***Determinants of Community Based Health Insurance Participation;***

*Evidence from Informal Sector Workers in Limu Kossa District of*

*Jimma Zone, Ethiopia*

*A Thesis Submitted to the School of Graduate Studies of Jimma University*
*in partial Fulfillment of the Award of the Degree of Masters of Science in*
*Economics(Economic Policy Analysis)*

By:

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**JIMMA UNIVERSITY**
**COLLEGE OF BUSINESS AND ECONOMICS**
**DEPARTMENT OF ECONOMICS**

**JUNE,2017**
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**Under the Guidance of**

**Badassa Wolteji (PhD)**

**and**

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**MSc IN ECONOMICS**

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# DECLARATION

I hereby declare that this thesis entitled "Socioeconomic Determinants of Community Based Health Insurance Participation in South West Ethiopia: A case of Limu Kossa District", has been Carried out by me under the guidance and supervision of Badassa Wolteji (PhD) and Endeg Tekalgn (MSc).       .

The thesis is original and has not been submitted for the award of degree of diploma any university or instructions. All sources of materials used for this thesis have been duly acknowledged.

Declared by

Name          ------------------------------

Date          ------------------------------

Signature     ------------------------------

# CERTIFICATE

*This is to certify that the thesis entities "Determinants of Community Based Health Insurance Participation: Evidence from Limu Kossa district of Jimma Zone, Ethiopia", Submitted to Jimma University for the award of the Degree of Master of Science in Economic policy Analysis and is a record of Valuable research work carried out by Mr. Temesgen Gemechu, under our guidance and supervision*

*Therefore we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.*

*Main Adviser's Name*                    *Date*                    *signature*

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*Co-Advisor's Name*                    *Date*                    *Signature*

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# Acknowledgements

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# ACRONYMS

| | |
|---|---|
| CBHI | Community Based Health Insurance |
| CHF | Community  Health Fund |
| CSA | Central Statics Agency |
| EU | Expected Utility |
| FED | Finance and Economic Development |
| FMOH | Federal Ministry of Health |
| HIA | Health Insurance Agency |
| ILO | International Labor Organization |
| MIDG | Millennium Development Goal |
| OLS | Ordinary Least Squares |
| OOP | Out of Pocket Payment |
| SEWA | Self-Employed Women's Association |
| SHI | Social Health Insurance |
| WHO | World Health Organization |
| WTJ | Willingness to Join |

## Abstract

*Community based health insurance(CBHI) is the strategic variable in mitigating risk of direct out of pocket spending in the case of health shocks and indirect economic costs affecting both individual and national wellbeing. However, household heads participation in Ethiopia CBHI pilot districts is limited and little is known empirically about its factors. This study was initiated with the objective of identifying major factors affecting informal sector workers participation in community based health insurance. For the purpose of the study a cross sectional data were collected from 396 sample households and primary data was used. Interview schedule was used to collect primary data from the sampled households. For the purpose of data analysis, descriptive statistics and Binary logit econometric model were used. From the Binary logit results, six variables namely; age of household head's, household head's educational status, annual expenditure, having information about the scheme and being member in local cooperatives of the household heads were found to have a positively significant effect on the informal sector workers decision to participate in CBHI while distance from the nearest health center was found to have a negatively significant effect on the informal sector workers decision to participate in community based health insurance. Based on these findings, the researcher recommended that emphasis should be given towards strengthening formal and non-formal educational opportunities, health sectors and CBHI agencies in collaboration with other concerned government sectors and nongovernmental organizations should work to improve households' income through implementing different development and income generating strategies. In addition, working with local cooperatives and diversifying the means of awareness creation about the scheme were also recommended as critical issues in improving household head's participation in community based health insurance.*

***Key words****: informal sector workers, community based health insurance, out of pocket payment, participation in CBHI and catastrophic expenditure.*

# CHAPTER ONE

# 1. INTRODUCTION

## 1.1 Background of the Study

Within variety of shocks threatening individuals' health shocks is among the most common and most severe. Given the unhealthy working and living conditions in low-income countries the poor are especially exposed to the risk of ill health. Health shocks do not only threaten individual's life or lifetime physical wellbeing but also creates a severe economic risk. Illness causes indirect costs by hindering individuals from engaging in income-earning activities while at the same time triggering high out-of-pocket (OOP) spending for medical care, which can be catastrophic in nature (Oberlander, 2013).

Health shocks have a direct impact on human capital formation. It pushes health expenditure on a poor household precisely at a time when they can ill-afford it due to income shortfall resulting from the shock. In addition, the uncertainty of the timings of illness and unpredictability of its costs make financial provision for illness challenging for households receiving low and irregular income (Tenkorang, 2001). Furthermore, given the strong association between health and income at low-income levels, a health shock affects the poor the most.

Developing countries account for 84 percent of world population and 93 percent of worldwide burden of disease; however, they account for only 18 percent of global income and 11 percent of global health expenditure. Limited resources and administrative capacity together with strong underlying needs for services pose severe challenges to governments in developing countries. The states in most developing countries have not been able to satisfy health care demand of their poor population. Falling of budgetary support for health care services, inefficiency in public health provision, an unacceptable low quality of public health services, and the subsequent imposition of user charges are

reflective of these states inability to satisfy health care needs of the poor (World Bank, 1993).

Ethiopia, being among developing countries, poor health care financing is also one of the major challenges for the health system of Ethiopia (FMoH,2010). Although the health financing in Ethiopia comes from a variety of sources, direct out-of-pocket expenditure accounts for a significant portion of health sector spending in the country as it was estimated to be 79.8 percent in 2011. Such substantial out-of-pocket payments create financial obstacles to access to health services and puts people at risk of impoverishment (Amanuel, 2014).

Health insurance could reduce uncertainty by covering medical expenditures in case of a health shock, thereby improving access to healthcare. However, neither the state nor the market provides health insurance for poor people in low-income countries. Therefore, poor people's residing in these countries need to rely on informal insurance mechanisms to insure their consumption levels in the face of health shocks. These are not only inadequate to fully insure consumption but also come at high future economic costs by reducing investment in human and physical capital. Thus, without formal health insurance health shocks are likely to increase poor individuals' vulnerability to poverty. Poverty in turn can serve as a facilitator for poor health. Therefore, the association between ill health and poverty is often described as mutually reinforcing (Oberlander, 2013).

To address this problem, Several African countries have recently employed effective health financing reforms that have improved access to health services and financial risk protection, moving them closer to the policy objective of universal health coverage. Many countries have implemented mechanisms to protect the poor and vulnerable population groups, including measures that have abolished or reduced user fees at the point of access to health services (WHO, 2013).

Since the late 1990s, due to inadequate ability of publicly financed health systems in developing countries to provide adequate access to health care and the weaknesses of informal coping strategies to provide financial protection against health shocks,

internationally various forms of community-based health care financing have been proposed as an alternative approach. This increasing policy attention has led to the establishment of a number of Community Based Health Insurance (CBHI) schemes, in several developing countries (Weismann and Jutting, 2001).

Similarly, to improve access to modern health care services and the prepaid plan coverage, Ethiopian government has established health insurances. Accordingly, two types of health insurance schemes were introduced in Ethiopia since 2010. The first is social health insurance (SHI). This scheme is planned to cover 10.46 percent of the population who are engaged in formal sectors and enrolling in SHI is compulsory for all in the formal sectors. The second health insurance scheme is community based health insurance (CBHI), which is being piloted in 13 selected districts in Ethiopia and projected to cover 83.6 percent of the population of Ethiopia who are engaged in informal sectors; mainly those dwellers of rural areas. Unlike joining social health insurance, joining community based health insurance is based on voluntary decision of the households (Haile et al, 2014).

In the pilot districts, households which join the community-based health insurance are expected to pay 180 ETB as premium annually. However, the members' annual premium varies among the pilot districts. Moreover, the benefits packages of community based health insurance in Ethiopia include all family health services and curative care that are part of the essential health package in Ethiopia when the scheme is scaled up to full implementation. Curative services include inpatient, outpatient services and acute illnesses (Haile et al, 2014).

Community based health insurance (CBHI) covers a wide range of health insurance arrangements with vast gradients in terms of membership, management, ownership, and service as well as financial coverage in typical settings and designed for different population groups. It is also characterized by community-based social dynamics and solidarity, risk pooling, participatory management and decision-making, non-profitability and voluntary membership. (Haile et al, 2014)

Community based health insurance (CBHI) schemes are one way of mobilizing community resources to share in the financing of local health services (Cripps et al.,2000).Moreover, access to community based insurance schemes can help to mitigate risks. This is especially important in areas where risk markets are not prevailing and public programs are not available or inefficient (Weinberger and Jutting 2000).Which benefits for public health, welfare and revenue generation can be expected to go hand in hand with the expansion of viable insurance schemes of this kind in rural areas. In addition, the proper health care delivered through insurance can improve health status, reduce out of pocket expenditure and lower decline in labor productivity or supply (Acharya et al, 2010).

Based on the executive summary of Health Finance and Governance project report, since Ethiopia have been announced Community Based Health Insurance scheme as pilots with the objective of drawing lessons for eventual scale-up of the scheme to countrywide. The 13 pilot districts' schemes have produced preliminary findings with promising results and the overall up take rate in the pilot districts reached approximately 52 percent of the target population; of which 85 percent are paying members and the remaining 15 percent have subsidized membership.

The amount of premiums collected including the payment for indigents through targeted subsidies, has reached over Birr 41.5 million ETB, and recent monitoring data show that health service utilization is increasing due to improved access to health services. The schemes have reimbursed health facilities a total of ETB close to 30 million for the health services utilized by members and their family members. The increased and improved cash flow has had a positive effect on the availability of drugs and other supplies, which in turn has improved the quality of health services the facilities provide. Triggered by the pilot's early successes, the government of Ethiopia decided to expand the pilot to 161 districts in July 2013(Solemon, 2015).

According to the Limu Kossa district CBHI Agency 2016 annual report, of the 13 pilot districts in Limu Kossa there are 39237 total informal sector worker household leaders and 1723 indigents or poorest household heads; among this only 15386 households are

currently insured. There is financial agreement between insurance and health care service providers. Members are expected to present in health care providers with membership ID card and will get service without any payment. Membership is renewed annually at the harvest time by providing 180 birr premiums. Statistically, 15386 members have got health care service by incurring around 2.8 million ETB and low and middle income group has benefited from this.

## 1.2 Statement of the Problem

In the last 10 years, Africa has witnessed a renewed interest in Community Based Health Insurance schemes as countries leverage communities to expand risk-pooling coverage to informal sectors and the rural population. CBHI schemes, also known as mutual health organizations, are not-for-profit mechanisms of health financing grounded in principles of risk sharing and solidarity (solemon, 2015).

Despite the advantages associated with these CBHI schemes, their coverage is still very low in resource poor countries (De Allegri et al, 2006; Bennett et al, 1998).Moreover, as indicated in Jacobs et al, 2010 most CBHIs schemes fail to enlarge their membership pool and often cover less than 10 percent of their target group. ILO (2002) also indicated that 50 percent of the schemes had less than 500 members. These small risk pools limit the population across which risks can be spread. Moreover, the small size of schemes makes them financially vulnerable since risk pooling works better the larger the scheme (Oberlander, 2013).

Given the focus on expanding enrolment of health insurance globally, many researchers have examined the determinants of enrolment in various types of profit oriented health insurance at the household level in different country contexts. But studying about the determinants of enrollment in CBHI (mutual health organizations) is lagged behind. Thus, there has been particular interest in exploring the determinants of enrolment in CBHI, likely because most CBHI schemes fail to achieve high coverage rates (Alkenbark, 2011).

However, since the scheme has been piloting in Ethiopia there were very few studies conducted to assess health care financing issues such as; willingness to join Community Based Health insurance (Haile et al, 2014 and Adane et al 2014), impact of Ethiopian pilot community based health insurance scheme on health utilization (Angaw et .al, 2013 and Gebremeskel,2014); the impact of community based health insurance on house hold economic welfare( Zelalemet.al,2014).Even, most of these studies were not conducted in the pilot districts or they were conducted to assess willingness to pay and willingness to join before introducing the pilot of this scheme.

Furthermore, even though the particular study district is being among the early 13 pilot districts in the country, there were no any published researches about CBHI issues. Hence little is known about factors which may influence the readiness of informal sector workers to enroll in the community based Health Insurance Scheme.

In view of the above, the study seeks to assess the determinants of informal sector workers participation in community based health insurance was undertaken by using cross sectional primary data in Limu Kossa district of Jimma Zone, Ethiopia

## 1.3 Objectives

## 1.3.1 General Objective

The general objective of the study is to investigate socio-economic and demographic factors affecting decision of informal sector workers household heads to participate in community based health insurance.

## 1.3.2 Specific Objectives

Specifically the objectives of the study are:

- ➢ To identify the reasons to participate in community based health insurance.
- ➢ To estimate determinants of informal sector workers participation in community based health insurance.

## 1.4 Research Questions

## 1.4.1 General Research Question

What are the demographic and socioeconomic factors determining informal sector workers enrollment in community based health insurance?

## 1.4.2 Specific Research Questions

This study is intended to answer the following research questions:

> ➢ What are the reasons to participate and to not participate in community based health insurance?
> ➢ What is the likelihood estimate of factors affecting the household heads decision to enroll in community based health insurance?

## 1.5. Significance of the Study

In a country where majority of the people lives in rural areas and engaged in informal sector, enrollment in community based health insurance is of paramount importance for ensuring access and quality of health service. Identifying determinants of informal sector worker participation in community based health insurance in the study area will help the concerned bodies to make relevant decisions to intervene in the development of appropriate policies and strategies. The findings of this research could also enhance Health Insurance Agency and other stakeholders to promote informal sector workers enrollment in community based health insurance. It will further open up the new areas which have not been covered by this study. Moreover, the research even has significance to the households themselves by making them well aware about the importance of participating in community based health insurance.

## 1.6. Scope and Limitation of the Study

Conceptually, the study focused on determinants of informal sector worker enrollment in community based health insurance in Limu Kossa district, Jimma zone, Oromia regional

state of Ethiopia. Geographically, the study will be confined to four rural Keble's in the district and on informal sector worker household's enrollment in community based health insurance. Besides, the other aspects of CBHIs with regard to institutional and financial sustainability are not dealt under this study. Therefore, its scope is limited in terms of coverage and depth owing to financial and time resources availability.

