Rural Household Vulnerability to Poverty in South West Ethiopia:

The Case of Gilgel Gibe Hydraulic Dam area of Sokoru and Tiro Afeta Woreda

BY:

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Declaration

I herby declare that this thesis entitled "Rural Houehold Vulnerability to Poverty in South West Ethiopia: *The Case of Gilgel Gibe Hydraulic Dam Area of Sokoru and Tiro Afeta Woreda*", has been carried out by me under the guidance and supervision of Dr. Wondaferahu Mulugeta and Mr. Yilkal Wasse

The thesis is original and has not been submitted for the award of any degree or diploma to any University or Institutions.

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This is to certify that the thesis entitled "Rural Houehold Vulnerability to Poverty in South West Ethiopia: *The Case of Gilgel Gibe Hydraulic Dam Area of Sokoru and Tiro Afeta woreda*", submitted to Jimma University forthe award of the Degree of Master of Science (MSc) in Economics is a record of bonafide research work carried out by Mr.*Sisay Tolla whakeshum,* under our guidance and supervision.

Therefore, we hearby declare that no part of this thesis has been submitted to any other University or Institution for the award of any degree or diploma.

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Table of Contents

Abstract

This study is proposed to measure the extent of vulnerability to poverty in line with current poverty status among rural households in Sokoru and Tiro Afeta woreda of south west Ethiopia. The study also examines the effect of socio-economic characteristics and idiosyncratic shocks on household susceptibility to poverty. This paper used rural household cross sectional data from the study area. A representative total of sample of 266 households were drawn via systematic random sampling technique and data were collected through structured questionnaires. The study applied a three step Feasible Generalized Least Squares (FGLS) estimation procedure to estimate the extent of rural household's vulnerability to poverty. It as well employed Ordinary Least Square (OLS) estimation method to inspect the effects of household socio-economic characteristics and idiosyncratic shocks on rural household's vulnerability to poverty standing. The results reveal that, about 52% of rural households in the study area are vulnerable to poverty and this is higher than observed poverty level of about 48 percent. Sizable fractions of non-poor households (51.3%) are vulnerable to poverty and 53.2 % of the sampled poor households have a probability of 50 percent and above to fall in to poverty in the near future again. Household head age, household head education level and household's access to credit and their exposure to idiosyncratic shocks significantly influence vulnerability to poverty. Moreover, household livestock holding and crop diversification are found to be important variables in examining the determinants of rural household vulnerability to poverty. The results suggest that since poverty and vulnerability to poverty are different signs of the same coin, policies directed towards poverty reduction need to take into account not only the current poor but also the vulnerability of current non-poor households.

Acknowledgment

Acronyms and Abbreviations

ADLI   Agricultural Development Led Industrialization

CBN   Cost of Basic Needs

CSA   Central Statistics Agency

DCI   Direct Calorie Intake

ETB   Ethiopian Birr

FEI   Food Energy Intake

FGLS   Feasible Generalized Least Squares

GLSS   Ghana Living Standards Survey

GTP   Growth and Transformation Plan

IFAD   International Fund for Agricultural Development

MBM   Market Basket Measure

MDGs   Millennium Development Goals

MPI   Multidimensional Poverty Index

MoFED   Ministry of Finance and Economic Development

OCSI   Oromia Credit and Saving Institution

OLS   Ordinary Least Square

OLZR   Oromia Livelihood Zone Reports

ONRS   Oromia National Regional State

OPHI   Oxford Poverty and Human Development Initiative

TLU   Tropical Livestock Unit

UNDP   United Nations Development Program

VEP   Vulnerability as Expected poverty

VER   Vulnerability as Exposure to Risk

VEU   Vulnerability as Lower Expected Utility

WB   World Bank

WDR   World Development Report

WFP   World Food Program

WHO   World Health Organization

WIDER   World Institute for Development Economics Research

List of Tables

CHAPTER ONE
1. INTRODUCTION

1.1. Background of the Study

More than 2.2 billion people of the world are either near or living in poverty. That means higher than 31 percent of the world's people remain vulnerable to multidimensional poverty which covers lack of the basic necessities such as food, education, health services, fresh water and hygiene which are essential for human continued existence. At the same time, nearly 80 percent of the global population requires comprehensive social protection. About 12 percent (842 million) people of the world suffer from chronic hunger, and nearly half of all workers or more than 1.5 billion are in precarious employment (UNDP, 2014).

According to Damas and Israt (2004), Poverty is generally associated with deprivation of health, education, food, knowledge and the many other things that make the difference between truly living and merely surviving. Another universal aspect of poverty, which makes it principally painful and difficult to escape is: Vulnerability.Unlike poverty, vulnerabilityreflects what households or individuals future prospects are and it is an ex ante anticipations of a household or individuals welfare. Thus, theperceptive of the concepts of poverty, vulnerability and their linkageisessential in the efforts to escape from the challenges of impoverishment since vulnerability to poverty is a central manifestation of human deprivations.

Mounting evidences show that households in developing countries particularly poor families are more vulnerable than any other group to health hazards, economic down-turns, natural catastrophes and man-made violence. Poor households are repeatedly hit by severe idiosyncratic shocks such as death, pests or diseases that affect livestock or crops, injury or unemployment shocks and this all affect the wellbeing of these households adversely. For example, WB (2014) indicated thatadverse shocks such as illness, injuryandloss of livelihood havedreadful impacts, andare significant causes of destitutionthenthis shocks play major role in pushing households below the poverty line and keeping them there.

Several countries, especially in Sub-Saharan Africa, have made poverty reduction and hence improvement in income and welfare their main goals in their growth and development agenda. And most policy interventions adopted by these countries have only focused on poverty at a point in time. For instance, thefirst MDGonly considers the current poor but neglects the future poor or vulnerable (Novignon, 2010).

However, currently non-poor households, who face a high probability of large adverse shock, may experience hardship and become poor tomorrow. Hence, the currently poor households may include some who are only transitorily poor as well as other who will continue to be poor in the future. In other words, a household'sobserved poverty status is defined in most cases simply by whether or not the household's observed level of consumption expenditure is above or below a pre-selected poverty line is an ex-post measure of a household's well-being. In line with this, Chaudhuri, et.al (2002) noted that for development and policy purposes, what really matters is the ex-ante risk that a household will fall below the poverty line or will continue in poverty. Thus, the current poverty status of a household is not enough and potential for analyzing household's vulnerability of being poor in the future. Moreover, for appropriate forward-looking anti-poverty interventions, the critical need is to go beyond a cataloging of who is currently poor and who is not, to an assessment of households' vulnerability to poverty.

In order to achieve sustainable economic growth and reduce poverty, the Ethiopian government introduced Agricultural Development Lead Industrialization (ADLI) in 1992 as its main policy program accompanied with many poor targeting interventions. Since then the government is constantly pursuing development efforts in addressing mainly rural poverty.Accordingly, Ethiopia has achieved sustainable economic growth since 2004 and the country becomes among the fastest growing non-oil producing economies in Africa (UNDP, 2012).

Although Ethiopia has come a long way in reducing poverty, widespread poverty and food insecurity still persist. The country is prone to drought, which has serious implications on vulnerability and food security as most of the agriculture is dependent on rain. More importantly, structural factors such as land degradation, population pressure, undeveloped farm technology, low levels of household assets and limited opportunities to diversify income make millions of Ethiopians vulnerable to poverty

(WFP, 2014). Likewise, Alemayehu and Addis (2014) pointed out that the Ethiopian economy and the country's poor are extremely vulnerable to shocks, which may include conflict, rainfall variability or drought, world price fluctuations of coffee and fuel as well as change in aid and remittances. Hence,the chances of slipping back into poverty both in rural and urban areas following shocks such as drought or the death of the head of the household are very high.

This study estimated the ex-ante risk that rural households in Sokoru and Tiro Afeta woreda will experience poverty one period ahead. Sokoru and Tiro Afeta woreda are found around Gilgel Gibe hydraulic dam of south west Ethiopia.

1.2. Statement of the Problem

Over the past two decades, the Government of the Federal Democratic Republic of Ethiopia has carried out far-reaching institutional and policy reforms to transform itself from a centrally planned, to the facilitator of a stable free market economy. These reforms have reinforced efforts to increase spending on basic sectors like agriculture, education, health, transport and telecommunications.As part of the global and national wits, the government of Ethiopia together with its development partners has been pursuing development with aim of achieving a broad based and sustained economic growth via reducing the magnitude of chronic poverty over time (MoFED, 2012).

The five year Growth and Transformation Plan (GTP) 2010/11-14/15 indicates that Ethiopia would achieve halving poverty by 2015 and projects that both income and food poverty reach 22.2% and 21.22% in 2014/15 (MoFED, 2010). However, The Global Multidimensional Poverty Index (MPI) which is reported by OPHI(2014) implies that Ethiopia ranks the second poorest country in the world just ahead of Niger. Ethiopia is still home to more than 76 million poor people even if the country is making progress at reducing the percentage of destitute people.

A large number of poor households in rural areas of Ethiopia are facing a prolonged hunger season during the pre-harvest period. Since agriculture is rain based, farmers are vulnerable to frequent drought, which can wipe out their livestock and assets and bring on severe poverty. Drought has most severe impact on vulnerable households living in the pastoral areas of lowlands and the high density parts of the country. In

addition to their vulnerability to climatic conditions and personal shocks, poor people lack basic socio-economic infrastructures such as health and education facilities, veterinary services and access to credit and saving services (IFAD, 2009).

In many developing countries like Ethiopia the principal economic policies have been focused on reducing just the level of poverty which may not be a wholly satisfactory approach to bring sustainable development. However, many development economists suggested that to trace the root factors that will determine destitution needsfurther investigation on the notion of vulnerability to poverty other than the crude issue of poverty. For example, Amartya Sen (1999) portrayed that the challenge of development includes not only the elimination of persistent and endemic deprivation, but also the removal of vulnerability to sudden and severe destitution.

In the view of these facts, the researcher believed that the adoption of innovative and appropriate onward looking anti-poverty perspectives, that is not only improving the well-being of households who are currently poor but also preventing people from becoming poor in the future, is necessary and timely to realize the universal visions of achieving sustainable development passing through poverty alleviation.

Since the detection of vulnerable and poor households together with determinants of vulnerability to poverty is a requirement for triumphantanti-poverty policies, this study, therefore,tried to provide an understanding concerningrural household vulnerability to poverty in Sokoru and Tiro Afeta woreda of south west Ethiopia.

