

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
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**RURAL HOUSEHOLD MULTIDIMENSIONAL POVERTY
AND VULNERABILITY IN DEGU'A TEMBIEN DISTRICT,
SOUTH EASTERN ZONE OF TIGRAY, ETHIOPIA**

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Rural Household Multidimensional Poverty and Vulnerability in
Degu'a Tembien District, South Eastern Zone of Tigray, Ethiopia

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DISSERTATION APPROVAL
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This is to certify that the thesis prepared by Desawi Kiros Gebrekidan entitled: “*Rural Household Multidimensional Poverty and Vulnerability in Degu’a Tembien District, South Eastern Zone of Tigray, Ethiopia*” and submitted in fulfillment for the requirements for the Degree of Doctor of Philosophy (Rural Development) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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I, the undersigned, declare that this PhD dissertation is my own course of study and research work except where indicated by referencing. All sources of information other than my own have been clearly acknowledged both in the text and references. This work has not been previously submitted to any other university for award of any type of academic degree.

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List of Abbreviations

ADB	Asian Development Bank
AF	Alkire and Foster
ANOVA	Analysis of Variance
ATA	Agricultural Transformation Agency
BNA	Basic Needs Approach
CA	Capability Approach
CIS	Commonwealth of Independent States
CPRC	Chronic Poverty Research Centre
CSA	Central Statistical Agency
DFID	Department for International Development
DHS	Demographic and Health Survey
DRMFSS	Disaster Risk Management and Food Security Sector
DTWOPF	Degu'a Tembien District Office of Planning and Finance
FAO	Food and Agriculture Organization
FAOC	First Axis Ordering Consistency
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focused Group Discussion
FGLS	Feasible Generalized Least Square
FGT	Foster Greer Thorbecke
GTP I	Growth and Transformation Plan I
GTP II	Growth and Transformation Plan II
Ha	Hectare
HDI	Human Development Index
ICA	International Cooperative Alliance
IDS	Institute of Development Studies
IFAD	International Fund for Agricultural Development
ILO	International Labor Organization
ILRI	International Livestock Research Institute
IMF	International Monetary Fund
IPCC	International Panel on Climate Change
ISI	Import Substitution Industrialization
m.a.s.l.	Meter Above Sea Level
MCA	Multiple Correspondence Analysis
MDGs	Millennium Development Goals
MFI	Micro Finance Institution
mm	Millimeter
MoA	Ministry of Agriculture
MoFED	Ministry of Finance and Economic Development
MoH	Ministry of Health

MPI	Multidimensional Poverty Index
N	Total Population
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OPHI	Oxford Poverty and Human Development Initiative
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
PPP	Purchasing Power Parity
PSNP	Productive Safety Net Program
ROC	Receiver Operating Characteristic
SACCOs	Saving and Credit Cooperatives
SDGs	Sustainable Development Goals
SDPRP	Sustainable Development and Poverty Reduction Program
SLF	Sustainable Livelihood Framework
SNNPE	Southern Nations Nationalities and Peoples of Ethiopia
Sqkm	Square Kilometer
TLU	Tropical Livestock Units
TV	Television
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
VEP	Vulnerability as Expected Poverty
VER	Vulnerability as Uninsured Exposure to Risk
VEU	Vulnerability as Low Expected Utility
VIFs	Variance Inflation Factors
WFP	World Food Program
WHO	World Health Organizations

Definition of Local Terms

Degu'a – is a traditional climatic agro-ecological zone of Ethiopia, with an altitudes 2300 and 3200 m.a.s.l and its average annual temperature ranges from 17.5 to 11.5 °C. On average, the annual rainfall amount received by this zone ranges between 900-1,200 mm (MoA, 2000).

Dergi – is a military committee or government that ruled Ethiopia from 1974 to 1991.

Equib – is an indigenous and informal local institution in Ethiopia established voluntarily to rotate member's savings on lottery basis.

Hanfets – is a combination of barley and wheat crops planted to minimize risks of crop failure.

Iddir – is an indigenous and informal local association in Ethiopia established voluntarily for the purpose of mutual help in time of risks, funeral and mourning activities, and other social events.

Kebele – similar with '*tabia*' in Tigrigna – is a term which refers to the smallest local administrative unit in Ethiopia which has defined geographic area.

Lifinti – is reciprocal type of labor sharing arrangement of the rural people for agricultural and non-agricultural works.

Qolla – is a traditional climatic agro-ecological zone of Ethiopia, with an altitude of 500-1500 m.a.s.l. Its average annual temperature ranges from 27.5 to 20 °C and its annual amount of rainfall ranges from 200–800 mm (MoA, 2000).

Qushet - is a Tigrigna term which refers to a part of a *tabia*.

Mahber – is voluntary religious associations related to Orthodox Tewahdo religion followers established for religious and social purposes.

Taff – is one of the most important staple crops of Ethiopia which is used to make *Injera* (national dish of Ethiopia). The scientific name of taff is *eragrostis tef*.

District – is an administrative area which is similar to Woreda. District is the third level administrative unit of the region which has defined area and its own budget.

Woynadegu'a – is a traditional climatic agro-ecological zone of Ethiopia, with an altitude of 1500 to 2300 m.a.s.l. Its average yearly temperature ranges between 20 and 17.5 °C and its yearly amount of rainfall ranges from 800-1200 mm (MoA, 2000).

Note that Ethiopian Authors are cited according their First name.

Abstract

Persistent rural poverty continues to be one of the most striking development challenges of Ethiopia and attracted the attention of policy makers, development practitioners and researchers. This study aimed at assessing household's multidimensional poverty and vulnerability (to poverty) using multidimensional poverty measures and lenses focused on a set of household capabilities and functioning's in Degu'a Tembien District. To address this objective, data were collected from primary and secondary sources. Using stratified random sampling technique, 420 households were sampled from six rural villages to fill a questionnaire that was used to collect primary data. The study used mixed research methods where cross-sectional quantitative and qualitative approaches are used. Descriptive and inferential statistics such as percentages, means, chi-square test and ANOVA test were employed to obtain the distributional characteristics and to describe the associations and variations among variables of interest. The research objectives were addressed using Multiple Correspondence Analysis approach to construct asset indices, and Alkire and Foster methodology to estimate multidimensional poverty. Whereas logistic regression was used to identify poverty determinants, and the three-step Feasible Generalized Least Square was used to address vulnerability to multidimensional poverty.

The paper initially investigates household's asset endowments, which are the foundation of household's strategies to achieve livelihoods. The findings reveal that although assets are the bases on which the livelihood of the poor depends, the general household's asset capacity and endowments are generally low. Households are poorly endowed with financial, natural, and human capitals. The highest proportions of households (45.7%) were categorized in the middle socioeconomic group while low proportions of households (20%) were concentrated in the highest socioeconomic group. The cluster technique classified 34.3% of households under the lowest socioeconomic positions.

The findings also indicated that household's incidence of deprivation were generally higher and widespread in landholding, livestock ownership, decision making on income, access to electricity, energy for cooking and sanitation where largest percentage of deprivation (>50%) were observed in each indicators. The adjusted headcount ratio, multidimensional headcount ratio and the multidimensional poverty intensity of households were also found high. The living standard dimension of poverty was the major contributor to households MPI while deprivation in decision making on income, livestock ownership and landholding appears to be the larger contributor indicators to overall Multidimensional Poverty Index (MPI). Building on these results, determinants of multidimensional poverty were investigated. Result of this analysis shows that access to non-household labor, number of plots, contact with extension agents, education level of the household head, household size and household's annual income are statistically significant determinants of multidimensional poverty.

Households were found highly exposed to various natural shocks particularly to drought, hailed rainfall, flood and pest. Reducing the number and quality of food, relying on savings and sale of livestock were the three dominant coping strategies following shocks. The finding of this empirical analysis demonstrates that greater proportions of households (80.3%) are vulnerable to future poverty, and the overall vulnerability incidence exceeds the current multidimensional poverty rate. Out of the total vulnerable households, 24.4% of the currently non-poor households

are at risk of becoming multidimensional poor while 55.9% of households who are currently poor will remain vulnerable to future multidimensional poverty. The results also disclose that ceteris paribus, female headed households, households with a better social capital, financial asset and number of plots are associated with reduced vulnerability to multidimensional poverty while households with better physical capital are found highly vulnerable. Household's exposure to drought, hailed rainfall and pest attack were highly vulnerable to multidimensional poverty with higher average level of MPI deprivation. Those who were vulnerable to drought were also found with lower expected volatility in their wellbeing. The finding also shows that households that relied on savings, sale of livestock and formal borrowing of money to manage shocks are associated with reduced vulnerability to future poverty.

In general, the empirical findings of this study have strong implications to vulnerability reduction efforts in the Degu'a Tembien District. Building asset endowments of the vulnerable should be the policy focus to increase and expand household's capability to invest in various livelihood activities. The most effective way of reducing poverty is not focusing on the current poor households, but addressing the larger population who are at risk of becoming multidimensional poor. Therefore, government should also focus on rural vulnerability reduction program as a strategic effort to increase human and financial capital rather than piecemeal dimension by dimension interventions targeted only on the currently poor households.

Key Words: Asset endowment; Multidimensional Poverty; Incidence; Intensity; Vulnerability; Deprivation

Chapter One

Introduction

1.1 Background

Poverty as a multidimensional phenomenon attracted the attention of policy makers, development agents and development economics researchers (Alkire and Foster, 2011) and it is widely recognized as one of the most complex economic and social problems of the 21st century in the developing world. United Nations (2009) pointed out that poverty has become trickier to reduce due to its complex nature and multidimensional sources. World governments at the United Nations general assembly in 2000 had promised to halve the proportion of people who are suffering from extreme poverty and hunger no later than 2015 (United Nations, 2000). However, although the United Nations (2015a) reported the number of people living in extreme poverty globally has declined by more than half, falling from 1.9 billion in 1990 to 836 million in 2015, poverty reduction progress across countries and regions were unequally distributed particularly in Sub-Saharan Africa and South Asia that remained behind attaining the MDGs (Millennium Development Goals). FAO (2015) also reported that almost half of the population in Sub-Saharan Africa lives in abject poverty. This shows poverty remains as a serious problem, particularly in Sub-Saharan Africa.

After a fifteen MDG years, the post-2015 Sustainable Development Goals (SDGs) are designed to end absolute poverty in terms of its monetary (the \$1.25 PPP per day) and non-monetary forms. The non-monetary form of poverty refers to multidimensional poverty described as deprivations in education, health and living standard outcomes. Considering income-based measures of poverty, 1.2 billion people of our world live with \$1.25 or less a day (Alkire et al., 2015a). However, OPHI (Oxford Poverty and Human Development Initiatives) (2015) study from 101 countries (which comprises 75% of the world's population or 5.2 billion people) indicated that a total of 1.6 billion people are living in multidimensional poverty; of which 31% of the multidimensionally poor are found in Sub-Saharan Africa. Nearly half of all multidimensionally poor people (i.e., 733 million) are destitute. Of 811.5 million people of Sub-Saharan Africa, a total of 496 million are Multidimensional Poverty Index (MPI) poor (OPHI, 2015a).

In spite of such problems, the multidimensionality of poverty is often neglected at the policy formulation stage in developing countries (Chowdhury and Mukhopadhyaya, 2014). Monetary poverty assessment dominates poverty measures of developing economies (Chen and Ravallion, 2010) and it plays a significant role in designing countries' development plan. However, recently it is recognized that poverty is multifaceted that includes many dimensions further than the purely economic elements. Sumner (2007) highlighted that although it is accepted to incorporate non-economic dimensions in poverty analysis, monetary approach continue to be the ideal measurement metric. But this approach makes difficult to assess poverty status of the rural people as they mostly own non-liquid resources. Nevertheless, depending on capability approach which recently advocated by Sen and broadened the definition of wellbeing to comprehensive functionings and capabilities (Duclos and Araar, 2006; Wagle, 2008; Alkire and Deneulin, 2009), the need to understand and measure poverty using multidimensional approach is increased as there is urgent need to comprehensively understand the principal foundations of poverty so that sound measures would be applied in relation to the needs of the people. According to Sen, functionings are '*the various things a person may value doing or being*', while capabilities are the real freedoms and opportunities to achieve a group of functioning's (Sen 1999, p75). Hence, multidimensional poverty measure would conceptualize the different deprivations of individuals or households to different features of wellbeing such as economic, social, psychological, and material wellbeing.

IFAD (2011) noted that although progress have been made in reducing poverty in developing economies, the rural people are suffering from poverty resulted from lack of assets, limited economic opportunities, poor education and capabilities. Even countries which show significant growth have large number of people who are vulnerable to poverty. Absence of proper understanding on the factors of poverty and vulnerability is one reason for the lower level of countries expected improvement in poverty reduction (Sahn, 2015). Some countries consider the causes of poverty and vulnerability the same and designed similar policy to reduce poverty and vulnerability (to poverty). However, the SDGs give a space to evaluate poverty and vulnerability reduction policies and interventions as interlinked but separate concepts. Of the seventeen goals, the first post-2015 SDGs tend to '*end poverty in all its forms everywhere*', by the year 2030 (United Nations, 2015b, p.15). The targets specified under this goal clearly emphasize on ending multiple deprivations, reducing vulnerability and poverty through providing social protection

interventions that help the poor and vulnerable people and this recent development have significant implication on how poverty and vulnerability should be measured and conceptualized.

Poverty and vulnerability (to poverty) are strongly linked concepts in such a way that each causes the other. That is to say, while poverty makes people vulnerable to various shocks, their vulnerability aggravates their poverty and hence their vulnerability to future shocks. As to Chaudhuri (2003), poverty is an *ex-post* measure of a household's wellbeing that reflects a current state of deprivation while vulnerability is an *ex-ante* measure of wellbeing that reflects not so much how well-off a household currently is, but what its future prospects are. Moser (1998, p.3) also remarked that "*vulnerability is closely linked to asset ownership. The more people have, the less vulnerable they are; and the greater the erosion of people's assets, the greater their insecurity*". Individuals, households and communities with better asset endowment can be resilient to hardships and recover from adverse effects of shocks.

Poverty in Ethiopia has given rise to many socioeconomic problems and threatens the survival and stability of the society. As a result, poverty reduction have become the top development agenda of the country, and the government have designed and implemented numerous policies, strategies and programs such as the Sustainable Development and Poverty Reduction Program (SDPRP) (2002/03-2004/05), Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005/06 to 2009/10), and Growth and Transformational Plan I (GTP I) has been put in place for the period 2010/11 to 2014/15 (MoFED, 2010). In addition to this, currently the government is implementing the Growth and Transformation Plan II (GTP II) (2015/16 to 2019/20) (MoFED, 2016). This all is aimed at reducing poverty and improving the living standard of the people which will bring about a sustainable national development.

Recent studies revealed that Ethiopia has been recording remarkable progress in different areas. For example, the average economic growth of Ethiopia between 2006 and 2013 was 10.6 percent (IMF, 2014). World Bank has reported that Ethiopia has experienced high and consistent economic growth, recording annual per capita growth rates of 8.3 percent in the last decade, driven largely by growth in service and agriculture sectors (World Bank, 2013). From 2006 to 2013 the number of health centers increased from 668 to 3,245 (MoH, 2013). The proportion of women who had an antenatal visit during their most recent pregnancy increased from 27% in 2000 to 43% in 2011. In 2005 the primary net attendance rate for 7-12 year old children was

42.3% and in 2011, it increased to 62.2% (Carranza and Gallegos, 2013). Despite such progress, UNDP (2015) and OPHI (2015b) reported that Ethiopia has remained one of the poorest country in the world. This suggests that the country's poverty is deep-rooted and complex.

Regionally, there is strong and persistent poverty in Tigray (the study region) due to its degraded environment that contributes to low agricultural production (Edward et al., 2010). According to Relief Society of Tigray (2011), smallholder farmers of the region account for more than 90% of agricultural production and these farmers are exposed to various problems such as low agricultural productivity, shortage of land, land degradation and poor access to market. World Bank (2015) also indicated that incidence of poverty is high in the region. 31.8% of the total population of the region is living under national poverty line (i.e., Birr 3,781 per adult person per year), which makes the region's situation more serious compared to the national average (29.6%) in 2011. Generally, poverty remains one of the chronic blight of the region. This is partially due to the fact that the root causes of poverty are complex that requires multidimensional analysis and diagnoses. A comprehensively and carefully investigated and sound development strategy based on better and deeper understanding of poverty, vulnerability to poverty and livelihoods contexts could be one solution to poverty. Therefore, it is against this backdrop on poverty that this study attempted to make a critical analysis on multidimensional poverty and vulnerability (to multidimensional poverty) of rural households, taking Degu'a Tembien District as a case study.