## 1.8 Organization of the Thesis

Chapter one deals with the introduction, focusing mainly on the background, statement of the problem, objectives, scope and limitation and significance of the study and chapter two deals with strategic review of theoretical, empirical literature and conceptual framework pertinent to the subject of the thesis. Chapter three describes the research methodology that includes a brief description of the study area, data collection procedures and analytical techniques. Chapter four discusses the findings and results of the study. Chapter five deals with summary of the major findings, conclusions and recommendations the study.

# CHAPTER TWO

## 2. LITERATURE REVIEW

## 2.1 Concept of Community Based Health Insurance

The term community-based health insurance is used in this study to refer to any non-profit health financing scheme. It covers any not-for-profit insurance scheme that is aimed primarily at the informal sector and formed on the basis of an ethics of mutual aid and the collective pooling of health risks, and in which the members participate in its management. (Musau, 1999)

A form of voluntary health insurance that in recent years has become widespread in Africa and Asia is community-based health insurance (CBHI), sometimes called "mutual health insurance", "community health funds", "community-based prepayment schemes", or "micro-insurance" (Bennett et al., 1998). These schemes exist within localized communities, most often in rural areas: members make small payments to the scheme, often annually and after harvest time, and the scheme covers the fees charged by local health services.

These types of health insurance schemes are characterized by voluntary membership and advance premium payment to cover potential medical costs. Members of these CBHI schemes pay premiums on a regular basis, usually when their incomes are high or mainly at harvest time. Such schemes are often initiated with the financial and technical support of NGOs and thereafter the community takes full responsibility for managing and administering the scheme. Local governments may also play a role in supporting and encouraging the efforts of such schemes. The community participates in designing the scheme and decides on the level of premium and the corresponding benefit. In addition, members participate actively in administration and supervision (Tenkorang, 2001).

Furthermore, these schemes represent promising mechanisms for creating additional financial resources for health and for increasing rural populations' access to health care

(Ekman, 2004 and Basaza et al., 2008).Also they may be considered as a stepping stone to universal coverage (Davies and Carrin, 2001).

Community financing for health can be instituted by direct payment of user fees for health care at the point and time of use. Schemes in urban areas can be inclined to establish quarterly or monthly premium contributions so as to match the income patterns of urban formal sector workers. Annual contributions, collected at the time of harvest of cash crops, seem to be prevalent among schemes in rural areas (Bennett et al., 1998).However, in some schemes, payment schedules were held flexible, with monthly, quarterly or semi-annual payments (Ron, 1999). Other CBHI schemes link the time of premium payment with a suitable event in the community. For instance, burial societies in Uganda use their monthly meetings for the collection of premiums, either for those who renew their membership or for the first-time members (Carrin et al., 2001).

## 2.1.1 Out of Pocket Payments

Out-of-pocket payments are direct payments made by a patient to a health care provider, i.e. funds are not channeled via any financing intermediary. User fees paid directly to public health facilities are a form of out-of-pocket payment. Also it consists of another form of out-of pocket payment which is co-payments made by members of a health insurance scheme, which reimburses only a portion of the cost of a health service paid by the members. Finally, out-of-pocket payments are also made to private providers by individuals not covered by any form of health insurance (McIntyre, 2013; McIntyre, 2007)

## 2.1.2   Catastrophic Expenditure

The term 'catastrophic' implies that such expenditure levels force households to drastically reduce consumption of other basic needs, to sell productive assets, or to take high loans, which is likely to lead to impoverishment (McIntyre et al. 2006, ). Findings from a systematic review suggested that healthcare expenditures frequently exceed the threshold of 10 % of household income, which some authors regard as potentially

catastrophic. Other authors also define as health expenditures exceeding 40 % of household income, so no consensus on a threshold exists (Xu et al., 2003).

When people have to pay fee for health care, and the out of pocket payments are so high in relation to their income that it results in "financial catastrophe" for the individual or the household. Such high expenditure for health care can mean that people have to cut down on necessities such as food and clothing, or are unable to pay or withdraw their children from schools or putting them in to government schools (Nasir 2015).

The informal sector workers including smallholder farmers often face health related shocks, such as unpredictable illnesses that weaken their health status. This results into massive loss of income but also meager resources that has been in a hard way saved over a long period of time. In addition to this, if they are not insured they face heavy medical bills while they are unable to work, which consequently impact not only on their economic activities, but also their overall wellbeing. Thus, health insurance if extended to informal sector workers will provide them with financial protection against health shocks thus enabling them to avoid catastrophic consequences of health payments (Mnally, 2013).

### 2.1.3 Informal Sector

The unofficial sector of the economy, in which income and the means used to obtain it are unregulated, and which coexists within a legal and social environment where similar income-producing activities are regulated: in the informal sector, labor relations, where they exist, are based mostly on casual employment, kinship or personal and social relations rather than on contractual arrangements with formal guarantees (McIntyre, 2007).

### 2.1.4 Payment Modalities and Difficulties

To enroll in an insurance program requires paying a premium. The combined premiums constitute the funds up on which the insurance draws in order to compensate members who use insured health care services. However, the lack of money to pay the premium is

the main reason why some people do not become insured. Payment modalities can also present problems. If the annual premium must be paid in a lump sum,( instead of payments spread out over the year),households find it more difficult to pay. Another element is the time, at which the payment is due, because the incomes of workers in the informal or agricultural sectors vary over the course of a year (Morestin and Ridde, 2009: cited in Gebremeskel, 2014). There are measures to promote health insurance membership among the poor.

## Premium Subsidized 100 percent

The poor are insured without having to pay; their premium is paid by a third body. For example, in Rwanda when the first health mutual appeared in 1999, there were local initiatives to pay the premiums for the indigent by certain churches or by the other insured members. In the following years, funding agencies began to intervene, but the initiatives remained circumscribed. In Ghana, the law on national health insurance exempts the poorest from paying the premium. In Tanzania, in the frame work of the Community Health Fund (CHF) that insures the rural population, districts are supposed to pay the premiums of the poorest households (Morestin and Ridde,2009).

In Limu Kossa district, there are 1723 indigent households or poorest households freely get insured and their premium is fully subsidized by local and regional governments in the form of funds. Local and regional governments transfer the premium in to the account of the CBHI office of the district. They will get the same service like any insured household to pay the premium OOP. (Limu Kossa CBHI office report, 2015) There is always an assessment in terms of indigents. Indigents in the last year may not always be indigents. If their income level increases and build the capacity to pay the premium, this household will be replaced by another household who cannot afford the income to pay the premium. This is done based on the community proposal. (Limu Kossa CBHI office, 2015)

## Premium Partially Subsidized

The poor pay part of the premium, and the rest is paid by a third party. In Burkina Faso, Nouna district, in response to the under representation of the poor among the insured, a subsidy of 50 percent of the premium for the poorest household was instituted in 2007. This affects the 20 percent of households that are the poorest, as defined by the community. Thus, these households can insure themselves by paying only the remaining 50 percent. In Ghana, before the implementation of national health insurance in Dangme west consisted of paying 75 percent of the premiums for the poor, who could then obtain coverage by paying the remaining 25 percent. But even minimum‖ premiums that households must still pay are obstacles for the poorest (Morestin and Riddle, 2009).

## Payment of the Premium at Harvest Time

Households in the poorest quintile primarily harvest earnings to pay the premium. If a lump sum payment is required, it must at least be after the harvest. When the program starts and for renewing purpose, Premium payment period of CBHI scheme of Limu Kossa district is at the end of harvesting period in January. Households decided to enroll to the program for the first time can pay their premium based on their own decision.

## 2.1.5 Non- Insured Health Expenses, Co-payments and Post-payment Reimbursement

Health care services utilization depends on numerous factors. Many are outside the control of the insurance companies. However, they have to do with the way insurances work, which allows certain financial obstacles to persist (Morestin and Riddle, 2009).

## Non –Insured Health Expense

These remain entirely the responsibility of the insured. According to the insured of Self-Employed Women's Association (SEWA) in India, an important obstacle to hospitalization is the cost of transportation to the hospital, often very high for those in rural areas, and covered by SEWA (Morestin and Riddle, 2009).

In Limu Kossa district, transportation costs, out-patient bedrooms, food drink and other related costs are entirely the responsibility of the insured. Even the Keble where the insured lives may be run out of road facility, insured households are responsible to come in any way to the health institution to get health care delivery. Car accidents and man accidents are not considered in the insurance (Limu Kossa CBHI office report, 2015).

## Co-payments

Often, even for insured services, the insurance reimburses only part of the expenses and the remainder (co-payment) must be paid by the insured. (Morestin and Riddle, 2009)

## Post –Payment Reimbursement

Some insurance let the insured pay the costs of services and then reimburse them afterward. Yet lack of money is the greatest obstacle for their members when they require hospitalization. People know that if they borrow the money required, the interest will grow while they are waiting for reimbursement from the insurance, which can take weeks or months. Moreover, there are costs associated with the reimbursement process; to obtain the required supporting documents (transportation to the health facility, payment charged by the doctor to reduce the documents); to submit the reimbursement request (transportation to the insurance office); to deposit the reimbursement cheque (transportation to the bank); and all of this, without country the hours of work lost for these activities. (Morestin and Riddle, 2009)

## 2.2. Theories on Decision-Making to Participate in Voluntary Health Insurance

### Consumer Theory

Consumer theory assumes that if consumers are perfectly informed, they maximize their utility as a function of consuming various goods, given relative prices, their income and preferences. Fluctuations in prices and income influence how much of different goods rational consumers will buy. Health insurance is expected to be a normal good with a positive income elasticity of demand, implying that the poor are less likely to insure. A

price increase of substitute for insurance such as user fees is expected to raise the insurance demand, as is a decrease in insurance premium. However, due to uncertainty about the unknown future health, insurance choice decision is not made based on utility alone but also on consumers' expectation about factors such as their health status. Thus, theories on decision-making under uncertainty are generally used to describe insurance enrolment.

## Decision-Making under Uncertainty

Among the theories that analyze decision-making under uncertainty are expected utility, state-dependent utility, endowment effect, status quo bias, regret and disappointment paradigms, and prospect theory.

## Expected Utility Theory

Under expected utility (EU) theory, insurance demand is a choice between an uncertain loss that occurs with a probability when uninsured and a certain loss like paying a premium. This theory considers that people are risk averse and make choices between taking a risk that has different implications on wealth. At the time of insurance choice, consumers are uncertain whether they will be ill or not, and of the related financial consequences. Insurance reduces this uncertainty. Through insurance, they can level out their income over two different states, ill or not ill, which makes the aggregate outcome relatively certain. This certainty enables the insured to reach a higher utility in case of illness than those uninsured. Based on this, the insurance demand reflects individuals' risk aversion and demand for certainty, implying that the more risk averse individuals are, and the more insurance coverage they will buy. This theory is silent about the level of consumers' income and its impact on the insurance choice. EU theory has been criticized. Laboratory studies have shown that the model's prediction of choice behavior is poor, and additional factors need to be included such as the societal context about prudent behavior or regret considerations. Despite these critiques, EU theory is most commonly used in models of decision-making under risk. However, other theories have emerged that aim to account for these drawbacks.

## State-Dependent Utility Theory

State-dependent utility theory suggests that consumers' utility level and tastes are influenced by their state, such as their health or socio-economic status. Based on this, people may have different degrees of risk aversion, which could influence their insurance decision and the magnitude of their expected insurance pay-off. Most people insure when they are healthy. Healthy persons might optimistically expect to remain healthy in the near future, which has implications on the insurance choice. The resulting insurance coverage may be under full loss coverage, if the expected insurance pay-off is below the real loss in case of illness.

## Prospect Theory

Prospect theory questions the assumptions made by expected utility theory, and states that the choice is about predictions of gains or losses, and not the level of uncertainty. Individuals assume an optimal risk level for every expected gain or loss. The point from which an individual perceives gains and losses to occur may influence the choice; and gambles are judged in terms of their deviations from this optimal risk level. Relative to the health insurance context, prospect theory suggests that people insure from a gain viewpoint and not because insurance reduces uncertainty.

## Cumulative Prospective Theory

Cumulative prospective theory combines state-dependent utility and prospect theory: people assign different weights to the probability that an event will occur. Then, they make choices between prospects through the weighted probabilities of losses and gains. However, they tend to overweight small probabilities, whereas high probabilities are underweighted. For example, *over-weighting of small probabilities* explains why people purchase lottery tickets. Applied to the insurance demand, cumulative prospective theory suggests that people insure because they overweight the relatively small probability of the event of illness.

## The Endowment Effect Theory

The endowment effect assumes that decision-making is affected by individuals' risk aversion about something new. People perceive greater costs in giving something up than benefits in acquiring something new. Therefore, they will charge a higher selling price for a good than they would be ready to pay for it. They would rather stay with the old if they do not know whether the benefits of an unknown alternative exceed the costs of giving up something well known. Under the endowment effect, poor individuals will insure if they perceive the benefits of insurance (for example, access to better quality care) as higher than the cost related to giving up being uninsured. But they will most likely remain uninsured if insurance does not improve access to care and eliminate informal under-the table payments charged by providers.

## Status Quo Bias Theory

The status quo bias theory is similar to the endowment effect. Studies suggest that consumers prefer the status quo they are familiar with instead of undertaking an unknown, innovative medical procedure. Apparently, people consider withdrawals from the status quo as more detrimental than beneficial. Besides, individuals tend to stay with the status quo if there is an increasing number of alternatives to choose from, and if choices become more complicated.

## Regret and Disappointment Theories

Regret and disappointment theories are based on the assumption that people have a loss aversion and conservative preferences. Individuals attempt to avoid regret and disappointment and do not just consider the ultimate outcome, as suggested by expected utility theory. They factor in their feelings of regret, in case the decision would have been wrong, and of disappointment, if the outcome does not match to what they have expected.

Despite the criticism of expected utility theory, none of the other decision-making concepts has provided superior results based on empirical findings on individuals' real market decisions (Schneider, 2004).

## 2.3. Empirical Studies on Determinants CBHI Enrollment

Discussion paper on CBHI schemes in developing countries; facts problems and perspectives identified six significant factors influencing CBHI membership; These are affordability of premium, unit of enrollment, distance, timing of collecting, trust and quality of health service (Guy Carrin,2003).

