02	0.36	-0.07 , 0.03
	41-50	0.02	0.02	0.92	-0.05 , 0.05
	50+	0.04	0.02	0.12	-0.01 , 0.08
Radio	No	Ref.			
	Yes	0.01	0.17	0.79	-0.03 , 0.04
HH size	≤5	Ref.			
	≥5	0.01	0.15	0.89	-0.03 , 0.32
Thermometer_h ealthcenter	No	Ref.			
	Yes	**0.07**	**0.02**	**0.00**	**0.04 , 0.09**
Self-rated health	Poor	Ref.			
	Medium	-0.04	0.02	0.07	-0.08 , 0.01
	Good	**-0.09**	**0.02**	**0.00**	**-0.13 , 0.43**

7.3.4. The Association between CBHI Enrollment and Sick Children's Healthcare Visit

As the result of first equation of table 13 below revealed, CBHI enrollment showed a positive association with sick children's healthcare visits. Perceived health care quality also shows a positive probability of association with sick children's healthcare visits. However, household head age shows a negative correlation with sick children's healthcare visits. In this table, the final line shows, the correlation coefficient ρ of the joint distribution of equation one and two is different from zero and statistically significant, which is an indication of the presence of endogeneity in the joint distribution. Therefore, application of classical probit/logit regression analysis would have introduced bias and ended up with wrong conclusions.

Table 13: Biprobit regression result of sick children's health care visit and CBHI enrollment

		Coef.	Std. Err.	P-value	[95% CI]
Explanatory variables	**Equation 1 Sick Children health care Visit**				
CBHI2	No	Ref.			
	Yes	**2.11**	**0.26**	**0.00**	**1.59 - 2.63**
wealth index	Poorest	0.65	0.36	0.12	-0.05 , 1.36
	Poorer	0.24	0.34	0.53	-0.42 , 0.89
	Middle	-0.22	0.31	0.54	-0.83 , 0.39
	Rich	-0.42	0.32	0.23	-1.04 , 0.19
	Richest	Ref.			
Radio	No	Ref.			
	Yes	0.43	0.29	0.12	-0.14 , 1.03
Perceived	poor	Ref.			
quality_healthservice	Medium	0.04	0.28	0.11	0.55 , 0.56
	Good	0.15	0.28	0.63	0.69 , 0.39
HH size	<5	Ref.			
	≥5	-0.33	0.23	0.21	-0.78 , 0.13
Education	Illiterate	Ref.			
	Read & write	-0.15	0.26	0.62	-0.65 , 0.35
	Elementary school (grade 1-4)	0.19	0.38	0.65	-0.55 , 0.93
	Elementary school (grade 5-8)	-0.31	0.37	0.43	-1.03 , 0.40
Age	18-30	Ref.			
	31-40	-0.37	0.27	0.24	-0.89 , 0.16
	41-50	-0.4	0.31	0.22	-1.02 , 0.21
	50+	**-0.68**	**0.34**	**0.00**	**-1.34 , 0.02**
_cons		0.41	0.37	0.33	-0.32 , 1.14
CBHI2		**Equation 2 CBHI Enrollment**			
Age	18-30	Ref.			

	31-40	0.42	0.27	0.12	-0.11 , 0.94
	41-50	0.32	0.33	0.33	-0.33 , 0.97
	50+	0.18	0.35	0.61	-0.51 , 0.86
Sex	Male	Ref.			
	Female	-0.34	0.24	0.20	-0.81 , 0.14
Education	Illiterate	Ref.			
	Read & write	-0.08	0.23	0.70	-0.53 , 0.38
	Elementary school (grade 1-4)	-0.52	0.37	0.20	-1.26 , 0.21
	Elementary school (grade 5-8)	0.07	0.36	0.90	-0.64 , 0.78
	Secondary school (9-12)	-0.88	0.65	0.21	-2.15 , 0.39
wealth index	Poorest	-0.35	0.37	0.32	-1.08 , 0.38
	Poorer	0.21	0.31	0.51	-0.40 , 0.82
	Middle	0.26	0.31	0.40	-0.36 , 0.87
	Rich	0.65	0.29	0.00	0.07 - 1.22
	Richest	Ref.			
HH size	<5	Ref.			
	≥5	-0.11	0.2	0.60	-0.49 , 0.29
Radio	No	Ref.			
	Yes	0.25	0.25	0.30	0.25 , 0.74
Self-rated health stat	Poor	Ref.			
	Medium	0.57	0.3	0.10	-0.03 , 1.16
	Good	-0.06	0.33	0.90	-0.71 , 0.59
Perceived quality_healthservice	Poor	Ref.			
	Medium	-0.05	0.3	0.92	-0.63 , 0.53
	Good	0.43	0.28	0.10	-0.12 , 0.98
Thermometer_healthcenter	Yes	Ref.			
	No	-0.31	0.24	0.20	-0.78 , 0.15
Localcredit_membership	No	Ref.			
	Yes	0.02	0.2	0.92	-0.37 , 0.40
Ananlyzer_chemistry	Yes	Ref.			