1.3. Objectives of the Study

The overall objective of this study is to analyze rural household vulnerability to poverty in the study area of Sokoru and Tiro Afeta woreda. More specifically the study attempts:

- To measure the aggregate extent of rural household vulnerability to poverty in the study area
- To describe the disseminations of poverty and vulnerability to poverty in Sokoru and Tiro Afeta woreda.
- To identify the determinants ofrural household vulnerability to poverty.
- To forward potential solutions based on the outcome of the study for designingeffective strategies for development challenges.

1.4. Significance of the Study

A series of poverty analysis studies have been done over the past years to examine the nature of poverty in Ethiopia. And this rural household vulnerability to poverty assessment can provide a detailed profile of thevulnerable households by applying vibrant and forward-looking approach.Therefore, this vulnerability to poverty study is able to enhance understanding of the nature of rural household vulnerability to poverty which will prove useful for the proper adjustment of the series of economic reforms aiming at poverty reduction and for effective policy interventions as key micro-level binding constraints.

The study is expected to contribute to the scarce predicted poverty literature by determining household characteristics and risks that affect consumption among the community of Sokoru and Tiro Afeta woreda that is found around Gilgel Gibe hydraulic dam of south western Ethiopia. Itgeneratesruralhousehold vulnerability to poverty profiles that will discriminate among the different sources of vulnerability to poverty of households of these districts.

Moreover, this paper is very essential in providing insight on how to measure household vulnerability to poverty with a sophisticated modelingtechniquefrom cross-sectional datato provide a recent and detailed account of vulnerability in the study area.Also this study can be a base for further studies in the field of vulnerability and poverty.

1.5. Scope and Limitations of the Study

Due to the homogeneous nature of districts around Gilgel Gibe hydraulic dam, this study is confined to Sokoru and Tiro Afeta woreda of south west Ethiopia. For the purpose of availing focused and concise information, the study is delimited to the analysis of the extent ofvulnerability to poverty at aggregate level in relation to poverty status of households in the study area. It also examines the determinants of rural household vulnerability to poverty.

Even if the issue of poverty or vulnerability is a multidimensional phenomenon, the study mainly focused on the unidimensional poverty analysisthat is based on monetary dimension of expenditure approach. Multidimensional poverty includes not

only insufficient income or consumption, but also deprivations related to health,nutrition,literacy,socialrelations,security,power and others.

As a result of lack of panel data which has the advantage of richness and length, this study applied cross-sectional data techniques forestimatingVEP that fails to account the temporal variability of parameters over time to study rural household vulnerability to poverty.

1.6. Organization of the Study

This study is structured as follows. Chapter one presents the background of the study.Chapter two reviews both theoretical and empirical literatures on the concept and measure of vulnerability to poverty. Chapter three outlines methodology employed to analyze the problems. Chapter four provides data discussion and analysis. Finally, chapter five discloses conclusions and recommendations.

CHAPTER TWO

2. LITERATURE REVIEWS

2.1 Theoretical Literature Review

2.1.1 Measuring Well-Being and its Indicators: Conceptual Approaches

There are a number of quite different conceptual approaches to themeasurement of well-being. Approaches differ in terms of the importance attached to the essentially materialist idea of standardof living. According to Sen (1979), broadly welfare measurement can be classified into two distinct approaches as 'welfarist' and 'non-welfarist. The welfarist approach aims to base comparisons of well-being solely on individual "utility" levels, as assessed by the individuals themselves. According to the welfarist approach, the value attached to commodities by the consumer himself and the subsequent preference ordering is sufficient for assessing a person's wellbeing. The non welfarist approach pays little regard to information on utilities. This approach attempts to assess the well-being of an individual based on certain basic achievements such as being adequately nourished, clothed and sheltered(Ravallion, 1992).

Besides, in the welfare measurements, the most important issue is the choice of using whether individual income or consumption expenditure as welfare indicators. Consumption expenditure and income can be acceptable as a measure of welfare since both measure the capacity to obtain goods and services. Consumption and income measure sometime fails to take into account some important aspects of welfare. Such as consumption of commodities supplied by the public sector including schools, health services, roads and other dimensions of the quality of life including consumption of leisure and the ability to lead a long and healthy life are not accounted by both consumption and income approaches (Engvall, 2006).

In poverty and vulnerability analysis literatures consumption expenditure as a proxy for welfare indicator is widely applied.Accordingly, in the most developing countries, consumption rather than income have been preferred as a measure of welfare indicators since current consumption provides information about incomes at other dates; it might be for the past or future. Hence, it considered as a good indicator of

long-term average well-being. Second, consumption considered as a measure of welfare achievements by households while income on the other hand treated as a measure of welfare opportunity. Focusing on the realized instead of potential welfare is pertinent. Third, most of the time consumption fluctuates less than income, due to households' not only financed their current consumption but also they responds to fluctuation in income by saving in the boom periods and dis-saving during lean periods so as to smooth their consumption (Lipton and Ravallion, 1993).

2.1.2 Definition and Concepts of Poverty and Vulnerability to Poverty

Poverty is an ex-post assess of a household's well-being or lack thereof. It reflects a current state of deprivation and of lacking the resources or capabilities to satisfy current needs. Vulnerability is broadly interpreted as an ex-ante measure of well-being which reflectshousehold'sfuture prospects. The uncertainty that households face about the future stems from multiple sources of risk like harvests may fail, world prices may rise, the main income earner of the household may become ill, and others. If such risks were absent and the future were certain, there would be no distinction between vulnerability and Poverty measures of well-being (Chaudhuri, 2003).

According to Holzmann and Jorgensen (2001), poverty and vulnerability are closely related concepts due to two established facts: (i) the poor are typically most exposed to diverse risks, and (ii) the poor have the fewest instruments to deal with these risks. Thus, Chaudhuri et al. (2002) stated that Poverty and vulnerability to poverty are two sides of the same coin.Chaudhuri, et.al, (2002) defined vulnerability to poverty as the "ex-ante risk that a household will be poor in the future, regardless of their current state of welfare". The concept supports measuring welfare not only by observed poverty but future poverty hence giving a dynamic perspective of welfare contrasting to static welfare measures.Chambers (1989) defined vulnerability as the exposure tocontingencies and stress which is defenselessness. The World Bank (2000) defined vulnerability to poverty as a likelihood that a shock will result in a decline in welfare.

Vulnerability is forward- looking rather than an ex post concept. Given the welfare measure and the poverty threshold,poverty status can be observed at a specific time period. By contrast, household vulnerability is not directly observed it rather predicted

(Suryahadi, et.al, 2002).According to Alwang et al(2001), there are five important principles avulnerability concept should abide by: 1) it is forward-looking and could be defined as the probability of experiencing a future loss relative to some standard of welfare; 2) vulnerability is caused by indecisive events; 3) the degree of vulnerability depends on the characteristics of risks involved and household ability to react to them; 4) vulnerability depends on the time horizon; and 5) both the poor and non-poor could be vulnerable because of their limited access to assets and abilities to react to risks.

The economics literature conceptualizes vulnerability as an outcomeof a processof household response to risks for agiven a set of underlying conditions. Vulnerable householdsarethose that have moved or are likely to move into a state of poverty or destitution as a result of thecumulative process of risk and other issues. Chaudhuri (2003) listed four reasons why we should be concerned about vulnerability:

1) A temporal or static approach like poverty assessment to well-being is of limited use in thinking about policy interventions to improve well-being that can only occur in the future.

2) Vulnerability assessment highlights the peculiarity between ex ante poverty prevention intrusions and ex-post poverty alleviation interventions.

3) Analyzing vulnerability assists to investigate sources and forms of risks households face. And this helps to design suitable safety net programs to reduce or mitigate risk, therefore vulnerability.

4) Vulnerability is an inherent aspect of well-being with the postulation that individuals are risk averse.

2.1.3 Poverty Line

The poverty line is the level of welfare that distinguishes poor households from non-poor households and it is a pre-determined and well defined standard of income or value of consumption expenditure. Poverty lines are frequently drawn either in relative or absolute terms. In relative term, a proportion of the mean expenditure is taken as the poverty line. The absolute poverty line is a predetermined one based on some minimum food and non-food expenditure below which a household is defined as poor. In addition to this, thepoverty line is fixed in terms of the standard of living it commands over the domain of poverty measurement (Baiyegunhi and Fraser, 2010).

However, as outlined by Tesfaye (2013) the central question in the poverty analysis is how to set this arbitrary line in order to distinguish the households or individuals into two categories that is Poor or non-poor. There are a number of approaches to set poverty line such as; food energy intake (FEI), direct calorie intake (DCI), and cost of basic need methods (CBN).

FEI method finds the consumption expenditure or income level at which food-energy intake is just sufficient to meet predetermined food-energy requirements for good health and normal activity levels. Food energy intake is determined by regressing the per capita consumption expenditure on calorie intake and the predicted value of the per capita consumption expenditure at the predetermined calorie intake level is considered as the poverty line. It accounts both minimum nutritional requirement and income or expenditure that supposed to be sufficient to acquire the minimum recommended calorie intake (Ravallion and Bidani 1994).

The second one is direct calorie intake method and it defines poverty line as the minimum calorie requirements for the individuals to endure and those who consume below a predetermined minimum level of calorie intake are considered to be poor and this method simply measures poverty with malnutrition. Conversely, DCI method does not consider the non-food basic need requirements that are essential for survival and it does not show costs of acquiring the minimum calorie requirement.

The third and the most extensively used method of setting a poverty line is the cost of a basic need method. In this approach, the food poverty line defined by selecting a 'basket' of food items typically consumed by the poor and quantity of the food basket scaling up or down until that the given bundle meets the predetermined level of minimum caloric requirement and valued at the relevant market prices. Thus, according to this method, poverty is normally a lack of command over basic consumption needs and poverty line defined as the cost of basic needs (Ravallion and Bidani 1994). After determining the food poverty line, alterations are then made for non-food expenses to get total poverty line.

2.1.4 Measurements of Vulnerability to Poverty

Vulnerability is a multi-dimensional concept that relates to risk and in Economics, vulnerability is dealt with both at the micro and macro levels.At the micro-levelthat focus chiefly on households, most often refers to the vulnerability to poverty. That is the probability that a household or individual will fall into or remain in poverty. At the macro-level, vulnerability is studied in the context that certain hazards may adversely affect a country or region's economy. These may be natural, like an earthquake or man-made such as a financial crisis. For example, from an economic perspective a country's exposure to macro-economic shocks, such as a financial crisis or sudden drop in export demand, generally depends on its reliance on degree of export diversification and on its openness to financial flows (WIDER, 2009).

In most literature there are two types of methods for measuring vulnerability, namely indicator and econometric approaches.