A population based case control study in rural Burkina Faso confirmed positive association between enrolment in CHI and Bwaba ethnicity, higher education, higher socioeconomic status, and while negative association with perception of the adequacy of traditional care, a higher proportion of children living within the household, an increased distance to the health facility, and a lower level of socioeconomic inequality within the community (De Allegri, 2006).

Study conducted by Mnally (2013) examined determinants of Health insurance participation among informal sector workers in rural Tanzania. The result showed that willingness of an informal sector worker to join health insurance scheme was found to be negatively related to the years of experience in current occupation, debt to income ratio and male household head; and positively related to debt and monthly income.

A study by Jutting (2003) identified as income of households, membership in local organization, religion and ethnic group are significant factors affecting household heads participation in community based health insurance schemes in rural Senegal.

Another study conducted by Gebremeskel (2014) also investigated as household size, information, educational status of the household heads and distance from health institution are factors affecting household heads participation in CBHI in kilte Awlaelo district of Tigray Regional State, Ethiopia.

Similarly a study conducted by Haile et al, (2014) identified determinants of willingness to join community-based health insurance among rural households of Debub Bench District, Bench Maji Zone, South west Ethiopia. The study revealed that a number of variables affect the households' decision in willingness to join the proposed community

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based health insurance scheme. Such as age, relationship of the respondent to the household, marital status, occupation, ethnicity of the respondent, family size, educational status, wealth index , annual incomes, self-reported health status of the household, borrowing money for covering treatments, and distance of the house to nearby health care facility were found to be significant predictors for the households' willingness to join decisions.

Based on this review, there are very few studies conducted on determinants of informal sector workers household's participation in CBHI in Ethiopia. Thus, this study, attempts to fill this gap and there is a need to look for policy options which are targeted at enabling higher enrollment of informal sector workers households in community based health insurance.

## 2.4. Conceptual Framework of the Study

As it has been mentioned in the empirical literature review, the result of a study conducted on determinants of health insurance participation among informal sector workers in rural Tanzania showed that willingness of an informal sector worker to join health insurance scheme was found to be negatively related to the years of experience in current occupation, debt to income ratio and male household head; and positively related to debt and monthly income (Mnally, 2013).

By reviewing various empirical literatures and making some modification on conceptual frame work already developed by the above mentioned author, the following conceptual framework is developed for this study.

There are a number of social economic factors such as income, household size, and health status of the households among others. These can make an individual decide to join such service or otherwise. On the other hand, the socio-economic factors are in a constant interaction with knowledge as well as attitudes of the individual about health insurance. This entails background factors such as education, awareness and trust towards such schemes.

Other factors to give emphasis to are those related to institutional systems that support day to day operations of health insurance scheme. These include the health system as a

whole and distance the household from health service. All these factors need a good environment to flourish. Therefore, an enabling environment characterized by presence of well-articulated relevant policies, legislations, laws, regulations and relevant legal instruments are crucial.

**Figure 1** Conceptual framework of Determinants of Informal Sector Workers Enrollment in Community Based Health Insurance
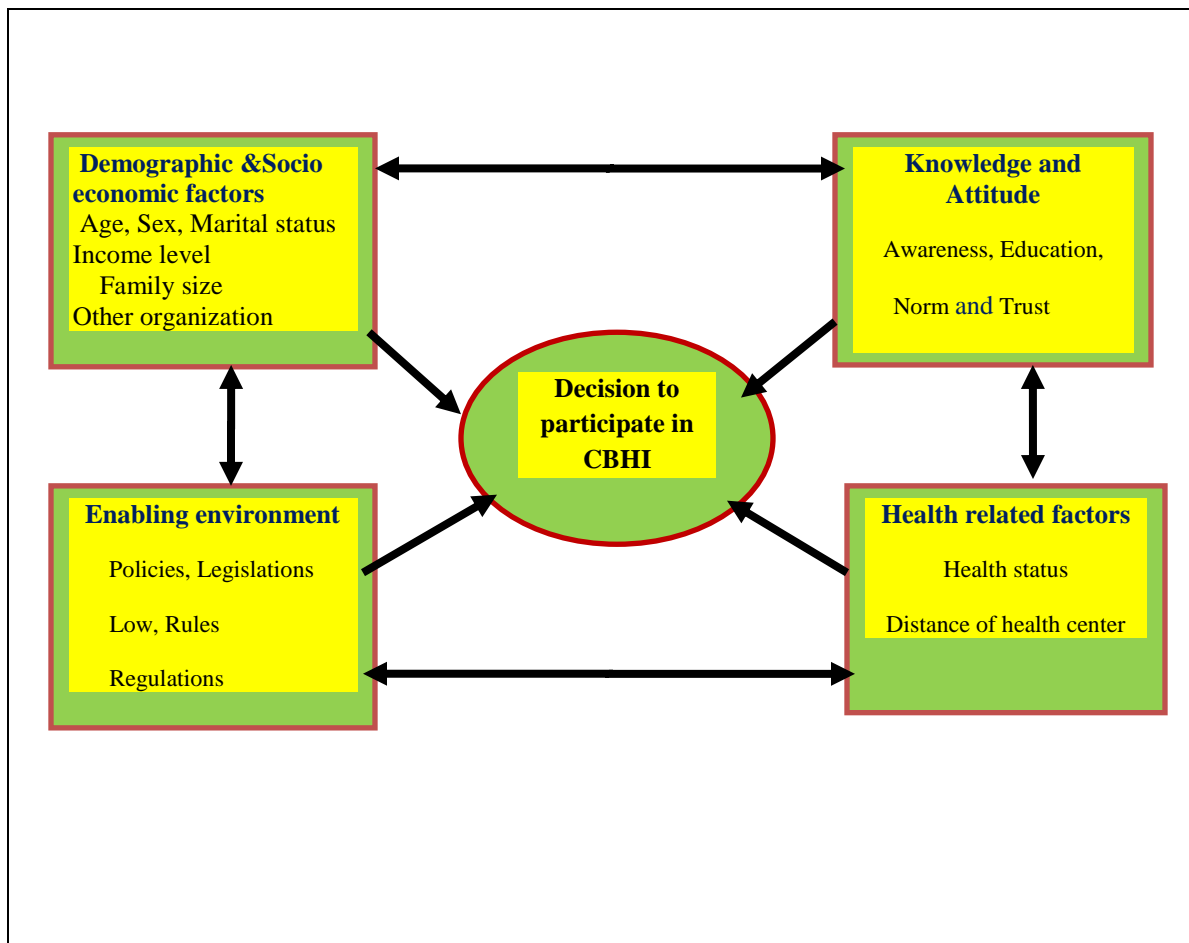


**Source:** Modified from (Mnally,2013)

# CHAPTER THREE

# 3. RESEARCH METHODOLOGY

## 3.1. Description of the Study Area

This study was undertaken in Limu Kossa district. This district is one of districts in Oromia Regional state of South Western Ethiopia. The choice of the study area was based on the fact that Limu Kossa district is among the most productive agro ecological districts in Ethiopia and it has a large proportion of population which is engaged in the informal sector mainly on smallholder agriculture. This district is administratively divided into 44 Keble's. Also the district is located on 75 km from Jimma town to the western direction and on the 432 km from capital city of the Country (Addis Ababa).

**Figure 2** Map of the Study Area
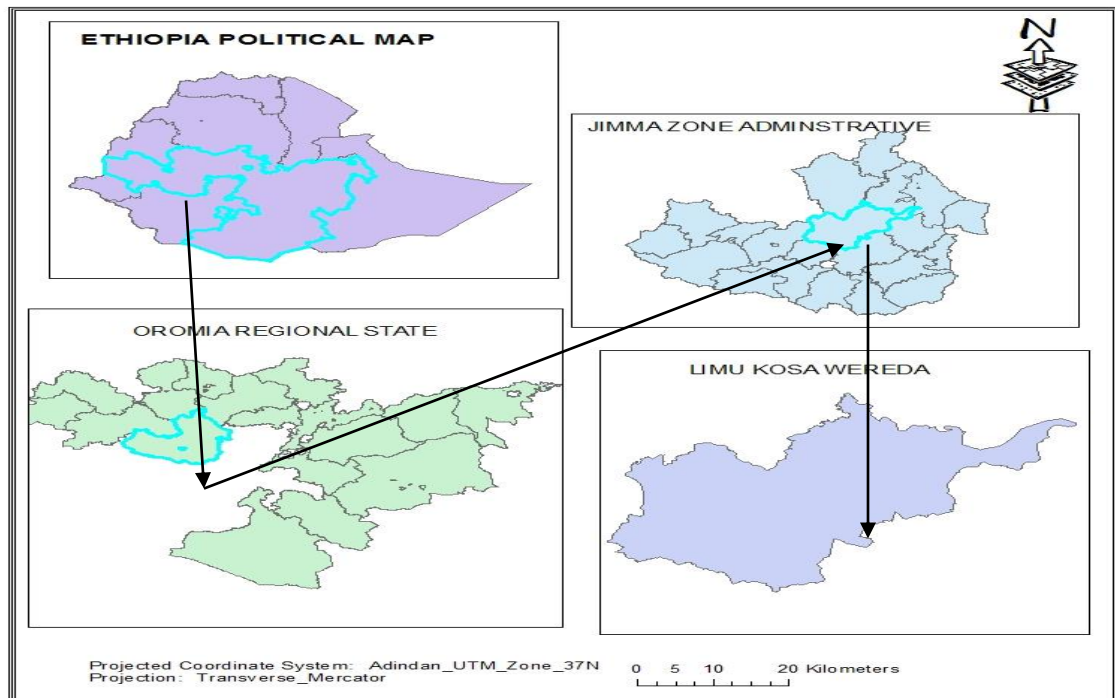


Source: Jimma Zone Rural Land and Environmental protection office (2017)

Agriculture is the largest single sectors in the economy of this district and there are seven 7 health centers and 44health posts constructed by NGO, government budgets and the population. Based on the statistics index 0.21 health posts per 1000 population and 0.036 health center per 1000 population (Limu Kossa FED office 2016 report).

Limu Kossa is one of 13 selected districts in the country for pilot of community based health insurance scheme. CBHI program has been practicing starting from January 2011 and among 44 Keble's 42 are included in this pilot starting from the beginning (Limu Kossa FED office 2016 report).

## 3.2. Research Design

The study used descriptive survey design. Survey design was used because of it's in depth aspect collecting personal information that helps in learning people's attitudes, beliefs, values, behavior, opinions, habits and desires. It would also help coverage of a wide area using representative samples.

## 3.3. Data Source and Sampling Methods

### The Population

According to the 2007 CSA population census, the total population of Limu Kossa District projected to 203,619 people in the year 2016. However, this study has drawn sample data from the population of male and female adult household heads whose major occupation is categorized as informal sector according to the operational definition of the informal employment that their enterprises are neither have formal bookkeeping system nor registered.

## Sources of Data

Relevant data for this study were from primary sources. Primary data comprised of socio-economic characteristics of the respondents, those enrolled in community based health insurance scheme or otherwise and reasons in favor of or against health insurance The data included such variables as monthly income, sex, age, marital status, religion, level of education, awareness, health status, family size, distance from health service, members in other organizations.

## Sample Size

This study used sample size of 396 respondents from 39237 informal sector worker households in the district. This sample was obtained based on the a simplified formula provided by Yamane, (1967) to determine the required sample size at 95% confidence level, degree of variability = 0.5% (0.05 level of significance)and level of precision =10% and

$$n = \frac{N}{1+N(e)2}$$

Where $n$ is sample size, $N$ designates total population and $e$ represents level of precision. This formula leads us to derive 396representative samples from the population of 39,237. Among the determined 396 sample sizes about 58% percent of the samples were the non-participant households and the remaining around 42% percent of the samples were participant in community based health insurance.

## Sampling Technique

Two-stage sampling method was applied to select sample respondents. Primarily, four rural kebeles namely; L/Chime, Tencho, Suntu, and G/Dembi were selected randomly. In the second stage, the study used a systematic random sampling technique by insuring that all parts of the population are represented in the sample in order to increase the efficiency. The population was divided in to two subgroups, insured and uninsured strata and a sample of pre specified size of the population was independently and systematically drawn from the insured and uninsured strata. Based on the data of Limu Kossa CBHI Agency, only 42 percent of informal sector worker households are enrolled in the scheme.

The identity numbers of the houses issued to each house in the Kebles by the administration of the Kebeles were used to develop sampling frames of the households. Informal sector workers household heads whose age is 18 years and above and who lived for more than six months in the Kebles will be eligible for the study. Household heads employed in the formal sectors or those employees of Government and Non-Governmental Organizations will be excluded from the study because, according to the health insurance proclamation of Ethiopia, such households are covered by the social health insurance scheme.

## Data Collection

A major instrument that was used to collect data was a structured questionnaire for cross-sectional data collection. The questionnaire comprises both close and open ended questions. Eight enumerators were chosen and they administer the questionnaire under the close supervision of the principal investigator. They were taken an orientation about the purpose and nature of the questionnaire. These enumerators were selected on the basis of their experience on data collection and on their cloth relation with the people and administration of the study area. All interviews with the respondents were done at a convenient place in the household. Prior to the interview, the respondents were asked for their oral consent to participate in the study after being briefed about its objective.

## 3.4 Method of Data Analysis

### 3.4.1 Descriptive Statistics

Descriptive statistics give a clear picture of the characteristics of CBHI participants and non-participants. By applying descriptive statistics, one can describe, compare, and contrast different categories of sample unit (participant and non-participant households) with respect to the desired characteristics. In this study, descriptive statistics, such as mean, percentages, frequency of occurrence were used, along with econometric models, to analyze the collected data.

### 3.4.2 Econometrics Model

To estimate the determinants of participation in a CBHI, this study followed an approach applied by Jutting (2003). In that approach, participation in a local organization depends on the rational choice of an individual weighting costs and benefits of membership. It is assumed that participation of a household (p) in a mutual depends on: the current income of the household (y), characteristics of the household head (H) who decides if the household joins or not, household characteristics (Z), community characteristics (C) and on the error term u, which is un covariant with the other regresses.