1.2 Statement of the Problem

Several studies that have been done in Ethiopia indicated that poverty remains high in the country (Brown and Teshome, 2007; Fekadu, 2010; UNDP, 2015; Alkire and Kanagaratnam, 2018). Recent poverty assessment also shows that while growth in Ethiopia was pro-poor between 2005 and 2011, some households today are largely poorer than any household in 2005 (World Bank, 2015). Eighty percent of Ethiopian population inhabited outside urban areas in 2018 (United Nations Population Division, 2018) where poverty is generally high and their means of living is dependent on agriculture (Dejene et al., 2011). This implies that rural household's livelihood is dependent highly on the effectiveness of this traditional sector. This aggravates vulnerability of households to poverty as the country's agriculture extremely relies on vagaries of seasons where irregular rainfall is dominant. Moges (2013) remarked that whenever an economy finds itself in such condition, persistent poverty and susceptibility defines the life

for the majority of the population. According to Dercon and Christiaensen (2007), even though households have better stock of livelihood assets, in Ethiopia, rainfall is the main determinant of poverty and food security. Lack of crucial household assets such as land, oxen and human capital (Ayalneh et al., 2005), low non-farm income, low agricultural production, poor health and low education, weak institutional structures and high population growth (Asmamaw, 2004) are also other factors which determine poverty in Ethiopia.

In understanding issues of poverty and vulnerability in Ethiopia, various studies have been conducted. However, as observed in many studies (see Fitsum and Holden, 2003; Ayalneh et al., 2005; Dawit et al., 2011; Ayalneh, 2011; Ahmed, 2013; Nega, 2015; Girma and Temesgen, 2017), the discussions mainly focused on extent and determinants of poverty using unidimensional approach. Up to the limited knowledge of the researcher, few studies (such as Gebretsadik, 2013; Bruck and Sindu, 2013; Alemseged, 2016; Mekonen and Heshmati, 2016) conceptualized poverty as multidimensional and assess multidimensional poverty in Ethiopia using the Alkire and Foster Methodology. Using Young Live survey data, Tassew (2014) conducted comprehensive multidimensional poverty and human wellbeing assessment in Ethiopia using different dimensions of wellbeing. However, the paper was focused more on social exclusion estimates of poverty than the ordinal Multidimensional Poverty Index estimation. With this exception, the rural household multidimensional poverty is not well documented, particularly in Ethiopian context. The existing studies on vulnerability to poverty are also dominated by one-dimensional measures of income or consumption poverty. Therefore, study on multidimensional poverty and vulnerability (to multidimensional poverty) in Ethiopia is very important to fill the following specific gaps.

First, regardless of the many of anti-poverty programs, poverty reduction still remains a difficult task to Ethiopia and many of the previous studies have used income or consumption expenditure as proxy indicator of poverty. This approach to poverty analysis is currently considered as important but provides narrow and incomplete definition (Alkire et al., 2014) which did not give a comprehensive picture of poverty (Klassen, 2008). One of the strong opposing arguments comes from Sen (2009) which believed that lack of income cannot fully explain the poverty phenomenon due to some limitations. Sen indicated that the use of the poverty line based on income doesn't guarantee that somebody will achieve the minimum of its needs. Different

individuals may face different prices thus reducing the accuracy of the line of poverty. Although Von Maltzahn and Durrheim (2007) highlighted that having a higher income and consumption enable individuals to enhance their socioeconomic wellbeing and capabilities, Thorbecke (2005) noted that there are some non-monetary problems (example, public goods) which cannot be filled by market due to market imperfections. Thus income or consumption expenditure is important but not sufficient measure of poverty. Sen (1999a) also documented that poverty is not simply having low income but is all about multidimensional deprivation in health, education, hunger, drinking water, social isolation, exploitation as well as human security. Furthermore, currently poverty is viewed as the shortfall of individuals or households in a different of life dimensions. Therefore, there is a dire need to have a new outlook and insight of Ethiopian poverty through multidimensional approach to get ample information about the poor and the various dimensions of poverty.

Second, the failure of the previous policies and interventions to eradicate the high prevalence of poverty in Ethiopia (Yeshtila, 2018) implies that one of the critical point needed to be considered is not that individuals, households and communities are poor but the probability that if they are poor, they will remain in poverty and if they are not poor they will fall in to poverty. This means vulnerability to poverty increases the incidence of poverty. Therefore, it is compulsory to go beyond measuring multidimensional poverty and categorizing of who is presently poor, how poor they are, and why they are poor. What is more essential is to identify who is likely to be poor, how poor are they likely to be, and why they are vulnerable to multidimensional poverty. This will better guide poverty preventive actions and enhance the ability of governments to minimize susceptibility (to poverty) through increased ability to investigate and respond to multidimensional poverty and enhance households' means of coping to recover rapidly when exposed to shocks.

Many studies have concentrated on addressing vulnerability to consumption poverty (see Jamal, 2009; Azam and Imai, 2009 and 2012; Abrham and Bauer, 2012; Adepoju and Yusuf, 2012; Dereje, 2013; Iqbal, 2013; and Agbaje et al., 2013). Exceptions include Calvo (2008), Azeem (2016) and Feeny and McDonald (2016), who explore vulnerability to multidimensional poverty in cases of Peru, Pakistan and Melanesia, respectively. These authors conceptualize vulnerability to multidimensional poverty as the risk of falling in to future poverty as a result of multiple

deprivations and they have used the most common indicators of multidimensional poverty such as deprivations in education, health and living standard. As far as the researcher knowledge is concerned, no study is addressed rural household's vulnerability to multidimensional poverty in Ethiopian context. Hence, assessment of household's vulnerability to multidimensional poverty using current information is highly required to be well documented.

Third, factors which causes and aggravates poverty need to be understood and identified both spatially and temporally to design context specific pro-poor poverty reduction policies and strategies. As a result, a multidimensional analysis of rural poverty focusing on sets of assets, capabilities and vulnerabilities requires an in depth area-focused research. Therefore, this study has used the recently developed poverty measurement approaches so as to have comprehensive understanding of multidimensional poverty and vulnerability status of rural households. In view of the above stated problem, this study attempts to answer the following research questions:

1. What livelihood resources do the study households possess to make a living? What is the asset based socioeconomic status of households in the study area?
2. What are the incidence and intensity of multidimensional poverty of households in the study area?
3. Which dimensions and indicators are contributing more to household multidimensional poverty?
4. Which factors are more potent to determine rural household's multidimensional poverty?
5. What are the major shocks that rural households experienced in the study area? How do households respond to shocks or vulnerabilities?
6. How vulnerable are rural households to multidimensional poverty?
7. What factors are associated with household's vulnerability to multidimensional poverty?

1.3 Objective of the Study

1.3.1 General Objective

The major objective of this study is to critically assess rural household's asset endowments, multidimensional poverty, and vulnerability to multidimensional poverty in Degu'a Tembien District.

1.3.2 Specific Objectives

The specific objectives of this study are:

1. Examining the household's livelihood asset endowments and its distribution among rural households in the study area.
2. Measuring the multidimensional poverty status of rural households in the study area.
3. Analyzing the major socioeconomic determinants of multidimensional poverty.
4. Estimating the vulnerability of rural households to multidimensional poverty.

1.4 Significance of the Study

Poverty is a multifaceted and dynamic phenomenon which has several causes that exhibit economic, social and political features. Hence, anti-poverty policy requires multidimensional approaches and strategies (Burgington, 2003). Ethiopian government has designed poverty reduction policies and development plans, including GTP I and GTP II, which are directly related to poverty reduction. The effectiveness of poverty reduction policies and interventions is highly dependent on the accurate identification of the multidimensional poor and vulnerable households, and this largely relies on how poverty is measured and conceptualized. Therefore, assessment of multidimensional poverty and vulnerability is highly required to support poverty reduction initiatives of the country. Moreover, there is compelling rationale to shift the analysis and measurement of poverty in Ethiopia from a single dimensional (consumption/income) approach which underestimate the complex nature of poverty to capability and functioning based multidimensional measurement and analysis. This is very important to capture the multiple dimensions of household's poverty. Generally, the result of this paper would have the following significances.

Cognitive significance: Given Ethiopia is a poor country, multidimensional poverty and vulnerability related research have the potential to benefit a large number of scattered rural households as it enable us to understand what their situation is. The study has identified the underlying multidimensional poverty status of rural household's so that policies would focus on both *ex-ante* and *ex-post* poverty reduction intervention which require strong evidence on the proportion of multidimensionally poor and vulnerable households in the study District. In addition, conducting grass root household level analysis to know the living condition of the poor

is highly desirable to understand the existing performance and efficiency of development institutions aimed at helping the poor.

Analytical significance: The study is significant to investigate factors that highly determine wellbeing of the study population and it can be helpful in identifying multiple deprivations experienced by the poor and the deprivations that are leading households to multidimensional poverty. The fact that there is too little knowledge on vulnerability to multidimensional poverty, further information on the various characteristics of vulnerability, conditions that make households susceptible to poverty, their incidence in diverse locations, the coping strategies assumed by households to different shocks is strongly required to be critically examined to design appropriate micro-level interventions.

Normative significance: Given the limited financial resources available, it is too difficult to deal with all dimensions of poverty in Ethiopia. Addressing Ethiopia rural poverty necessitates designing local level and site-specific intervention and to do this it demands understanding of the extent and determinants of multidimensional poverty and vulnerability. Informing policy makers to keep the poor on the agenda through developing coordinated poverty reduction policies and programs is another benefit of this dissertation. Hence, with Alkire and Foster methodology, the study has identified the poorest and vulnerable section of rural households, and the dimensions and indicators in which they are mostly deprived. Such findings are too crucial for government, Non-Governmental Organizations, donors and other stakeholders who are interested on poverty reduction as the information is vital for effective targeting and allocation of resources aimed at reducing poverty and inclusive development. This is because the multidimensional poverty analysis findings address indicators that are directly connected to functionings and the means/inputs more closely related to the ends/outcomes of a policy. Furthermore, most of the indicators included in the poverty analysis are closely related to Sustainable Development Goals which would be significant to evaluate the effectiveness of current development interventions.

Analysis of vulnerability to poverty is also significant for poverty reduction efforts because it helps policy makers to take prior intervention to protect and prevent the non-poor vulnerable households from falling in to future multidimensional poverty. Furthermore, from academic standpoint, the study would serve as a guide for future research and would enrich the stock of

existing but limited emerging body of knowledge on multidimensional poverty and vulnerability (to poverty) in Ethiopia.

1.5 Scope of the Study

The study was carried out and confined to the geographical area of South Eastern Zone of Tigray, Northern Ethiopia, focused on six rural Kebeles of Degu'a Tembien District. It addressed multidimensional poverty and vulnerability of households in the study District. Although the study was conducted on six Kebeles, the result of the study can be generalized to all areas and population which have similar characteristics in the study region.

The main intention of this research is to document the livelihood resources of rural households, assess their multidimensional poverty status and analyze the major contributing factors to household's multidimensional poverty and susceptibility to poverty using households as a unit of analysis. Poverty and vulnerability analysis is a very broad, and time and energy consuming task. To make it easy and relatively specific, analysis of multidimensional poverty was specifically used education, health, standard of living, wealth and empowerment as broad poverty dimensions. The wider scale dimensions of poverty such as consumption expenditure, quality of work, psychological wellbeing and political dimensions of poverty are not covered under this study. Besides, assuming the study area is experiencing various shocks, the probability of households falling into multidimensional poverty in the future was assessed using various predictors like household characteristics, asset, shocks and response strategies. Moreover, as the focus of the study is on rural households, the District town households were excluded from this study because the socioeconomic activities and access to resources are different from the rural inhabitants.

1.6 Organization of the Dissertation

The introductory section of the dissertation is presented under this (first) chapter which provides the background of the study, statement of the problem, objectives and significance of the study among others. Following this, the next chapters of the dissertation are structured as follows. The second chapter comprises the overview of the literature relevant to the study including the theoretical, empirical, and conceptual framework of the study. Chapter three discusses about research methodology which consists of research design, study philosophy, sampling procedure,

source and method of data collection, and general method of data analysis for each research objectives. Chapter four describes households' livelihood asset endowments which are important for relatively long term household's wellbeing. Specifically, the chapter addressed the human, natural, physical, social and financial capitals of households and based on these assets, household socioeconomic status were assessed. Chapter five comprises discussions on household's multidimensional poverty. In this part, topics related to incidence and intensity of multidimensional poverty and the contribution of dimensions and indicators to the overall multidimensional poverty are included among the others. Chapter six presents the determinants of household's multidimensional poverty. Chapter seven comprises the analysis on household vulnerability to multidimensional poverty. In the chapter, the major shocks experienced and coping responses adopted by rural households are described. Following this description, the level of household's vulnerability to multidimensional poverty is estimated. Finally, the paper winds-up its presentation by providing conclusions and policy recommendations in chapter eight.

Chapter Two

Review of Related Literature

2.1 Introduction

Research project needs sound theoretical and methodological foundation for effective understanding of the research problem under investigation (Harlow, 2009). As indicated by Gay and Weaver (2011, p. 26), “*Theories are systematic sets of interrelated statements and constructs intended to explain some aspect of social life*” and as Gardner (2004) stated a theory takes the form “*X has occurred because of A, B, C and D*”. Although no single theory explains all instances of poverty, some of the major theoretical explanations associated with causes of poverty are discussed in this chapter and here the theoretical basis and analytical framework of the study are presented. The study begin by presenting three grand development theories that is modernization theory, dependency theory and post-development theory, and then proceed to individual, cultural, geographic and structural theories of poverty.

The welfare (one-dimensional) and non-welfare (multidimensional) approaches of poverty are also described in this chapter to have a comprehensive understanding on poverty definitions and measurement issues. In the theoretical and analytical framework of this study, the Capability Approach (CA) and Sustainable Livelihoods Framework (SLF) are discussed. Moreover, approaches to vulnerability estimation and its linkage with poverty are reviewed. Finally, this chapter finalized its discussion by presenting empirical literature on household’s poverty and vulnerability to poverty.

2.2 Theoretical Paradigms of Development

2.2.1 Modernization Theory

Modernization theory is a grand development theory that explains the underdevelopment of third world countries. According to Rojas (1996), the theory was originated as a result of three factors: the emergence of the United States of America as a powerful and influential nation, the expansion of united world communist movement and the collapse of the European colonial power in Africa, Latin America and Asia, which lead to the emergence of new states. These newly formed nations were looking for a model of development to enhance their economy and to improve their political autonomy. With this regard, Chrot (1981) stated that the American

politicians promoted their scientists to study the situation of third world countries, to ensure political stability and advance economic growth in the third world, so as to reduce the risk of losing the newly formed states to the Soviet Union and Eastern Europe which has communist government. Specially, after World War II, disparity has been created and the world was classified under two groups that is the developed (the west) and underdeveloped (the south) world. The west assumed that the project of modernization/development which is engineered and directed by them as a remedy to narrow the gap between the developed and underdeveloped world. This top down approach was designed to improve the conditions of lower income economies. As a result, modernization theory comes into existence as a political, social and academic response to underdevelopment.

The fundamental idea of the modernization theory, according to Coetzee (2001), is that industrialization and market forces drive societies towards certain direction of change. With this ideology, structural change processes have been introduced to underdeveloped countries with the assumption that their economies would grow according to the western model. Chaudhary (2013) also remarked that the theorists strongly believed that development would be achieved through diffusion of innovations (such as capital, technology, entrepreneurship) and modern technological skills and expertise's from the developed to the developing world through secular and scientific education. Educational institutions serve as a tool to diffuse the scientific technical knowledge of western societies to produce skilled man power required in the industrial economy.

Modernization theory stated that the internal factors such as traditional agrarian structure, poverty, illiteracy, backward culture and attitude of the population are responsible for backwardness of underdeveloped countries (Kuhnen, 1987). Henshaw (2010) also added that the theory stated that underdevelopment of the third world countries is the product of their wrong and backward development practices which are not appropriate for economic progress. Economic development is constrained by lack of capital, technology and democratic institutions important for economic advancement. Nations historical origins, variations in culture and structure, and their international connections and dependency interrelations are not considered.

Isbister (2006) indicated that of the existing theories of development, modernization theory is a dominant theory for analyzing poverty and development of underdeveloped countries. Its conception of the current underdeveloped countries is traditional, stagnant and static. It describes

the underdeveloped society values as spiritual. It presumes their way of life as routine and backward. Isbister also pointed out that from economic perspective, the theory assumes that those traditional societies have a life without hope for wealth accumulation. However, as noted by Cowen and Shenton (1996) capital/wealth accumulation within the umbrella of modernization theory is considered as a core factor of production.

One important assumption of the modernization theory proponents is that the cultural traits and backward economic policies are the reasons for the underdevelopment of many underdeveloped countries. Rostow (1960) outlined the five stages of economic growth that identifies countries modernization and development. These are the traditional society (agrarian based with low productivity); the preconditions to take-off (precondition to shift into industrial production); the take-off (societies with dynamic economic growth); drive to maturity (capitalized and technologically advanced societies); and the age of high mass consumption (prosperous societies with abundance of multiple choices). These linear stages of development are specific criteria which identify the country level of modernity.