I.   Indicator Approaches

The indicator approaches are based on developing a wide range of indicators and selecting some of them through proficient judgment (Kaly and Pratt 2000; Kaly et al. 1999), via principal component analysis (Easter 1999; Cutter et al. 2003), and through correlation with past disaster events (Brooks et al. 2005). And most of the time the indicator approachesis valuable for monitoring trends and exploring conceptual frameworks. However, in the indicator approaches,there is high level of subjectivity in the selection of variables and there are difficultieson testing or validating the different metrics.

II.   Econometric Approaches

According to Hoddinott and Quisumbing(2003), for measuring vulnerability there are three econometric methods: vulnerability as expected poverty (VEP), vulnerability as low expected utility (VEU) and vulnerability as uninsured exposure to risk (VER) (Thus, Hoddinott and Quisumbing (2003)briefly explained these three principal approaches for assessing vulnerability:

Vulnerability as Expected Poverty (VEP)

Many economist like Chaudhuri, Jalan, and Suryahadi (2002) and Christiaensen and Subbarao (2001) provide ways where vulnerability is defined as the probability that a household will fall into poverty in the future. Welfare defines in terms of consumption so that vulnerability of household h at time t – V_{ht} - is the probability that the household's level of consumption at time t + 1 (c$_{ht+1}$) will be below the consumption poverty line, z;

i.e., **V_{ht}=Pr (ch, t+1 = z).** (1)

Since the future is uncertain, the degree of vulnerability rises with the length of the time horizon. For this reason, Pritchett, Suryahadi, and Sumarto (2000) extended the time horizon used by Chaudhuri, Jalan, and Suryahadi (2002) and Christiaensen and Subbarao (2001). Vulnerability of household h for n periods isthe probability of observing at least one spell of poverty for n periods or it is one minus the probability of no episodes of poverty:

R_h(n, z)= 1 − [(1-(P(ch, t+1) < z), …, (1-(P(ch, t+n) < z))] (2)

Pritchett, Suryahadi, and Sumarto (2000) define a household as vulnerable if the risk in n periods is greater than a threshold probability p:

V_{ht} (p, n, z) = I{R_{ht} (n, z) > p] (3)

This approach can all be implemented using a single round of cross-sectional data. Thus, the data needs associated with this approach are less overwhelming than those that require panel data.

Vulnerability as Low Expected Utility (VEU)

Vulnerability as expected poverty measures have a somewhat vicious feature related to measuring the welfare consequences of risk. Ligon and Schechter (2002, 2003) proposeda measure of vulnerability and they define vulnerability with reference to the difference between the utility derived from some level of certainty-equivalent consumption, z_{CE} and above which the household would not be considered vulnerable. Z_{CE} is analogous to a poverty line and the expected utility of consumption.

Vh = Ui(z$_{CE}$) –EUh(ch),(4)

Where, U_h is a strictly increasing function. Note that (4) can be rewritten as:

Vh = [U$_h$(z$_{CE}$) – U$_h$(Ec$_h$)] + [U$_h$(Ec$_h$) - EU$_h$(c$_h$)]. (5)

As a measure of poverty, first bracketed term is the difference in utility at Z_{CE} compared to household i's expected utility at c. The second bracket measures the risk faced by household h. This risk can be further decomposed into covariate and idiosyncratic risk. Thus, equation (5) can be rewritten as:

V$_h$ = [U$_h$(Z$_{CE}$) – U$_h$(Ec$_h$)] (Poverty)

+ {U$_h$(Ec$_h$) – EU$_h$[E(c$_h$|xt)]}(Covariate risk)

+ {E U$_h$[E(c$_h$|xt)]

– EU$_h$(c$_h$)}(Idiosyncratic risk) (6)

Vulnerability as Uninsured Exposure to Risk (VER)

Shocks could be either covariant like a rainfall shock or idiosyncratic such as illness. Vulnerability as uninsured exposure to risk approach is similar to the VEP and VEU approaches in that it is concerned with assessing welfare and welfare losses in a world where some risks are at best partially insured. However, unlike VEP measures, VER is an ex post assessment of the extent to which a negative shock caused a welfare loss.

Tesliuc and Lindert (2002) applied VER for a measure of vulnerability. Suppose, household h residing in village v at time t. Δlnc_{htv} is the change in log consumption or the growth rate in total consumption per capita of household h in period t , S(i)tv denotes covariate shocks, and S(i)$_{htv}$ shows idiosyncratic shocks. Additionally, D_v is a set of binary variables identifying each community separately and X is a vector of household or household head's characteristics. Finally, δ, β, γ , and θ are vectors of parameters to be estimated and $\Delta \in htv$ is error term capturing changes in the unobservable components of household preferences. Thus, VER is explained by the following equation.

Δln c$_{htv}$= $\sum_i\theta_i$ S (i) tv+ $\sum$iβ i S (i) htv+ $\sum_{tv}\delta_v$(D$_v$) +δX$_{hv}$ +$\Delta\epsilon_{htv}$ (7)

The estimated values of θ and β in (7) identify the impact of covariate S(i)tv and idiosyncratic S(i) htv shocks respectively. This approach identifies which risks would be an appropriate focus of policy through quantifying the impact of these shocks.

2.2 Empirical Reviews

Various literatures shows that the searchlight is presently being turned on vulnerability as means of solving social protection and poverty alleviation problems in the developed and developing countries' welfare studies.

As cited by Dercon (2005), Chaudhury (2002) studied vulnerability in Indonesia by applying cross-sectional data. The results shows that the vulnerable population is generally larger than the fraction observed as poor at a given point in time which implies that true poverty cost of risk is higher than theobserved outcome. He also found differences between the distribution of vulnerability and poverty across different population characteristics. As well Chaudhury (2003) applied cross section data methodology for Philippines and Indonesia and he found similar patterns.

Suryahadi and Sumarto (2003) estimated household poverty and vulnerability in Indonesia before and after the economic crisis of the late 1990s using cross section data from household surveys. They found that the level of vulnerability to poverty among Indonesians after the crisis increased significantly and the number of high vulnerability to poverty households has tripled because of the crisis.

Jacob (2010) used cross section data from the fifth round of the Ghana Living Standards Survey (GLSS) with a nationally representative sample of 8,687 households from all administrative regions in Ghana to study household vulnerability to poverty. The study employed a three step Feasible Generalized Least Squares (FGLS) estimation procedure to estimate vulnerability to poverty and to model the effect of household socioeconomic status on expected future consumption and variations in future consumption. The results show that, about 56% of households in Ghana are vulnerable to poverty and this is significantly higher than observed poverty level of about 28%. Household health status, household size and education attainments significantly influence vulnerability to poverty. Male headed households were found to be less vulnerable to future poverty. The results suggested that poverty

and vulnerability to poverty are independent concepts. This implies that policies directed towards poverty reduction need to take into account the vulnerability of current non-poor households. Also, various household characteristics should be considered in developing poverty reduction strategies.

To empirically assess the dynamics of poverty and estimate the determinants of households' vulnerability to poverty, Baiyegunhi and Fraser (2010) used a representative sample of 150 rural households in the Amathole District Municipality of the Eastern Cape Province. The result of the study indicated that the number of vulnerable households is significantly larger than for the currently poor households; the vulnerability index was found to be 0.62 compared to 0.56 headcount index. This implies that 56 percent of the sampled households are poor and 62 percent are vulnerable to poverty in the future. The result of the Probit model showed that the age, level of education and occupation of the household head, dependency ratio, exposure to idiosyncratic risks and access to credit are statistically significant in explaining a households' vulnerability to poverty.

As cited by Shafiul Azam (2011), Culloch and Calandrino (2003) estimated the determinants of chronic poverty and vulnerability using the data from rural Sichuan. And the study found that the determinants of chronic poverty and vulnerability appear to be similar which suggests that policies to reduce chronic poverty will also reduce vulnerability. Imai, Gaiha and Kang (2007) estimated ex-anti measures of vulnerability for Vietnam. They found that vulnerability in 2002 generally translates into poverty in 2004 and also vulnerability of the poor causes persistent poverty.

Using micro growth model, Dercon (2004) demonstrates that in Ethiopia rainfall shocks have substantial persisting effect on consumption growth. He shows that covariates capturing the severity of the 1980s famine are causally related to slower growth in household consumption in the 1990s. Similarly, Dercon et al (2005) found drought and illness shocks as an important factors reducing consumption of the household. They reported that drought and illness shock reduce consumption by 20% and 9% respectively. The drought shock affects more households headed by females or with no schooling and households with small land holding in their village. Illness shock affects largely households with large land holding and households headed with no schooling household head (Yesuf, 2007).

For detail assessment of poverty and vulnerability to poverty, Tesfaye (2013) used primary data from the stratified random sample of 250 households drawn from three agro ecological zones of Guba Lafto woreda, Amhara region. The study applied multivariate regression analysis to identify the correlates of household welfare and the level of vulnerability to poverty, and also the censored regression model (Tobit) used to analyze the determinants of poverty intensity. Its result revealed that head age, mean age of household, oxen and asset holding, own business activity, access to credit, extension services and village level infrastructural facility affect household vulnerability negatively in the significant manner. However, head male, number of children, dependency ration, distance to the main market and kola agro ecological dummy affect positively.

According to the study by Dereje (2013) in assessing household's vulnerability to poverty in rural Oromiya of Ethiopia, an estimate of vulnerability to poverty showed that 17.93 percent of the non-poor are highly vulnerable. The mean vulnerability for highly vulnerable households is found to be 0.62. Larger household sizes and illiterate head of household significantly increase the probability of the household to be vulnerable. Therefore, the author recommended that ex ante measures to prevent households from becoming poor as well as ex post measures to alleviate those already in poverty should be combined in designing poverty reduction strategies.

CHAPTER THREE

3. RESEARCH METHODOLOGY

The study of vulnerability to poverty at the household level should ideally be attempted with panel dataof sufficient length and richness. However,as a second best alternative to examine household vulnerability to poverty, a cross-sectional household surveys with detailed data on household characteristics, consumption expenditures, asset of household, household access to saving and credit services, shocks experienced by household can potentially beinformative about the future in a case where panel data are rare which is the feature of developing countries.Vulnerability measurement assumes general perspectives which include the time prospect and the wellbeing measure. The welfare in vulnerability measurement mostly explained in terms of consumption.

3.1 Description of the Study Area

The Gilgel Gibe project is one of the most attractive potential hydroelectric developments in Ethiopia and it is located 250 Kms Southwest of Addis Ababa and 75 Kms Northeast of Jimma town. The Dam covers an area of 51 square Kms at an altitude of 1670 meters above sea level, and holding around 668 million cubic meter of water. The four woreda bordering the dam are Omonada, Sokoru, Tiru Afeta and Kersa which is majority of the population practice farming as their main means of livelihood (Alemeshet Y. et al, 2011).And this study is conducted in South West of Ethiopia at Gilgel Gibe hydraulic Dam Area of Tiro Afeta and Sokoru woreda, which is found in Jimma Zone of Oromia Regional State. The agro ecology of the study area is entirely midlands or woinadega with undulating and plains topography. Vegetation coverage consists of bush scrubs. The principle crops grown are maize, sorghum, teff and coffee. The largest earning cash crops are maize, coffee and peppers. The main livestock kept are cattle, goats, sheep, donkeys and chickens.