The following equation describes the model:

**$P_i = f(Y_i, Z_i, H_i, C)$**

Since our dependent variable is dichotomous, logistic regression is well suited for describing and testing hypothesis about relationships between categorical or continuous predictor variables (Joanne, 2002). Thus, in order to estimate the probability of participation, we use a binary logit model:

The logit distribution function for the participation in CBHI is specified as:

$$P_i = E\left(y = \frac{1}{xi}\right) = \frac{1}{1 + e^{-(\beta1 + \beta2Xi)}} \quad \text{------------------------------ (1)}$$

$$P_i = \frac{1}{1 + e^{-z_i}} = \frac{e^z}{1+e^z} \quad \text{---------------------------------------------- (2)}$$

Where:

$Z_i = \beta_1 + \beta_2 X_i$

$P_i$ is the probability of enroll/participating in CBHI

    $1-P_i$ is the of not participating in CBHI

Therefore we can write

$$\frac{P_i}{1-P_i} = \frac{1+e^{z_i}}{1+e^{-z_i}} = e^z \quad \text{----------------------------------- (3)}$$

Now simply $\frac{P_i}{1-P_i}$ is the odds ratio

If we take the natural log of the above equation we obtain

$$L_i = ln\left(\frac{P_i}{1-P_i}\right) = Z_i \text{----------------------------------------} \quad (4)$$

$= \beta_1 + \beta_2 X_i$

L is the log of the odds ratio, is not only linear in *X*, but also linear in the parameters.

L is called the logit, and hence the name logit model for models (Gujarati, 2004).

Thus, logistic regression model that is employed in this study while the dependent variable is Y and independent one X is:

**logit** (*y*) = **ln**$\left(\frac{P_i}{1-P_i}\right)$ = $Z_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \text{-------} \beta_n X_{in} + U_i$

$$Z_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \text{........} \beta_n X_{in} + U_i$$

## 3. 5.Specification and Explanation of Variables

The variables used in the analysis and their theoretical expectations of these variables on non-participants of CBHI are explained below. These variables are chosen based on the available

literature. In order to make the estimation of the model more clear and make it easier for the reader to understand, the variables used are discussed below.

**Dependent variable of the model (CBHI):** The dependent variable for logit analysis is dichotomous dependent variable (participation in CBHI or otherwise). It is represented in the model by "0" for those who don't participate in CBHI scheme and"1" for participants in CBHI scheme.

**Independent variables:** Based on literature review and past experience, the following factors are expected to influence the participation in CBHI scheme.

**Age of household head (age):** It is a continuous variable, defined as the household heads age at the time of the study measured in years. Haile et al. (2014) found that negatively association between age of household heads and decision to participate in CBHI while Jutting, (2003) revealed a positively association between participation in CBHI and age of household heads. Despite, the above in concurrent findings this study expected that as family heads get older they need security in other words health insurance to enable them prevent from highest risk of finance. So that, the older household heads are expected to likely participate in the scheme than the younger.

**Sex (SEX):** Sex is a dummy variable which explains whether the household leader is male or female and coded in the model by "1" if the household head is female and "0" if household head is male. Mothers and fathers have difference concentrations in their life. Mnally (2013) found that female household heads are likely to participate in CBHI than male household heads. Thus, this study also hypothesized the more likely participation of the female headed households than the male headed households.

**Household size (famsiz):** Household size is a continuous variable which explains whether the household have more members or not and directly affects the household heads decision to participate in community based health insurance. Study by Gebremeskel (2014) revealed that as number of the household members increase the probability of household heads participation in CBHI also increase. This study also

expected a positive association between household size and participation of household heads in CBHI.

**Marital status (MARST):** Marital status is a dummy variable that distinguishes between widow, single (never married), divorced/separated, with married or living as a couple as the reference category. A single decision maker in a household and a decision of composition of two people may not be the same. Haile et al. (2014) elicited that in comparison to married the spouse, divorced and widowed are less likely to join CBHI. Thus, in this study also married households are expected to be more likely to participate in CBHI than those spouse, divorced and widowed households.

**Religion (RELIG):** Religion is a dummy variable representing the religion of household heads and coded in the model by "1" for those household heads in Islam religion and "0" for those in all other religions. Religion also affects whether households participate in community based health insurance. There are believes which restrict people not to use and get additional interest on money they save or earn and this also expected as it can affect decision of household heads to participate in CBHI. So that, this study also expected that religion can affect household heads decision to participate in CBHI.

**Educational status of the household head (EDUS):** It is a dummy variable and 1 is assigned for literate, 0 for illiterate. Gebremeskel (2014) revealed that as educational status of the household leader increases the probability of the household participating in CBHI program also increases. This means literate household leaders expected to have better participation in CBHI program than of illiterate household leaders. This study also expected to confirm positive association between educational status and participation in CBHI program.

**Number of illness cases (illcases):** It is one of the proxies of health status and explains the number of illness cases faced by households in the last six months. As number of illness cases in the household increase the probability of participating in CBHI also increases. This indicates households with poor health status exhibits higher participation in CBHI than those households have better health status because of the need to reduce high financial risk.

**Presence of Chronic disease (CHRON):** CHRON represents the other proxy of health status and it is also a dummy variable coded in the model as "1" if there is chronic disease in the household and as "0" if there is no any chronic disease in the households. Households those have chronic disease are expected to be more likely to participate in CBHI than those households haven't chronic disease.

**Annual expenditure (expenditure)**: It is a continuous variable that explains the total expenditure of households that they spend on food, clothing, purchase of inputs and others. Jutting (2003) found that household income has a positive influence on the households decision to participate in CBHI and that the poorer strata of the population will not participate due to difficulties in paying the premium. This study also hypothesized that household's those have higher annual expenditure are more interested to become a member in the insurance than households those have lower annual expenditure.

**Information (INFOR):** It is a dummy variable which distinguishes between household heads those informed about CBHI scheme and those not informed about the scheme and consider "1" if the household heads are being informed about the scheme and "0" if they are not informed about the scheme. Gebremeskel (2014) identified that the positive association between being informed of the household heads about the scheme and decision to participate in CBHI. This study also expected that the more likely participation of the informed households than those not informed household heads.

**Distance from health institution (distahealthcn):** Distance from health institution indicates that the time taken to reach the nearest health center from the respondents' home. Haile et al. (2014) found that a negatively association between the distance of the nearest health center and decision of household heads to participate in CBHI. This implies as distance of health institution from home increases, people opened for additional transportation and other health related costs like bedroom and food, then decrease their interest to enroll in the program. Thus, this study expected to confirm this negative relationship between distance and enrollment.

**Other organization (COOPM):** It is a dummy variable which explains whether the household heads are member in local or Agriculture cooperatives and represented in the model by "1" for those household heads member in cooperatives and "0" for those are not member in cooperatives. Jutting (2003) found that as people who already have experience of participation in local organizations are more likely to be willing to join a mutual insurance than people who have no such experience. Thus, we also assume a positive relationship between membership in Agricultural Cooperatives and membership in Community Based Health Insurance.

**Table 1** Summary of Major Explanatory Variables and their Expected Sign

| Explanatory Variables | Description | Expected sign |
|---|---|---|
| SEX(dummy) | Female headed household(yes=1) | + |
| Age | Household heads age | + |
| EDUS(dummy) | Household heads those at least have ability to read& write (yes=1) | + |
| MARST(dummy | Marital status of household head | |
| | Married(reference group) | |
| | Single | - |
| | Widowed | - |
| | Divorced | - |
| famsiz | Family size of the household | + |
| Religion(dummy) | Household heads religion(Muslin=1) | |
| Expenditure | Households annual expenditure | + |
| Proxy of health status | Number of illness cases in the house hold in last six months(illcases) | + |
| | Presence of at least one household member with chronic disease(CHRON)(yes=1) | + |
| INFOR(dummy) | Information about CBHI (yes=1) | + |
| COOPM (Other organization) | Particiation in development cooperatives (yes=1) | + |
| Distancehealthcen | Distance of the household head from the health institutions | - |

# CHAPTER FOUR

## 4. RESULT AND DISCUSSION

This chapter presented and discussed the results of the analysis on determinants of households' participation in Community Based Health insurance. Descriptive statistics were used to summarize the data. The description was made using frequency distribution, mean and standard deviation. Statistical tests like; chi-square test was employed to see association between the dependent and dummy independent variables and t-test was employed to identify differences between dependent and continues independent variables. In addition, an econometric model of Binary logit was applied using STATA version 13 to identify major determinants of households' participation in Community Based Health Insurance.

### 4.1 Descriptive Results

### 4.1.1 Characterization of Participants and Non-Participants by Demographic and Socio Economic Factors

### Sex of household heads

Sex is one of the variables that can explain households' participation in community based health insurance. As indicated in Table 2, out of the sampled households 381 (96.2%) were male and the remaining 15 (3.8%) were female. Of the total sampled households, 11 (5%) of the non-participants were female headed households where as 205 (95%) of the non-participants were male headed households. On the other hand, 4 (2.2%) of the sampled participant households were female headed households where as 176 (97.8%) of the sampled participant households were male headed households. Based on Table 2 the chi- square value ($\chi^2$= 2.2; P=0.13) showed that there was no statistically significant association between decision to participate in CBHI and sex of household heads. This implies that being male or female headed household had no statistically significant effect on decision of the household heads to participate in CBHI.

## Marital status of household heads

The marital status of the head of the households also affects the participation of the households. Of the total sampled household heads, 370 (93.4%), 26 (6.6%) were married and single respectively (Table 2). Among the non-participants 199 (92.1%) were married whereas 17 (7.9%) of them were single. On the other hand, 171 (95%) of the participants were married whereas 9 (5%) of the participants were single. Regarding its association, the chi-square test indicated that there had no statistically significant association between marital status and decision of the household heads to participate in CBHI ($\chi^2 = 1.32$; P = 0.25). Therefore, the result in this study clearly showed that being married or unmarried had no significant effect the informal sector workers households' participation in CBHI.

## Education level of household heads

Education enhances the capacity of individuals to obtain, process, and utilize information through different sources. It is required to make participation decision. As a result, level of education of the head of the households influences the CBHI participation of the households. According to the survey result, participants and non-participants who were illiterate were 28 (32.2 %) and 59 (67.8%) respectively and from the participants and non-participants who were literate were 152 (49.2 %) and 157 (50%) respectively. The chi-square value ($\chi^2=7.91$; p= 0.005) of the sampled households indicated that there were statistically significant difference between educational status of household heads those are participants in CBHI and those are not-participants in CBHI (Table 2). The percentage difference between participants and non-participants in terms of literacy level may mean that literate household heads had more exposure to the external environment and information which helps them to easily associate them to participate in community based health insurance. This implies that literate household heads were likely to participate in community based health insurance than those illiterate household heads.

**Table 2** Characterization of Participants and Non-Participants Households by Demographic Factors

| Variables | | | Participant (N=180) | Non-participant (N= 216) | Total (396) | $\chi^2$-value |
|---|---|---|---|---|---|---|
| **Sex** | Female | N | 4 | 11 | 15 | |
| | | % | 2.2 | 5 | 3.8 | 2.22 |
| | Male | N | 176 | 205 | 381 | |
| | | % | 97.8 | 95 | 96.2 | |
| **Marital Status** | Married | N | 171 | 199 | 370 | |
| | | % | 95 | 92.1 | 93.4 | 1.32 |
| | (Single, divorced &widowed) | N | 9 | 17 | 26 | |
| | | % | 5 | 7.9 | 6.6 | |
| **Educational status** | illiterate | N | 28 | 59 | 87 | |
| | | % | 32.2 | 67.8 | 22 | 7.92*** |
| | Literate | N | 152 | 157 | 309 | |
| | | % | 49.2 | 50.8 | 78 | |

***Significant at 1%      **Significant at 5%

**Source:** Own field survey data (2017)

## Age of household heads

The average age of the household heads was 40.8 years. The average age of the participants and non- participants were 43.5 and 38.72 years respectively and the standard deviation of the age of participants and non-participants were 10.24 and 8.61 years accordingly. Thus, the average age of sampled households indicated that average age of participants was greater than that of non-participants. The t-value (t=5.04; P=0.000) showed that as there was statistically significant difference between the mean age of participants in CBHI and non-participants in CBHI with respect to their age. Thus, age was found to have a significant effect on decision of household heads to participate in CBHI. The possible explanation here was as the mean age of participants were relatively higher than that of the non-participants indicates age of household head had positive association with participation in community based health insurance.

## Family size of sample households

The size of the family is also an important factor for the participation of the households. Accordingly, the average family size of the sampled household was 5.17. The result indicated that the average family size of the sampled participants and non-participants was 5.79 and 4.67 respectively and the standard deviation of the family size of participants and non-participants was 2.10 and 2.013. Based on Table 3, the t- value (t = 5.43; P=0.000) showed that there was statistically significant association between decision to participate in CBHI and family size of the households. Thus, the average result revealed that there was large difference among the family size of the participants and non-participants with respect to their family size. The variation of family size of the two groups showed a larger difference and this descriptive result indicated that there were significant effect on households' participation decision.

**Table 3** Characterization of Participants and Non-Participants by Age and Family Size

| Variables | | Participant (N=180) | Non-participant (N=216) | Total (396) | t-value |
|---|---|---|---|---|---|
| **Age** | *mean* | 43.5 | 38.72 | 40.89 | |
| | *std* | 10.24 | 8.61 | 9.67 | 5.04*** |
| **Family size** | *mean* | 5.79 | 4.67 | 5.17 | |
| | *std* | 2.10 | 2.01 | 2.13 | 5.43*** |

**Std** = standard deviation

**Source:** Own field survey data (2017)

## Religion of household heads

Religion plays an important role in affecting the participation decision of the households. The survey result revealed that 337 (85.1 %) of the sampled households belongs to Islam and 59 (14.9 %) of them belongs to Christians. Among the total non-participant sampled households, 179 (82.87%) were Islam religion followers whereas the remaining 37 (17.13%) were Christians and other religion followers. Of the total participants, 158 (87.77%) were Islam religion followers whereas 22 (12.23%) were Christian and other religion followers. Based on Table 4, the chi-square value ($\chi^2$ =1.86; p= 0.17) of the sampled households indicated that there was no statistically significant association between religion and decision of household heads to participate in CBHI.