Although the theory has been highly influential theoretical paradigm in social sciences since 1950s, it is strongly criticized for its exclusive claim that internal factors cause third world countries poverty/underdevelopment. Critics claim that modernization is empirically unattainable, theoretically inadequate and practically inefficient to facilitate the path of advancement in the third world (Frank, 1967). It fails to consider local knowledge as an alternative source of holistic development strategies which can be crucial for sustainable livelihoods (Mararike, 2011). It is also claimed to be socially and environmentally harmful theory (Lee, 2000) which seeks to eliminate all traditional values, though these may not be barriers to improving human wellbeing. The idea that development cannot be compatible with traditional values is not convincing (Haynes, 2008). Moreover, the theory rejects the inclusion of the poor in poverty reduction interventions and marginalizes their resourcefulness, engagement and support for alternative intervention strategies (Matunhu, 2011). Nonetheless, according to Chaudhary (2013) regardless of such criticisms, modernization perspectives have some positive effects in terms of informing various economic and geopolitical development policies. Most importantly, the advances made by the developed world in scientific knowledge and technology in the name of modernization have been good for humanity and development.

2.2.2 Dependency Theory

Dependency theory emerged as a result of dissatisfaction with modernization perspectives of the 1950's and it became an important reaction to approaches of modernization theory to economic development (Matunhu, 2011). In this regard, many dependentistas researching Latin America like Samir Amin, Andre Gunder Frank, Dos Santos and Paul Baran have tried to find alternative approaches and explanations to the problems of underdevelopment. These intellectuals were mainly focused on the problems of exploitation of the poor by the rich in general and the extraction and transfer of resources from the poor to the rich economies. The discourse of development that deals with such problems was dominated by dependency theory in the 1960s and 1970s. According to So (2010), dependency theory assumed that the relationship between the rich and poor world regions was exploitative, and poverty was externally caused and highly dependent on historical economic linkages which were not well matched to reducing inequality. Shandra et al., (2003) indicated that the theory was dominant in the 1960s and 1970s as a result of approaches from modernization perspectives failing to reduce poverty in various regions of the world. Thus dependency theory encouraged poor countries to cut their relationship with the developed nations in order to encourage self-directed and autonomous ways of development (So, 2010).

Although dependency theory influenced policies were advocated in different parts of the world during 1970s it has been subjected to a number of criticisms. First, the *“theory does not provide exhaustive empirical evidence to support its conclusion ... uses highly abstract levels of analysis* (Reyes, 2001, p. 7). Sanchez (2003) also indicated that dependency theory lacks empirical ground and its arguments are generally not based on rigorous research findings. Second dependency theory gives much emphasis to external linkages. It did not recognize the effects of internal factors such as internal national policies, internal conflicts, internal mode of production and class structure on underdevelopment of developing regions. Third, dependency theory is too pessimistic in asserting that developing nations cannot grow if they are economically dependent on developed nations. Historically this assumption is proved to be incorrect and this is contradicted by the experience of a number of countries in recent decades. For example, East Asian countries like South Korea, Taiwan, Hong Kong, and Singapore, and now regions of China have experienced dramatic economic growth since the 1950s (Willis, 2005). Besides,

Wills also indicated that dependency theories were highly focused on economic factors; other structural factors which determine underdevelopment or development are not considered. Fourth, according to Chirot (1986), the contemporary developing nations were experiencing poverty and misery even before they fell under the domination of the advanced capitalist countries, although poverty and misery may have worsened as a result of foreign influences. In general, the theory fails to provide research based evidence to its arguments and conclusions and unable to prove dependence and development are irreconcilable (Reyes, 2001)

2.2.3 Post-Development Theory

Post-development theory emerged as a new strand in thinking about change in the 1980s and 1990s through the works of scholars like Rahnema, Esteva, Escobar and Sachs. These post-development theorists argued that modernizing development was always unjust and unsuccessful and dependency theory is flawed in seeking the same goals but through different means. According to Escobar (1995), post-development theory expresses the disappointment with the existing development ideas and practices and needs to reject the concept of development and call for alternatives to development. Sachs stated that, "*the idea of development stands like a ruin in the intellectual landscape... it is time to dismantle this mental structure*" (Sachs, 2010, p.XV).

Likewise, Sidaway (2008) documented that according to post-development theorists, development should be dismissed because it is the new religion of the West which did not bring change, rather it leads to impoverishment and ecological degradation. According to this theory, development perspectives and practices of the post-1950s have failed because development itself is a flawed western society concept that should be eradicated from the discourse on human wellbeing (Karplus, 2014). Moreover, for Escobar, continuing poverty, famine, malnutrition, and violence were indicators of 40 years of unfruitful development practices from 1945 to 1995 (Escobar 1995). Post-developmentalists also argue that the impact failures in these policies and practices are the incredible social crises and ecological destructions that our world is encountering today. Therefore, post-development theory can be regarded as a fundamental response to the problems of both modernization and dependency theories of development.

Post-development school is highly characterized by its strong interest in the promotion of local indigenous knowledge, culture and different local level movements (Escobar 1995). Hence, it is

focused on searching possible alternatives to development by integrating ideas and elements from both the traditional and modern cultures. However, although most post-development writers do not make clear what to reject, Matthews (2004) writes a clear indication on what post-development theorists need to reject. According to him, post-development theorist rejects the Post-Second World War development actions that have not realized progress, rather than the initiative/idea of development itself. He precisely noted that the rejection of development should not be understood as poverty eradication being impossible. The idea that attempts to create transformation processes cannot result in improved life of humans is rejected.

What advocates of this theory reject is the efforts to restructure the Post-Second World War development plan in order to avoid its adverse effects. Apart from this, according to Matthews (2006), the theory put forward two broad methods to reduce the problems of the poor. First, local and new social movements have to be supported since these bottom level schemes are instrumental for enhancing the lives of self-defined communities. Second, exploitative and unfair power relations should be eradicated and to do so we need to work with the advantaged societies and their elites. Post-development strategies may be more or less promising, but are not free from criticisms. For example, post-development theory of development rejects the idea of development without proposing alternative development policies and interventions (Blaikie, 2000). The theory also lacks careful analysis on current development practices (Sidaway, 2002) and it ignores the tangible developments that the world experienced over time and not all developments are harmful and the same (Storey, 2000). Once they declare development is a false western project, they didn't able to translate the weakness of the previous development practice in to efficient and productive position.

2.3 The Ethiopian 'Developmental' Experience in the Light of the Three Theories

During the Imperial Regime (1930-1974), Ethiopia's development strategy (insofar as it had one) was based on Import Substitution Industrialization (ISI) consistent with dependency theory, but inhibited by the over-arching demands of a neo-feudal political economy with neo-feudal internal structure. While most of the Ethiopian economy was dependent on agriculture for food supply, market, capital accumulation and foreign exchange generation, the small element of development strategy gave priority to industry at the expense of peasant agriculture. But the strategy failed to ensure economic development. Instead it contributed to low growth of both

food and industrial crops (Getnet and Mahrab, 2010; Getnet et al., 2011). The concept of modernization in the classical spirit was one of the major reasons for giving primacy to industry during the imperial regime, and it was during this period that the modernization approach introduced and begins to strongly influence the Ethiopian development policies. This was basically supported by the West financial and technical support. The influence of the dependency concept in the international arena and the need for national pride and self-reliance in the domestic context drive of the imperial regime to adopt ISI development strategy (Getnet, 2003).

During the Dergi/socialist regime (1974-1991), the same development strategy i.e., the ISI, was pursued as with the imperial regime (Getnet, 2003) to achieve social and economic transformation in the structure of the national economy (Fitamo, 2003). Ethiopia introduced Marxist dependency theory to its economic development policy during the socialist regime in 1974. The fact that Ethiopia is an independent country, the traditional dependency theory does not directly affect the country development as the country had non-colonial relations with the western countries. However, the existing economic system of Ethiopia is dependent on the west. In this sense Ethiopian economy is reliant on trade with western countries. But, Van der Loop (2002) indicated that Ethiopia has been disadvantaged from the effort to use dependency and moderation theory during the imperial and the socialist administration. Rather the nation's economy turned-down, trade and investment reduced and poverty was aggravated. Getnet (2003) also pointed out that both governments failed to liberate the poor smallholder farmers from poverty which makes agriculturalists to be more susceptible to famine.

The Ethiopian People's Revolutionary Democratic Front (EPRDF) government (since 1991) has made a radical shift from a policy of industry first to a policy of agriculture first with a particular focus on peasant agriculture known as Agricultural Development Led Industrialization (ADLI). This strategy has become the guiding framework for the macro policy frameworks for growth and development. But technology transfer and industrialization which are the core ideas of modernization approach are also given a role. The contemporary Ethiopian economic ties with the developed regions could be taken as particular indications of influence of dependency theory since the structure of Ethiopia's exports are a direct manifestation of the backward economy. Like other developing countries, its export composition is dominated by small agricultural products (UNCTAD, 2006). The country is exporting agricultural products like cereals, coffee,

live animals, flowers and vegetables. This signifies that Ethiopian economy is dependent on trade with the developed world.

Empowerment, gender equality, indigenous technical knowledge, local and regional development are also some of the post-development ideologies exercised in Ethiopia. Generally the current Ethiopian development is highly influenced by modernization, dependency and post-development theories. It is too difficult to say a single theory fully explains and influences the current socioeconomic, political and cultural development of the country. Nevertheless, there is a dire need to identify a better development approaches that reduce multidimensional poverty of the country and ensure sustainable development. Thus it is to the nature and causes of poverty that we now turn.

2.4 Theories of Poverty

2.4.1 Individual Theories of Poverty

Individual theory of poverty originated from the American values and beliefs of free market system which is expected to offer opportunities for all people (Rank, 2004). According to Rank, the United States is seen as the land of opportunity and given this opportunity, individuals can achieve success using their talents and hard works, and can fall in to poverty due to lack of motivation, laziness, low intelligence and poor choices. This theory claims individuals are responsible for their own poverty. Van der Oorschot and Halman (2000) and Bradshaw (2006) suggest that this theory can be described as individualistic and focuses on individual problems and weaknesses, where the poor are accused and criticized for their own impoverished status.

The individualist theory assumes that “*outcomes of the exchanges taking place in the marketplace are efficient*” (Davis and Sanchez-Martinez, 2014, p.17). Therefore, poverty is largely considered as a result of weak individual decisions and choices which adversely affect their production capacity. “*The wrong choices made by individuals may lead them to find themselves in a poverty trap*” (Davis and Sanchez-Martinez, 2014, p.17). Similarly, the neoclassical economics also indicated that all individuals have the ability to maximize their wellbeing through investing in their capabilities (Abdulai and Shamshiry, 2014). This theory also assumes that since individuals have perfect information, they can maximize their wellbeing by

making appropriate choices and investments such as choosing long-term and high-payoff returns and looking for better paying jobs, if not they might fall under poverty trap (Bradshaw, 2006).

The theory of Social Darwinism explained that individual's attributes are determinants of their poverty and prosperity (James, 2006). Based on Spencer and Sumner, James (2006) also documented that social existence is a competitive experience among individuals who have various natural abilities and characteristics. For these authors, hard-working individuals and individuals with particular abilities would survive as they are productive while the incapable will die off. Another point that Spencer and Sumner have raised is that there should not be government intervention to support the poor because their poverty status is naturally ordained and such support will encourage the reproduction of unproductive characteristics.

Despite the above claims, according to Rank (2004), no adequate evidence is found by empirical studies to endorse these arguments and claims. Rather, these studies indicated that the poor tend to be hard workers and their poverty is not the product of their personal characteristics (Schwartz, 2000). Van Oorschot and Halman (2000) also stated that individual theories of poverty ignore the structural problems that constrained individuals and obstruct them from improving their wellbeing.

2.4.2 Cultural Theories of Poverty

The term culture of poverty was initially coined and developed by Lewis in 1959 when he conducted his research on poverty in Mexico (Mandell & Schram, 2003). The underlined assumptions of this theory are that both the poor and the rich possess different norms and values, and the poor remain poor for the reason that they learn some social and psychological behaviors related with poverty. For example, Lewis in his study stated that the poor do not learn to study hard, to plan the future and to spend money properly. Lewis also noted that poverty is shared and transferred across generations since children are socialized to learn the values and traits of poverty (Lewis, 1966). This makes poverty to be a way of life of the poor people. Lewis also observed people living in such culture as isolated from the socio-economic elite and from this observation, he explained that the poor are separated themselves from the society and once this system is established or accepted, the culture of poverty tends to continue across generations

(Lewis, 1966). In this case, individuals are not responsible for their poverty since they are living with their dysfunctional subculture or culture (Bradshaw, 2006).

This theory of poverty is not free from flaws and criticisms. Cultural theory of poverty assumes that culture is static and unchangeable. This means poverty is integrated in to the long duration culture of the poor which means poverty eradication programs find it difficult to alter the behaviors of the poor. For this reason, the cultural theory of poverty shifts the responsibility for the cause of poverty from the behavior of the wealthy people to the characteristics and habits of the impoverished themselves (Bourgois, 2001). From this perspective, the theory claims the poor's social attitudes as the main cause of poverty. Mandell and Schram (2003) criticized the culture of poverty by indicating that wider social relationships associated with poverty are not given due emphasis. Moreover, Rank (2004) claimed that blaming-the-victim ideology in both individualistic and culture of poverty models gives much emphasis on identifying the failings of the poor instead of investigating the underlying causes of poverty.

2.4.3 Structural Theories of Poverty

A wider range of social science authors suggests that poverty is predominantly the result of structural factors. Structural theories of poverty oppose blaming the poor, rather they focus on structural failures of the economic, social and political structure that determine people access and opportunities to various resources important for wellbeing maximization (Bradshaw, 2006). Many forces such as changes in the economic structure, labor market opportunities, educational services and the fundamental structures of the society, including social relations such as age, gender, race, power and class influence the life of individuals in particular and the living standards of the people in general (Bradshaw, 2006). This theory do not blame the poor for their poverty rather the external factors which push them into undesirable political, economic and social structures which do not provide equal access to opportunities.

Davis (2007) stated that market failures, adverse selection and lack of complete information are also other factors which can exacerbate poverty. Marxian theory views poverty as a social incident which is a logical consequence of a class based mode of production where resource ownership inequalities are inherent in the production system and relations between workers and capitalists are reduced to serving profit. Given that relations are calculated in terms of money,

employees are considered as a means of maximizing profits (Dini and Lippit, 2009). Risks and unintended events can also aggravate poverty as the poor are highly vulnerable to multiple deprivations due to little capability and ownership of livelihood resources. Overall, the structural theory of poverty presumes that individuals have the interest to achieve something successfully. However, the structural barriers that desired to be removed prevented individuals from achievements and this shows that the failure of the structure is causing poverty in the society.

Generally, no single theory can explain all the features of poverty as poverty can be caused by individual factors (such as old-age and laziness), cultural factors (working culture, backward norms and beliefs) and structural factors (such as the economic, social and political systems). Therefore, this study assume that understanding why the poor people become poor requires a combined explanations of the different interrelated perspectives to have a broad and comprehensive clue to the causes of poverty. Various interrelated perspectives of poverty are needed to have a complete explanation of why the poor become poor.

2.5 Poverty and Vulnerability

The concept of vulnerability becomes an essential feature of studies on poverty and livelihoods (Chambers and Conway, 1992; Moser, 1998), food insecurity (Scaramozzino, 2006), and impact of climate change (Downing and Patwardhan, 2003). More emphasis is also given to the capabilities of vulnerable people to predict and withstand to risks, and to the abilities of institutions to build resilience and adapt to change (Bankoff, 2001). According to Holzmann and Jorgensen (2001), poverty and vulnerability are highly linked concepts due to the facts that the poor are typically considered as the most exposed to different risks and at the same time they have the low capacity to deal with these risks. Chaudhuri et al., (2002) also indicated that notions of vulnerability and poverty are linked but are not the same. They stated that *“poverty and vulnerability (to poverty) are two sides of the same coin. The observed poverty status of a household (defined simply by whether or not the household’s observed level of consumption expenditure is above or below a preselected poverty line) is the ex-post realization of a state, the ex-ante probability of which can be taken to be the household’s level of vulnerability”* (Chaudhuri et al., 2002,p.3). While poverty is *ex-post* concept directly observed at a specific time period, vulnerability is forward looking or an *ex-ante* notion which is not straightforwardly observed, rather it can only be predicted. Moser (1998, p.3) indicated that poverty is ‘static’ with

no probabilistic term but vulnerability is ‘*dynamic*’ in the sense that anyone can potentially fall into poverty. Hence, a systematic and comprehensive understanding of the features, barriers and priorities of the poor and vulnerable groups is essential to design valuable strategy for reducing poverty and for designing social protection interventions (Alayande, 2004).

Alwang et al., (2001, p.5) have assessed the view of poverty and vulnerability by different disciplines such as economics, sociology, disaster management, environmental science, and health or nutrition. Vulnerability in the economics literature is conceptualized as “*an outcome of a process of household responses to risks, given a set of underlying conditions. The outcome (poverty status) is an ex-post state that is assumed to be the primary concern of policy makers. This conceptualization has led some economists to use measures of variability in outcomes (e.g. income variance) as the measurement of vulnerability*”. However, the approach is criticized due to its use of monetary measurements and approaches for all risks and losses to measure vulnerability. The non-money metric shortfalls such as lack of health, education and malnutrition are not considered as important policy issues.