	No	0.67	0.28	0.00	0.12 , 1.22
Religiousgroup_Membersh	No	Ref.			
ip	Yes	0.45	0.24	0.11	-0.02 , 0.92
_cons		-0.94	0.58	0.11	-2.12 , 0.20
/athrho		**-1.43**	**0.66**	**0.00**	**-2.71 ,-0.14**
rho		-0.89	0.14		-0.99 , -0.14
Observation		226			
Wald test of rho=0	chi2(1) = 4.72223	Prob > chi2 = 0.02			

7.3.4.1. Marginal effects of predictor variables on sick children's health care visit

As Table 14 below shows, CBHI enrollment increases the probability of household's healthcare facility visit for the sick children's by 0.44 (44%) points controlled for other predictor variables. Moreover, when the age of the household head is above 50 years the probability of visiting healthcare facility for their sick children's is decreased by 0.16 (16%) points compared to the younger household head in the age of 18-30 years. Moreover, households in the poorest wealth group have a 0.13 (13%) point higher probability of visiting healthcare facilities for their sick children's than the richest one.

Table 14: Marginal effects of predictor variables on sick children's health care visit

		dy/dx	Std. Err.	P-value	[95% CI.]
CBHI2	No	Ref.			
	Yes	**0.44**	**0.05**	**0.00**	**0.29 , 0.58**
Wealth index	**Poorest**	**0.13**	**0.07**	**0.05**	**-0.01 , 0.27**
	Poorer	0.05	0.07	0.47	-0.09 , 0.19
	Middle	-0.05	0.07	0.48	-0.19 , 0.09
	Rich	-0.10	0.08	0.22	-0.26 , 0.06
	Richest	Ref.			
	Poor	Ref.			
P. quality	Medium	-0.02	0.06	0.76	-0.15 – 0.11
health service	Good	-0.05	0.07	0.53	-0.19 – 0.09
Radio	No	Ref.			
	Yes	0.09	0.09	0.26	-0.07 – 0.26
Household size	**≤5**	Ref.			
	≥5	-0.07	0.08	0.32	-0.22 – 0.07
Education	Illiterate	Ref.			
	Reda and write	-0.03	0.06	0.66	-0.14 – 0.09
	Elementary (1-4)	0.02	0.09	0.82	-0.15 – 0.19
	Elementary (5-8)	-0.08	0.09	0.38	-0.25 – 0.09
	Secondary and above	0.25	0.32	0.42	-0.37 – 0.87
Age	18-30	Ref.			
	31-40	-0.08	0.06	0.17	-0.19 , 0.04
	41-50	-0.09	0.07	0.21	-0.23 , 0.05
	50+	**-0.16**	**0.08**	**0.05**	**-0.32 , 0.01**

7.3.5. Summary results of the effect of CBHI enrollment on outpatient, inpatient, and sick children's health care visits

Table 15: Summary marginal effect results of CBHI enrollment on healthcare visits

CBHI enrollment	dy/dx	Std. Err	P-value	[95% CI.]
Outpatient health care visit	0.50	0.06	0.00	0.36 - 0.64
Inpatient health care visit	0.22	0.06	0.00	0.13 , 0.31
Sick children healthcare visit	0.44	0.05	0.00	0.29 , 0.58

In summary as we can see in Table 15 above, CBHI enrollment in the study area showed a promising positive association with outpatient visit, inpatient health service utilization, and sick children's healthcare visits. However, the extent of the impact on health services utilization for inpatient is low compared to outpatient and sick children's health services utilizations which needs further investigations.

7.4. Discussion

Using bivariate probit regression analysis this sub-study revealed the correlation between CBHI enrollment and different healthcare utilization measures in Northwest Ethiopia. The result demonstrated that CBHI enrollment has a positive association with adult outpatient, inpatient, and sick children's healthcare visits.

Our finding of the association between CBHI participation and probability of outpatient healthcare visit is consistent with previous findings in the literature on the impacts of CBHI and other voluntary health insurance program on outpatient health service utilization in different parts of the world such as Lao PDR (Alkenbrack et al. 2015), India (Aggarwal 2010), Burkina Faso (Gnawali et al. 2009; Parmar et al. 2014), Ethiopia (Mebratie et al. 2013), Ghana (Blanchet et al. 2012), Colombia (Trujillo et al. 2005), and Ecuador (Waters 1999) which indicates CBHI membership improves outpatient visits for insured ones. This finding is also in line with study findings from Mutual health insurances in Rwanda that shows, membership in mutual health insurances significantly associated with an increased utilization of health services and a higher degree of financial risk protections (Saksena et al. 2011; Lu et al. 2012).