**Table 4** Characterization of Participants and Non-Participants by Religion

| Variables | | | Participation status | | | |
|---|---|---|---|---|---|---|
| | | | Participant | Non-participant | Total | $\chi^2$-value |
| | | | (N=180) | (N=216) | (396) | |
| Religion | Islam | N | 158 | 179 | 337 | |
| | | % | 82.87 | 87.78 | 85.1 | |
| | | | | | | 1.86 |
| | Christian& Others | N | 22 | 37 | 59 | |
| | | % | 12.23 | 17.12 | 14.9 | |

**Source:** Own field survey data (2017)

## Annual expenditure of sample households

As shown in Table 5, the result tried to find out the sampled households spent their incomes on and the expenditure of the money of the sampled households. The result indicated that a significant number of sampled households spent their income on food, clothing and purchase of inputs. The annual expenditure of the sampled households was calculated in ETB. The average annual expenditure of the participants and non-participants was 14077.4 and 10950.2 ETB and the standard deviation of the annual expenditure of participants and non-participants was 10928.9 and 5744.9 ETB respectively. The result revealed that households those are participants in CBHI spent more than those non-participants households. The t-value (t=3.64; P=0.00) showed that there was statistically significant difference between the annual expenditure of the insured and uninsured households with respect to their expenditure. So that, this result indicates a positive association between households expenditure and decision of household heads to participate in CBHI.

**Table 5** Characterization of Participants and Non-Participants by Annual Expenditure

| Variables | | Participation status | | | |
|---|---|---|---|---|---|
| | | Participant | Non-participant | Total | **t**-value |
| | | (N=180) | (N=216) | (396) | |
| | *mean* | 14077.4 | 10950.2 | 12371.63 | |
| **Annual Expenditure** | *std* | 10928.9 | 5744.9 | 8632.6 | 3.64*** |

**Source:** Own field survey data (2017)

## Information about CBHI

Having information about the CBHI also affects the participation of the households. Of the total sampled household heads, 320 (80.81%), 76 (19.19%) were have information and haven't information about CBHI respectively. Among the non-participants 143 (66.2%) were informed whereas 73 (33.8%) of them were not informed. On the other hand, 177 (98.3%) of the participants were those have information whereas 3 (1.7%) of the participants were haven't information about the scheme. This result revealed that households those have information about CBHI were better in participating in CBHI than those haven't information. In addition, regarding the source of information among those informed household head 19 (5.9%) of them were got information from News/Medias, 280 (87.23%) of them were from Meeting/gatherings and 17 (5.30%), 5 (1.56%) were from neighborhoods/friends and other sources respectively. According to this result meeting/gatherings is used as the major source of information about the scheme. The chi-square value ($\chi^2$=65.35; p= 0.000) of the sampled households indicated that there were statistically significant difference between having information about CBHI of the insured and uninsured household heads (Table 6). This implies that households those are more informed about CBHI were likely to participate in community based health insurance than those are not informed about the scheme.

**Table 6** Characterization of Participants and Non-Participants by Information

| Variables | | | Participant | Non-participant | Total | $\chi^2$-value |
|---|---|---|---|---|---|---|
| | | | (N=180) | (N=216) | (396) | |
| Information | **Informed** | *N* | 177 | 143 | 320 | |
| | | *%* | 98.3 | 66.2 | 80.81 | |
| | **Not Informed** | *N* | 3 | 73 | 76 | 65.35*** |
| | | *%* | 1.8 | 33.8 | 19.19 | |

**Source:** Own field survey data (2017)

## Participation in other organizations

The participation of the household heads in other organizations also affects the participation of the households in community based health insurance. To identify whether or not participation in other organization can determine the level of participation in community based health insurance this study emphasized on being member of household heads in Agricultural Cooperatives. Based on this, of the total sampled household heads, 270 (68.2%), 126 (31.8%) were cooperative members and not members respectively. Among the non-participants 112 (51.85%) were cooperative members whereas 104 (48.15%) of them were not members. On the other hand, 158 (87.8%) of the participants were cooperative members whereas 22 (12.2%) of the participants were not members. Based on table 7, the chi-square value ($\chi^2$=58.41; p= 0.000) of the sampled households indicated that there were statistically significant difference between being member in cooperatives of participants in CBHI and non-participants in CBHI household heads. This implies that households those are members in cooperatives were likely to participate in community based health insurance than those are not members in cooperatives.

**Table 7** Characterization of Participants and Non-Participants membership in Other Organizations.

| Variables | | | Participation status | | | |
|---|---|---|---|---|---|---|
| | | | Participant | Non-participant | Total | $\chi^2$-value |
| | | | (N=180) | (N=216) | (396) | |
| Cooperative member | Yes | *N* | 158 | 112 | 270 | |
| | | *%* | 87.8 | 51.85 | 68.2 | |
| | No | *N* | 22 | 104 | 126 | 58.41*** |
| | | *%* | 12.2 | 48.15 | 31.8 | |

**Source:** Own field survey data (2017)

## 4.1.2. Characterization of Participants and Non-Participants by Health Related Factors

### Physical distance from nearest health institutions

Table 8 shows the distance in minute that the potential beneficiaries traveled on foot for using health services in health institutions. The average distance traveled by participants and non-participants to their nearest health institution was 46.87 and 57.12 minute and the standard deviation of the average distance to their nearest health institution of participants and non-participants were 41.60 and 43.77 km. The t-value (t=-2.37; P=0.018) showed that as there was statistically significant difference between the mean distance to the health center of the insured households and uninsured households with respect to distance from the health institution. The result indicated that participants traveled relatively shorter distance than non-participants to seek service from nearest health institutions. Households located relatively in near distance from health institutions shows greater participation in community based health insurance than households located in farer to health institutions.

**Table 8** Characterization of Participants and Non-Participants by Distance from the Nearest Health Institutions

| Variables | | Participation status | | | |
|---|---|---|---|---|---|
| | | **Participant** | **Non-participant** | **Total** | **t**-value |
| | | **(N=180)** | **(N=216)** | **(396)** | |
| **Distance of the Health Center** | *mean* | 46.87 | 57.12 | 52.46 | |
| | *Std* | 41.60 | 43.77 | 43.05 | 2.37** |

**Source:** Own field survey data (2017)

## Health Status of the households

The health status of household is one the major factors in determining households participation in community based health insurance. Health status was proxyed in to presence of chronic illness in the household and number of illness cases in the households within the last six months. According to the survey result, participants and non-participants those faced illness cases in the last six months were 135 (47.37 %) and 150 (52.63%) respectively and from the participants and non-participants did not face illness were 45 (40.54 %) and 66 (59.46%) respectively. Based on Table 9, the chi-square value ($\chi^2$ =1.5; p= 0.220) of the sampled households indicated that there was no statistically significant association between number of illness cases in the household and decision of household heads to participate in CBHI.

Besides, participants and non-participants those have chronic diseases were 40 (66.7 %) and 20 (33.3%) respectively and from the participants and non-participants those have not chronic diseases were 140 (41.66 %) and 196 (58.34%) respectively. The chi-square value ($\chi^2$ =12.83; p= 0.000) of the sampled households indicated that there were statistically significant association between presence of illness cases in the household and decision of household heads to participate in CBHI. This implies that households those have chronic disease in the households were likely to participate in community based health insurance than those have not chronic disease in the households.

**Table 9** Characterization of Participants and Non-Participants by Health Status of the Participants

| Variables | | | Participation status | | | |
|---|---|---|---|---|---|---|
| | | | Participant | Non-participant | Total | **t**-value |
| | | | **(N=180)** | **(N=216)** | **(396)** | |
| **Illness cases** | **Yes** | *N* | 135 | 150 | 285 | |
| | | *%* | 47.37 | 52.63 | 71.97 | |
| | **No** | *N* | 45 | 66 | 111 | 5.32 |
| | | *%* | 40.54 | 59.46 | 20.03 | |
| **Chronic Diseases** | **Yes** | *N* | 40 | 20 | 60 | |
| | | *%* | 66.7 | 33.3 | 15.15 | |
| | **No** | *N* | 140 | 196 | 336 | 12.83*** |
| | | *%* | 41.66 | 58.34 | 68.85 | |

**Source:** Own field survey data (2017)

## 4.2. Reasons for Participation and Not-Participation in Community Based Health Insurance

### 4.2.1 Reasons in Favor of Community Based Health Insurance

The most critical reasons those enhancing participation in community based health insurance are the fact that the benefit which can obtained from CBHI and the schemes provide low cost or affordable means to health financing. These facts are supported by the largest proportion of respondents who mentioned that as they are enrolling in community based health insurance scheme because of its benefit (40%) and it enables them to access health services with a minimum cost (32.8%). Another important reason cited by the respondents is that being a member of health insurance scheme enables one to access health services without paying out of pocket medical fees (10.2%).

There are other reasons which contribute to such decision to participate in community based health insurance including timely access of health services (7.3%); it helps poor people to access health services when they become ill and to get treatment free of charge (2.3%) and hearing favorable views from others (3.4%). Further reasons cited include for solidarity; because of frequent illness cases; and paying low membership fee (4%).Figure 3 displays pertinent factors which attract the informal sector workers to participate in community based health insurance.

**Figure 3** Respondents Reasons to Participate in Community Based Health Insurance
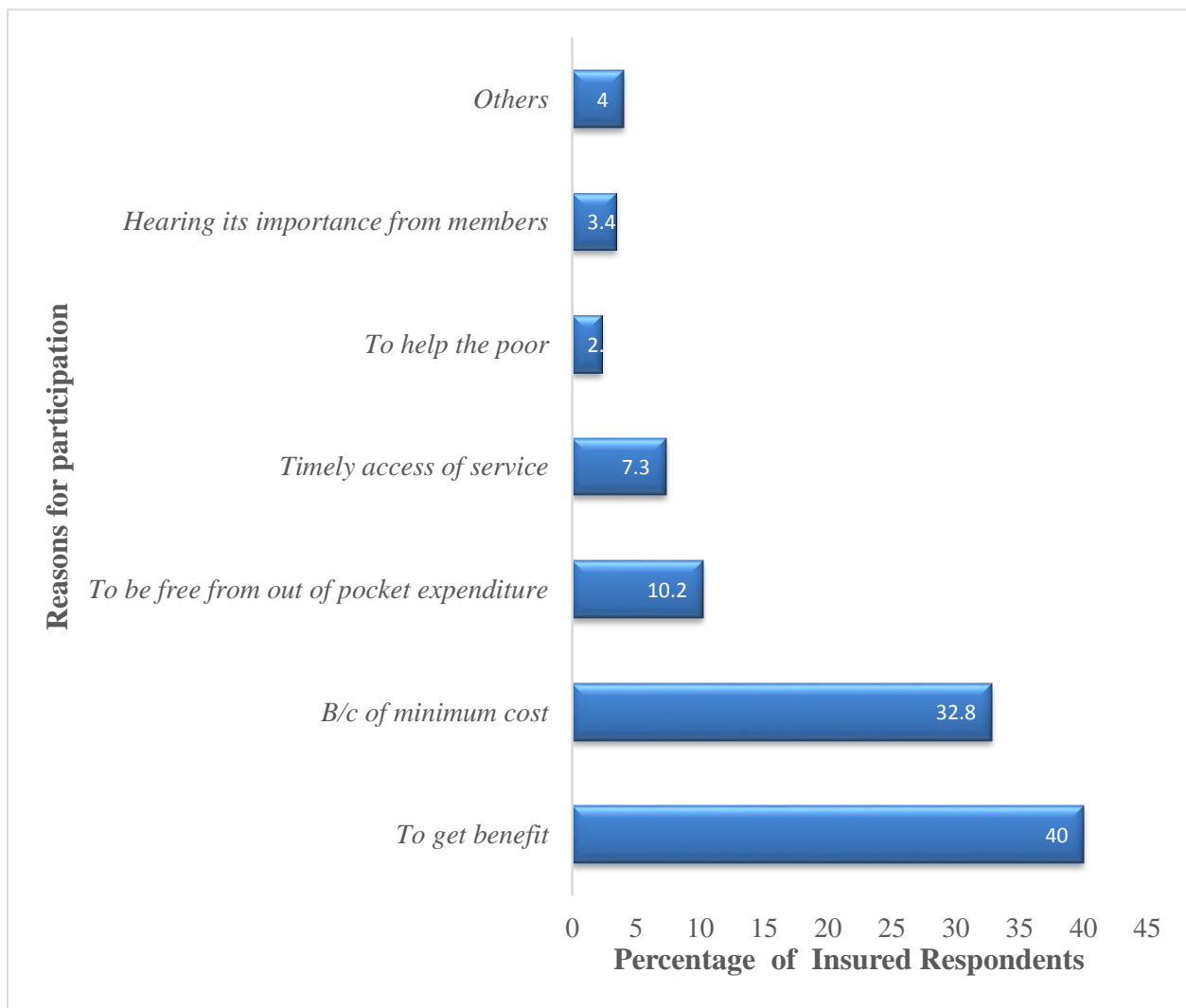


Source: Own computation

## 4.2.2. Reasons against Community Based Health Insurance

The critical question of the study was what the factors are, reasons or issues that may lead to low acceptance of community based health insurance schemes among the informal sector workers typically in Limu Kossa district of Jimma Zone, Ethiopia The most critical reason that creates low participation in the scheme was lack of sufficient income, cited by 40% of the respondents who were not participating in community based health insurance scheme. The second critical reason was lack of knowledge about such schemes cited by 24% of the unwilling respondents; and reluctance to pay membership fee when one is not sick cited by 8%.

In addition reasons against health insurance schemes were because current members are not getting good health service (6%); because current members are not free from out of pocket expenditure (3%); late established households (2%); and religious belief (1%).Other reasons such as: expensiveness, reimbursement problem and private problem account for (16%)

Accordingly, among the reasons of being reluctant to participate in community based health insurance the major were shortage of income and lack awareness about the scheme respectively.