Alwang et al., (2001, p.7) also distinguish four groups within the economics literature. These are poverty dynamics, asset-based, sustainable livelihoods and food security literature. The *poverty dynamics* literature is particularly focused on the probability of falling into future poverty and it emphasized “*on the static outcome of vulnerability: ex-post movement into (and out of) a state of poverty*”. This assumption is linked with the notion of vulnerability in the sense that poverty is considered as the result of a dynamic process. The use of monetary approach and the identification of specific outcome threshold (for example, a poverty line) are important to narrow the focus of the poverty analysis. In the *asset-based* literature, poverty is described as the result of poor access to tangible and intangible assets and vulnerability as the probability of falling below a poverty threshold and the loss/degradation of assets. According to this literature, the result of risky events is that asset loss creates welfare loss, reduces future income, consumption and investment. In the *livelihoods literature*, the concept of vulnerability is forward looking and refers to the likelihood that livelihood stress will occur - with more stress or a higher probability implying higher susceptibility. Therefore, their vulnerability might be signifying livelihood vulnerability. In the *food security* literature, the concept of vulnerability has defined as the multiple effects or outcome of “*risk and of the ability of an individual or household to cope with*

those risks and to recover from a shock or deterioration of current status” (Maxwell, et. al., 2000, p.9; cited in Alwang et al., 2001, p.14). This statement clearly recognizes the risk-response-outcome associations of vulnerability.

Generally, although poverty and vulnerability are closely interrelated concepts in terms of explaining wellbeing, in theory they have different notions. The difference is clearly described by Chaudhri as follows. *“Poverty is an ex-post measure of a household’s wellbeing. It reflects a status of deprivation, of lacking the basic resources or capacity to satisfy current desires. Vulnerability, on the other hand, may be widely construed as an ex-ante measure of welfare, reflecting not so much how well off a household currently is, but what its future prospects are. What distinguishes the two is the presence of risk—the fact that the level of future wellbeing is uncertain. The uncertainty that households face about the future stems from multiple sources of risks”*, such as harvests failure, food inflation and income reduction caused by illness of household’s bread winner. The distinction between poverty and vulnerability measures of wellbeing becomes visible if such risks are occurred (Chaudhri, 2003, p.2). Hence, since vulnerability refers to future anticipation of household or individuals wellbeing, this study defines it as expected future poverty.

2.6 Poverty Approaches and Measurement Metrics

In the development literature, there are two broad approaches to poverty measurement that is the welfarist and non-welfarist approach (Semasinghe, 2011). The first approach mainly concentrates on economic welfare of individuals or households, and defines poverty in monetary terms (Ravallion and Chen, 1997). This approach has strong links with traditional economic theory and it also widely used by economists in the operations and research works of organizations such as the World Bank and the International Monetary Fund (IMF). The other approach focuses on the multidimensional poverty and encompasses not only the financial components but also non-financial deprivation. In more specific terms, Laderchi et al., (2003) identified four approaches to poverty. These are the monetary poverty, capability or the basic needs approach, social exclusion approach and participatory approach. The first two approaches of poverty are reviewed for the purpose of this paper seeing that they provide different perspectives on understanding, analyzing and measuring poverty.

2.6.1 Welfare or Monetary Approaches to Poverty

Monetary approach to poverty is considered as the pure economic approach to poverty (Baulch, 1996) which is based on the microeconomic objective of utility maximization, but measured using income or consumption expenditure data. Whenever income or consumption falls below a predetermined monetary-equivalent poverty line, an individual or a household would be considered poor. From this perspective, the monetary approach has a narrow or pure single dimensional definition of poverty (Laderchi et al., 2003; Riddell, 2004). Utilitarianism is the strong theoretical background of the welfarist approach which assumes that individual welfare is measured by utility/satisfaction generated from consuming goods and services. Most of the time, this theory uses monetary-equivalent income as proxy indicator of utility, and individuals/households who have less income are considered as poor who have low welfare and vice-versa. In this way, poverty line can be defined and the poor can be separated from the non-poor (Dini and Lippitt, 2009).

World Bank (2010) indicated that starting from Rowntree's (1910) first scientific research on poverty, the monetary approach is still dominant in influencing policies. Income based poverty assessment is the most widely used approach by global developmental organizations like the World Bank. Many countries including Ethiopia also use this approach to examine their national poverty status. The World Bank poverty line (e.g. one dollar per day per person) is uniformly applied to all low and middle income countries. There are many reasons for applying this approach to poverty analysis. According to Laderchi et al., (2003), the approach assumes that using equal monetary metric helps to control the existing difference in individual circumstances. This method ignores some essential and fundamental dimensions of human wellbeing which have significant impact on individual's attainments (Laderchi et al., 2003). Riddell (2004) point out that the approach also assumes that the poor will spend their money in the most efficient way and not purchase any other unnecessary things. This is because individuals or households are rational and needs to maximize their wellbeing.

Although many organizations and researchers use monetary approach to assess the level and extent of poverty, the approach is subjected to a number of criticisms. Despite the fact that monetary approach is easy to apply and understand, it fails to address the real picture of human wellbeing (Semasinghe, 2011) as it do not include the various dimensions of human life. In the

mid 1970's, ILO introduced the concept of basic need approach. According to this approach, poverty is not defined in terms of income only but also in terms of access to education, health and other social services. Robert Chamber have introduced multiple concepts such as assets, livelihood security, defenselessness/powerlessness, vulnerability, participation, sustainability and livelihood into a poverty alleviation definition; while previous work of Amartya Sen contributed the concepts of entitlement and capability that assume income as only one means for achieving valuable wellbeing outcomes of individuals (Satterthwaite and Jonsson, 2001). Likewise, Lindenberg (2002) indicated that the wellbeing or poverty status of a person can be addressed by asking individuals whether they have sufficient food, clean water to drink, safe place to live within their household and community. If such conditions and achievements are not properly assessed, poverty incidence of any person cannot be assessed and addressed.

2.6.2 Non-Welfarist Approach

Opposite to the welfare approach, non-welfare approach uses multiple dimensions of wellbeing which have both instrumentally and intrinsically significance to assess and analyze the standards of living. Studies such as Duclos and Araar (2006) and Duclos (2002) indicated that there are two major schools of non-welfarist approach in the poverty literature. These are a) the Basic Needs Approach (BNA) and b) the Capability Approach (CA). The BNA focuses on a set of primary goods that are basic components of wellbeing and considered essential to live a decent life (Streeten et al., 1981). The CA pioneered by Sen focuses on essential set of functioning's that an individual is able to attain. This set of functioning refers to the capability set "*reflecting the person's freedom to lead one type of life or another*" (Sen 1992, p. 40).

2.6.2.1 Basic Needs Approach

The most important sources of the basic need approach is the argument that all people should be able to attain their basic needs. In this context a person is considered to be poor whenever he/she is failed to achieve his/her basic needs. This approach highly concerned with currently experienced poverty than future long-term growth and highly concerned with disparity in the allocation of growth's benefits than its absolute speed (Watson, 2014). From the basic needs perspective, poverty is defined as "*the deprivation of material requirements for the minimally acceptable fulfillment of basic human needs, including food*" (UNDP, 1997, p.16). Therefore, minimum specified quantities of basic goods (such as food, water and sanitation) which are

important to prevent ill health, undernourishment and the like are necessary to interpret basic needs (Streeten et al., 1981). From this point of view, one can understand that the concept of poverty goes well beyond lack of income or low consumption rather it includes basic need materials which have to be supplied either by the state or community in order to prevent people from becoming poor. Stewart (2006) also highlighted that the BNA needs all persons to achieve the minimally accepted basic need requirements through ensuring sufficient and properly distributed basic needs materials and services. Haughton and Khandker (2009) indicated that the cost of calorie approach is treated as basic needs approach to poverty. If one assumes that adequate nutrition is precondition for improved level of wellbeing, then we could just look at the quantity of calories consumed per person. A person consuming lower than the specified minimum Calories (often set at 2,100 Calories per person per day) would be considered poor.

Given the major idea of the BNA is materialistic it needs to identify a bundle of goods and services consumed by the non-poor population and evaluate whether they have access to it. There is a general consensus that the bundle should involve universally needed commodities such as food, shelter, water and sanitation. Nevertheless, there has been no general consensus on what the package should exactly contain (Wong, 2012). According to advocates of the BNA, three groups of needs are considered as fundamentally basic. These are a) the physiological needs which refers to the food, shelter, clothes and other daily necessities of life; b) the need for access to public infrastructures and services such as health and education; c) the need to participate or engage in community and national political decisions (Martinussen, 1997). These sets of needs are considered as basic because their fulfillment is assumed to be prerequisite for decent life. Hence, much emphasis is given to individuals needs related to basic commodities such as food, shelter, cloths, and education and health services.

Regardless of its wide application, the BNA received an extensive challenge from several authors. The approach assumes that all individuals require the predefined goods and services equally. This view rejects the fact that individuals may prefer some goods and services over the others and it also failed to recognize the existing hierarchy of needs of persons by supplying uniform bundle of consumption/basic needs. Besides, the approach certainly stifled people's choices over their basic goods which generally lead to an unfair poverty assessment (Wong, 2012). Alkire and Sarwar (2009) criticize the BNA by indicating that some operational forms of

the approach were completely emphasized on resources and inputs (means) and this fail to notice people's different abilities and capacities to change resources into functioning's. Sen (1984) noted that the approach is highly focused on commodities which do not show how it incorporates freedom and participation in its framework. In addition, Alkire (2005) added that the approach gives inadequate concern to freedom.

2.6.2.2 The Capability Approach

The Capability Approach (CA) is a broad normative framework for the evaluation and assessment of individual wellbeing (Robeyns, 2005) aimed at enhancing social justice for the poor (Sen, 2009; Nussbaum, 2011). Conceived by Amartya Sen and developed by Martha Nussbaum, the CA challenges the welfarist notion of poverty with a new multidimensional view (Alkire, 2002). Sen rejected income as proxy measure of wellbeing by noting that income or expenditures are only a single dimension of human life and he instead argued that human wellbeing is not dependent on owning resources rather on what they can do and be. Sen (2009) indicated that his approach focuses on what people are able to do and be, as opposed to what they have, or how they feel. Sen argues that, when we analyze wellbeing, we should focus on real opportunities a person has i.e., on functioning's and capabilities instead of focusing on the means's or resources to achieve a livelihood.

Sen (1999, p.75) indicated that functioning's and capabilities are the two fundamental concepts of the CA. Functioning's are beings and doings that people value and have reason to value. '*Functioning's*' refers to the different things an individual achieve in '*doing or being*'. Same examples of beings are being well-nourished, being undernourished, being housed in a pleasantly warm but not excessively hot house, being educated, being illiterate, being part of a supportive social network and being depressed. Some examples of the doings are travelling, working, taking part in social events, caring for a child, donating money to charity and consuming lots of fuel to heat one's house.

On the other hand, capability refers to "*the real opportunity that we have to accomplish what we value*" (Sen 1999, p.75). Robeyns (2011) also indicated that capabilities are individual's real freedoms or opportunities to realize valuable functioning's. For example, if riding illustrates functionings, the opportunity for riding would describe capabilities. While functionings represent

an individual's realized wellbeing, capabilities signify the real opportunities that include persons freedom of choice to achieve wellbeing. According to Robeyns (2006), Sen identified two types of capabilities: the basic and general capabilities. The basic capabilities are elementary capabilities directly linked with human basic needs and are significant for sustainable human survival while the general capabilities are more common and broad capabilities used to enhance and expand other capabilities.

In addition to functioning's and capabilities, CA has another central concept that is the conversion factors which influence the functionings to achieve certain beings and doings (Robeyns, 2003). The role of conversion factors is crucial in the process of transforming individuals' resources into realized functionings. These conversion factors can be personal (may be our skills, intelligence, physical condition and income), social (could be community level organizations and agencies which provide public services) or structural (the macro-level forces such as market forces and political structures) (Brunner, 2015). The above three factors do not only influence the way resources are converted into achieved wellbeing but also determine the degree to which these resources are available and accessible to individuals.

Sen does not prescribe and endorse a well-defined list of capabilities to evaluate human wellbeing (Robeyns, 2003; Nussbaum, 2003). His CA is deliberately incomplete (Sen, 1992). The reason behind this is that he needs his approach to be applied differently in different contexts by different disciplines with different measurement goals at different places and conditions. Unless, listing indicators ought to limit the approach to certain dimensions and sectors, and it also limits the essential capabilities of the approach to measure wellbeing (Alkire, 2015). Sen rejected to declare a list of capability dimensions and indicators objectively for practical and strategic justifications (Clark, 2002) arguing for the relevance of democratic discussion in selecting the significant dimensions. Sen stated that: *"the problem is not with listing important capabilities, but with insisting on one predetermined canonical list of capabilities, chosen by theorists without any general social discussion or public reasoning. To have such a fixed list, emanating entirely from pure theory, is to deny the possibility of fruitful public participation on what should be included and why. Public discussion and reasoning can lead to a better understanding of the role, reach and significance of particular capabilities"* (Sen, 2005, p.158). From this statement, one can simply understand that people should have the freedom and

opportunity to decide their list of capabilities. Furthermore, Alkire (2002) indicated that Sen's capability framework is too strong, dynamic and shows a substantial degree of internal pluralism which empowers academicians to develop, widen and apply it in diverse ways.

In the context of poverty, the focus of the capability approach is on the deficit in some basic capability to achieve a key functioning (Sen, 1995) where basic capabilities are elementary but extremely important in functioning's for human survival (Sen, 1992). Hence, poverty can be defined as "*the failure of basic capabilities to reach certain minimally acceptable levels*" (Sen, 1992, p.109). This definition focuses on outcomes that define quality of life of persons, and show a shift in evaluation of wellbeing from the monetary to non-monetary measures. However, Sen does not reject the important role of income in human wellbeing rather he regarded it as necessary means for enhancing capabilities and functionings. But he indicated that there are some elements of life such as respect, freedom and culture, which are not adequately described and addressed by income. This is because wellbeing is basically a multidimensional and difficult concept. Nevertheless, the CA is capable of addressing the multifaceted character of wellbeing since it describes person's wellbeing in terms of their beings and doings. According to this approach a person is considered to be poor if he/she is failed to achieve certain defined levels of functionings. Therefore, the theoretical underpinning behind moving from a one-dimensional poverty measurement to evolving a multidimensional measurement of poverty in this dissertation rests on Amartya Sen's capability framework, and as studies such as Jenkins and Micklewright (2007) and Anand (2008) indicated, this approach is considered to have novel and extensive significance for the conceptualization of wellbeing and multidimensional poverty.

Alkire and Foster developed a new tool in 2007 (Alkire and Foster, 2007, 2011) which allows the measurement of multidimensional poverty using the concepts of capability approach. This methodology clearly shows the incidence, intensity and severity of poverty based on clearly identified dimensions and indicators. Specifically, according to Alkire et al., (2015b), the Alkire and Foster methodology shows the Adjusted Multidimensional Headcount Ratio which is interpreted as a partial measure of capability poverty. This method assumes various sets of dimensions which represent functionings and capabilities that an individual may or may not have. Higher value of Adjusted Multidimensional Headcount Ratio implies higher capability poverty which means the poor do not have the capability to attain the functioning's in which they

are deprived and vice-versa. Thus, a person being deprived in at least a minimum set of widely valued achieved functionings will be interpreted as multidimensionally poor. Therefore, this study intends to assess the multidimensional poverty of rural households based on Sen's capability framework. Accordingly, this study considered poverty as a state of basic capability failure. Poverty as capability failure will be understood as the incapacity of households to realize basic functionings that they considers as important and valuable for their own wellbeing.

2.7 Operationalising Sen's Capability Approach

According to Lienert and Burger (2015), the CA does not adequately explain the resources or inputs dimensions of the approach. It only broadly defines inputs for the creation of capabilities and gives no concrete directions for an empirical application. Thus, operationalizing the CA becomes a difficult task. However, Sen proposed his approach to be applied and used in combination with other theoretical approaches (Sen, 1992). To operationalize the CA, Bebbington (1999) proposed to integrate the CA with Sustainable Livelihood Framework (SLF). In this way he has developed his own framework based on capitals and capabilities and he argued that *"assets are not simply resources that people use in building livelihoods: they are assets that give them the capability to be and act"* (Bebbington, 1999, p.2022). Akin to human CA, the sustainable livelihood model also assumes that various assets/capitals are required to sustain and realize the desirable livelihoods outcomes. The multidimensionality of deprivation in poverty analysis is increasingly being recognized in the livelihood approach (Chowdhury, 2014). Given that the Sustainable Livelihood Approach (SLA) is fundamentally dependent on the assumptions of *"capability, equity, and sustainability"* (Chambers and Conway, 1992, p.3), it comprises a broad understanding of wellbeing which goes beyond monetary aspects. Therefore, integrating the CA concepts in to the Sustainable Livelihood Framework (SLF) components as an analytical tool to operationalize the CA in this study helps our effort to combine theory and observation. In view of this, this study is used combined framework as its analytical tool to more adequately incorporate the instrumental input factors left open by the capability approach.

2.8 The Sustainable Livelihood Framework

Recent studies on poverty have revealed that poverty is multifaceted which requires comprehensive approach to understand and possibly alleviate it. With this perspective, various

approaches have been developed. The livelihood approach is one among the other approaches designed to provide conceptual understanding of the livelihoods of the poor. Ludi and Slater (2008) explained that the SLF gives a framework for poverty examination, and the design of grass root level development policies and poverty eradication measures and interventions. The SLF is a powerful tool for investigating the significant factors of that drive people into and out of poverty. In addition to this, it allows a focus on who is particularly susceptible to shocks and stresses because of inadequate resources and capabilities, thus identifying those likely to be vulnerable.