In our analysis, we found that households in the poorest wealth status have more chance of outpatient and sick children's healthcare visit than richest one. This finding is in disagreement with different study findings that revealed wealth status as an indirect measure of relative income of the households positively correlates with different health care utilization and health outcome measures (Feinstein 1993; Ahmed et al. 2010; Asmamaw Atnafu Ayalneh et al. 2017). Our finding may be justified, in the rural Ethiopian context public health posts and health centers are main healthcare service providers. The services at the public health posts and health centers are accused of low quality but the service charges are minimal. Therefore, given the

CBHI membership the better-off households prefer visiting private health facilities or travel a long distance to find better health service provider. However, the poor's without other options frequently visit public health posts and health centers. This finding could be used as an opportunity for further researches in rural Ethiopia with related to the quality of services provided by health posts and health center and healthcare use. Moreover, in this study we found that illiterate have a better chance of visiting health facilities than those who can read and write, this could also related to the above justification as low quality of health services at CBHI contracted health facilities may lead the better-off households to look for other options.

In this study, CBHI enrollment has a positive association with health service visit for sick children in the study area. This finding is in line with different studies that indicates participation in insurances improves utilization of child health services. Studies in Burkina Faso indicates a strong positive effect of community-based health insurance enrollment of parents and reduction in child mortality as a result of increased utilization of health services (Schoeps et al. 2015). Another study conducted in the Philippines also revealed that child health outcomes and insurance coverage have a positive relation (Quimbo et al. 2011).

However, in our study the age of the household head has a negative association with sick children healthcare visits. The older household head has a lower probability of visiting healthcare facilities for their sick children, this may be justified as elder household heads may prefer to use their life experience to treat their sick children rather than bringing them to a health facility.

Moreover, our study finding shows that CBHI participation also positively associated with inpatient health care visits. This study finding is in line with study result conducted in Senegal (Jutting 2004) that shows CBHI members have a higher

probability of using hospitalization services than non-members. Additionally, this finding is in agreement with a result from a systematic review on the impact of health insurance in Africa and Asia revealed that CBHI and SHI improve health service utilization in general (Spaan et al. 2012). It is also in line with a study finding from an Indian study that shows community-based health insurance increases access to inpatient care (Ranson et al. 2006). However, this finding is in disagreement with a study finding from Burkina Faso that shows no inpatient health care utilization difference between members and non-members if they are living far from health facilities(Parmar et al. 2014). The result is also in disagreement with a study finding during the pilot CBHI implementation in Ethiopia (Mebratie et al. 2013) that shows CBHI have no significant association with inpatient health care use. The disagreement with the Ethiopian pilot study might be related to the difference in the study periods, the first study was conducted in the first year of pilot implementation of CBHI in Ethiopia, at that time people might not be well informed about the importance of it. But our study is conducted after 6 years of the pilot which is a sufficient time for the communities to understand the concept of insurance and to influence their health care utilization behavior.

In our study self-rated health status also shows an association with inpatient healthcare utilization. Households with good self-rated health status have a lower probability of inpatient healthcare visits, this result is in line with a study finding from Tamil Nadu, India that shows existing health problems or poor self-rated health status is one main cause of increased inpatient health services utilization (Dodd et al. 2016). This finding shows the need of further studies to assess whether there is moral hazard issue with inpatient healthcare use and CBHI membership or not.

Overall, this study demonstrated that CBHI enrollment has a positive association with the use of adult outpatient, inpatient, and sick children's healthcare services in the study area. Therefore, the combined effect of demand-side (CBHI enrollment) and supply-side factors in terms of availability of health centers in a short radius possibly increase the chance of healthcare visits for adult outpatient, inpatient, and sick children for CBHI enrolled households.

7.5. Contributions and Limitations of the Study

The primary limitation of this study might be an introduction of selection bias due to the differences in risks/health status between the CBHI members and non-members. However, we applied bivariate probit model, a model recommended to control a binary endogenous regressor and have been used in health economics studies (Winkelmann 2012), so that we can causally interpret the results. Moreover, recall-biases are expected to be a problem in this study, since we have used 1, 3 and 12 months of recall time for sick children, adult outpatient, and inpatient health problems. However, we thought that the periods are not long to be recalled by the respondents and they have been used in different studies. Cross-sectional nature of our data may pause a challenge to causally interpret our result and it can be considered as an additional limitation.