**Figure 4** Respondents' Reasons to Not-Participate in Community Based Health Insurance
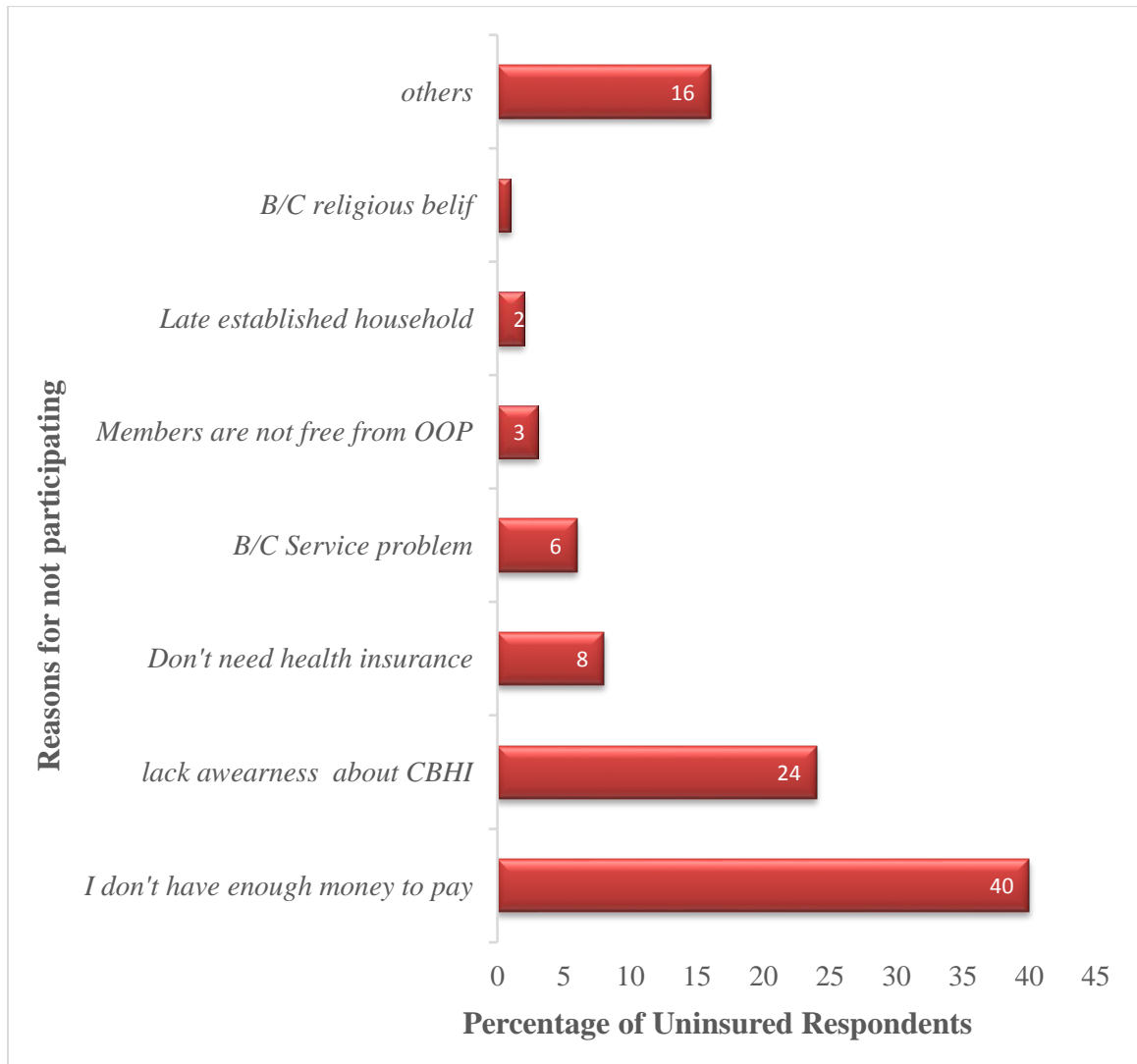


Source: Own computation

## 4.3. Factors Affecting Households Participation in Community Based Health Insurance

The dependent variable households' participation in community based Health Insurance takes value of one if the households participate in the CBHIs, and zero otherwise. Binary logit model identifies characteristics that stimulate households to participate in community based health insurance as opposed to those who do not.

Before running the Binary logit model, different tests were carried out. The technique of variance inflation factor (VIF) was employed to detect the problem of multi-co linearity among the continuous variables. According to Gujarati (2003), VIF can be defined as: VIF

$$(xi) = 1/1-Ri^2$$

Where, $Ri^2$ is the square of multiple correlation coefficients that results when one explanatory variable (Xi) is regressed against all other explanatory variables. The larger the value of VIF the more collinear the variable Xi is. As a rule of thumb, if the VIF of a variable exceeds 10, there is a multi-co linearity problem. The VIF values displayed below (Table 10) have shown that all the continuous explanatory variables have no multi-co linearity problem.

**Table 10** Variance Inflation Factor for Continuous Variables

| Variable | VIF | 1/VIF |
|---|---|---|
| famsiz | 1.18 | 0.848975 |
| expenditure | 1.11 | 0.900694 |
| illcases | 1.11 | 0.903583 |
| age | 1.08 | 0.924134 |
| distahealthcen | 1.01 | 0.989351 |
| **Mean VIF** | 1.10 | |

**Source:** Computed from own survey data (2017)

Similarly, contingency coefficients were computed to check the existence of multi-co linearity problem among the discrete explanatory variables. The contingency coefficient is computed as:

$$C = \sqrt{X^2/N+X^2}$$

Where, C= Coefficient of contingency,

$\chi^2$ = Chi-square random variable and N = total sample size.

The result showed that in all cases contingency coefficient is less than one so that there was no high degree of association? The decision rule states that when the result approaches to 1(one) indicates the existence of multi-co linearity whereas values less than 0.75 indicate as there is no problem. The values of the contingency coefficients implied that there was no multi-co linearity problem among the explanatory dummy variables (Table 11).

**Table 11** Contingency Coefficients for Dummy/ Discrete Variables

| | SEX | EDUS | RELIG | CHRON | INFOR | COOPM | Married | single | divorced | widowed |
|---|---|---|---|---|---|---|---|---|---|---|
| SEX | 1.0000 | | | | | | | | | |
| EDUS | 0.1823 | 1.0000 | | | | | | | | |
| RELIG | 0.0656 | 0.0178 | 1.0000 | | | | | | | |
| CHRON | 0.0637 | 0.0649 | 0.0977 | 1.0000 | | | | | | |
| INFOR | 0.2056 | 0.0821 | 0.1382 | 0.1165 | 1.0000 | | | | | |
| COOPM | 0.0065 | 0.0042 | 0.0796 | 0.0770 | 0.2040 | 1.0000 | | | | |
| Married | 0.5883 | 0.1548 | 0.0322 | 0.0302 | 0.1297 | 0.0378 | 1.0000 | | | |
| single | 0.1596 | 0.0328 | 0.0407 | 0.0106 | 0.0244 | 0.0210 | 0.5417 | 1.0000 | | |
| divorced | 0.1742 | 0.0214 | 0.0515 | 0.0032 | 0.0806 | 0.0094 | 0.5060 | 0.0193 | 1.0000 | |
| widowed | 0.6104 | 0.2443 | 0.0276 | 0.0571 | 0.1517 | 0.0825 | 0.6356 | 0.0243 | 0.0227 | 1.0000 |

**Source:** Computed from own survey data (2017)

Table 12 depicts the results of the Binary logit model estimations of factors significantly influencing the decision to participate in community based health insurance and the model was found to be significant at 1% significance level. The logit model analysis emphasizes on considering the combined effect of variables between participant and non-participant households in the study area. Therefore, the emphasis is on analyzing the variables together, not one at a time. Out of the total variables; eight of the variables were found to be significant while the remaining were not significant in explaining the variations in the dependent variable.

The maximum likelihood estimates of the Binary logistic regression model showed that age of head of the households, education level of head of the households, annual income, annual expenditure, participation in other organizations, distance of the household from nearest health institutions and level of information about CBHI were important factors influencing decision to participate in community based health insurance of household heads in the study area. Other variables such as sex, marital status, family size and religion were not powerful in explaining household heads participation in community based health insurance.

**Table 12** Maximum Likelihood Estimates of the Binary Logistic Model

| Explanatory Variables | Coefficient. | Std.Err. | Z | P> \|Z\| | Odds. Ratio |
|---|---|---|---|---|---|
| Sex of household heads(Male=1) | -1.120786 | 1.143939 | 0.98 | 0.327 | .3260236 |
| Age | .0633821 | .0165285 | 3.83 | 0.000*** | 1.065434 |
| Family size of household heads | .0110505 | .0719024 | 0.15 | 0.878 | 1.011112 |
| Educational Status(Literate=1) | 1.018535 | .3502210 | 2.91 | 0.004*** | 2.769134 |
| Marital Status(Married reference) | -- | -- | -- | --- | --- |
| single | 1.149436 | 1.018178 | 1.13 | 0.259 | 3.156411 |
| divorced | .5069476 | 1.051902 | 0.48 | 0.63 | 1.660216 |
| widowed | .7302667 | 1.256498 | 0.58 | 0.561 | 2.075634 |
| Religion (Muslim=1) | -.147128 | .4216854 | 0.35 | 0.727 | .8631838 |
| Annual Expenditure | .0000814 | .0000255 | 3.2 | 0.001*** | 1.000081 |
| Presence Chronic diseases (Yes=1) | .2154764 | .4290165 | 0.5 | 0.615 | 1.240453 |
| Number of Illness cases | .1459113 | .0812886 | 1.79 | 0.073 | 1.157094 |
| Information about CBHI(Yes=1) | 3.771455 | .6857521 | 5.5 | 0.000*** | 43.44322 |
| Member in Cooperatives (Yes=1) | 1.547627 | .3167096 | 4.89 | 0.000*** | 4.700305 |
| Distance from health center | -.008789 | .0030533 | 2.88 | 0.004*** | .9912498 |
| _cons | -8.836552 | 1.225018 | 7.21 | 0.000*** | .0001453 |

| | |
|---|---|
| Logistic regression | Number of obs  = 396 |
| | LR chi2(14)  =  188.80 |
| | Prob > chi2  =  0.0000 |
| Log likelihood = -178.44675 | Pseudo R2    =  0.3460 |

Notes: Odds ratio shows the predicted changes in odds for a unit increase in the predictor.

*** = Significant at 1%     ** = Significant at 5%

## 4.3.1. Interpretation of the Model Results

The Binary logit model result, the maximum likelihood estimates revealed that household participation in community based health insurance is determined by the interaction of different potential demographic, socio-economic and health institutions related variables. To test the measure of goodness of fit in logistic regression analysis, the likelihood ratio test that says chi-square distribution with degree of freedom (df) equal to number of independent variables included in the model (Gujarat, 2003). Consequently, the chi-square computed indicated, as the model was significant at 1% significance level.

**Age of household heads:** Age was hypothesized to have an influence on household heads decision to enroll in community based health insurance. The model result revealed, age of households is statistically significant at 1 % significance level and positively influences the dependent variable, household heads participation decision, and it is in line with the hypothesis. This indicates as the age of household heads increase by one year the odds of participating in community based health insurance also increase by 1.065434 factor other factors being constant. That is as family head become older and older their demand to participate in the scheme will get maximized. Thus among the expected variables age is one of the variables showing significant effect in determining the dependent variable that is enrollment in CBHI of the model. This finding is contrary to the finding of Haile *et al*. (2014) that shows household heads age has negative effect on household's enrollment decision and statistical significant. But the result is similar with the finding of Jutting (2003) that shows age has positive effect on households' enrollment decision.

**Education level of household heads:** Education increases the analytical ability of individuals to process information received from any source. As the model result on Table 12 revealed, education level of households is statistically significant at 1 % significance level and positively influences the dependent variable, participation in CBHI, and it is in line with the hypothesis. This shows as households are getting educated, they are more likely to participate in community based health insurance. Based on this result, literate household heads were 2.769134 times likely to participate in

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community based health insurance than illiterate household heads other things being constant. The possible explanation for this is that education helps the household head's to participate in community based health insurance and because the capacity created would help them to analyze, interpret and make use of it than illiterate household head's. This finding is similar to the findings of Gebremeskel (2014) that shows education level has positive contribution for household decision to participate in community based health insurance.

**Annual expenditure:** The model result showed that annual expenditure had statistically significant and positive effect at 1 % probability level on households' participation in community based health insurance in the study area. Other factors being constant, as households annual expenditure is increased by one unit the odds of participation in community based health insurance also increased by 1.000081factor. This implies that as income of the sampled households' increases, their expenditures increases in some amount similarly their participation in CBHI also increases. The finding was similar with the work of Haile *et al* (2014) that shows positive relationship between expenditure and household decision to participate in community based health insurance.

**Information (knowledge):** Information was also hypothesized to have positive association with the probability of participation in community based health insurance. Having true information about the program enables households to enroll in the program. Information is statistically significant at one percent (P<0.01) significance level and positively influences the dependent variable, household heads participation decision, and it is in line with the hypothesis. This indicates that household heads those have true information about CBHI were 43.44322 times more likely to participate in community based health insurance than those haven't true information about CBHI. This result is consistent with study by Gebremeskel (2014) that shows information is positively and significantly associated with the probability of participation in community based health insurance.

**Distance from health institution:** To enroll in CBHI, households consider distance of health institution from home. As distance of health institution from home increases, people exposed for additional transportation and other health related costs like bedroom

and food, then decrease their demand to enroll in the program. There was negative relationship between distance and enrollment in CBHI. In line to the hypothesis the regression estimates revealed that the odds of joining the scheme decreases by 0.9912498 factor while the time taken to reach the Health Institutions increases by one minute and it is strongly significant at one percent (p<0.01) level of significance.

**Other organization (member in cooperatives)**: We also assume a positive relationship between membership in a community based health insurance and membership in other organizations. People who already have experience of participation in local organizations are more likely to be willing to join a mutual insurance than people who have no such experience. In order to realize being member in other organization can determine participation of the respondents in community based health insurance; among several organizations this study particularly emphasized on whether or not membership of respondents in agriculture cooperatives(members in cooperatives Yes=1).As the model result on Table 12 revealed, being member in cooperatives of household heads is statistically significant at 1 % significance level (0.000) and positively influences the dependent variable, participation in CBHI, and it is in line with the hypothesis. Based on this result, household heads those are members of development cooperatives were 4.700305 times more likely to participate in community based health insurance than those are not member in development cooperatives. This study result is concurrent with the findings of Jutting (2003) that shows being member in other organizations has positive contribution for household decision to participate in community based health insurance.