Part of the Jimma Zone, Sokoru woreda has 38kebeles and among these 36kebeles are rural district. The altitude of this woreda ranges from 1160 to 2940 meters above sea level. Persistent rivers include the Gilgel Gibe a tributary of the Gibe and the Kawar. A survey of the land in this woreda shows that 36.6% is arable or cultivable, 16.8% pasture, 17.2% forest, and the remaining 29.4% is built-up or degraded (OLZR, 2007).

Tiro Afeta woreda has 27 rural kebeles among 32 districts as one woreda in Jimma Zone of the Oromia Region State. The altitude of this woreda ranges from 1640 to 2800 meters above sea level. Persistent rivers include the Gilgel Gibe, the Busa, the Nedi and the Aleltu. A survey of the land in this woreda indicates that 26% is arable, 8.3% pasture, 14% forest, and the remaining 51.7% is considered built-up, degraded or otherwise unusable (OLZR, 2007).

These two woredas are principally affected by chronic threats such as trypanosomiasis, blackleg and stalk borer which harms cattle and crops. Additionally, periodic crop pests like stalk borer and cattle diseases such as trypanosomiasis and blackleg affect these two woreda every 2-3 years (OLZR, 2007).

3.2 Source and Type of Data

Primary source of dataare the most beneficial instruments for the researcher since the study focuses on the micro-level context of a country.Households are the major units of analysis. Multipurpose and Structured questionnaires isused to collect information on household demographic compositions, consumptionexpenditure, physical capital variables of household including livestock holding and grown crop types, human capital variables, household access to saving and credit services, shocks that the household faced. The data collection process held through a personal interview with the rural households on April 2015. This data is collected by trained high school completed persons who have experience and knowledge about the culture, language and ethics of the study areas' society. The data collectors trained for two days and principal investigators strictly supervised data enumerators and check the completeness of the questionnaire. The study also included essential secondary data from responsive office of Jimma zone planning and program office.

3.3 Sampling Procedures

To meet the overall objective of the study and because of lack of prior information on the vulnerability to poverty status of households in Sokoru and Tiro Afeta woreda, the target populations are households whose conditions suggest that they could be poor in the future even if they are above the poverty line today. Sokoru and Tiro Afeta woreda are selected purposively from Jimma zone of south west Ethiopia. Because these selected woreda are represented by a dominantly subsistence farming

community where high land degradation, soil erosion and drought problems pose a serious threat on households' wellbeing (Amsalu and Wondimu, 2014).

To select the appropriate sample size needed from a total of 55679 rural households in Sokoru and Tiro Afeta woreda, the following sample size determination formula (Noel, et al., 2012) is used:

$$n \geq \frac{N}{1 + (N-1)(\frac{2d}{z})^2} = 266$$

Where, N= The total population

n= The required sample size,

d=0.06 Margin of error,

z=1.96 for a 95 % confidence interval.

The margin of error d is taken as percent point error term and is often calculated for d=1%, d=2%, d=5% and d=6%.Marginal error of 0.06 is tolerable with 95% confidence interval. Once the required sample size is determined, for the purpose of selecting representative sample, a two-stage sampling techniques is applied to generate the required primary data from 266 households.

In the first stage, for the reasons that of high homogeneity nature of Kebeles in both Woreda that would still be representative of the target population in drawing conclusions for a study of household vulnerability to poverty in the selected provinces, five Kebeles were selected randomly from each woreda. Finally, a systematic random sampling method was employed to select 266 sample households in the study area. Systematic random sampling is a type of probability sampling technique and there is an equal chance of selecting each unit from within the population when creating the sample. Total sample households are allocated as follows.

Table 3.1 Composition of Sample Households by Kebeles

Woreda	Kebele	Household Size	Percentage	Sample Households
Sokoru	Begiso	837	0.075	13
	Bore	850	0.076	13
	Dobi	1116	0.100	28
	Cheka	2086	0.187	51
	Chopa	456	0.041	15
TiroAfeta	SaroSento	636	0.056	18
	AlegeSidamo	984	0.088	24
	Afeta	1408	0.126	36
	Mecha	1642	0.147	40
	Kanani	1102	0.099	28
Total	10	11117	1	266

Source: Jimma zone planning and program office

3.4 Methods of Data Analysis

The study utilized descriptive tools as well as econometric models of data analysis. Descriptive data analysis like percentage, mean values and frequencies about the household characteristics and other relevant information are employed. Using Stata11.0 software, the data analyzed via applying a three-stage feasible generalized least squares (3FGLS) technique to identify the extent of rural household vulnerability to poverty and to describe disseminations of poverty and vulnerability to poverty in the study area. And ordinary least square (OLS) regression method is employed to assess the determinants of rural household vulnerability to poverty in the study area.

3.4.1 Specification of the Consumption Process

In the most developing countries, consumption rather than income approach is preferred as a measure of welfare indicators. Because in consumption approach, current consumption provides information about incomes at past or future dates that makes it a good indicator of long-term average well-being. It is regular that consumption fluctuates less than income, due to households or individuals smoothing

their consumption. Households' not only financed their current consumption but also they responds to fluctuation in income by saving in the boom periods and dis-saving during lean periods in order to smooth their consumption. Lastly but not the least, consumption contains smaller measurement error as compared to income; there is a belief that households are more willing to reveal their consumption behavior than they are willing to reveal their income (Lipton et al, 1993).Consumption reflects the ability of household's access to credit and saving at times when their income is very low. Hence, consumption reflects the actual standard of living than other relative proxies for measuring household wellbeing.

For this study purpose, consumption is adjusted for difference in the calorie requirement of different household members (for age and gender of adult members). This adjustment is made by dividing household consumption expenditure by an adult equivalent scale that depends on the nutritional requirement of each family member. Therefore, throughout this paper, consumption expenditure per adult equivalent per month is used as the measure of household welfare. Chaudhuri (2003) defined vulnerability to poverty as a forward looking or ex ante measure of household well-being and he articulated that the level of vulnerability to poverty at time t is defined in terms of household consumption scenario at some point in time t+1 to distinguish the notion of vulnerability to poverty and poverty. These concepts of vulnerability to poverty indicate the possibility of examination of household vulnerability to poverty without direct reference to the current poverty incidence.

Since the study of household's vulnerability to poverty is principally determined via applying inferences from the future consumption prospects, measuring vulnerability to poverty from cross section data requires a number of factors include: household demographic compositions, consumption expenditure, physical capital variables, human capital variables, household access to socio-economic services and shocks that the household faced, etc.

Conceptually, the following reduced form of the future consumption prospect shows the specification of consumption process.

$$Cht = f(Xi, Sit, eit)$$

Xi is a vector of household characteristics including socio-demographic characteristics, and livelihood sources and endowments of assets. Si represents observed locally idiosyncratic shocks experienced by household between t-1 and t.eit is error term and represents unobservable household and community characteristics, as well as unobserved idiosyncratic shocks and covariate shocks that contribute to differential welfare outcomes of otherwise observationally equivalent households.

3.4.2 Econometric Techniques

As exclusively explained in the literature there are three main approaches in measuring vulnerability. These approaches include measuring vulnerability as expected poverty (VEP), vulnerability as low expected utility (VEU) and finally vulnerability as uninsured exposure to risk (VER).

For the purpose of this study, vulnerability is defined as expected poverty (VEP) which has measurement advantage for ex-ante information that measures vulnerability to poverty using cross sectional data. Also this method has an advantage on identifying households at risk who are not poor that can be estimated with a single cross sectional data. This approach is adopted by different researchers including (Dawit,2015;Tesfaye, 2013; Novignon, 2010; Imai et al, 2009; Jamal, 2009;Oni and Yusuf, 2007;Alayande et al, 2004; Deressa et al, 2009; Chaudhuri, 2003;Jalan et al,2002) to estimate household vulnerability to poverty from a single cross sectional data. To estimate the extent of rural household vulnerability to poverty, this study followed an approach developed by Chaudhuri et al (2002).This method is commonly used in a number of developing country contexts when only cross-sectional data are accessible.

As outlined by Lachlan (2011), estimating vulnerability as the probability of experiencing future poverty reflects three main advantages. Firstly, it produces results that are corresponding to more established poverty measures. Secondly, it sheds light on the connection between vulnerable and poor households; by expressing vulnerability in terms of the probability of being poor. Thirdly, this approach is applicable when only cross-sectional data are available.

Following Chaudhuri et al. (2002), measure of vulnerability as expected poverty is the probability of household, h finding itself to be consumption poor at time t+j can be expressed as :

$$Vht = pr(lnCh < lnZ|Xh) \tag{1}$$

Where, Vht represents vulnerability of household hat time t, lnCh measures household's per adult equivalent consumption expenditure at time t+j and Z is poverty line of household consumption.

The possibility that a household will find itself poor in the future depends on its expected or mean consumption and variance of its consumption stream. And a household's vulnerability to poverty defined as a probability condition representing its inability to attain a certain minimum level of consumption in the future. Therefore, household expected consumption and the variance of its consumption are required to quantify the level of household's vulnerability to poverty

The consumption generating process can be specified as;

$$lnCh = Xh\beta + eh \tag{2}$$

Where, Ch is a log normally distributed per adult equivalent consumption expenditure, Xh is represents a bundle of household characteristics, observed experiences of shocks and other covariates, and β is the K×1 vector of parameters of interest and eh is F×1 vector of unobservable or error term. This error term is a mean zero disturbance term have that captured unobservable household characteristics and idiosyncratic shocks, and covariate shocks that would have contributed to different per capita consumption expenditures of households and assumed to be normally distributed.

By and large, there is high possibility consumption volatility among the poor households. Thus, Chaudhuri (2003) assumed that the variance of the disturbance term is not identically distributed across a household which rather depends upon some observable household characteristics. And this notion raises the prospect of formulating heteroscedasticity. Hence, the following (equation (3)) implies the functional form of heteroscedasticity via applying the variance of eh. The variance of eh is assumed to be represented by:

$$\sigma^2 e, h = X_h \theta \tag{3}$$

In case of mean zero disturbance term e_h which is heteroscedastic, using standard regression techniques can yield estimates that are inefficient. Therefore, a three-stage Feasible Generalized Least Squares (FGLS) procedure as suggested by Amemiya (1977) is used to estimate β and θ.