Overall, given the above limitations this study expected to contribute to the limited literature in the association between CBHI and different health care use in Ethiopia. Moreover, this study also provides evidences for an evidence-based policy decision before the nationwide implementation of CBHI and SHI in Ethiopia. It can also use as an initial point for further studies in Ethiopia.

7.6. Conclusion and Policy Recommendations

This study provides a preliminary evidence suggesting that CBHI is a potential demand-side mechanism to improve adult outpatient, inpatient, and sick children's healthcare visits in the study area. Therefore, the government and other responsible bodies need to strengthen this pre-paid mechanism by expanding benefit packages and enrollment in order to strengthen further access to healthcare services. Complementary supply-side innervations to improve the quality of and geographic access to health facility especially access to primary hospitals are also critical for improving healthcare use. Moreover, in a rural and informal sector where the supply of health services is expected to be weak, both financing and provision aspects are essential to be tackled simultaneously.

Additionally, continuous monitoring and rigorous evaluation of the existing CBHI scheme effect on different inpatient and outpatient healthcare services and OOP expenditures using a panel data set is essential.

Finally, further studies using a better sample size and data set to ensure that the present positive associations in the existing CBHI membership and healthcare visits are really due to the previously unmet needs of the households or moral hazard related demand of community-based health insurance membership are essential.

Chapter 8: Conclusion and Policy Implications

In this dissertation, three sub-studies were designed and implemented to explore 1) The determinants of CBHI enrollment, 2) the magnitude and factors associated with CBHI membership renewal, and 3) the association between CBHI enrollment and health service utilization in Northwest Ethiopia. Findings from the three sub-studies are presented in the results chapter 5, 6, and 7. This chapter synthesizes the key findings from the results and links them to the overall objectives of the dissertation. Additionally, it summarizes the limitations and strengths of the methods and presents the overall contribution to the literature.

8.1. Summary of Key Findings

8.1.1. The Determinants of CBHI Enrollment in Northwest Ethiopia (Sub-study 1, chapter 5)

Employing a mix of quantitative and qualitative methods, this sub-study identified essential supply and demand-side factors that influence enrollment into CBHI in Northwest Ethiopia. The findings showed that the likelihood of enrollment in CBHI is influenced by the perceived quality of health services, self-rated health status, knowledge & awareness about CBHI, household sizes, and prior participation in informal associations. Furthermore, supply-side factors, such as the availability of services like blood glucose test in the health center, are positively correlated with CBHI enrollment. The main findings of the first sub-study are briefly discussed in chapter 5 in relation to their contribution to the literature in CBHI enrollment as well as their implication for health policy in the study area. However, some of the main findings are summarized below:

First, this study revealed the positive relationship between poor self-rated health status, large household size, and CBHI enrollment. This findings shed a light on the possibility of adverse selection in the participation of CBHI. The findings are in agreement with several prior empirical evidence and theories related to voluntary enrollment in insurance and adverse selection. Second, CBHI participation in the study area also highly correlated to the knowledge and awareness level of household heads. Third, this study also identified the positive relationship between the prior participation in informal credit association (social capital) and current CBHI enrollment of the households. Finally, it identified the effect of health facility factors on the decision of CBHI enrollment, such as the effect of poor perception of quality of health services and availability of services like blood glucose test on enrollment in CBHI.

8.1.2. Factors Associated With the Willingness to Renew Community-Based Health Insurance Membership in Northwest Ethiopia (sub-study 2, chapter 6)

Using a mixed method and multilevel analytical approach this sub-study revealed important demand-side (household level) and supply-side (health facility and insurance scheme) characteristics that affect the willingness to renew CBHI membership. The findings are summarized below.

First, this study revealed the association between the institutional trusts (trust in public health care facility and CBHI schemes) and willingness to renew CBHI membership. The result indicates that once the households enrolled in CBHI, trust in healthcare facility and insurance schemes are more influential factors on the membership renewal than others. Second, this study also sheds a light on the possibility of adverse selection in insurance membership renewal because households

with poor self-rated health status are found to be correlated with a higher chance of membership renewal decision. Moreover, premium collection convenience was one of the significant factors identified as a barrier to the willingness to renew CBHI membership.

8.1.3. Association Between Community-Based Health Insurance Enrollment and Health Services Utilizations in Northwest Ethiopia (sub-study 3, chapter 7)

The third study of this dissertation examined the association between CBHI enrollment and health service utilization (adult outpatient, adult inpatient, and sick children's healthcare). In this study, we applied a bivariate probit regression model to control the endogeneity problem of insurance enrollment.

The findings suggested that CBHI enrollment has a positive association with the utilization of adult outpatient, adult inpatient, and sick children's healthcare services. This positive association of CBHI enrollment and healthcare visits for adult outpatient and inpatient and sick children are consistent with study findings in the literature.