## 4.4. Model Evaluation

According inferential test employed to evaluate the fitness of the logistic model against actual outcomes. The inferential goodness-of-fit test is the H–L statistic that yielded a $\chi 2$ of 10.52 which was statistically significant *(p > .05)*. This suggests that the model fit to the data well.

**Table 13** Overall evaluation of the model

| Goodness-of-fit test | $\chi 2$ | df | P |
|---|---|---|---|
| **Hosmer and Lemeshow** | 10.52 | 8 | 0.2303 |

## 4.5. Validations of Predicted Probabilities.

According to the conducted test result, the prediction for informal sector workers who were not participating in community based health insurance schemes and those who were participating show identical accuracy. This observation was supported by the magnitude of sensitivity (78.3%) compared to that of specificity (78.7%).

Both false positive and false negative rates were not more than 25%. Sensitivity measures the proportion of correctly classified events in this case those who were participating in community based health insurance scheme, whereas specificity measures the proportion of correctly classified nonevents (those who were not participating in community based health insurance scheme). The false negative therefore measures the proportion of observations misclassified as nonevents over all of those classified as nonevents. The overall correct prediction was about 78.54% correct showing high acceptability of the results (Appendices-5)

# CHAPTER FIVE

## 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Summary

This study was conducted in order to assess factors affecting households' decision to participate in community based health insurance in Limu Kossa district. Different characteristics of the households were analyzed among participants and non-participants of community based health insurance. These characteristics were categorized as demographic and socio-economic (sex, age, marital status, family size, educational status, annual income, annual expenditure, information (awareness), participation in other organization) and health related variables (health status, distance of the nearest health institution).

In this study cross sectional data were used that were collected from 396 sample households and from four rural kebeles namely; L/Chime, Tencho, Suntu, and G/Dembi. This study was used primary data and had employed interview schedule as data collection tools. Data analysis methods like percentage, frequency distribution, mean and standard deviation were used. In addition, Binary logit model was used to identify major factors affecting household heads decision to participate in community based health insurance.

From the demographic variables, sex of the household head was hypothesized to affect households' decision to participate in community based health insurance significantly. The result showed that sex had no significant association with household heads participation in community based health insurance. Household head's marital status and family size were hypothesized to have significant association with decision to participate in community based health insurance. The result at the same time showed that there were not statistical significant association between marital status and decision to participate in CBHI. Age of the household heads and education level of the household head also hypothesized to have significant association with households' decision to participate in community based health insurance. The result showed that both had statistically

significant association with households' decision to participate in community based health insurance.

The socio-economic variables such as annual income and annual expenditure were hypothesized to have significant association with households' decision to participate in community based health insurance. The result also indicated that annual income and annual expenditure had statistical significant association with households' decision to participate in community based health insurance. Participation in other organizations and level of information about the scheme were hypothesized to have significant relationship with households' decision to participate in community based health insurance. The result also showed that they had significant association with household heads decision to participate in community based health insurance.

In line with this, from health related variables health status and distance of health institution were hypothesized to have significant association with household heads decision to participate in community based health insurance. The result showed that one of the proxies of health status which is number of illness cases and distance from health institution had significant effect on household heads decision to participate in community based health insurance.

The result of the Binary logit model indicated that age of household heads, education level of the household heads, annual income, annual expenditure, participation in other organization and level of information had positive and statistical significant effect on household heads decision to participate in community based health insurance whereas distance from health institutions and health status had negative and statistical significant effect on household heads decision to participate in community based health insurance.

Besides, the result of analysis of reasons in favor of and against participation of household heads in community based also showed that the most important reasons that enhance the acceptability of the community based health insurance scheme among the informal sector workers were to get benefit from the insurance service and to get service with minimum cost of health services. Others were accessibility of health service without paying out of pocket fee and provision of health services in a timely manner. In addition

to help the poor people and to get free of charge service has been identified as positive factors. Furthermore, the study has shown that majority of factors which lower decision of participation in community based health insurance schemes are based on lack of sufficient income, lack of understanding(awareness) about the scheme, because service problem facing the current members, members were not freed from out of pocket payment, late established household and religious belief.

## 5.2. Conclusions

In this study attempted has been made to assess factors affecting household heads participation in community based health insurance in Limu Kossa district, Jimma Zone, Oromia Regional State, Southwest Ethiopia. The descriptive analysis showed that as only some of household heads enrolled in community based health insurance and the major reasons for household heads not enrolling in community based health insurance in the study area were; shortage of sufficient income, lack of awareness about CBHI scheme and reluctance of household heads to participate in this scheme.

Moreover, the Binary logit analysis showed that household heads' education level enhances household heads to decide to participate in community based health insurance. Age of household heads also significantly affects decision of household heads to participate in community based health insurance .Similarly household heads with high annual expenditure and those are members in other organizations (cooperatives) would like to participate in community based health insurance. Other factors such as household's distance from the nearest health center and health status of the respondents also significantly affects rural households' decision to participate in community based health insurance in the study area.

## 5.3. Recommendations

The findings of the study identified major factors of household heads participation in community based health insurance in Limu Kossa district. Based on the findings of the study, the following recommendations are forwarded.

According to the result of the Binary logit model, educational level of sampled households was found to have a significant positive association with households' decision to participate in community based health insurance. Literate households have the awareness regarding the importance of participation in community based health insurance and participate in this scheme than illiterate household heads. In order to make illiterate rural households have better understanding towards community based health insurance and make decision to participate, emphasis should be given towards strengthening different educational opportunities (formal and non-formal education).

Similarly this result indicted that having true information about the scheme of the respondents was found to have positive association with households' decision to participate in community based health insurance. Even though these household heads had obtained this information through various source of information, majority of the respondents cited as they got from the same source which is from meeting (gatherings). Thus, in order to have all households well informed about CBHI, health sectors in collaboration with other government organizations, NGOs and other community based organizations should work on awareness creation activities in the study area though providing training to the households. In addition, appropriate emphasis should be given to other means of awareness creation such as broadcasting through radio and television programs.

The result of the Binary logit model revealed that annual expenditure had positive and statistically significant effect on household heads participation in community based health insurance. This finding is not only realized by estimation of Binary logistic regression but also by descriptive analysis of reason in favor of or against CBHI at the same time. Thus, to make the non-participant household heads participant in community based health insurance, there is a need to further improve the households' income through different income generating and development strategies. Despite, the affordability problem indicated by the analysis result the researcher observed that as members in most study kebeles were asked to pay their annual premium together with other mandatory annual taxes and this also believed as it might be aggravating the affordability problem in the study area. Thus, in addition to improving households' income, concerned bodies

should have to set suitable annual premium payment time and to assign responsible body for premium collection in order to reduce affordability problem confronting the poor households and to ensure better participation of these households in community based health insurance.

The finding of this study also showed that being members in other organizations of household heads particularly being member in local cooperatives had positive and strongly significant effect on household heads participation in community based health insurance than those are not member in cooperatives. The researcher believes as this finding is because of both this organization are mutual benefit oriented organizations. Thus, in order to make non-participant households to participate in community based health insurance, CBHI agencies, Health sectors and other concerned bodies should have to design strategies to work in collaboration with local cooperatives.

Generally, these are major factors affecting households' participation in community based health insurance therefore emphasis have to be given in designing strategies aimed at improving the participation of household heads in community based health insurance in the study area and country wide.

# REFERENCES

Adane Kebede, M. G. (2014). Willingness to pay for Community based health insurance ammong the households in the rular community of Fogera district. *International Journal of Economics,Finance and Managment Scince :2(4)*, 263-269.

Alkenbrack, S. E. (2011). Health Insurance in lao PDR: Examining enrollment,impacts and the prospects for expansion. *Unpublished Thesis submitted to the University of London*.

Amanuel Dibaba, M. H. (2014). *Improving Health Care financing in Ethiopia: An Evidence brief for policy.* Addis Ababa: Ethiopia public Health Institute.

Anagaw Derseb Mebratie, R. S. (2013). *Community Based Health insurance schemes: A symetric review.* ISS international institution of social studies.

Appiah, B. (2012). Universal Health Coverage Still rare in Africa in CMAJ. *Canadian Medical Association Journal*.

Arnab Acharya, S. V. (2010). Impact of National-level or Social Health Insurance for the Poor and the Informal Sector: A Systematic Review for LMICs. *unpublished source*.

Atim.C. (1998). Contribution of mutual health organizations to financing, delivery, and access to health care.Syntesis of research in nine West and central Africa Countries. *Bethesda MD:Abt. Associates Inc.*

Bennett S., A. a. (1998). *Health Insurance Scheme for people Outside formal sector employment.* World Health Organization,Devision of A nalysis ,Research and Assessment(.

Besaza R., B. a. (2008). Community Based Health Insurance in Ugand: Why doesenrollment remain low?A View from Beneath. *Health Policy Vol.87*, 172-184.

Carrin, G. (2oo3). *Community Based health insurance in developing Country.* Geneva: World Health Organization.

Carrin, G. B. (2001). *Social Health Insurance Development in Low- Income Developing Countries.New roles for government and non -profit health insurance organizations.* London: Transaction publishers.

Cripps G., J. E. (2000). *Guide to Designing and Managing Community-Based Health Financing Schemes in East and Southern Africa: Including Toolkit.* rsion 1, Partnerships for Health Reform, Abt Associates Inc., Bethesda, MD.

Davis P. and G.Carrin, 2. (2001). Risk-pooling:Necessary but not sufficient? *Bullettin of the world health organization vol.79,No,7*, p. 587.

De Allegri, M. a. (2006). Understanding Consumers preferences and decsion to enroll in community based health insurance. *Health policy 76(1)*, 58-71.

De Allegri.M., R. S. (2009). Community Health insurance in Sub Saharan Africa:What opretional difficulties hamper its successful development. *Trop Med Int Health*.

Dror, D. (2002). *Health insurance and reinsurance at the community level.* Washington: In:Social Health insurance(eds D Dror &As Preker)The World Bank.

Ekman.B. (2004). Community Based Health Insuarance in low income countries:A systematic review of the evidence. *Health policy planning vol.19*, 249-270.

FMoH. (2010). *Health Sector Development Program.* Addis Ababa: FMoH.

FMoH. (2014). *Health sector Development Program IV: Annual performance Report.* Addis Ababa: FMoH.

Gebremeskel Tesfaye. (2014). The impact of Community Based Health insurance in service utilization in Tigray. *Unplished thesis submitted to Mekole University*.

Gujarati, D. (2004). *Basic Econometrics,Third Edition.* New york: MCGraw Hill Inc.

Habiyonizeye, Y. (2013). Implementing Community based Health insurance scheme:Lesson lessons from the case of Rwanda. *unplished source*.

Hsiao, W. (2001). *Unmet health needs of the billion:Is Community financing a solution?,HNP Discussion paper.* Washington,Dc.: World Bank.

ILO. (2002). *Extending Social Protection in health through Community based health organizations:Evidence and Challenges discussion paper.* Geneva: Swizerland: International labour organization.

Jacobs, B. a. (2008). Bridging Community Health Insurance and Social Protection for health care. *Tropical Meicine & International Health 13(2)*, 140-143.

Jutting, J. (2003). Do Community-based Health Insurance Schemes Improve Poor People's Access to Health Care? Evidence From Rural Senegal. *World Development Vol. 32, No. 2*, 273–288.

McIntyre, D. (2007). *Learning from experiance: Health care financing in low and middle icome countries.* Geneva: Global forum for health research.

Melaku Haile, S. O. (2014). Willingness to join CBHI among rural house holds of Debub Bench destrict,Bench Maji Zone,South West Ethiopia. *BMC Public Health*, 1-10.

Mnally, L. P. (2013). Determinants of Health Insurance Participation among inforal sector workers in rural Tanzania. *Unpublished thesis submitted to Sokoine University*.

Musau, S. (1999). *Community -Based Health Insurance:Exeperiance Learned from East Africa.Technical Report No 34.* Partnerships for Health Reform Project ,Abet Associates Inc.,Bethesda,MD.

Oberlander, L. (2013). Community Based health insurance and Household welfare.Empirical evidence from Burkina faso. *Unpulished thesis submited to Ruprechet- Karis- University*.

Ron, A. ( 1999). NGOs in community health insurance schems:examples from Gutamela and the Philippines. *Social Science and Medicine*, 939-950.

Schneider, P. (2004). Why should the poor insure? Theories of decision-making in the context of health insurance. *Health Policy and Planning 19(6)*, 349–355.

Shimels, A. (2010). *Community Based Health Insurance Schemes in Africa: the Case of Rwanda. Working Papers Series N° 120.* Tunis, Tunisia.: African Development Bank.

Solomon Feleke, W. M. (2015). *Ethiopia's Community Based Health Insurance: A step on the road to universal Health Coverage.* HFG Health Finance and Governance.

Tenkorang, D. (2001). Health Insurance for informal sector In Africa:Design features Risk protection and Resource Mobilaisations. *CMH Working Paper Series, No. WG3/1*.

Werner Soors, N. D. (2010). *Community Health Insurance and Universal Coverage: Multiple paths, many rivers to cross.* Geneva,Swizerland: WHO.

WHO. (2013). *Success stories .Building from the bottom, steering and planing from the top.* Rwanda.

Wiesmann, D. J. (2001). Determinants of viable health insurances in rural sub Seharan Africa. *Quarterly journal of Agriculture*, 361-378.

World, B. (1993). *Investing In Health.* Washington .DC.: The World Bank.

Xu, K. &. (2010). *Exploring the relationship of Health expenditure for protection againest financial risk :world Health report.* Retrieved from http:/www.WHO.int/.

Zelalem, Y. M. (2014). Imapact of Community Based Health Insurance on Household Welfare. *Unpublished*.

**Appendices – 1.** Sample of Questionnaire for the Study

# JIMMA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS

# DEPARTMENT OF ECONOMICS

## Questionnaire for Data Collection

The study on *analysis of socio economic determinants of community based health insurance participation in southwest Ethiopia: case of limu kossa district* is undertaken by Mr. **Temesgen Gemechu** who is a post graduate student at Jima University College of Business and Economics. The participation to this study is voluntary. Names of respondents will not be used in reporting the results of the study and all the information provided by the respondent will be strictly confidential. There will be no direct benefit for the respondent that will accrue from the study. However, the study will provide empirical information that will be useful for policy makers to design appropriate strategies for enhancing high enrollment level of informal sector workers in community based health insurance.