Sen's work on entitlements and capability approach has greatly contributed to, and influenced, the development of the livelihood approach. Despite the fact that Sen used the concept of capability in a general form, with in this there are subsets of capabilities (livelihood capabilities) which are more specific and include the capacity to cope with adverse events such as shocks, and the capacity to create livelihoods and make use of livelihood opportunities. However "*such capabilities are not just reactive, being able to respond to adverse changes in conditions; they are also proactive and dynamically adaptable*" (Chambers and Conway 1992, p.4). SLF also gives a space to analyze and deeply understand poverty from the poor perspective. Thus, the framework has been used by many authors and institutions as a guiding tool for poverty and vulnerability research (Bebbington, 1999; DFID, 2000; Scoones, 2009).

As shown in Figure 2.1, households have access to livelihood capital assets which are assumed to be direct input factors for household's capability space. These livelihood resources determine access to the transforming structures and processes of the community which are important to construct the broader livelihood opportunity space. The transforming structures and processes also determines the available set of capabilities and the choice of livelihood pathways to realize certain positive or negative outcomes, thus the feedback rounds as indicated in the figure.

The SLF comprises five different components as discussed follows: First, the vulnerability context refers to the shocks, trends and seasonality that affect people's livelihoods (DFID, 2000). Vulnerability not only determines individual's wellbeing, it also hampers growth and development, primarily by destructing livelihood resources, and indirectly as the threat of unintended effects diverts assets from more productive investments to those that decrease vulnerability. Vulnerabilities are the risks individuals, households or communities face in their

daily life. According to Chambers (1989), vulnerability has internal and external sides of risk. While the internal side of risk is associated with defenselessness to cope, the external side of risk refers to shocks and stresses to which an individual is exposed from the external environment. Whenever, the exposure (the prevalence and extent of a stress) and sensitivity (the extent of the pressure a stress can create) to shocks is increased and adaptive capacity (the capacity of a system to cope with stress) diminished, an individual is considered as vulnerable or susceptible to shocks (Marshall et al., 2010; Bennett et al., 2015). So, different individuals or households can experience the same shocks differently as their coping and adapting mechanisms may be varied.

Muyanga et al., (2013) indicated that individuals with low responsive capacity will have a more challenging time to preserve resources. Consequently such shocks often create a process whereby more vulnerable people move in and out of poverty. In addition, individuals or groups who failed or denied the opportunities to recover from shocks due to discrimination on the basis of gender, age, and ethnic background fall under poverty (Van der Berg, 2014). As pointed out by Mubaya et al., (2012), long term shocks, shocks with significant and multiple impacts call for more dynamic and comprehensive livelihood adjustments. Generally, this study used cross sectional data which was difficult to analyze the vulnerability trends of households. Thus, focus was made on assessing immediate shocks that enhance the susceptibility of households to multidimensional poverty.

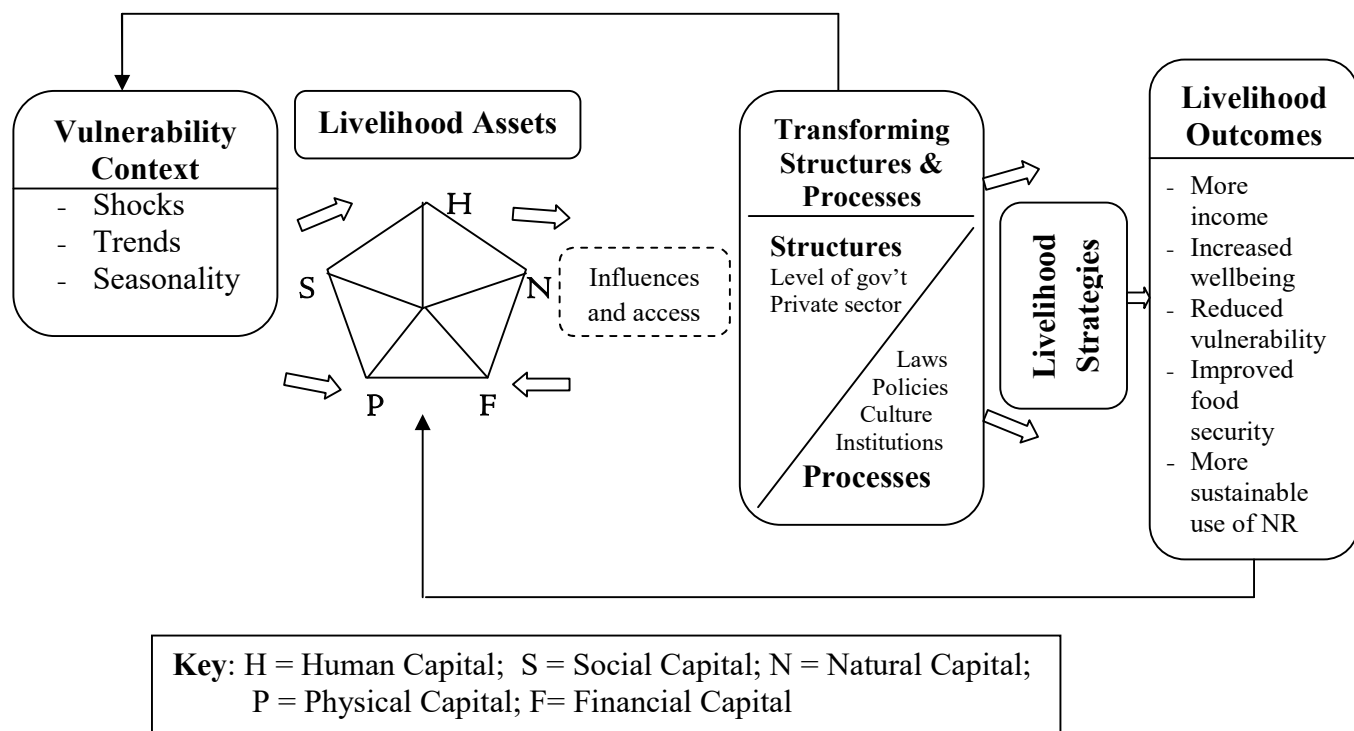
The second component of the SLF refers to capitals/assets. Livelihood assets are considered as peoples' strengths (DFID, 1999) and resources that people employ as part of their livelihood strategies in order to realize their positive livelihood outcomes. Increased assets can make people capable to influence factors that affect their livelihoods. Moser's '*asset-vulnerability framework*' (Moser 1998) shows that households with better assets endowments are less vulnerable, for the reason that their assets provide insurance against risks and shocks. For example, a household that possesses more livestock can sell some animals to purchase food if natural shocks such as drought and pests destroyed their crop production. Therefore, the means to reducing poverty and vulnerability is to accumulate livelihood assets such as land, livestock, savings, marketable skills and networks. Several studies (see Scoones, 1998; Carney, 1999; DFID, 2000; Serrat, 2008) indicated that there are five groups of livelihood assets. These are the human, natural, physical, social and financial capitals.

Human capital (H) refers to the labor, health, knowledge, and ability people possess to work and pursue various livelihood strategies (DFID, 2000). Human capital determines people's ability to the effective utilization of other four livelihood capitals. Natural capitals (N) are natural resource such as land, water, trees, and wildlife which are important for human to derive a wide range of services useful for livelihoods (Serrt, 2008). Physical capital (P) comprises of assets that are created in the processes of economic production (Ellis, 2000). This comprises the basic infrastructure and produced goods needed to support livelihoods, such as, access to healthcare, market availability, access to agricultural technologies, household durable assets, and farm equipment. Social capital (S) refers to social resources, networks, connections, trust and mutual understanding and group memberships that support society to achieve desirable livelihood outcomes (Serrat, 2008). Financial capital (F) denotes the financial resources that people use to obtain goods and services needed for their livelihood and financial capital also refers to the availability of monetary resources that enables people to adopt different livelihood strategies. According to Mazibuko (2013), these assets are not universally available for all households. Households own those assets to varying degrees since there are various opportunities and degree of freedoms to access these resources.

Third, transforming structures and processes denotes institutions, organizations and policies that work externally at all levels that effectively determine access, control and use of assets. They are the enabling and constraining components defining household's access to resources and determining the possible strategies leading to an outcome. *Structures* can be described as the hardware (organizations) that set, implement and perform all functions that affect livelihoods (DFID, 2000) while *processes* are described as software (laws, policies, societal norms etc) that determine the way in which structures function (Serat, 2008). Haidar (2009, p.7) stated that '*this element of the livelihoods framework covers the complex social, economic and political context within which people pursue their livelihoods strategies*'. Carney (1998) indicated that understanding this livelihood component helps to explain the link between micro and macro policies and institutions. This understanding also helps to investigate areas of restrictions/barriers or opportunities to sustainable livelihoods and is important to explain the social processes that could possibly determine livelihood sustainability (Scoones, 1998).

Fourth, the other element of SLF is the various decision-making livelihood strategies. Functioning within a broader vulnerability context, utilizing their livelihood capabilities/asset base and under the significant influence of transforming structures and processes, poor people identify, choose and employ a range of livelihood strategies. Livelihood strategies are the various activities and pathways that people decide to undertake for achieving livelihood outcomes (Haidar, 2009). Three rural livelihood strategies are identified by Scoones (1998). These are livelihood diversification, agricultural intensification/extensification and migration. Ellis (2000) categorizes livelihood strategies as natural resource based activities or non-natural resource based activities. For Carney (1998), livelihood strategies are categorized as natural resource based, non-natural resource based and migration. These strategies can be productive and unproductive due to many reasons, and change as the external environment changes.

Figure 2.1 Sustainable Livelihood Framework



Source: DFID (2000)

The last component of the SLF refers to positive or negative livelihood outcomes that households are looking for when they select a range of coping strategies. Livelihood outcomes can be defined as *'the goals to which people aspire the results of pursuing their livelihood strategies'* (Haidar, 2009, p.8). Livelihood outcomes are the achievements of livelihood strategies, such as

more income, increased wellbeing (such as health status, education status, self-esteem), reduced vulnerability or better resilience, improved food security and a more sustainable use of natural resources (Scoones, 1998).

2.9 Empirical Strategy to Estimate Vulnerability to Poverty

Adger (2006) pointed out that measuring vulnerability is a difficult task in terms of defining vulnerability in various settings, identifying indicators and associated causes and effects. The poverty dynamics strand of economics literature on vulnerability proposed three economic measures of vulnerability to poverty: the vulnerability as expected poverty (VEP) (Chaudhuri et al., 2002), vulnerability as low expected utility (VEU) (Ligon and Schechter, 2003) and vulnerability as uninsured exposure to risk (VER) (Tesliuc and Lindert, 2002). All provide econometric models to assess vulnerability to poverty (Hoddinott & Quisumbing, 2003).

2.9.1 Vulnerability as Low Expected Utility

The Vulnerability as Low Expected Utility (VEU) measure is based on a definition of vulnerability as the loss of utility because of risk and the difference between a household's utility derived from certainty equivalent consumption and its expected utility derived from actual consumption. This measure can be naturally decomposed into distinct measure poverty, exposure to aggregate risk, exposure to idiosyncratic risk, and plained risk plus measurement error (Ligon and Schechter, 2003). This measure has the benefit of disaggregating vulnerability due to poverty and vulnerability, and uninsured risk. Although considered a stronger measure of vulnerability than VEP, VEU is difficult to calculate and reliant upon panel data. According to Gallardo (2018), the VEU approach is founded on the basis of expected poverty but described in terms of utility gaps as the defining element of vulnerability.

2.9.2 Vulnerability as Uninsured Exposure to Risk

Whenever there is absence of risk management tools, shocks may exert significant damage on the livelihood and wellbeing of households. Vulnerability as Uninsured Exposure to Risk (VER) do not measure future poverty but it identifies the actual change in wellbeing due to a given idiosyncratic or covariate shocks. This approach is similar to the VEP and VEU approaches since they all concerned with welfare losses but it differ from VEP in that it is *ex-post* estimation of the magnitude to which adverse events caused a welfare deprivation/loss rather than an *ex-ante*

measurement of future poverty (Hoddinott and Quisumbing, 2003). VER can also define household's exposure to risk, either in terms of absence of insurance to cover the risk of falling below the poverty threshold (Cafiero and Vakis, 2006) or because of an expected financial risks or downside risk related with loss (Dutta et al., 2011). Overall, this approach share common characteristics with VEP and VEU as they presume the exposure to risk as a major factor of vulnerability.

2.9.3 Vulnerability as Expected Poverty

Vulnerability to expected poverty is defined as the likelihood that a household will fall into poverty in the near future (Montalbano and Magrini, 2012). Vulnerability as Expected Poverty (VEP) measures individuals vulnerability based on the notion that individuals will become poor in the near future if they are not currently poor, or they will continue to be poor if they are currently poor (Christiansen and Subbarao 2004). Vulnerability to poverty in this model is calculated using indicators on household's demographic and socioeconomic characteristics associated with poverty, shocks and risks (Chaudhuri et al., 2002). Although panel data are ideally important in vulnerability assessment to understand the shocks that influence the individuals or households, and to know their capacity to cope with those shocks (Holzmann et al., 2003), the VEP approach is considered as powerful tool to estimate vulnerability to poverty using cross-sectional data (Chaudhuri et al., 2002; Jha and Dang, 2009). Using income or consumption as widely used indicators of individuals/households wellbeing, this vulnerability estimating strategy defined vulnerability as an expected future poverty measured by assessing the chance that a given shock will move household consumption/income below a given minimum level or force the consumption level to remain below the minimum if it is already below this level (Chaudhuri et al., 2002).

Therefore, in this dissertation the VEP theoretical framework was adopted for assessing and measuring vulnerability of rural households to multidimensional poverty in the study District. The rationale for choosing this approach is that the study is focused on addressing expected poverty as an important feature of vulnerability to multidimensional poverty. In this context, instead of using consumption or income, each household deprivation in multiple dimensions of poverty was used to estimate vulnerability to multidimensional poverty at a specific time given various households characteristics and assets, and their capability to withstand shocks. For the

purpose of this research, the study defines vulnerability to multidimensional poverty as an expected poverty, or the probability that household's deprivation will fall below the predetermined multidimensional poverty cutoff in the near future.

In general, Hoddinott and Quisumbing (2003) point out that all the three measures can be used in combination and the definition of vulnerability in terms of income/consumption can be replaced by other non-monetary indicators such as health, education or other indicators of wellbeing. The quality of these models can be enhanced when used in combination with qualitative methods

2.10 Livelihood Shocks and *Ex-post* Shock Coping Strategies

2.10.1 Household Exposure to Shocks and Vulnerabilities

Studies indicated that risks, shocks and vulnerabilities has a significant role in increasing or perpetuating households poverty as the poor are adversely affected by uninsured shocks and has less capabilities or assets such as human and physical assets to cope and recover from these shocks. Rural household's livelihoods are often exposed to different risks and shocks. According to Ellis (2000), shocks and trends affect households and communities livelihood activities at different scale. Absence of appropriate insurance arrangement and provisions put household's at a greater risk in time of shocks (Dercon et al., 2005). Risk is common phenomenon for most households in developing countries (Banerjee and Duflo, 2011) and these risks can be converted in to various '*shocks*', defined '*as adverse events that lead to a loss of household income, a reduction in consumption and/or a loss of productive assets*' (Dercon et al., 2005, p.5). This definition indicates that shocks are realization of risks, and episodes that lead to undesirable livelihood outcome which impact individuals, households, communities and regions (Fafchamps 2009).

Several studies indicated that individuals and households wellbeing were negatively affected by different shock types. For example, drought reduce consumption in Ethiopia (Dercon et al., 2005), and cyclones and floods are negatively affecting a huge number of households in rural India (IPCC, 2012). Shocks expose children to nutritional deficiency, and continued stunting of child growth (Alderman, 2011). This contributes to a long lasting low level of human development as they fail to develop skills (such as word accumulation and verbal communication) at normal rates compared non-stunted kids (UNDP, 2014). Most rural

population in low income countries relied on agriculture for their income and consumption. Some households also employed in agricultural sector, trading agricultural products, and other services. The effectiveness, profitability and seasonality of agricultural sector directly affect the wellbeing of farmers, workers, and communities depend on this sector. This show the income generation activities of rural households are greatly interrelated, and hence, the rural areas are mostly exposed to covariate shocks (Alpizar, 2007).

CSA and WFP (2014) indicated that natural shocks such as drought is one of the major shock that lead rain-fed agriculture dependent households to food insecurity. Such households are more vulnerable to shocks due to inadequate access to resources, frequent exposure to risks and low farm productivity (Tirivayi et al., 2013). Apart from drought/inadequate rains, flooding, input and output price shocks, and disease outbreak are some of serious shocks that aggravated the poverty level of agricultural households. The poor are severely vulnerable to shocks because they have less strength to withstand the negative impact of shocks on their income. The poor also has low education level and access to credit to obtain various economic opportunities. Alayande and Alayande (2004) indicated that due to absence of insurance against income, farmer's sale their productive assets such as livestock, land and farm equipments to smooth consumption, which also perpetuate household vulnerability to various shocks.