8.2. Summary of Methodological Limitations and Strengths

The primary limitation of the studies in the dissertation may be the cross-sectional nature of the data that we have used for the three sub-studies. Due to the cross-sectional nature of the survey, it may be difficult to infer a causal relationship. However, the study utilized a mix of quantitative (population survey linked to health facility survey) and qualitative (FGD & In-depth interview) methods to better understand the factors that affect CBHI enrollment and membership renewal. Additionally, the data collection tool was comprehensive and data included details

about a wide range of factors expected to influence participation into CBHI and membership renewal.

Another limitation of the study could be the influence of measurement error since the survey was based on respondents' self-reported information such as health services utilization, self-reported health status, and perceived quality of health services. However, these measures have been used in many studies in LMICs and provided meaningful findings.

The other limitation of this study might be the introduction of selection bias due to the differences in risks/health status between the CBHI members and non-members in the third sub-study. When classical probit/logit regressions are not able to control endogeneity problems, the findings is biased. Thus, we applied bivariate probit model, which is a better model recommended to account for a binary endogenous regressor and have been applied to health economics studies(Winkelmann 2012).

Moreover, recall bias can be a problem of this study, since we have used 1, 3 and 12 months of recall period for sick children's, adult outpatient, and inpatient health problems. However, we believed that these are relatively short periods to be remembered by the respondents.

Additionally, question of external validity could be raised as a limitation of the study since the study is a regional study in Ethiopia. However, we feel that the majority of the Ethiopian's in the rural society have similar socio-economic status and institutional arrangements, which make the results to be representative.

In general, given the above limitations, this study has the following strengths. The study utilizes a mix of quantitative and qualitative methods to better understand the factors that affect CBHI enrollment and membership renewal. Furthermore, the

data include details about a wide range of factors related to CBHI participation and membership renewal. Moreover, the study employed multivariate logistic regression and mixed effect models in order to control household and health facility characteristics. It also applies a bivariate probit model to control the endogeneity problem of CBHI enrollment and its effect on healthcare utilization. Finally, the study used quite a large sample for papers one and two compared to the previous studies in Africa.

8.3. Summary Contribution to the Literature

The findings of this dissertation are expected to have a number of contributions to the limited health care financing literature in low and middle-income countries like Ethiopia. The study sheds a light on the scarcely studied empirical evidence of the association between institutional trusts (trust in public health facilities and CBHI schemes) and the willingness to renew CBHI membership in developing countries. In addition to political, economic, and social factors, trust in public institutions is a barrier to the implementation and sustainability of public policies like insurance in low and middle-income countries. Therefore, this finding contributes to the limited empirical evidence in the area and it can be used as a springboard for further studies and policy interventions in this regard.

The results of the studies revealed the presence of adverse selection in the early stage of CBHI implementation because households with poor self-rated health status and larger household members seemed to be motivated to join CBHI and willing to renew their membership. This finding is expected to contribute to the limited empirical evidence concerning the possibility of adverse selection with CBHI

enrollment and membership renewal where the implementation of pre-payment scheme is in its premature stage like Ethiopia.

It also identified the correlation between CBHI enrollment and participation in informal association as a social capital predictor. It gives a clue for further studies on the relationship between informal associations and formal association participation like CBHI. Furthermore, it will add to the limited literature on the association between CBHI enrollment and health services utilization using a range of health service measures including sick children's health services utilization in Ethiopia.

Overall, the study presented a comprehensive country-specific empirical evidence about the factors that drive enrollment into CBHI, membership renewal, and its association with health services utilization.

8.4. Policy Implications of the Study

The findings of the three sub-studies provide the following policy implications. Policymakers need to consider continuous community education and social marketing activities to increase CBHI enrollment and membership-renewal. Comprehensive strategies to improve public awareness and knowledge about CBHI to rural society and how to maintain it is essential.

Since adverse selection is identified as the main influential factor of CBHI enrollment and membership renewal, it gives a clue to policymakers to design a better strategy to tackle adverse selection in a voluntary insurance scheme in developing countries from the early period of implementation. Additionally, policy-makers need to design a convenient premium collection strategy in order to maximize CBHI membership renewal and to maintain the sustainability of the CBHI schemes.

The findings of this study also provide relevant information to policymakers on the effect of quality of public health facilities on insurance enrollment and membership renewal. Therefore, policymakers need to design mechanisms for regular evaluation of the quality of the services provided by public providers.

Moreover, trust in health facilities and the insurance schemes are identified as a main deterring factor of CBHI membership renewal, therefore, there should be a continuous evaluation of the schemes and health care providers whether they are providing the promised services. Regular assessment of customer satisfaction is also important to improve the customer's trust in the health care facilities and CBHI schemes.