Date of the interview   DD----------MM--------YY----

### I. Demographic and Socioeconomic Characteristics of the Respondent

1. Kebele of the respondent --------------------
2. Respondent (household head's) sex     a) Female     b) Male
3. Age of household head   ---------------------
4. Marital status              a) Single   b) Married   c) Divorced   d) Widowed
5. Educational Background the respondent   a) Illiterate    b) Read and write

   c) Grade 1-8       d) Secondary school and above

6. Religion of the respondent    a) Muslim  b) Protestant   c) Orthodox     d) Others

7. How many families do you have?  Male------- Female----------Total-------

    a) 1-2    b) 3-5     c) 6-8      d) 9 and above

8. How much income do you earn annually from different sources?

| No | Products(Sources of Income) | Unit | Total quantity produced/gained/ | Unit price | Total price /Birr/ |
|---|---|---|---|---|---|
| 8.1 | Coffee product | Quintal /kg/ | | | |
| 8.2 | Cereals and grains | | | | |
| 8.3 | Fruits and vegetables | | | | |
| 8.4 | Livestock production | | | | |
| 8.5 | From off farm activities | | | | |
| 8.6 | From Remittances' or others | | | | |

Total income of the household is ------------------------birr

9) How about the annual expenditure of the household?

| NO | Items | Unit | Quantity | | | Unit price | Total cost |
|---|---|---|---|---|---|---|---|
| | | | purchased | produced | Total | | |
| 9.1 | Grains and cereals | | | | | | |
| 9.2 | Fruit and vegetables | | | | | | |
| | Animal products | | | | | | |
| | Other food expenditure | | | | | | |
| 9.3 | Cloths/Shoes | | | | | | |
| 9.4 | School expense | | | | | | |
| 9.5 | Health service expense | | | | | | |
| 9.6 | Electricity (Fuel) expense | | | | | | |
| 9.7 | Social life contributions or expenses(Wedding, iddir and etc) | | | | | | |
| 9.8 | Different equipments | | | | | | |
| 9.9 | Others | | | | | | |
| | Total | | | | | | |

10) How about the wealth status of the respondent in comparison to his neighborhoods?

   a) Very low   b) Low   c) Medium   d) High   e) Very high

**Ii. Health and Health Related Situations**

11) How about your health status?

　　　a) Very poor　　b) Poor　　　c) good　　　d) very good　　　e) excellent

11.1) Is there any persons with chronic illness and/or disability in the household?

　　　a) Yes　　　　　b) No

11.2) If your response is yes what type of chronic illness? -----------------

11.3) How many number of illness cases in your household in the last six months? --------

　　　a) No　　　　　b) 1-3　　　　c) 4-6　　　d) more than 7

11.4) How far is the respondent house from the nearest health center?

　　------------Km---------hour

　　　a) Near　b) not far　　c) far

## 12 . Awareness Level

12.1. Do you know about CBHIs?　a) Yes　　　b) No

12.2. If your answer for Q-11 is yes from where did you get its information?

　　a) From media/Newspaper　　b) From gathering (Meeting)　　c) From friends and Neighbors

　　d) From other

12.3. If your answer for Q-11 is yes how much is the premium level required to participate in CBHIs?　-------------birr

12.4. If your answer for Q-11 is yes within how much duration of time should members of CBHI renew their membership? -----------------------------

12.5 If your answer for Q-11 is yes what are the major services to be provided to the members of CBHIs?--------------------------------------------------------------------------------------------
----------------------------------------------------------------------------------------------------

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12.6. If your answer for Q-11 is yes what are the services which are not included in services to be covered by CBHIs?-------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------------

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## 13. Enrollment Condition

13.1. Are you a member in CBHIs? (Are you active beneficiary now?)     a) Yes          b) No

13.2. If your answer for Q-13.1 is yes what is the reason behind your preference?

  ------------------------------------------------------------------------------------------------

  ------------------------------------------------------------------------------------------------

13.3. If your answer for Q-13.1 is No what is the reason behind your preference?

  ------------------------------------------------------------------------------------------------

  ------------------------------------------------------------------------------------------------

14. Do you face out of pocket payments even if you are a member of CBHI?

   a) Yes                              b) No

15. If your answer for Q- 13.4 is yes having you renewed or getting ready to renew your membership?

   a) Yes                              b) No

## 16. Questions concerning only participants of CBHIs.

16.1. How is your satisfaction on the current CBHIs service provision by health centers/hospital?

a) Very unsatisfied        b) unsatisfied        c) Neutral        d) Satisfied        c) Very satisfied

16.2. How is your satisfaction on the current CBHIs service provision by kebele leaders?

a) Very unsatisfied        b) unsatisfied        c) Neutral        d) Satisfied        c) Very satisfied

16.2. How is your satisfaction on the current service provision by district CBHI office? )

a) Very unsatisfied        b) unsatisfied        c) Neutral        d) Satisfied        c) Very satisfied

**17. Participation in Other organizations.**

17.1. Do you participate in agricultural development Cooperatives?    a) Yes      b) No

17.2. Have you being member in social or religious organizations before?

a) Yes      b) No

18. What do you feel about the benefits of CBHI in the livelihood of your family?

-------------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------------------

*Thank you for your cooperation!*

**Appendices.2.** Model out puts for multi co linearity tests.

```
. corr SEX EDUS RELIG CHRON INFOR COOPM Married single divorced widowed

(obs=396)
```

|          | SEX     | EDUS    | RELIG   | CHRON   | INFOR   | COOPM   | Married | single  | divorced | widowed |
|---------:|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|
| SEX      | 1.0000  |         |         |         |         |         |         |         |          |         |
| EDUS     | -0.1823 | 1.0000  |         |         |         |         |         |         |          |         |
| RELIG    | -0.0656 | 0.0178  | 1.0000  |         |         |         |         |         |          |         |
| CHRON    | 0.0637  | -0.0649 | 0.0977  | 1.0000  |         |         |         |         |          |         |
| INFOR    | -0.2056 | 0.0821  | 0.1382  | 0.1165  | 1.0000  |         |         |         |          |         |
| COOPM    | -0.0065 | 0.0042  | 0.0796  | 0.0770  | 0.2040  | 1.0000  |         |         |          |         |
| Married  | -0.5883 | 0.1548  | 0.0322  | -0.0302 | 0.1297  | 0.0378  | 1.0000  |         |          |         |
| single   | 0.1596  | 0.0328  | -0.0407 | -0.0106 | 0.0244  | 0.0210  | -0.5417 | 1.0000  |          |         |
| divorced | 0.1742  | -0.0214 | -0.0515 | -0.0032 | -0.0806 | 0.0094  | -0.5060 | -0.0193 | 1.0000   |         |
| widowed  | 0.6104  | -0.2443 | 0.0276  | 0.0571  | -0.1517 | -0.0825 | -0.6376 | -0.0243 | -0.0227  | 1.0000  |

```
. vif

    Variable |       VIF      1/VIF
─────────────┼─────────────────────
      famsiz |      1.18    0.848975
 expenditure |      1.11    0.900694
    illcases |      1.11    0.903583
         age |      1.08    0.924134
 distahealt~n |     1.01    0.989351
─────────────┼─────────────────────
    Mean VIF |      1.10
```

**Appendices.3.** Likelihood Estimations (Model Output)

```
. logit CBHI SEX EDUS RELIG CHRON INFOR COOPM single divorced widowed age famsiz expenditure illcases distaheal

Iteration 0:   log likelihood = -272.84766
Iteration 1:   log likelihood = -183.62864
Iteration 2:   log likelihood = -178.58741
Iteration 3:   log likelihood = -178.44721
Iteration 4:   log likelihood = -178.44675
Iteration 5:   log likelihood = -178.44675


Logistic regression                             Number of obs   =        396
                                                LR chi2(14)     =     188.80
                                                Prob > chi2     =     0.0000
Log likelihood = -178.44675                     Pseudo R2       =     0.3460
```

| CBHI | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| SEX | -1.120786 | 1.143939 | -0.98 | 0.327 | -3.362865 | 1.121294 |
| EDUS | 1.018535 | .350221 | 2.91 | 0.004 | .3321139 | 1.704955 |
| RELIG | -.1471276 | .4216854 | -0.35 | 0.727 | -.9736158 | .6793606 |
| CHRON | .2154764 | .4290165 | 0.50 | 0.615 | -.6253803 | 1.056333 |
| INFOR | 3.771455 | .6857521 | 5.50 | 0.000 | 2.427405 | 5.115504 |
| COOPM | 1.547627 | .3167096 | 4.89 | 0.000 | .926888 | 2.168367 |
| single | 1.149436 | 1.018178 | 1.13 | 0.259 | -.8461567 | 3.145028 |
| divorced | .5069476 | 1.051902 | 0.48 | 0.630 | -1.554742 | 2.568638 |
| widowed | .7302667 | 1.256498 | 0.58 | 0.561 | -1.732425 | 3.192958 |
| age | .0633821 | .0165285 | 3.83 | 0.000 | .0309867 | .0957775 |
| famsiz | .0110505 | .0719024 | 0.15 | 0.878 | -.1298757 | .1519766 |
| expenditure | .0000814 | .0000255 | 3.20 | 0.001 | .0000315 | .0001313 |
| illcases | .1459113 | .0812886 | 1.79 | 0.073 | -.0134113 | .305234 |
| distahealthcen | -.0087887 | .0030533 | -2.88 | 0.004 | -.014773 | -.0028044 |
| _cons | -8.836552 | 1.225018 | -7.21 | 0.000 | -11.23754 | -6.43556 |

. logistic CBHI SEX EDUS RELIG CHRON INFOR COOPM single divorced widowed age famsiz expenditure illcases dist

Logistic regression

Number of obs   =       396
LR chi2(14)     =    188.80
Prob > chi2     =    0.0000

Log likelihood = -178.44675

Pseudo R2       =    0.3460

| CBHI | Odds Ratio | Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| SEX | .3260236 | .3729511 | -0.98 | 0.327 | .0346359 | 3.068822 |
| EDUS | 2.769134 | .9698088 | 2.91 | 0.004 | 1.393912 | 5.501139 |
| RELIG | .8631838 | .363992 | -0.35 | 0.727 | .3777148 | 1.972616 |
| CHRON | 1.240453 | .5321746 | 0.50 | 0.615 | .5350579 | 2.875807 |
| INFOR | 43.44322 | 29.79128 | 5.50 | 0.000 | 11.32945 | 166.5847 |
| COOPM | 4.700305 | 1.488631 | 4.89 | 0.000 | 2.526634 | 8.743991 |
| single | 3.156411 | 3.213788 | 1.13 | 0.259 | .4290608 | 23.22032 |
| divorced | 1.660216 | 1.746384 | 0.48 | 0.630 | .2112438 | 13.04804 |
| widowed | 2.075634 | 2.608031 | 0.58 | 0.561 | .1768551 | 24.36038 |
| age | 1.065434 | .0176101 | 3.83 | 0.000 | 1.031472 | 1.100514 |
| famsiz | 1.011112 | .0727014 | 0.15 | 0.878 | .8782046 | 1.164133 |
| expenditure | 1.000081 | .0000255 | 3.20 | 0.001 | 1.000031 | 1.000131 |
| illcases | 1.157094 | .0940585 | 1.79 | 0.073 | .9866782 | 1.356942 |
| distahealthcen | .9912498 | .0030266 | -2.88 | 0.004 | .9853355 | .9971995 |
| _cons | .0001453 | .000178 | -7.21 | 0.000 | .0000132 | .0016035 |

## **Appendices.4.** Goodness of Fit Test Result (Model Output)

```
. lfit, group(10) table
```

**Logistic model for CBHI, goodness-of-fit test**

(Table collapsed on quantiles of estimated probabilities)

| Group | Prob | Obs_1 | Exp_1 | Obs_0 | Exp_0 | Total |
|-------|--------|-------|-------|-------|-------|-------|
| 1 | 0.0149 | 0 | 0.3 | 40 | 39.7 | 40 |
| 2 | 0.0977 | 4 | 1.9 | 36 | 38.1 | 40 |
| 3 | 0.1889 | 7 | 5.6 | 32 | 33.4 | 39 |
| 4 | 0.3548 | 7 | 11.5 | 33 | 28.5 | 40 |
| 5 | 0.4529 | 17 | 16.0 | 22 | 23.0 | 39 |
| 6 | 0.5701 | 19 | 20.8 | 21 | 19.2 | 40 |
| 7 | 0.6911 | 27 | 25.2 | 13 | 14.8 | 40 |
| 8 | 0.7943 | 31 | 28.8 | 8 | 10.2 | 39 |
| 9 | 0.8733 | 30 | 33.6 | 10 | 6.4 | 40 |
| 10 | 0.9999 | 38 | 36.2 | 1 | 2.8 | 39 |

```
        number of observations =        396
               number of groups =         10
      Hosmer-Lemeshow chi2(8) =       10.52
                  Prob > chi2 =        0.2303
```

**Appendices.5.**Test Result for Validations of Predicted Probabilities (Model Output)

```
. estat clas

Logistic model for CBHI

                ─────── True ───────
Classified  │      D          ~D    │     Total

    +        │     141          46   │      187
    -        │      39         170   │      209

  Total      │     180         216   │      396

Classified + if predicted Pr(D) >= .5
True D defined as CBHI != 0
─────────────────────────────────────────────
Sensitivity                    Pr( +| D)   78.33%
Specificity                    Pr( -|~D)   78.70%
Positive predictive value      Pr( D| +)   75.40%
Negative predictive value      Pr(~D| -)   81.34%
─────────────────────────────────────────────
False + rate for true ~D       Pr( +|~D)   21.30%
False - rate for true D        Pr( -| D)   21.67%
False + rate for classified +  Pr(~D| +)   24.60%
False - rate for classified -  Pr( D| -)   18.66%
─────────────────────────────────────────────
Correctly classified                       78.54%
─────────────────────────────────────────────
```

**Appendices.6.** Graphical Diagnostics for Goodness of Fit



Area under ROC curve = 0.8669