Based on scope of impact, Dercon (2002) classified livelihood shocks as idiosyncratic and covariate shocks. Idiosyncratic shocks are individual specific shocks such as injury, job loss, illness and death of a household member, while covariate shocks are events that have large coverage and affect large group of population like market fluctuations and climate change. Specifically, Dercon et al., (2005) divide shocks in to five categories; climatic, economic, sociopolitical, crime and health shocks. Natural shocks include drought, flooding and pests that directly affect crops and livestock's. An economic shock comprises shocks that result in income loss and input/output price shocks. A sociopolitical shock comprises arbitrary taxation, discrimination/exclusion and contract disputes. Crime shock consists of shocks such as theft and destruction of assets. Shocks such as death and illness were also categorized under health shock.

Ethiopia is highly dependent on rain-fed subsistence agriculture and farmers are living on the edge of uncertainties. Similar with other developing countries, the country is affected by many natural and man-made shocks such as drought, floods and price shocks. Mahoo et al., (2013,

p.23) stated that “*crop production in Ethiopia is affected by failure of rains or occurrence of successive dry spells during the growing season. Food shortages resulting from adverse weather conditions are not new in Ethiopia. However, food shortages have increased in severity, with frequent shortages in recent years*”. This aggravated the risk of hunger and hardship for large rural population who are dependent on rain-fed agriculture for their livelihood. Deressa et al., (2008) compared Ethiopian regions vulnerability to climate change and they found that the level of vulnerability among regions varies based on access to technology, markets, irrigation potential, literacy rate, wealth and other services and infrastructures.

FAO (2009) also indicated that rain-fed food producers are highly exposed to severe and frequent production risks due to climate variability, which have immediate impact on livestock production and productivity. It also added that weather induced shocks have indirect effects on livestock development through reducing the availability and quality of livestock feeds. Generally, Mahoo et al., (2013) marked that climate related shocks, mainly drought have considerable undesirable impacts on farming, food security and economic growth. Ethiopia as agrarian country is severely challenged by frequent and concurrent shocks. Thus, understanding of shocks and their consequences is necessary for prioritizing and designing effective poverty reduction policies and social protection interventions that strengthen the present resilience capacities of households.

2.10.2 Household *Ex-post* Shock Coping Strategies

Households who are exposed to shocks employ a mix of sequenced *ex-ante* risk management strategies and *ex-post* coping mechanisms to mitigate and cope with impact of the unexpected events and to maintain livelihood (Alwang et al., 2001; Dercon, 2002). An *Ex-ante* coping strategy refers to action taken before the risk is occurred. It is all about risk reduction/elimination, risk exposure minimization and taking compensation against the anticipated loss. This may includes accumulating buffer stocks of precautionary savings, purchasing formal insurance, and building social networks to provide a level of informal self-insurance (Heitzman et al., 2002). In contrast, *ex-post* risk coping strategies are actions and instruments taken after any adverse event or actual loss realized. This may include selling of asset, migration, joining safety net programs, and other type of transfers (Heitzman et al., 2002).

However, this study is focused on *ex-post* shock coping strategies rather than *ex-ante* (long term and prevention) coping strategies.

Dercon (2002) indicated that coping strategy deals with the ability to select and decide the right measures depending on the existing resources. Many authors (Azam and Imai, 2009; Chaudhuri et al., 2002; Chaudhuri, 2003 and Dercon, 2001)) emphasizes that the incorporation of household's shock coping responses in the analysis of household's vulnerability to poverty is important to design proper social safety net programs. Feeny and Mc Donald (2015, p.121) stated that *"analyses of vulnerability are typically forward looking and focus on those households that are likely to fall into poverty in the future. However, vulnerability analyses can also be backward-looking. These analyses typically use observed changes in household wellbeing to determine the extent to which households were vulnerable, and resilient, to the effects of a past shock"*. Similarly, Moser (1998, p. 3) stated that *"analysing vulnerability involves identifying not only the threat but also the resilience or responsiveness in exploiting opportunities, and in resisting or recovering from the negative effects of a changing environment. The means of resistance are the assets and entitlements that individuals, households, or communities can mobilize and manage in the face of hardship"*. For this reason, Vulnerability as Expected Poverty (VEP) approach incorporated *ex-post* shock coping components in its analysis.

Examination of the shock coping strategies is highly important from three policy perspectives. One, as Chambers (2006) indicated, addressing households shock coping behavior is essential to know the existing coping options in the local context. This helps to identify what works in time of crisis. As Skoufias (2003) also notes, understanding the available risk management strategies is important for immediate intervention in time of crisis. Secondly, some coping strategies are not appropriate for all type of shocks. Sale of assets, for example, may be inappropriate to respond covariate shocks. Dercon (2006) found that livestock price declined during covariate shocks as all households attempt to sell their livestock to smooth consumption. Thirdly, having the information on how households respond to shocks enable us to understand the long-term impact of shocks. Depleting fixed assets to respond temporarily shock might result in long-term disruption of welfare (Carter and Barrett, 2006). Because some strategies such withdrawing children from school and reducing health expenditure can have longer-term impact on wellbeing.

2.11 Review of Empirical Literature

2.11.1 Empirical Studies on Multidimensional Poverty

The United Nations (2015) Millennium Development Goals Report indicated that 836 million people are still living in extreme poverty with an income level below one dollar a day. Raising the poverty line to \$2.5/day increases the proportion of poor to about 2.7 billion people (UNDP, 2014) which shows poverty in developing countries is very chronic and widespread. Ethiopia had shown significant progress in reducing monetary poverty over the last decades. Ethiopia was one of poorest country that had high poverty rate in the world in 2000, with 56% of the population living below US \$1.25 PPP a day and 44% of its population under the national poverty line. In 2011, less than 30% of the population lived below the national poverty threshold and 31% lived on less than US \$1.25 PPP a day (World Bank, 2015). However, this progress in wellbeing is not reflected in other non-monetary wellbeing dimensions such as electricity and water.

For the first time, Alkire and Santos (2010) have computed Multidimensional Poverty Index (MPI) for 104 developing countries which covers 78% of the world's population using micro datasets (household surveys). Alkire and Foster multidimensional poverty measures were employed to compute the MPI using ten indicators from three dimensions of wellbeing: education, health and standard of living. According to Alkire and Santos (2010), the MPI is an index of acute multidimensional poverty that shows deprivations in basic services and human functionings, and it provides information on a set of deprivations that hit an individual simultaneously. Following them, UNDP Human Development Report has published that most of the world's multidimensional poor inhabited in Sub-Saharan Africa and South Asia. Out of the total world MPI poor, 54.7% world poor people, which mean about 843.8 million people, are found in South Asia. The proportion of multidimensional acute poor were 64.5% in Sub-Sahara Africa (which means about 458 million people) and a population-weighted average of 17.9% poor people, which means about 38.9 million people are MPI poor, were found in the Arab States. 13.7%, 10.4% and 3% MPI poor people were in East Asia and the Pacific, Latin America and the Caribbean, and Europe and Eastern Europe and the Commonwealth of Independent States (CIS) (the lowest), respectively. However, Alkire and Robles (2017) indicated that the 2017 global MPI indicated a reduction in the proportion of MPI poverty. For example, 48% of world MPI poor live in South Asia and 36% live in Sub-Saharan Africa. East Asia and the

Pacific comprise 10% MPI poor while Arab States constitutes only 4%. In Latin America and Caribbean, 2% were found MPI poor and no MPI poor person were found in Europe and Central Asia. Furthermore, Alkire and Robles indicated that the 2017 Global MPI covers 5.4 billion people. Of which a total of 1.45 billion people from 103 countries are multidimensional poor.

Looking at the intensity of poverty, poverty was greatest in Sub-Saharan Africa (58.2%) followed by South Asia (53%). These clearly show significant difference in terms of poverty intensity across different geographic regions and countries. Africa comprises the highest proportion of MPI poor population in the world. Niger is one of the poorest Sub-Saharan Africa countries which had 93% poor population, with 69% of average intensity of deprivation. Ethiopia as a second MPI poorest country was with 90% poor population, with 65% poverty intensity. This ranked Ethiopia 103rd out of 104 countries. Mali was the third MPI poor country with 87% of poor population (Alkire & Santos, 2010). In Ethiopia, the incidence and intensity of poverty is decreased to 84% and 59% in 2016, respectively (OPHI, 2018). In 2016, MPI in Ethiopian Regional States were highest in Afar and Somali (MPI=57% each) followed by Oromia (MPI=53%) and Amhara Regional State (MPI=50%). Result also shows the value of MPI of SNNPE (MPI=49%), Beshangul Gumuz (MPI=47%), Tigray (MPI=45%), Gambella (MPI=35%), Harari (MPI=30%), Dire Dawa (MPI=29%), and Addis Ababa (6%). With respect to urban and rural difference, multidimensional poverty measurement also shows that the proportion of MPI poor is higher in rural areas (55%) than urban areas (16%) (OPHI, 2018).

Recently, the multidimensional poverty indices, censored headcount ratio (the proportion of households who are poor and deprived in each indicator) and uncensored headcount ratio (the percentage of households who are deprived in each indicator) were calculated by Oxford Poverty and Human Development Initiatives researchers using 2016 DHS data for Ethiopia. Accordingly, result shows that the poor in Ethiopia experience 51% of the total deprivations that would be experienced if all households were multidimensional poor (MPI poor) and deprived in all poverty indicators. The multidimensional headcount ratio and multidimensional poverty intensity were 83 % and 61%, respectively. This means 83% of households were poor and the share of deprivation each poor households experiences on average is 61%. Regarding the uncensored headcount ratio, higher deprivation was observed in all indicators of multidimensional poverty. That is the percentage of households deprived in years of schooling (43.9), child school

attendance (33.7), child mortality (31.6), electricity (79.4), improved sanitation (93.4), drinking water (63.7), cooking fuel (95.1), nutrition (50.8), flooring (84.5), and asset ownership (70.6) were extremely high (Alkire and Kanagaratnam, 2018).

Using the 2011 and 2016 DHS data, the proportion of people who are poor and deprived in education, health and living standard dimensions of wellbeing in Ethiopia were computed, that is, respectively; 62% and 44% of the population were poor and deprived in years of schooling, 65% and 33% were poor and deprived in child school enrollment, 38% and 31% were poor and deprived in child mortality, 21% and 48% were poor and deprived in nutrition, 86% and 75% were poor and deprived in electricity, 88% and 80% were poor and deprived in sanitation, 54% and 61% were poor and deprived in drinking water, 88% and 79% were poor and deprived in flooring, 90% and 82% were poor and deprived in cooking fuel and finally 89% and 67% were poor and deprived in assets. This shows poverty in Ethiopia is severe which affect a very large population (Alkire and Santos, 2011; Alkire and Kanagaratnam, 2018). Except for nutrition and water deprivation, these result shows significant decrease in the rate of MPI poverty and deprivation in each indicator.

2.11.2 Empirical Studies on Determinants of Poverty and Vulnerability to Poverty

Dawit et al., (2011) examined the extent and determinants of poverty in six selected villages of Amhara and Oromia regions of Ethiopia using probit model. Results of the probit indicated that family size, size of land , number of TLU owned, number of crops produced, non-farm income, nearness to all weather road and utilization of microfinance institutions were found to be significant factors affecting households poverty status. Family size was found to affect rural household's welfare situation negatively. Increased ownership of the basic livelihood assets, farm land and livestock, showed positive effect on the welfare status of rural households. Crop diversification and engagement in non-farm activities showed a significantly positive effect on the probability of households to be non-poor. Their study also shows that a household with better access to transportation has a positive impact in reducing poverty; the nearer the household to all weather road the likelihood of being non-poor is higher. Moreover, access to microfinance institutions was found to influence household's poverty negatively.

Alemseged (2016) examines determinants of households' multidimensional poverty in Weri Leke District, Central Zone of Tigray. The paper first computed households Multidimensional Poverty Index using the Alkire and Foster methodology and applied logistic regression model to identify determinants of multidimensional poverty. Result shows that 41% of the studied households were MPI poor and result of the regression model also shows that education level of household heads, sex of household heads and distance to the nearest market increases households probability of being multidimensionally poor. In contrast, size of cultivated land, size of cattle TLUs, possession of radio and residing in Zongi Kebele decreases households' probability of being multidimensionally poor.

Nega (2015) identify the socioeconomic factors that contribute to consumption based rural household's poverty in Gulomekeda District, Tigray Regional National State of Ethiopia. He found that dependency ratio and total family size were found to have significant and positive correlation with poverty of the household, while number of livestock ownership in TLU, education status of the household head, total land size, households access to credit, value of productive asset owned by the household, and off-farm income was identified to have significant and negative correlations with the households poverty status.

Tsegaye et al., (2014) assessed determinants of rural household poverty in Gozamn District of East Gojjam Zone, Ethiopia, using the cost of basic needs approach to setting absolute poverty line. They were also employed binary logit model to investigate the relationship between household's poverty status and its correlates. Result of the regression shows that education level of household heads, household livestock ownership excluding oxen, household off-farm and non-farm income, credit utilization, frequency of contact with extension agents and ownership of cultivated farm land has statistically significant and negative correlation with the poverty status of rural households. Only family size alone was significantly and positively related with rural household's poverty status.

Adugna and Sileshi (2013) used binary logistic regression to explore determinants of poverty in agro-pastoral areas of Southern Regional State of Ethiopia. Their work indicated that the probability of a household to escape from poverty is significantly related with annual income, land ownership, and contact with extension agents, while the probability of households to continue with rural poverty is significantly and positively associated with family size. Contrary

to their expectations indicators such as age, sex, and number of livestock owned were not significant to explain the likelihood of households to exit poverty. The study also marked that number of livestock in the study area is not an option to escape from poverty unless the livestock production is commercialized through various interventions such as pasture development, market linkage, extension and veterinary services.

With regard to vulnerability to poverty, Feeny and Mc Donald (2016) examine vulnerability of households to multidimensional poverty in two Melanesian small islands that is Solomon Islands and Vanuatu using cross-sectional data. The paper used both Alkire and Foster methodology to compute poverty status of households and employed FGLS method to identify determinants of vulnerability to MPI poverty. Their model was estimated using the aggregate sample as well as separately estimated for capital city and non-capital city of the study area. Results show that, 36.4% of surveyed households were found vulnerable to multidimensional poverty; of which 14.5% are from the poor and 21.9% are from the non-poor households. They also found that, on the one hand, better educated households, households with better access to formal employment, households with a better conventional and traditional wealth (based upon livestock holdings, environmental assets and social capital) were found to be less vulnerable to multidimensional poverty. On the other hand, households with more adults and larger dependency ratios, and female-headed households are more vulnerable to multidimensional poverty. Their work also indicated that in capital cities households experienced inflation and environmental shocks (such as a natural disaster and crop failure) were more vulnerable to poverty. Looking at response strategies, households that reduced their food intake following a shock were more vulnerable owing to a higher level of expected deprivations while households that sold livestock and relied on savings (particularly in capital cities) are less vulnerable to multidimensional poverty.