This study provides evidence on the positive association between participation in informal associations and CBHI enrollment. Policymakers need to design strategies to use informal associations for communication and social marketing because they as a social capital can be used as a base for further formal association participation like health insurance.

This study provides an evidence on the association between CBHI enrollment and health services utilization. It suggests that CBHI is an important demand-side mechanism to improve the health care utilization for adults and children. Therefore, policy measures to strengthen the pre-paid mechanism by expanding benefit packages and enrollment is essential. Additionally, complementary supply-side interventions to improve the quality of and geographic access to health care, especially access to primary hospitals, are also critical for improving healthcare use. This study is the first comprehensive study after CBHI piloting and the findings can be used as a baseline and as an input for evidence-based policy decision before the nationwide rollout of CBHI and SHI in Ethiopia.

Finally, as Ethiopian government has been implementing CBHI and plans to introduce SHI for the formal sector, policy makers need to design a road-map for the future merger of these two schemes. However, the merger should start with merging of the current CBHI's at the regional level to increase CBHI's effect on purchasing, health services utilization, and financial risk protection. After the regional merger of the schemes, nationwide merger will be the next step.

Additionally, the Ethiopian health insurance agency and other responsible organizations should prepare for the future integration of the current CBHI and the planned SHI schemes to have one national health insurance pool. Therefore, our study findings could provide baseline policy information that should be considered before the nationwide implementation.

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국문초록

에티오피아의 지역사회기반 건강 보험: 보험가입, 자격갱신, 의료서비스 이용 효과

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배경: 여러 중저소득 국가에서 환자부담을 완화할 수 있는 보건의료 재원조달 수단으로 지역사회기반 건강보험(Community-Based Health Insurance: CBHI)이 주목 받고 있다. 2010 년 CBHI 를 포함한 사전 지불 제도 시행을 위한 에티오피아 정부의 다양한 시도가 있었으며 이 논문은 에티오피아에서 시행된 CBHI 가입과 자격갱신, 의료이용에 관해 살펴본 세개의 소논문으로 구성되어 있다; 1) CBHI 가입 결정 요인, 2) CBHI 자격 갱신 관련 요인, 3) 서북 에티오피아 지역의 CBHI 가입과 의료이용의 상관관계

방법: 본 연구는 지역사회기반 횡단면 가구 조사와 보건의료시설 조사를 연계한 사례 비교 연구이다. 연구대상은 5개 지역내 15개 클러스터에 설립된 CBHI의 가입 자격요건이 되는 모든 가구이며 연구 대상의 대표성을 위해 표본추출방법으로 다단계군집표집(Multi Stage Cluster Sampling)을 사용하였다. 구조화된 설문지를 활용하여 2,008 세대와 7 개 보건의료시설을 대상으로 설문 조사를 실시하였다. 또한 정량적 연구 결과를 보완하는 수단으로 CBHI 가입자 4명과 비가입자 4명으로 구성된 집단 심층 토론(Focus group discussion)과 심층면접(In-depth interview)을 실시하였다. 양적 자료의 분석으로 주제 분석(thematic analysis)과 함께 mixed effect 로지스틱 회귀분석, 이변량 프로빗 회귀분석을 수행하였다.

결과: CBHI 가입 관련요인을 분석한 결과에 따르면 가구특성으로 연령, 교육, 주관적 건강상태, 보건의료서비스의 질, 가구 규모, CBHI 에 대한지식 및 정보(인식)와 같은 요인이 CBHI 가입과 관련된 요인으로 나타났으며 추가적으로 실험실 시험 가능 여부와 같은 시설 요인, 지역신용협회와 같은 비공식협회 가입여부가 CBHI 가입에 미치는 영향이 유의한 것으로 나타났다. CBHI 자격 갱신 관련 요인을 살펴 본 연구 결과에 따르면 가입자의 36%는 CBHI 자격 갱신을 하지 않을 것이라고 응답하였으며 보건 시설에 대한 신뢰 및 CBHI

제도에 대한 신뢰와 같은 제도적 신뢰와 보험료 징수의 불편함이 자격 갱신과 관련된 요인으로 밝혀졌다. 또한 낮은 주관적 건강상태와 높은 의료서비스의 질 요인은 자격 갱신을 높이는 요인으로 밝혀졌으며 이는 CBHI 가입 및 자격갱신에 역선택의 가능성이 있다는 것을 시사한다.

세 번째 연구에 따르면 CBHI 가입은 성인 외래 서비스, 입원 서비스, 소아 서비스 이용과 양의 상관관계가 있는 것으로 나타났으며 CBHI 가입자의 경우 성인 외래, 입원, 소아서비스 방문 확률이 미가입자에 비해 각각 50%, 22%, 44% 높았다.