According to FGLS procedure, equation (2) is first estimated using the Ordinary Least Squares (OLS) procedure. Then the OLS estimation of residuals from equation (2) is used to determine the following OLS estimation of the residuals:

$$\hat{e}_{OLS,h}^2 = X_h\, \theta + \mu_h \tag{4}$$

The predicted values from this supplementary regression $X_h\, \widehat{\theta}$ are then used to transform equation (4) into:

$$\frac{\hat{e}_{OLS,h}^2}{X_h\widehat{\theta}_{OLS}} = \left(\frac{X_h}{X_h\widehat{\theta}_{OLS}}\right)\theta + \frac{\mu_h}{X_h\widehat{\theta}_{OLS}} = X_h\widehat{\theta}_{FGLS} + u_i \tag{5}$$

$X_h\widehat{\theta}_{FGLS}$ s a consistent estimate of the variance component from equation (3), and this $\sigma_{e,h}^2$ transformed equation is again estimated using OLS, and the estimated coefficients from equation (5) are the asymptotically efficient FGLS estimator of the variance of household consumption. Subsequently the estimate from the variance can be modified as:

$$\widehat{\sigma}_{e,h} = \sqrt{X_h\widehat{\theta}_{FGLS}} \tag{6}$$

Then this estimated variance can be u $X_h\widehat{\theta}_{FGLS}$ equation (2) into:

$$\frac{lnC_h}{\sqrt{X_h\widehat{\theta}_{FGLS}}} = \left(\frac{X_h}{\sqrt{X_h\widehat{\theta}_{FGLS}}}\right)\beta + \frac{e_h}{\sqrt{X_h\widehat{\theta}_{FGLS}}} \qquad (7)$$

OLS estimation of equation (7) leads to a consistent and efficient estimate of β. Then after using the estimates of thatacquired from $\widehat{\beta}\ and\ \widehat{\theta}$ equation (7), it is possible to determine expected log consumption and variance of log consumption for each household.

The expected log consumption:

$$\widehat{E}\ [(lnC_h\ |\ X_h)] = X_h\ \widehat{\beta} \qquad (8)$$

The variance of log consumption:

$$\widehat{Var}[lnC_h\ |\ X_h] = \widehat{\sigma}^2_{e,h} = X_h\widehat{\theta} \qquad (9)$$

And the log normally distributed consumption is an estimate of the probability a household to either be poor or not known as vulnerability as expected poverty is specified by:

$$\widehat{V}_h = \Phi\left(\frac{ln\ Z - X_h\widehat{\beta_{FGLS}}}{\sqrt{X_h\widehat{\theta}_{FGLS}}}\right) \qquad (10)$$

$\Phi(.)$ reflects the cumulative normal distribution function, Z represents the poverty line, $X_h\widehat{\beta}_{FGLS}$ is the expected mean of real household consumption,and $X_h\widehat{\theta}_{FGLS}$ is the estimated variance in consumption.

Consequently, the measure of household vulnerability as expected poverty depends on the choice of poverty line, the expected level of consumption and the expected variability of consumption.

Besides, for investigating the determinants of household vulnerability to poverty by using monthly per adult equivalent consumption expenditure as the endogenous variable, this study applied ordinary least square (OLS) regression schemes as (Dereje, 2013; Tesfaye, 2013;Oni and Yusuf, 2007).Ordinary least square regression is advantageous over other regression methods in the analysis of vulnerability in the case of cross sectional data. Hence, the following model is presented to examine the determinants of vulnerability to poverty of each household as expected poverty (VEP) in the study area.

$$Yij = \beta Xi + ei \qquad\qquad (11)$$

Where:

Yij = Estimated vulnerability as expected poverty indices

Xi = Vector of explanatory variables

B = Vector of respective parameters

ei = error term

3.4.3 Variables Description
- **Dependent Variables**

Household expenditure (natural log of per adult equivalent household consumption expenditure per month) serves as a measure of welfare and dependent variable for the household vulnerability to poverty analysis in the first stage of FGLS procedures.Householdexpenditureincludes both food and non-food consumption expenditure valued in ETB. Theestimated values of household vulnerability to poverty indices for each household obtained from FGLSprocedures serve as dependent variable for defining the determinants of rural household vulnerability to poverty via using ordinary least square method.

Independent Variables

Selection of the possible determinants of rural household vulnerability to poverty depends on theoretical expositions which are likely to affect household welfare. Different micro level literatures also used as guideline in selecting the appropriate explanatory variables which have economic relevance to assess the measurement of vulnerability to poverty. These variables include:

Household Size: The impact of household size on the welfare of households is mixed. Household size can affect wellbeing positively or negatively depending on the demographic composition of the household.Therefore, its effect might be positive if larger household composed of productive force hence less dependency ratio and negative if it involves higher dependency ratio. According to Aniceto and Orbeta (2005), there is strong and enduring link between vulnerability to poverty and family size and large family size significantly contributes to the vulnerability of households. It is a continuous variable and shows number of family members in the household.

Age of the Household Head: Age of the household head is continues variablethat expected to affect consumption expenditure of household in either ways. As the age of the household head increases the household may attains abilities and experience which can impact vulnerability to povertynegatively. For example, Bogale and Genene (2012) found that household head age has a considerably positive effect on the household wellbeing. On the other hand, age of household head variable might have positive relationship with vulnerability to poverty if higher age is asign of poor productivity and low labor supply.

Education level of the Household Head: It is continues variable that is expected to affect consumption expenditure of household positively.Years of schooling of the household headis a proxy for the education level of the household headandit is premised to have a positive impact on the welfare of households. Educated household headhas exposure and know how to technological advancement and rational ways of life which can improve productivity, health and readiness for shocks. Households with educated household head have a better wellbeing as related to their counterparts(Similer et al, 2004).

Dependency Ratio: The dependency ratio relates the number of children and older persons to the working-age population. It is a continuesvariable and indicates the potential effects of changes in population age structures for social and economic development. Contrast to a household with high dependency ratio, households with low dependency ratio most probably have better welfare status due to the fact that a household with few dependents inclined to exert less pressure on household resources

and likely to have higher consumption. Households with higher dependency ration have higher probability to fall into the poverty depth (Engvall, 2006).

Livestock Holdings: In the rural part of Ethiopia livestock are the most important element of agricultural activities which serves as a source of income from their products, their dung for cooking and as manure, a coping mechanism in the time of risk, for storing wealth, and as a protective method against riskand key source of power and income. Hence, a household with a large number of livestock is likely to have a better welfare. Livestock possession have a significant and a direct relationship with household consumption expenditure (Bogale and Genene, 2012; Similer et al, 2004). Therefore, livestock ownership is expected to have positiveassociationwith the welfare of households since it reflects a household's long term capacity to manage risk and meet its consumption requirements. It is a continuous variable that concerns with TLU per adult equivalent.

Crops diversification: Thiscontinuous variable is contained as a proxy for number of crop grown. Crop diversification means growing a variety of crops in an area that can be a possible system for the time of hardship like crop failure. It is expected to affect households' welfare significantly and positively as it spreads risks of crop failure. Crop diversification is a method of crop management whereby a producer reduces the risk of his or her portfolio by producing a variety of different crops that have low correlations with each other.This notion also related with habit of not growing the same crop in the same place year after year, depleting the soil of the nutrients needed to grow that crop.

Access to Credit and Saving Service: The contribution of credit and saving services on reducing vulnerability to poverty is not ambiguous. The provision of credit has been found to strengthen crisis-coping mechanisms, diversify income-earning sources, build assets and improve the status of women (Hashemi et al, 1996; Montgomery et al, 1996;Morduch, 1998; Husain et al, 1996**).**Therefore, access to credit and saving provision isexpected to be positively associated with household wellbeing and negatively related to vulnerability to poverty of rural household.This variable is a proxy for formal and informal credit and saving services that includetraditional saving and helping institutions like Iqqub and Idir.It is dummy

variable taking a value of 1 for those who took credit and saving services in the last 12 months and 0 otherwise.

Exposure to Idiosyncratic Shocks: It is a continuous variable, proportionate of exposure to idiosyncratic shocks household faced in the last 12 months. Shocks whether it is idiosyncratic or covariate refers to emergency events that occur as a result of failure in a particular system and can result decline of welfare of a community or individuals. The idiosyncratic shocks relates to households or individual level vulnerabilities such as illness, death, unemployment, crop pest, diseases and other micro shocks which tends to increase instability in households consumption patterns.

CHAPTER FOUR

4. RESULTS AND DISCUSSIONS

4.1. Socio-Demographic and Economic Characteristics of the Study Area

This section gives an overview of the socio-demographic characteristics of households like household composition and household size in the study area, and also it shows features such as age, gender, marital status, education level, ethnicity and religionof household heads. As well as economic characteristics of the household including farm land and livestock holdings, access to credit and saving services and crop diversification are among the major variables that determine the study of rural household vulnerability to poverty. To create a larger picture about households and to describe some of the outcomes that are used as a basis for analyses, the results are presented virtually at household levels.

According to the data collected from the study area that is explained by table 4.1, majority of the household head (87.6 %) aremale and the remaining (12.4 %) are female headed household. Household head is mainly responsible for the economic well-being of the household. This evidence shows that in the study area male are more responsible for the welfare of the household and this is due to the fact that female relative to male are deprived in accessing society's economic resources and opportunities.Besides gender of household head, the age structure of a household head is significant in determining the welfare prospect of the household. In the study area, more than 99 % of the household heads are belonging to productive age group.

Several studies indicate that marriage has intrinsic potential to bring an array of benefits on adding a potential earner to the household. In the study area, the majority of the household head (81.9%) are married followed by divorced (9.8%), widowed (5.6%) and single (2.7%). As well table 4.1 implies that the mass of the household heads are Muslim (83.5%), while 7.9 % of the household head alleged they are practicing Protestant, and the remaining 6.4 % and 2.3% of the households are follower of Orthodox and Wakefeta religion sect respectively. The five largest ethnic groups reported in the study area of Sokoru and Tiro Afeta woreda are Oromo

(78.9%), the Yem (7.8%), the Amhara (6.8%), the Dawuro (5.6%), and the Wolayta (0.8 %).

Table 4.1 socio-demographic characteristics of the households and household heads, Sokoru and Tiro Afeta woreda, Jimma Zone, 2015 (n=266)

Gender of Household Head	Freq.	%
Male	233	87.6
Female	33	12.4
Age of Household Head	Freq.	%
18-65	264	0.992
>65	2	0.007
Marital Status of Household Head	Freq.	%
Married	218	81.9
Widowed	15	5.6
Divorced	26	9.8
Single	7	2.7
Ethnicity of Household Head	Freq.	%
Oromo	210	78.9
Amhara	18	6.8
Yem	21	7.8
Dawuro	15	5.6
Wolayita	2	0.8
Religion of Household Head	Freq.	%
Muslim	222	83.5
Orthodox	17	6.4
Protestant	21	7.9
Wakefeta	6	2.3

Source: compute from own survey, 2015.