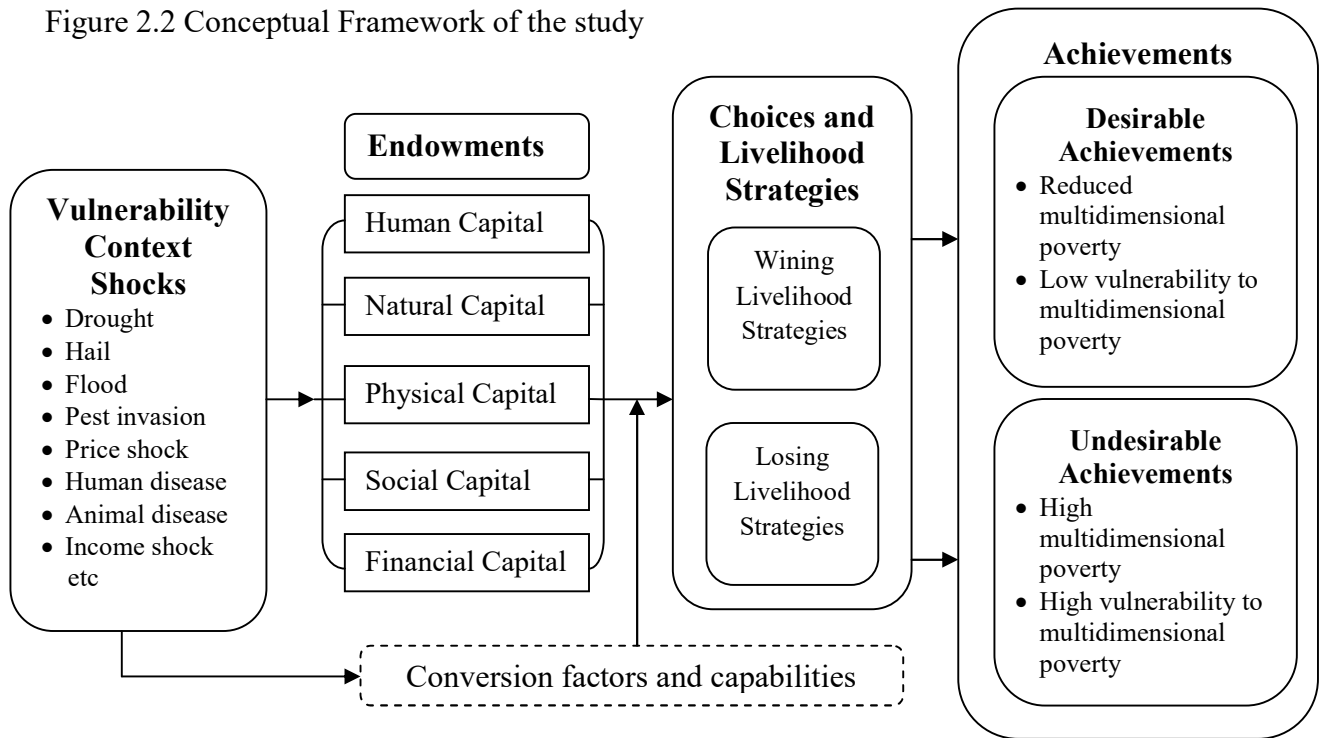
Abrham and Bauer (2012) examine the dynamics and determinants of rural poverty and vulnerability in the Northern highlands of Ethiopia using their own primary data and mainly the Ethiopian Rural Household Survey data 1994-2010 in Shumsheha and Yetmen peasant associations. The paper employed three steps Feasible Generalized Least Squares (FGLS) and Fixed Effects IV models to examine vulnerability of rural households to poverty and its determinants. Their result shows that households in Shumsheha has shown a consistent reduction in both poverty incidence and vulnerability to poverty measures excluding the dramatic increase

in 2010 while households in Yetmen shows fluctuations throughout the panel. The study revealed that the two villages show different sources of vulnerability to poverty. Households headed by younger individuals were found to have higher vulnerability, while aged household heads represented by age-squared variable are observed to have less vulnerability to poverty in Shumsheha peasant association. While household size was found to aggravate household's vulnerability to poverty, access to credit tend to reduce vulnerability of households to poverty in both study villages. Besides, Abrham and Bauer indicated that fertile land, households that store cereals, and young household heads are significantly less vulnerable to poverty than their counterparts in Yetmen. In contrast, number of crops grown, number of oxen owned, receiving transfers and involvement in off-farm income reduce the chance of households falling into poverty at least for one more year significant only to households in Shumsheha.

Tesfaye (2017) examined determinants of vulnerability to poverty in Amhara Region, Gubalafto District using consumption expenditure data. Results of the OLS and three step FGLS shows that large family size, participation on wage employment, distance to the market center and Qolla agro-ecology aggravates household vulnerability to poverty. In contrast, oxen ownership, size of landholding, employment on own business, access to credit and extension service and having village level basic infrastructural services (embodied in the form of infrastructural index) reduce household vulnerability to poverty significantly. The study also shows that current households asset value were positively associated with household vulnerability to poverty.

Sisay et al., (2016) used consumption poverty and Feasible Generalized Least Squares (FGLS) estimation to assess rural household vulnerability to poverty in Gilgel Gibe Hydraulic Dam Area of Sokoru and Tiro Afeta District, South West Ethiopia. Result shows that more than half (51.3%) of the non-poor households were susceptible to poverty while 53.2% of the poor have a probability of 50% and above to experience poverty in the near future again. With respect to determinant factors, result of the logistic regression revealed that age of household head and exposure to idiosyncratic shock were found significant and positively associated with household vulnerability to poverty. On the other hand, education level of household head, crop diversification, livestock holding, household's access to saving and credit facilities were found to have negative and significant association with vulnerability to poverty.

Figure 2.2 Conceptual Framework of the study



Sources: Author, adapted from Scoones (1998) and DFID (2000)

Chapter Three

Research Methodology

3.1 Description of the Study Area

Geographic location and topography: Degu'a Tembien is one of the four Districts in South Eastern administrative Zone of Tigray Region, Ethiopia. The District is divided in to 24 *Tabias/Kebeles* (one urban and 23 rural Kebeles) and 84 *Qushets* (DTWOPF, 2017). The District had been part of the Central Zone of Tigray until 2008. Geographically, it is situated in between 39°10' East longitudes and 13°38' North latitudes covering an area of approximately 1,125sqkm. The District is bounded by Qolla Tembien District in the west, Enderta District in the east, Kelteawlalo District in the north and Seharti Samre District in the south. Hagereselam is the capital of the District located 50km from regional capital, Mekelle and found at the Mekelle Abiy-Adi regional road. The altitude of Hagereselam is 2618 m.a.s.l. (Ayenew et al., 2011).

Agro-ecology and climate condition: According to the conventional Ethiopian agro-ecological zonation, the District's climatic zones are classified as qolla/lowland, weinadegu'a/midland and degu'a/highland with proportion of 18.75%, 37.5% and 43.75% of the District's area, respectively. The annual amount of rainfall ranges from 600–800 mm (DTWOPF, 2017). The daily weather condition of the District ranges from 18°C to 24°C. The District has erratic type of rainfall with high variation between and within years, and receives rainfall once a year. More than 80% of the total rainfall (heavy rain season) is occurred between June and September. The District is highly vulnerable to soil erosion due to its mountainous terrain and rainfall induced soil erosion is occurred in the District due to large drop size. The major soil types of the District are mainly clay (50%), sandy loam (40%) and sandy (10%) (Nyssen et al., 2005).

Population and demographic condition: The total population of the District is 129,601, of which 65,088 are female and 64,513 are males. The total number of rural households in the District is 31,711 of which 23,591 are male household heads and 8,120 consists female-household heads. Report also shows that almost all (99.8%) of the District inhabitants are practicing Ethiopian Orthodox Christianity while 0.02 are Muslims (DTWOPF, 2017). The District has population density (the ratio of the population size to its total area) of 61.31, which was above the zone average of 56.29/sqkm (CSA, 2007).

Land and land-use pattern: The land use pattern of the District shows that the District covers a total land area of 112,500 ha. Of which, 19,472 ha is cultivatable land and 92,193.34 ha is non-cultivable land. The District has 7,582 ha of potentially irrigable land, 21,177 ha forest land, 20,238.47 ha is grazing land and others (3,529.5 ha) (DTWOPF, 2017).

Economic activities, food insecurity and vulnerability context: Agriculture is the dominant sources of livelihood for the majority of the population. Agriculture in this District is characterized by crop-livestock mixed farming and is exclusively small-scale family farms. The major crops grown and cultivated in the District includes cereals like barley, wheat and taff. These are very common cereals which are endemic to Ethiopia. For the purpose of reducing risks of harvest failure, *hanfets* (a combination of barley and wheat) is grown and sown together. Crops such as maize, horse bean, lentil, linseed and grass pea are also important crops grown in the District. Livestock production is an important economic activity in the mixed farming system of the District. They provide food and traction power and serves as a source of cash income in time of shocks. Cattle, sheep, goats, donkeys and mules are the major livestock reared by households in the study area. On average, a household in the District owns one or two oxen, five to six goats/sheep and sometimes a donkey (Nyssen et al., 2008).

According to Disaster Risk Management and Food Security Sector (DRMFSS, 2015) report of the country, drought is the major disaster risk reported in the District which led to crop and livestock destruction, shortage of potable water and exposure to diseases, and thus caused loss of income and migration of humans and animals. In addition to this, crop pests and diseases, and hail storms are other shocks household's experienced in farm production, which also resulted in food insecurity and migration of households. Furthermore, human diseases such as diarrhea and malaria, and animal diseases like foot and mouth diseases are also prevalent as major risks of the community which challenges the overall development of the District. Human disease in the District is mainly resulted from absence of potable water, food insecurity and poor sanitation.

Degu'a Tembien District is one of the most poverty-stricken and drought prone area in the region and is distinguished by a high prevalence of food shortage. During 2016, 29,775 people of the District was identified as food insecure and become beneficiaries of the government Productive Safety Net Program (PSNP) (DTWOPF, 2017). DRMFSS (2015) report also shows that in 2015, 49.5% of the District households are affected by crop damage, while 13.2 and 11.6% affected by

income and livestock damage, respectively. Table 3.1 shows the common shock types affecting communities' in order of importance by the smallest administrative units.

Table 3.1: Major shocks reported in each Kebeles of Degu'a Tembien District

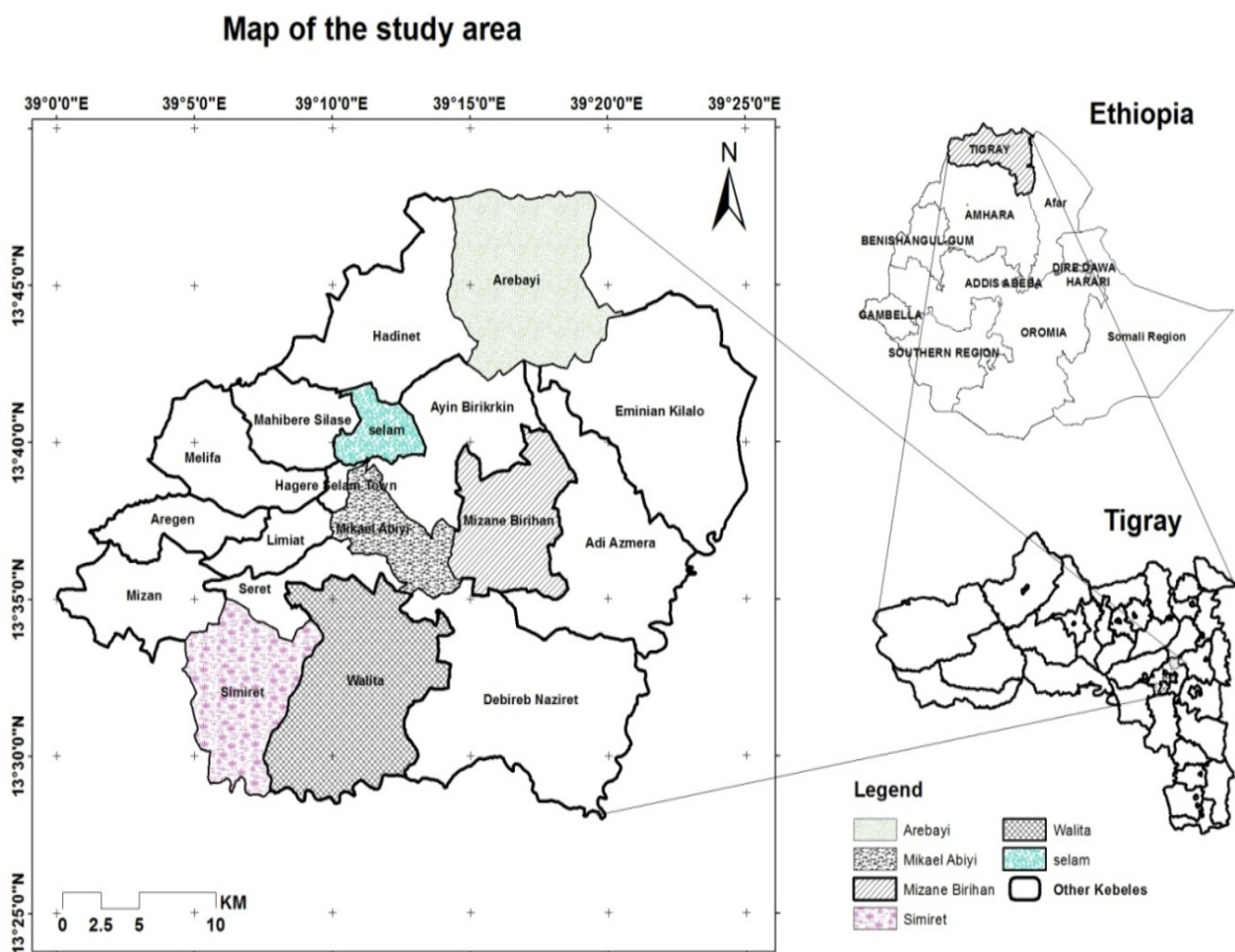
Kebele	Disaster 1	Disaster 2	Disaster 3
Amanit	Drought	Snow	Stalk borer
Hagereslam	Drought	Flood	-
Mahberesilasie	Flood	Hailstorm	Rodents and rust
Selam	Drought	Rodents	Rust
Simret	Hailstorm	Rust	Rodents
Adi-Walka	Drought	Snow	Flooding
Mizane Brhan	Drought	-	-
Adi-Azemera	Drought	Snow	Flood
Aynmbrkekn	Flood	Drought	Rodents
Melfa	Flood	Drought	Rodents and rust
Enienkelaln	Drought	Flood	Rust
Hadnet	Hail storm	Drought	Flood
Adilal	Drought	Flood	Rust
Seret	Drought	Hailstorm	Rust
Endaslasie	Drought	Hailstorm	Flood
Debre-nazrate	Drought	Water	Logging
Mikael Abiy	Drought	Hail Storm	Flood
Walta	Human diseases	Animal diseases	Drought
Arebay	Drought	-	-
Limat	Rust	Hail storm	
Menachige	Drought	Flood	
Arsein	Drought	Hailstorm	
Mizan	Drought	-	-
Degol Weyane	Drought	-	-

Source: National Disaster Risk Management and Food Security Sector (DRMFSS, 2015)

Basic services: Regarding communication services, the District has automatic and mobile telephone, one post office, fax services in Hagereslam and 23 satellite telephones in the rural Kebeles. Hagereslam and other seven rural Kebeles have 24 hours electric power services from the national grid of hydroelectric power. As accessibility of the District capital is all weather roads, there is public transport facility to Hagereslam. Dedit Credit and Saving Institution is the major Micro Finance Institution (MFI) in the District and has three branch offices at Ayenberkeken, Hagereslam and Enda-Mariam (Ayenew et al., 2011). With regard to water supply, ground water mainly hand dug wells is the major sources of water for the study area, followed by shallow wells and spring development. In contrast, there are some Kebeles in the

District which have serious problem to access drinking water. Adi-Lal, Adi-Walka, Emni-Ankelalo, Amanit, Adi-Azmera, Mizan, Menachike and Endasilasie Kebeles do not have any alternative source of water apart from dug wells. These Kebeles have shortage of shallow groundwater and the existing spring sources in Kebeles such as Walta, Adi-Edaga, Mai-Gize, Mai-Shih, Midri, and Seret have multiple use purpose. This water sources are in use for domestic water supply and irrigation purposes (Ayenew et al., 2011). In 2016, there were 6 health institutions, 19 health posts and 62 schools (DTWOPF, 2017).

Figure 3.1: Location of the study area



Source: Ethio GIS and CSA (2007)

3.2 Research Design

Explanatory sequential design - one of the major mixed research design - is selected to be the research design of this study. According to Creswell and Plano Clark (2011), this design gives priority to quantitative analysis but the findings are integrated with the qualitative analysis and interpretations. This type of design is highly significant when the research problem have more quantitative orientation and the researcher needs qualitative data to support or explain some quantitative research findings. Moreover, this mixed design helps us to explain and contextualize quantitative results. With this regard, cross-sectional data (information collected from household's only one point in time) was used for intensive analysis and this makes the research process fast and inexpensive.

3.3 Research Philosophy

All studies are dependent on one specific or several philosophical theories on what appropriate research is and which method is appropriate to develop knowledge. It is significant to have specific research paradigm for a given study. A research paradigm is a set of fundamental assumptions and beliefs as to how the world is perceived which then serves as a thinking framework that guides the behavior of the researcher (Jonker and Pennink, 2010). The paradigms are ways of explaining the basic set of beliefs that we have and provide the principles that can guide our practical aspects of doing research. The decisions we make about the research process depend upon the paradigm we hold. Hence, pragmatic research paradigm was adopted as research philosophy of this dissertation.

Tashakkori and Teddlie (2003, p. 713) define pragmatism as: “... *a deconstructive paradigm that debunks concepts such as ‘truth’ and ‘reality’ and focuses instead on ‘what works’ as the truth regarding the research questions under investigation. Pragmatism rejects the either/or choices associated with the paradigm wars, advocates for the use of mixed methods in research, and acknowledges that the values of the researcher play a large role in interpretation of results*”. Creswell and Plano Clark (2007, p. 23) also noted that “...*pragmatism involves research design and operational decisions based on ‘what works best’ when answering the questions being investigated*”. Pragmatist researchers favors working with both quantitative and qualitative data because it enables them to better understand social reality (Wahyuni, 2012) and as it is clearly indicated by Creswell and Plano Clark (2011), the underlined reason for using pragmatist

research philosophy is that the research question can adequately answered by both qualitative and quantitative methods.

Creswell (2009) indicated that pragmatism provides a philosophical basis for research because it allows researchers to choose the methods, techniques, and procedures of research that best meet their needs and purposes; it is not committed to any one system of philosophy and reality. This is because it uses both quantitative and qualitative assumptions as far as researchers establish the rationale for why quantitative and qualitative data are needed to be mixed; and it provides an incentive to use different views, methods and types of data collection instruments and methods of analysis. Therefore, since this research adopted mixed design, pragmatism research philosophy is appropriate philosophy for this particular research. This research philosophy informed the whole methodology which gives rise to the methods and materials employed in the research. Specially, its dual orientation is believed to provide a detail description of the existing reality that this research is going to address. This perspective also allows the researcher to emphasize on the research problem and use all approaches available to understand the depth and breadth of the problem.