결론 및 권고: 본 논문은 CBHI 가입 및 자격 갱신과 관련된 주요 영향요인을 파악하고 CBHI 가입과 의료서비스 이용 지표간 관련성을 살펴 본 연구이다. 에티오피아에서 CBHI 와 사회보험이 전국적으로 확대 시행되기 전에 다각적인 정책 개입이 고려 될 필요가있으며 강제 가입, 보험료 차등, 단체 가입과 같은 전략은 역선택으로 인한 부작용을 해결하기 위해 필수적으로 고려되어야 하는 사항이다. CBHI 를 비롯한 사회보험의 가입자를 늘리고 보험의 지속가능성을 유지하기 위해서는 지역사회에 대한 지속적인 교육 및 인식개선을 위해 노력하여야 하며 여기에는 보건의료시설을 향상시키기 위한 정책개입과 보험이 보장하는 서비스를 가입자에게 제공하고 신뢰를 구축하기

위한 계획도 병행되어야 한다. 또한 다양한 의료서비스 이용에 대한 CBHI 의 효과를 높이기 위해 보장성 확대와 함께 여러 공급 측면의 개입이 필요하다.

주요어: 역선택, 이변량 프로빗 모형, 지역사회 기반 건강보험, 에티오피아, 의료이용, 제도적 신뢰, 중저소득국가, 자격갱신, mixed-effect 모형

학번: 2014-31499

Annex

Table 16: Descriptive statistics on outpatient, inpatient and child health care use and CBHI enrollment.

		Inpatient health N = 2008 IPT Yes=141(7%) IPT No = 1876(93%)			Sick Child health N =226 Sick child health Yes = 194(86%) No=32 (14%)			*Outpatient health N= 454 Yes = 372(82%) No = 82 (18%)*		
		Total n (%)	Yes n (%)	No n (%)	Total n (%)	Yes n (%)	No n (%)	Total n (%)	Yes n (%)	No n (%)
CBHI	Yes	832(41.4)	72(51.0)	760(40.9)	111(58.9)	106(54.4)	5(15.6)	207(45.6)	197(53.0)	10(12.2)
	No	1,176(58.6)	69(48.9)	1,107(59.1)	115(41.2)	88(45.4)	27(84.4)	247(54.4)	175(47.0)	72(87.8)
Sex	Male	1,478(73.6)	107(75.9)	1,371(73.4)	158(69.9)	134(69.0	24(75.0)	330(72.7)	269(72.3)	61(74.4)
	Female	530(26.39)	34(24.1)	496(26.6)	68(30.1)	60(30.9)	8(25.0)	124(27.3)	103(27.7%)	21(25.6)
Age	18-30	421(20.97)	14(9.9)	407(21.8)	71(31.4)	65(33.5)	6(18.7)	45(9.9)	37(9.9)	8(9.76)
	31-40	500(24.9)	21(14.9)	479(25.6)	70(30.9)	61(31.4)	9(28.1)	87919.2)	70(18.8)	17(20.7)
	41-50	483(24.0)	37(26.2)	446(23.8)	50(22.1)	41(21.1)	9(28.1)	112(24.6)	96(25.8)	16(19.5)
	50+	604(30.0)	69(48.9)	535928.6	35(15.5)	27(13.9)	8(25.0)	210(46.3)	169(45.4)	41(50.0)
Residence	Rural	1,821(90.7)	133(94.3)	1,688(90.4)	207(91.6)	177(91.2)	30(93.7)	428(94.3)	346(93.0)	82(100)
	Urban	187(9.3)	89(5.7)	17(9.59.0)	19(8.4)	17(8.7)	2(6.25.0)	2695.7)	26(6.9)	0(0.0)
Education	Illiterate/No education	1,038(51.7)	86(60.9)	952(50.9)	102(45.1)	90(46.4)	12(37.5)	257(56.6)	209(56.18)	48(58.5)
	Read & write	587(29.2)	36(25.5)	551(29.5)	75(33.2)	61(31.4)	14(43.7)	131928.8)	109(29.3)	22(26.8)