Many literatures show that low education leads to poverty and poverty leads to low education which is vicious circle of poverty and vulnerability to poverty. Thus, better education is the main tool for poor to escape from poverty and vulnerability. Table 4.2 shows that, in Sokoru and Tiro Afeta woreda, 14.66 % of the household head are unable to read and write. Primary education level takes the biggest share, 191 (71.8%), in the categories for educational status, and the remaining 13.54 % of the household head attended secondary and higher education.Household size can influence wellbeing of the society in either way. The average family size in Sokoru and Tiro Afeta woreda is around 5.1 persons per household with a minimum of one person and a maximum of eleven persons. The average household size in adult equivalent unit is about 4.2.

The dependency ratio is the number of young and elderly people in a population divided by the productive age group. The higher the dependency ratio is, the greater the burden on the average adult because the needs of the dependents must be met by the rest of the productive population. Accordingly, the average dependency ratio of Sokoru and Tiro Afeta woreda is 0.72 with minimum of 0 and maximum of 6.

Table 4.2 Educational Status of Household Head and Family Size Characteristics of the Sample Households

Educational Level of Household Head	Freq.	%
Unable to read and write	39	14.66
Primary	191	71.8
Secondary	26	9.79
Higher	10	3.75
Household Size and Dependency Ratio of Sampled Households		
Average Household Size		5.1
Average adult equivalent size		4.2
Average Dependency Ratio		0.72

Source: compute from own survey, 2015.

Land is asset base of poor households for agricultural production and other activities. In Ethiopia, one of the frequent non-standards units for the measurement of land is timad. This measurement can be expressed in terms of hectar and most of the time one hectar is considered as four timad. As it can be seen from table 4.3, the average size of farm land holding per household in Sokoru and Tiro Afeta woreda is 0.8 hectar.

Ethiopia is largely an agrarian country and more than 80% of Ethiopian population is reliant on agriculture of which livestock play a very important role. In Sokoru and Tiro Afeta woreda livestock are the main means of sustaining livelihood through smoothing consumption at times of failure of harvest due to crop disease and other factors. The average tropical livestock unit per household is 1.52 in the study area of Sokoru and Tiro Afeta woreda. Since crop failure significantly impacts welfare,crop diversification or producing a variety of crop has many recognized benefits like income enhancement and consumption smoothing. The average crop type production per household is 3.2 in the study area of Sokoru and Tiro Afeta woreda. There is closer link between consumption and well-being and consumption is better tool for measuring wellbeing particularly in developing countries.

The study revealed that the average food consumption expenditure per adult equivalent household size is 334.8 ETB per month with a share of 76 % among the total consumption expenditure.In the study area, agricultural sector appears to be a main source of livelihood and employment for household heads and it is a key source of occupation, 77 % of the household heads are engaged in farming activities, followed by trading 7.5 %. Household heads that are retired and working in government offices account 6.2 % and 5.6 % respectively. On the other hand, household head whose main occupation is daily laborer shares 3.7 percent.

Table 4.3 Economic Characteristics of Sample Households including Household Head (compute from own survey, 2015)

Average Farm Land size in Hectar per Household		0.8
Average Livestock unit (TLU)		1.52
Average Crop Type		3.2
Monthly Average Food Expenditure per Adult Equivalent		334.8
Monthly Average Non-Food Expenditure per Adult Equivalent		103.2
Monthly Average Total Expenditure per Adult Equivalent		438
The Share of Food in Total Expenditure		0.76
Main Occupation of Household Head	Freq.	%
Farmer	205	77
Trader	20	7.5
Government employee	15	5.6
Daily Laborer	10	3.7
Retired	16	6.2

4.2 Determination of a Poverty Line in the Study Area

According to the WB (2000),the most widely used method of estimating poverty line is the cost of basic needs (CBN) method because the indicators will be more representative and the threshold will be consistent with real expenditure across time, space and groups.

In the CBN approach, first the food poverty line is defined by choosing a bundle of food typically consumed by the poor. In the case of food poverty line, most practices use the nutritional level of 2200 kilocalories to provide an objective standard for what is considered a minimum. A non-food poverty line is determined by tolerating the necessary allowance for the basic non-food items like clothes and shoes, cooking materials and lighting, household durables, cleaning and personal care items, educational expenses, medical expenses, transportation expenses, etc.

In Ethiopia total poverty line used since 2010/2011 is 3,781 ETB per adult person per year expressed in terms of national average prices. And this poverty line is conducted in the context of the 1995/96 poverty analysis report which based on the cost of 2,200 kcal per day per adult food consumption with an allowance for essential non-food items. The food and total poverty lines used since 1995/96 in the country are 648 and 1075 ETB respectively at national average prices (MoFED, 2012).Total poverty refers to a combination of both the food and non-food requirements. To conduct a representative vulnerability study centered on per adult consumption expenditure, the total poverty line of 3,781 ETB per adult person per year used since 2010/2011 is updated at national average prices for the year 2014/2015.Thus, the updated total poverty line used in this thesis is 429 ETB per adult person per month.

4.3 The Choice of Vulnerability Threshold

The choice of a vulnerability threshold and time horizon is rather arbitrary in the study of vulnerability to poverty providing indication that there is no obvious choice. Most of the empirical studies like (Pritchett, Suryahadi et al. 2000; Chaudhuri, Jalan et al. 2002; Zhang and Wan 2008) adopted the vulnerability threshold of 0.5 and it is the most preferred susceptibility verge. According to Suryahadi and Sumarto (2003), the choice of 0.5 is justified for three reasons. Firstly, it makes instinctive sense to say a household is 'vulnerable' if it faces a 50 percent or higher prospect of falling into

poverty in the near future. Secondly, this is the point where the expected consumption coincides with the poverty line. Thirdly, if a household is just at the poverty line and faces a mean zero shock, then this household has a one period ahead vulnerability of 0.5. This implies that as the time horizon goes to zero, then being 'currently in poverty' and being 'currently vulnerable to poverty' coincide (Pritchett et al., 2000).

Thus, the current study employed a VEP threshold of 0.5 and time horizon of one year which can indicate the likelihood of poverty in the short run. Appropriate VEP threshold of 0.5 and higher considered as a reasonable threshold to regard one household vulnerable to poverty.

4.4 The Extent of Rural Household Vulnerability to Poverty

The choice of a vulnerability threshold, that is, a minimum level of vulnerability above which all households are defined to be vulnerable and time horizon are necessary elements in the assessment of household vulnerability to poverty status. And these decisions involve certain degree of arbitrariness. To investigate the distribution of household vulnerability to poverty, following Chaudhuri (2003), this paper adopted a vulnerability threshold of 0.5 which is the most preferred vulnerability verge and a time horizon of one year. Households are then considered to be vulnerable if they have a 0.5 or higher probability of falling into poverty at least once in the next year and households with vulnerability index less than 0.5 are grouped as non-vulnerable group. Applying three stage FGLS regression method specified in the methodology part of this paper, an index of household vulnerability to poverty is generated for each household in Sokoru and Tiro Afeta woreda of south west Ethiopia. A total of 139 (52.25 %) households are vulnerable to poverty among the sampled households, using the total poverty line of 429 ETB per adult person per month.

Table 4.4 Household Vulnerability to Poverty Estimates

Vulnerability to Poverty Status of Households	Frequency	Percent
Not Vulnerable to Poverty	127	47.75
Vulnerable to Poverty	139	52.25
Total	266	100

Source: compute from own survey, 2015.

4.5 Decomposition of Household Poverty and Vulnerability to Poverty Status

Head count poverty index is calculated applying the total poverty line of 429 ETB per adult person per month. Based on the data used for this study, 48.2 % of households in Sokoru and Tiro Afeta woreda are poor. While 52.25 percent of households in this study area are vulnerable to poverty. Arguably, this shows that expected poverty is much higher than the point-in-time estimates of poverty, which connote the importance of forward looking poverty analysis.

Table 4.5: Cross-Distribution between Poverty and Vulnerability to Poverty (%)

	Non-Vulnerable to Poverty	Vulnerable to Poverty	Total
Total	47.75	52.25	100
Poor	46.8	53.2	48.2
Non-Poor	48.7	51.3	51.8

Source: compute from own survey, 2015.

Table 4.5 shows that a sizable fraction of non-poor households (51.3%) are vulnerable to poverty and 53.2 percent of the poor households have a vulnerability index greater or equal to 0.5 or have a probability of 50 percent and above to fall in to poverty in the near future. Thus, poverty reduction strategies need to incorporate not just alleviation efforts but also prevention campaigns. It can be seen that, in this case, the poverty rate overestimates the fraction of the population vulnerable to poverty.

4.6 Determinants of Vulnerability to Poverty

Table 4.6 Determinants of Rural Household Vulnerability to Poverty (OLS Regression)

Explanatory variables	Coefficient	Robust.Std. Err	t- value	p-value
Age of Household Head	.0001543**	.0000597	2.59	0.010
Education level of Household Head	-.0039188 ***	.0012574	-3.12	0.002
Household Size	.0003385	.0003262	1.04	0.300
Dependency Ratio	-.0000638	.0002015	-0.32	0.752
Household Access to Credit and Saving Service	-.0024653***	.0009055	-2.72	0.007
TLU	-.0004226***	.0000124	-33.98	0.000
Crop Diversification	-.0017504***	.0005211	-3.36	0.001
Exposure to Idiosyncratic Shock Index	.0066391***	.0022404	2.96	0.003
_cons	.5871805***	.0032086	183.00	0.000
Number of obs = 266		F(8, 257) = 580.96		Prob> F =
R-squared = 0.9460		Root MSE = .00695		0.0000

///** and *** refers to Significant at 5% and 1% Significant level respectively.

Source: Compute from own survey, 2015

The result of the above regression analysis shows that the coefficient of the age of household head is statistically significantly at 5 % and positively related to household's vulnerability to poverty. And this implies that the likelihood of a household's becoming vulnerable to poverty increases with an increase in the age of the household head. This could be because of the fact that as household heads get aged, more probably they become economically inactive which in turn affects their productivity and consequently increase their vulnerability. Thus, the extent to which

households manage to escape poverty which is headed by aged person would usually depend on changes in important conditions of the household.

The coefficient of household head education as measured by years of schooling is statistically significantly at 1 % and negatively related to vulnerability to poverty. This implies that household becomes less vulnerable to poverty with an increasing educational attainment, i.e. higher years of schooling increase earning potential and improve occupational and geographic mobility. This result matches with other studies concluding that household head education attainment decreases household vulnerability to poverty (Imai and Gaiha, 2007). Therefore, educational status of household head matters more on household's ability to cope up with risks and ongoing changes like globalization.