		Inpatient health N = 2008 IPT Yes=141(7%) IPT No = 1876(93%)			Sick Child health N =226 Sick child health Yes = 194(86%) No=32 (14%)			*Outpatient health N= 454 Yes = 372(82%) No = 82 (18%)*		
	Elementary school (grade 1-4)	197(9.8)	11(7.8)	186(9.9)	20(8.8)	17(8.7)	3(9.4)	29(6.4)	22(5.9)	7(8.5)
	Elementary school (grade 5-8)	119(5.9)	7(4.9)	112(6.0)	21(9.3)	18(9.3)	3(9.4)	26(5.7)	24(6.45.0)	292.4)
Marital status	Single	94(4.7)	10(7.1)	84(4.5)	5(2.2)	4(2.1)	1(3.1)	11(2.4)	8(2.2)	3(3.6)
	Married	1,632 (79.8)	111(78.7)	1,521(81.5)	207(91.6)	178(91.7)	29(90.6)	376(82.8)	314(84.4)	62(75.6)
	Divorced	157(7.8)	11(7.8)	146(7.8)	11(4.8)	9(4.6)	2(6.3)	31(6.8)	24(6.5)	7(8.5)
	Widowed	125(6.2)	9(6.4)	116(6.2)	3(1.3)	3(1.6)	3(1.4)	36(7.9)	26(6.9)	10(12.2)
Occupation	Farmer	1,761(87.7)	131(92.9)	1,630(87.3)	198(87.6)	169(87.1)	29(90.6)	420(92.0)	341(91.6)	79(96.6)
	Merchant	83(4.1)	7(4.9)	76(4.0)	8(3.5)	8(4.2)	4(2.1)	15(3.3)	15(4.3)	5(1.2)
	Day laborer	45(2.5)	6(0.4)	51(2.7)	8(3.5)	7(3.6)	1(3.1)	4(0.9)	4(1.1)	4(1.1)
	Petty trader	113(5.6)	3(2.1)	110(5.8)	12(5.3)	10(5.6)	2(6.2)	15(3.3)	12(3.3)	3(3.6)
Self-rated	Poor	121(6.0)	24(17.2)	97(5.2)	19(8.4)	13(6.7)	6(18.7)	60(13.2)	43(11.5%)	17920.7)
health stat	Medium	766(38.2)	79(56.3)	687(36.8)	131(57.9)	119(61.0)	12(37.5)	253(55.7)	225(60.5)	28(34.2)
	Good	1,121(55.0)	38(26.9)	1,083(58.0)	76(33.6)	62(31.9)	14(43.7)	141(31.1)	104(27.9)	37(45.1)
Perceived	Poor	348(17.3)	44(31.2)	304(16.3)	38(16.8)	32(16.5)	6(18.7)	89(19.6)	71(19.1)	18(21.9)
quality health	Medium	555(27.6)	47(33.3)	508(27.2)	74(32.7)	62(31.9)	12(37.5)	138(30.4)	111(29.8)	27(32.9)
service	Good	1,105(55.0)	50(35.5)	1,055(56.5)	114(50.4)	100(51.6)	14(43.7)	227(50.0)	190(51.1)	37(45.1)

		Inpatient health N = 2008 IPT Yes=141(7%) IPT No = 1876(93%)			Sick Child health N =226 Sick child health Yes = 194(86%) No=32 (14%)			*Outpatient health N= 454 Yes = 372(82%) No = 82 (18%)*		
Household size (mean)		5.1 SD 1.82	5.5 SD 2.1	4.8 SD 1.97			5.6 SD 1.89	5.3 SD 2.05		4.08 SD 2.00
Chronic disease	No	1,631(81.2)	55(3.4)	1,576(96.6)	148(65.5)	129(66.5)	19(59.4)	229(50.4)	181(48.6)	48(58.5)
	Yes	377(18.8)	86(22.8)	291(77.2)	78(34.5)	65(33.5)	13(40.6)	225(49.5)	191(51.3)	34(41.5)
Elderly above 65	No	1,794(89.3)	114(80.8)	1,680(89.9)	210(92.9)	182(93.8)	28(87.5)	363(79.9)	304(81.7)	59(71.9)
	Yes	214(10.7)	27(19.2)	187(10.0)	16(7.0)	12(6.2)	4(12.0)	91(20.0)	68(18.3)	23(28.0)
Wealth index	Poorest	402(20.1)	18(12.7)	384(20.6)	34(15.0)	31(15.9)	3(9.4)	53(11.7)	51(13.7)	2(2.44.0)
	Poorer	399(19.9)	25(17.7)	374(20.1)	47(20.8)	43(22.2)	4(12.5)	74(16.4)	58(15.7)	16(19.5)
	Middle	400(20.0)	30(21.3)	370(19.9)	42(18.6)	36(18.6)	6(18.7)	78(17.3)	65(17.6)	13(15.8)
	Richer	409(20.5)	42(29.8)	367(19.7)	46(20.4)	39(20.1)	7(21.8)	123(27.2)	97(26.2)	26(31.7)
	Richest	390(19.5)	26(18.4)	364(19.6)	57(25.2)	45(23.2)	12(37.5)	124(27.4)	99(26.7)	25(30.5)