The other important variable is household exposure to idiosyncratic shocks. The coefficient of household exposure to household level shock is statistically significantly and positively related to household's vulnerability to poverty. This indicates that households exposed to idiosyncratic shock such as illness, job loss, disability, unemployment, crop pest and diseases are vulnerable to becoming poor. This is due to the fact that these unexpected events will erode the households' economic stand and deplete its assets. This result is largely in line with the findings of Morduch (1994).

It is evident from the results that household access to credit and saving service is a key determinant of vulnerability to poverty. The coefficient of credit and saving service availability is statistically significantly at 1 % and negatively related to vulnerability to poverty. This implies that households with access to credit and saving services are less likely to be vulnerable to poverty. Increased access to credit and saving services enhances household's wellbeing through provision of investment and consumption credit and saving services to even household's consumption as well as to boost their income. This result is consistent with the finding of (Hashemi et al, 1996; Baiyegunhi, 2010). Even if formal financial institutions and micro-enterprises are scant in the study area, local savings and credit associations such as Iqqub and Iddirare playing a great role in smoothing consumption and investment. Iqqub and Iddir institution are almost ubiquitous throughout Ethiopia particularly in rural areas regarding their roles in saving purpose and coping mechanisms during shocks at

village level. Iqqub is a system of saving where by people form groups and pay periodically a fixed amount of money and it can be formed for various purposes such as; starting or expanding business ventures, consumption purposes that need expending large sum of money at one time or simply for saving (Dejene, 1998). Iddir is an association made up by a group of persons united by ties of family and friendshipand has an object of providing mutual aid and financial assistance in certain circumstances.

Number of crops grown and household livestock holding variables appear to have significant and positive effect on household's wellbeing and it reflects that households with diversified crop and enhanced livestock are less likely to be vulnerable to poverty. Possession of a larger number of livestock is one of the determining factors on smoothing consumption and provision of investment since livestock asset is easily and possibly convert to monetary value to positively affect the welfare of households and hence cope up negative shock. This variable affects vulnerability to poverty positively at a 1% level of significance. Crop diversification determines households' vulnerability to poverty negatively at 1 % significant level. Crop diversification spreads risks of crop failure and creates opportunities to use different soil conditions to their best advantage, hence lower level of susceptibility to poverty. Generally, in Sokoru and Tiro Afeta woreda of south west Ethiopia, livestock holding and crop diversification play a great role on the livelihood of households falling into poverty trap at least for one more year.

However, the regression results revealed that dependence ratio and household size variables are found statically insignificant in determining vulnerability to poverty status of rural households in Sokoru and Tiro Afeta woreda of south west Ethiopia. Dependence ratio and household size could be significant variables in the determinations of rural household vulnerability to poverty if extensive research is undertaken based on Panel data. This is due to the fact that many researchers (Alayande, 2004; Adepoju, 2012; Oni and Yesuf, 2007; Shafiul, 2011, etc) in their panel data studies found dependency ratio and household size variables noteworthy in the determination of rural household vulnerability to poverty.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study examines a standard cross-sectional dataset on a representative sample of 266 rural households in Sokoru and Tiro Afeta woreda of south west Ethiopia to empirically assess the aggregate extent of rural household's vulnerability to poverty as well as the determinants of rural household vulnerability to poverty. Also this paper inspects the level of poverty and vulnerability to poverty of households in rural area of Sokoru and Tiro Afeta woreda.

The result of three stage FGLS estimate signifies that the number of vulnerable households is larger than the currently poor households; the vulnerability index is found to be 0.52 compared to 0.48 head count poverty index. This shows that while 48 percent of the sampled households are poor, 52 percent sampled households are vulnerable to becoming poor in future. A sizable fraction of households (51.8) that are now non-poor are indeed vulnerable to poverty in future. Also 53.2 percent of the poor households have a vulnerability index greater or equal to 0.5 or have a probability of 50 percent and above to fall in to poverty in the near future.

The result of OLS regression shows that the crop type grown, access to credit, exposure to idiosyncratic shock and livestock holding of household, age and level of education of household head are statistically significant in explaining a household's vulnerability to poverty.Factors like household head education, total livestock unit, types of crop grown and household access to credit found negatively correlated with rural household's vulnerability to poverty. Furthermore, the finding confirms that idiosyncratic shocks and age of household head variables have positive impact on rural household vulnerability to poverty.

The coefficient of age of the household head appears statistically significant at 5 % level and positively related to household's vulnerability to poverty, implying that aged household head is more likely to be vulnerable to poverty compared to those who are in more productive age groups. The result of study shows that households headed by illiterate person are more vulnerable to poverty, whereas a household head with a

higher level of education is better poised to cope with risk and uncertainty and therefore less vulnerable to poverty. The finding indorses that types of crop grown and household livestock holding are important variables for tackling rural household vulnerability to poverty via making households in a better position for smoothing consumption and investment at a normal and uncertain events.

Access to saving and credit services is vital factor on defining rural household vulnerability to poverty. Credit and saving services such as traditional saving and helping groups like Iqqub and Iddir are helpful to build assets as it smooth income and consumption, enables the purchase of inputs and productive resources, and provides security against crises. Idiosyncratic shocks index is found to be an important element in determining vulnerability to poverty at 1 % significant level. Households with high proportion of idiosyncratic shock are more vulnerable to poverty since it adversely affects household consumption and production processes. Whereas other variables such as: household size and dependence ratio in determining vulnerability to poverty status of rural households in the study area are statistically insignificant.

5.2 Recommendations

In light of the evidences exposed in this study the following recommendations are drawn. This study estimated vulnerability to poverty of rural households using three stage FGLS procedures and found out that 52 % of rural households in the study area are vulnerable to poverty which exceed the number of households currently poor (48%). It further indicates that a large number of rural households (51.8 %),out of the total sampled non- poor households, are vulnerable to poverty and also 53.2 percent of the poor households are susceptible to poverty again, signifying the importance of forward looking poverty analysis and calls for action oriented policy interventions that reduce vulnerability to poverty.

Therefore, to bring sustained poverty reduction, poverty diminution strategies should focus not only on the current poor households but also on the other part of the population who are currently not poor but are likely to be poor in the future at the time of application of the programme or policies. For example, combinations of strategies like prevention, protection and promotion presumably benefits both poor and non-poor but vulnerable household which would give them a more secure base to diversify their production and consumption activities and decisions. And this is worth full and imperative for policy makers to conscious this fact when designing social policy.

The findings presented in this study indicated that households headed by illiterate person and aged person are more vulnerable to poverty, whereas a household head with a higher level of education and a household head at more productive age is better dignified to cope up with risk and uncertainty and therefore less vulnerable to poverty. Consequently, investment in human capital along with other means of social protection and promotion such as old age grants could be instrumental for reducing household vulnerability to poverty.

Cognizant of the fact that idiosyncratic shocks determines rural household's vulnerability to poverty significantly through affecting rural household's consumption and productions choices, it is important to assess ex-ante coping strategies that could reduce the exposure of households to various types of idiosyncratic shocks that lead to a reduction in their wellbeing. Developing formal credit and saving institutions and informal protection mechanisms like Iddir and Iqqub is essential scheme for

improving household's ability on mitigating the adverse effects of idiosyncratic shocks. As well through improving the ex post coping mechanisms of the vulnerable households, it is possible to lessen the impact of susceptibility to poverty. In line with this, puts ahead the importance of social protection and promotion programmes is indispensable for ensuring inclusiveness in the poverty reduction process so that growth becomes more pro-poor.

On the other hand, factors like livestock holding and crop diversification found negatively correlated with the household's vulnerability to poverty at 1 % significant level. As a result, this is an insight that strong efforts should be made to improve rural household's welfare and reduces vulnerability to poverty through expanding and providing effective credit and agricultural extension services in the study area to have productive livestock species and diversified crops.

Furthermore, access to saving and credit services significantly affect household's vulnerability to poverty with the expected signs. Hence, providing and expanding rural saving and credits services with the necessary awareness creation campaign among the rural households in the study district should be one of the main areas of intervention and policy options. Access to credit and saving services help households particularly in rural area for smoothing income and consumption at the time of man-made or natural catastrophes like disputes and drought.

To sum up, a meaningful and a comprehensive suite of practical strategies that consider poor and non poor vulnerable households is needed to free poor and vulnerable households out of poverty circle and sustain pro-poor growth.

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APPENDICES

Appendix 1: Calorie Based Nutrition Adult Equivalence Scales Years of age

Years of age	Male	Female
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.80
30-60	1.00	0.82
60+	0.84	0.74

Source: Adopted from Tesfaye (2013).

Appendix 2: Conversion factors that used to estimate tropical livestock unit (TLU) equivalents Animal

Animal Category	TLU	Animal Category	TLU
Cow & Ox	1.00	Donkey (adult)	0.70
Horse & mule	1.10	Donkey (young)	0.35
Camel	1.25	Sheep and Goat (adult)	0.13
Heifer & bull	0.75	Sheep and Goat (young)	0.06
Calf	0.25	Chicken	0.013

Source: Adopted from Tesfaye (2013).

Appendix 3: Exposure to idiosyncratic shocks index

A. Dummy variable equal to one if the household experienceddeath of household members in the last 12 months, 0 otherwise.

B. Dummy variable equal to one if there is job loss among the household members in the previous 12 months, 0 otherwise.

C. Dummy variable equal to one if the household member faced illness or disorder in the last 12 months, 0 otherwise.

D. Dummy variable equal to one if the household faced problems of pests or diseases that affected crops at household level in the past 12 months, 0 otherwise.

E. Dummy variable equal to one if the household faced diseases that affected livestock at household level, 0 otherwise.

Exposure to idiosyncratic shocks index$=\dfrac{a+b+c+d+e}{5}$

Appendex 4: OLS regression result on determinants of vulnerability to poverty

. reg Vptdx agehh hhheadeduca hhsize depratio hhaccredtsav TLU cropdivers expidisindx

Source	SS	df	MS		
Model	.224308202	8	.028038525	Number of obs =	266
Residual	.012403452	257	.000048262	F(8, 257) =	580.96
				Prob > F =	0.0000
				R-squared =	0.9476
				Adj R-squared =	0.9460
Total	.236711654	265	.000893252	Root MSE =	.00695

Vptdx	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
agehh	.0001543	.0000597	2.59	0.010	.0000368	.0002718
hhheadeduca	-.0039188	.0012574	-3.12	0.002	-.0063949	-.0014427
hhsize	.0003385	.0003262	1.04	0.300	-.0003038	.0009808
depratio	-.0000638	.0002015	-0.32	0.752	-.0004607	.000333
hhaccredtsav	-.0024653	.0009055	-2.72	0.007	-.0042485	-.000682
TLU	-.0004226	.0000124	-33.98	0.000	-.0004471	-.0003981
cropdivers	-.0017504	.0005211	-3.36	0.001	-.0027766	-.0007242
expidisindx	.0066391	.0022404	2.96	0.003	.0022271	.011051
_cons	.5871805	.0032086	183.00	0.000	.580862	.593499

Appendix 5: First stage of the 3FGLS estimates

. reg lntotexpa agehh hhheadeduca hhsize depratio hhaccredtsav TLU cropdivers expidisindx

Source	SS	df	MS
Model	22.3455549	8	2.79319436
Residual	.901539164	257	.003507934
Total	23.2470941	265	.087724883

```
Number of obs =     266
F( 8,   257) =  796.25
Prob > F      = 0.0000
R-squared     = 0.9612
Adj R-squared = 0.9600
Root MSE      = .05923
```

lntotexpa	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
agehh	-.0009844	.0005086	-1.94	0.054	-.001986	.0000172
hhheadeduca	.0522423	.0107201	4.87	0.000	.0311319	.0733526
hhsize	-.0032086	.0027806	-1.15	0.250	-.0086842	.0022671
depratio	-.0002186	.0017181	-0.13	0.899	-.0036019	.0031647
hhaccredtsav	.0145906	.0077201	1.89	0.060	-.0006122	.0297934
TLU	.0041912	.000106	39.53	0.000	.0039824	.0044
cropdivers	.0147192	.0044428	3.31	0.001	.0059703	.0234681
expidisindx	-.0682089	.0191008	-3.57	0.000	-.1058229	-.0305948
_cons	5.138361	.0273552	187.84	0.000	5.084492	5.19223

Appendix 6: Rural Household Vulnerability to Poverty Questionnaire

General Notes:

➢ This questionnaire is a prototype for collecting the information required for the computation of the rural household vulnerability to poverty.

➢ The document is produced to meet the demand of those who wish to incorporate those questions that may also cover other topics that would be required to construct a household vulnerability to poverty study.

➢ Some elements of this questionnaire are adopted from a research on "Rural household's poverty and vulnerability '', Tesfaye Gedefaw, July 2013, Ethiopia.

Dear respondent

Hello. My name is _____. I am working with Jimma University. We are conducting a survey about "Rural Household Vulnerability to Poverty in South West Ethiopia'' in case of Gilgel Gibe hydraulic dam area. The information we collect will help the researcher to develop an academic study concerning vulnerability to poverty. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team.

In case you need more information about the survey, you may contact the researcher viathe following addresses**: e-mail-**sisayrealchange@gmail.com **and phone number +251941180156.**

Woreda: _____

Kebele: _____

Interviewer: _____

Date of interview: _____

Comments by supervisor: _____

Household ID code: _____

Part I: Basic Household (Respondent) Information

1. Age of the respondent _____

2. Sex of the respondent_____

3. Ethnicity of the respondent   Oromo=1 Amhara=2 Yem =3 Dawuro=4 Wolayita=5 others=6

4. Religion of the respondent Muslim=1 Orthodox=2 Protestant=3 Wakefata=4 others=5_____

5. Marital status of the respondent   Single =1 Married=2 Widowed=3 Divorced=4

6. Education level of the respondent No education =1 primary=2 secondary and higher =3

7. Number of household members _____

8. Are you head of the Household? Yes=1 N0=2

9. If yes, go to Q 10, If not what is the relationship to the head of the house hold? wife=1 daughter=2 daughter-in-law=3 grandchild=4 parent=5 parent-in-law=6 brother or sister = 7 other relative=8

10. How old is the head of the household _____

11. Sex of Household Head_____

12. Ethnicity of the head Oromo=1 Amhara=2 Yem =3 Dawuro=4 Wolayita=5 others=6

13. Religion of the head   Muslim=1 Orthodox=2 Protestant=3 Wakefata=4 others=5----------

14. Does the head of the household ever attend school? Yes=1 N0=2

15. If yes, what is the highest grade completed? _____

16. Is this house owned by you or by member of this household? Yes=1 N0=2

17. What are the main activities of the household _____

18. What are the secondary activities of the household_____

19. Number of Children (0-15) + Number of Pensioners (> 65) in the household_____

20. Number of Working age 16-65in the household _____

Part II: Household Farm Land Holding

1. Does the household own any land that can be used for agricultural service? Yes=1 No=2, if yes go to the remaining questions

2. Plot size in tsimad (Hectar)_____

3. Use of the plot in last main season _____

Part III: Crop Output Types and Sales during the Last Season

1. Plot size in tsimad _____

2. Crop types grown in the last season_____

3. How much was your harvest from last season's crop? _____

Part IV: Livestock Ownerships and Income from Livestock Products

1. Do you have Owen livestock at present? Yes =1, No =2,

2. If your answer is yes, indicate the number and types of livestock that you owned?

Do not include any animal that you are rearing for someone else.

Types of livestock	Number owned at present	Total value	During the last season, how many were died/lost
Oxen			
Local cows			
Improved cows			
Bull			
Calf			
Sheep			
Goat			
Donkey			
Mule			
Horse			
Camel			
Poultry			
Bee			

Part V: Access to Credit and Saving Services:

1. Have you ever participated in saving and credit services in formal financial institutions? Yes=1 No=2,"

2. If yes, state your purpose of participation. _____

3. Are you a member of Iqqub at present? Yes=1, '' No=2,

4. If you are a member of Iqqub, how much do you contribute per month? Br._____

5. Are you a member ofIddir at present? Yes=1 No=2,

6. If you are a member of Iddir, how much do you contribute per month? Br._____

Part VI: Consumption Expenditure

Section 6.1 food expenditure

We would like to ask you about all the food that was bought for consumption and/or was consumed from your own stock, in last month. Please do not include food bought for resale, even after processing (aggregate from the different sources should be equal to the total amount consumed).

	Food type	Total food consumption in the last 30 days			Consumed from purchased		Consumption from own harvest		Consumption from gifts or food aid		Consumed from other sources	
		Unit (A)	Amount	Value (birr)	Amount	Value (birr)	amount	Value (birr)	Amount	Value(birr)	Amount	Value (birr
Cereals	Teff											
	Barley											
	Wheat											
	Maize											
	Sorghum											
	Finger Millet/oats											
	Finger Millet											
	Rice											
	Furnoduket											
	Besoduket											
Pulses	Lentils(mesir)											
	horse Bean/bakel											
	Cow peas/ater											
	Chick peas(shira)											
	Guaya											
Oil crops	Linseed(teliba)											
	Boleke											

	Food type	Unit (A)	Total food consumption in the last 7 days		Consumed from purchased		Consumption from own harvest		Consumption from gifts or food aid		Consumed from other sources	
	Sesame/selit											
	Sun Flower (suf)											
	Nug											
	Groundnut/lewuz											
	gulo											
spices	Salt											
	Berbere											
	Cooking oil											
	Onion/key											
	Garlic/nech											
	Jingibil											
Spices	abish											
	Sugar											
Beverages	Tella											
	Arequi											
	Teji											
	Beer (Bira											
	Soft drink											
	Coffee											
	honey											
	tea											

			Amount	Value (birr)	Amount(	Value (birr)	amount	Value (birr)	Amount	Value(birr)	Amount	Value (birr)
Products	Macaroni											
	Pasta											
	Bread											
vegetables'	Potato											
	Tomatoes											
	Sweet potato											
	Carrot											
	Keysir											
	Kariya											
Gomen (selata, kosta, tikilegomenetc)												
	Others											
fruits	Papaya											
	Avocado											
	Zeytihun											
	banana											
	Sugar cane											
Milk &animal product(ask this question for non-fasting season)	Milk/yogurt											
	Cheese											
	Butter											
	Beef meat											
	Mutton/goat											
	Chicken											
	eggs											

1. Is the household has purchased any prepared food, or eaten elsewhere against payment in the last months? Yes=1, No=2, if yes total expenditure in the last 30 days (in birr)_____

Section 6.2 Non-food expenditure

Items	Total expenditure incurred (Birr)	Expenditure paid by other household (outside your family members (Birr)	Items
Clothes and shoes	Clothes/shoes/fabric for adults (both men and women)		
	Clothes/shoes/fabric for children (both boys and girls) do not include a student's uniform		
	Linens; sheets, towel, blankets, others		
Cooking materials & lighting	Kitchen equipment; cooking pots, midija, others		
	Kerosene (including for lighting),		
	Fuel wood & charcoal from purchased		
	Fuel wood & charcoal from Owen		
	Matches		
	Batteries		
Household Durables	Furniture and lamp/ torch		
	Building material for houses		
	Others		
Cleaning and personal care items	Soap (both for close and body), omo (soap powder), others		
	Cosmetics; Hair Oil (both men &women),		
	Hair butter purchase		
	Hair butter from own product		
	Hair salon (for both women & men)		
	Others		
Educational expenses	Educational materials: books, pen, pencil, bags, uniform etch		
	School fees		

Medical expenses	Modern medical treatment and medicine		
	Traditional medical services and medicine		
	Others (Specify)		
Transportation expenses	Transportation expenses including both for man and goods, livestock etc.		
Social and other contributions	Contribution to EDIR, association (women, youth, farmers, sport etc.)		
	Contribution to ADA, ANDM, etc.		
	Contribution to church/ mosque		
	Contribution to community service construction (schooling, clinic, etc.)		
	Taxes and other contribution to tibia(police station, and other)		
	Compensation and penalty		
	Other voluntary contribution (not for credit)		
Service charge	Electricity		
	Water bill (other related)		
	Others (specify)		
Ceremonial expenses ** &***	Wedding,Teskar,kurban, kiristna,senbete,mahiber-tsebel, engagement (kelebet-assera), etc		
Cigarettes & chat	Cigarettes & chat		

** 1. Prepared by interviewee,: Wedding_____ _____; Funeral ceremonies (incl. Teskar, kurban) _____; Engagement (kelebet elsewhere) _____; Circumcision (religious holy days) _____;

Mahber _____; Senbete_____

***2. Paid to others: estimated value for all_____

Part VII: Idiosyncratic Shocks

1. Has this household been affected by the following idiosyncratic shocks in the last year? 1=yes ,2= no

Types of shock	Did these shocks result in:	How widespread was this shock?	How did your household cope with these major shocks/hardships
Pests or diseases that affected crops before they were harvested athousehold level			
Pests or diseases that affected livestock at household level			
Death of household members			
Illness of household members			
Job loss of household member			
Others (specify)			