3.4 Research Approach

The study was used both the quantitative and qualitative research methods by large with quantitative components. The major reason for using both approaches is due to the nature and difficulty of studying household's poverty and vulnerability with one approach, and poverty needs more understanding on the perceptions of the studied groups through rigorous qualitative and quantitative interpretations. This would have a large potential payoff in terms of understanding and explaining poverty and vulnerability. Creswell (2009) indicated that quantitative approach uses surveys and experiments as methods of investigation while the qualitative approach uses constructivist/participatory or both perspective claims in the creation of knowledge.

Alkire et.al, (2012, p.7) indicated that *"Poverty research should be pluralist in its methods and theoretical approaches"*. A combination of both approaches to poverty analysis is advantageous because it would deepen the effectiveness of poverty analysis. Therefore, this study employed mixed research approach. The quantitative approach was important to measure the problem by

way of generating numerical data, helps to quantify respondent's experiences, define variables and generalize results from a larger sample population. As well, the qualitative approach was helpful in obtaining understanding on the underlying reasons and opinions, and it was helpful in identifying, examining and contextualizing the research problem.

3.5 Sampling Procedure

Cochran stated that *"In every branch of science we lack the resources to study more than a fragment of the phenomena that might advance our knowledge"* (Cochran, 1963; quoted in Sharma, 2008, p.112). Among the resources, time and cost are two factors that influence sample size determination. The size of the sample affects the representativeness of the results obtained from the sample population (Burns and Bush, 2010). Nonetheless, Saundres et al., (2009) indicated that the possibility of obtaining accurate generalization is higher in large sample. Therefore, taking time and cost limitations, this study was conducted in a single District, Degu'a Tembien District of South Eastern Zone Tigray. The reason behind selecting this District is that households in this District are dependent on agricultural activities but exposed to a number of natural and man-made problems. As a result, they have been repeatedly prone to poverty, drought and seasonal food aid. Therefore, the multidimensional poverty and vulnerability status of those rural households would be fairly analyzed.

Three stage sampling technique was employed to select sample respondents for this dissertation. Sample size was also determined on the basis of practical approach that is, with size of the population. First, the District Kebeles was stratified by agro-ecology in to three groups as highland, midland and lowland, considering the traditional agro-ecological zonation of Ethiopia. The rationale for this classification is to see variation in the variable of interest since they are found in different locations. Second, the District has a total of 24 Kebeles with a total of 31,053 households. 10, 7, and 7 Kebeles are found in the lowland, midland and highland agro-ecology, respectively. Excluding the main town of the District, a total of 6 Kebeles; two Kebele from each agro-ecology was selected randomly using lottery method. In the last stage, after taking the household baseline data from the District agricultural bureau, sample households was selected proportionately from each selected Kebeles by using simple random sampling technique. Sample size of the study was determined using Yamane (1967) simplified formula:

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

Where, n is the sample size; N denotes the population size and e refers to precision level. Therefore, assuming 95% confidence level and 5% precision level, and given the total household of the study District is 31,035, the sample size of the study becomes 395. However, according to Naing et al., (2006), the above sample size can be representative if there is no missing and non-response value. Researchers should assume 10 to 20 percent contingency to achieve the required accuracy. Assuming 11% contingency, the minimum drawn sample size of the study was 438. However, 18 household survey questionnaires were not properly filled and hence the analysis was finally made on 420 respondents. The following Table summarizes the total sample size of the study as follows.

Table 3.2: Summary of sample size

S.N	Study Kebeles	Agro-ecology	Total Households	Sample Size
1	Mizane Brhan	Lowland	1060	65
2	Walta	Lowland	1341	83
3	Michael Abiy	Midland	1362	84
4	Simret	Midland	1546	95
5	Selam	Highland	956	59
6	Arebay	Highland	846	52
Total			7111	438

Source: Own calculation based on Degu'a Tembien District Bureau of Agriculture (2015)

3.6 Methods of Data Collection

The selected research methods were important to determine how data is collected and which type of information is supportive to better understand the study problem. Hence, both primary and secondary data sources were employed to collect the quantitative and qualitative data for this particular study.

3.6.1 Primary Data

The research has used household survey, focused group discussions and interviews to collect the primary data of the study.

Household Survey: Household surveys are the most commonly used data source to study poverty (Alkire et al., 2015c). Hence, to gather the required data from respondents in relation to

variables like demographics and socioeconomic characteristics, asset endowments and deprivation statuses, risks and coping mechanisms, household survey was administered using semi-structured questionnaire. One of the main benefits of household survey is that it can obtain evidence from a large respondent's with very small costs and little efforts in a valuable way. Therefore, the designed questionnaire was translated into local language of the study area (i.e., Tigrigna) in order to create clear understanding, credibility and confidence in the respondent answers. Before administering it, the questionnaire was pre-tested on randomly selected rural households. Accordingly a proper amendment was made based on the feedback. To collect the data in the proper manner, enumerators' familiar to the culture of respondents was recruited. Training was also provided to enumerators' on how to approach the respondents and how to collect the data using the questionnaire.

Focused Group Discussion (FGD): A focus group discussion is an informal discussion among a group of selected individuals about a particular topic. It is a useful research tool that provides rich and detailed information about feelings, thoughts, understandings, perceptions and impressions of people in their own words (Stewart et al., 2009). Several studies such as Hoyle et al., (2002) and Hennink (2007) pointed out that FGD involves 6 to 10 individual participants and should not take more than one and half to two hours. When the number of participants becomes less than 6, idea diversity will be restricted and if member participants go beyond 10, it would be difficult for participants to express their view widely (Hoyle et al., 2002). Therefore, six FGDs (one from each Kebele) which consists of 6 to 8 participants was carried out to gather various information on perception of household's on their poverty, susceptibility to various idiosyncratic and covariate level shocks, and their ability to cope with shocks. The researcher was facilitated discussions through raising discussion issues and maintaining the group discussions to the agenda.

Key informant Interview: Interview is used to gather qualitative data and is more personalized form of data collection instrument than household survey. The direct and face-to-face communication between the interviewee and interviewer is very helpful in obtaining detailed information about the subject matter. This face-to-face interaction is highly significant whenever respondents cannot be directly observed (Creswell, 2009). A semi-structured interview was used as it has features of both structured and unstructured interviews and has the advantage of both

methods of interviews. In order to be consistent with all participants, the interviewer had a set of pre-planned core questions for guidance such that the same areas are covered with each interviewee. The primary advantage of in-depth interviews is that they provide much more detailed information than what is available through other data collection methods, such as surveys (Boyce and Neale, 2006). Therefore, interview was conducted with key informant or individuals such as peasant association leaders, District level agricultural bureau officials and extension workers on underlying causes of household's poverty and vulnerability, household livelihood experiences and causes of livelihood shocks, and the effectiveness of their means of coping. The interview was planned to be free flowing with the interviewer to pursue new information that may come up during the interview. The information obtained from interview was also used to triangulate the findings of other types of collection methods.

3.6.2 Secondary Data

Creswell (2009) noted that secondary data are those which are gathered by other persons and have already been passed through the statistical process. This type of data was collected from previous documentations such as books, journals, reports and other research outputs to identify relevant information that serve as a background for this study. Secondary data save time and money since it do not need to be re-examined by the researcher. Besides, Fabregues (2013) indicated that secondary data is helpful in generating new insight from previous analysis. Generally, secondary data was collected to assess what other academicians or practitioners have said about the subject matter and it serve as a base for determining the feasibility of the research.

3.7 Methods of Data Analysis

In the process of conducting research, the researcher ought to choose systematically appropriate data analysis procedures to answer his questions. Therefore, in order to meet the objectives of the study, sequential procedure were used to analyze the research problem. Creswell (2009) indicated that sequential procedure of data analysis refers to the process of analyzing qualitative data after analyzing the quantitative data and vice versa. This method can give priority to either method. Nevertheless, their ultimate objective is to support each other.

The qualitative data which was obtained from interview and group discussion was analyzed contextually immediately after the data is collected. In this case, contextualization was used to

“give a meaning of the obtained results with reference to the specific and particular context of the study” (Gelo et al., 2008, p. 277) without changing the data in to statistical arrangements (Babbie, 2008). This type of analysis is helpful to find out concepts, explain relationships and construct underline meanings of the gathered information.

The quantitative data which was collected through household survey is analyzed quantitatively. Before proceeding to inferential statistics, descriptive statistics analysis such as frequencies, percentages, minimum, maximum, mean and standard deviation was conducted. Besides, some data was also displayed through various graphical descriptions such as bar graphs and histograms. The study was also employed inferential statistics such as Chi-Square test, ANOVA test, and logistic regression analysis. While the descriptive statistics is important to organize, describe, and summarize the collected data, the inferential statistics was also helpful in drawing conclusions about characteristics of a population based on the sample taken from that population. In general, the specific and detail method of data analysis is presented in each chapters. The following paragraphs provide objective wise general methods of data analysis for this particular study.

The first objective of this chapter is designed to examine the household’s livelihood asset endowments and its distribution among rural households in the study area. Livelihood assets offer considerable contributions to the wellbeing of the rural people. Poverty analysis has revealed that household’s ability to eradicate poverty is significantly dependent upon their ownership and access to various livelihood assets. Assessing household livelihood assets is important to understand their strength and it is assumed that households with a range of assets have the probability of achieving positive livelihood outcomes. This study initially adopted, as identified by DFID (2000), the five livelihood building blocks (i.e., human, natural, social, physical, and financial capitals) as central dimensions of household livelihood resources. Within these assets, various measurable indicators were also identified for each dimension.

Therefore, household capital endowment, its significant characteristic’s and its linkage with poverty and vulnerability were discussed contextually. Besides, quantitative analysis was made to assess household’s socioeconomic status, and this was analyzed and summarized using descriptive statistics. Since the collected asset variables have ordinal, binary and categorical modalities, a more suitable multivariate technique that is Multiple Correspondence Analysis

(MCA) were used for compiling or construction of the asset index. Many studies (see Asselin, 2009; Booysen et al., 2008) have used MCA to develop asset index and to lower the various dimensional descriptions. MCA were used to develop a general asset index and separate asset index for each capital asset. After computing a separate index for each livelihood capitals, households' asset endowment structure were displayed using asset pentagon to show how the average households' assets are distributed across the different asset categories. This also helps us to observe the variation in access to different livelihood assets. Moreover, cluster analysis was used to classify households into different socioeconomic groups using the general asset index.

Regarding the second objective of the study, the incidence and intensity of rural household's multidimensional poverty, its variation across Kebeles and socioeconomic characteristics was measured using Alkire and Foster Methodology (2007, 2011). The justification for choosing this model is that it is very advantageous for both technical and practical justifications. Alkire et al., (2015d) indicated that technically this methodology satisfies various properties such as decomposability, dimensional monotonicity, poverty focus, subgroup properties, and deprivation focus. Practically, the Alkire and Foster (AF) family of measures uses the intuitive counting approach to identify the poor, and explicitly considers the joint distribution of deprivations. Among the AF measures, the Multidimensional Poverty Index (MPI) measure is particularly applicable due to its ability to use ordinal or binary data rigorously (Alkire et al., 2015d). With this methodology, it is possible to compare groups and other key household characteristics. Furthermore, it enables us to analyze the share of each dimensions and indicators to overall poverty (Alkire and Santos, 2011a). Following Sen (1976), the methodology first identify who is poor and then aggregate the result to obtain the overall measures of poverty that reflect the multiple deprivations experienced by the poor. The AF methodology is highly dependent on the selection of poverty dimensions, indicators, individual indicator cutoff points, general poverty cutoffs, and determination of weights to measure multidimensional poverty.

Once household's deprivation in each selected indicators are identified, household's deprivation score was calculated to identify the multidimensional poor and non-poor households. Based on their deprivation, all households were assigned a value of 1 and 0 if the household is deprived and non-deprived in each indicator, respectively. Following Alkire and Foster (2007, 2011) methodology, whenever the household deprivation score is equals to or greater than one-third of

the weighted indicators, the household is declared to be multidimensionally poor and takes the value of 1, and 0 otherwise. With this categorization, binary logistic regression is employed to explore the major factors that determine multidimensional poverty status of households in the study District. This analysis is significant to verify the relative role of household's socioeconomic characteristics and asset compositions in influencing household's multidimensional poverty status. Logistic regression was selected because it is important to identify the relationship between the dichotomous dependent variables and any form of explanatory variables, and the model doesn't have restrictive distribution assumptions.

In order to estimate household vulnerability to future multidimensional poverty, the study used Vulnerability as Expected Poverty (VEP) approach due to its applicability to cross sectional data. Chaudhuri et al., (2002) has developed a model to estimate household's vulnerability to consumption poverty using VEP. This method use three-step Feasible Generalized Least Squares (FGLS) to estimate vulnerability to poverty using expected mean and variance of consumption. Therefore, this study adopted Chaudhuri et al., (2002) methodology to measure and estimate households vulnerability to multidimensional poverty. A combination of different variables of demographic and socioeconomic characteristics, observed covariate and idiosyncratic shocks and coping strategies were used in the estimation model as the level and variance of household's deprivation is considered to be dependent on such characteristics. Before estimating vulnerability to multidimensional poverty, first, the study identified an indicator of households' wellbeing that is multidimensional poverty. Then, wellbeing threshold or in our case the multidimensional poverty line was also identified. Alkire and Foster's (2007, 2011) method for computing the Multidimensional Poverty Index (MPI) were used to calculate the weighted deprivation score for each households and this weighted deprivation score were used to predict households vulnerability to future multidimensional poverty. In addition to this, to classify a household as non-vulnerable and vulnerable, we also adopted a standard vulnerability threshold of 0.5. That is a household is considered as vulnerable to future multidimensional poverty if his/her estimated vulnerability levels is above 0.5. This means a household face 50% chance of falling in to multidimensional poverty in the future.

3.8 Validity, Reliability and Ethical Considerations

This dissertation attempts to address the issues of validity, reliability and ethical issues throughout the research process. Validity of a research refers to how the research instruments well measures what it is expected to measure (Price et al., 2015). It shows the accuracy of a research and the extent to which the findings are truthful. The researcher used various strategies to ensure the validity of the research findings. First, triangulation of the data obtained from different sources such as questionnaire and interviews was used to examine the truthfulness of the collected information before arriving at conclusion. Second, the researcher spent the whole data collection time period in the field. This was helpful to develop deep understanding of the research problem, know the population/actual setting very well and enable us to narrate the issues under investigation credibly. Third, the objective of the paper was clearly explained to surveyed households because their willingness and confidence was important to obtain a valid response. Fourth, the household survey questionnaire was pre-tested to examine the validity of the data collection tool. Finally, the study also conducted various tests to ensure the validity of the models used in the research process.

On the other hand, reliability is a measure of consistency of research outcomes over time, across measurement tools and across different researchers (Price et al., 2015). Therefore, the various techniques of data gathering and analysis and the personal administration of key informant interviews and group discussions were helpful to ensure the reliability or stability of the research findings.

Research ethics is another critical part of any study. It helps to safeguard research participants from any material and physiological problems. Researchers should respect the needs, values and rights of respondents. Hence, research ethics is attempted to be ensured by taking authorization letter from Addis Ababa University and presenting it to the District and Kebele administrators to obtain permission of conducting research in the selected sites. Next to this, the research objective and how the data would be used was properly communicated verbally to research participants. It was also explained that the research will not have any effect on the surveyed households and their anonymity will kept confidential. Moreover, findings are honestly reported and reviewed studies are properly accredited.

Chapter Four

Livelihood Resources Possession of Households' in Degu'a Tembien District

4.1 Introduction

Household's poverty and socioeconomic status was frequently assessed using income or consumption expenditure as a favored unit of analysis. The reason for using income as a single indicator of poverty assessment is that it enable individuals to achieve certain level of living standard (Sahn and Stifel, 2003; Dutta, 2013). Income is a cardinal indicator of wellbeing which helps us to provide direct interpretation and comparison of results across observation. In 1990s, the use of income was replaced by consumption based analysis as the living standard approach of poverty prefers consumption as the welfare indicator (Ravallion, 1992).

However, this all does not tell us much about how and why households are poor. Sahn and Stifel (2003) also indicated that poor quality of data on income/expenditure, loss of memory or under-reporting of income and problems of estimating the right price of goods are some of the reasons that made classification of household's socioeconomic status difficult. As a result, the analysis of assets has gained an increasing importance in determining socioeconomic status of households in developing countries (Filmer and Pritchett, 2001). The analysis of assets accumulation is also considered as alternative to the monetary measurement of poverty by widening the concept that poverty is multidimensional phenomena (Adato et al., 2006). This asset based approach to assessing households socioeconomic status is instructive and gives much understanding of why households are poor.

Access to and control over assets are important elements in people's livelihoods (Carter and Barrett 2006) and play an essential role in reducing vulnerability, and providing insurance services against shocks. Poor households may not have access to adequate resources to properly respond to shocks. Those with better asset ownership can achieve their livelihood objectives by improving their income. In that way, they can engage in activities that can promote economic growth, and that enable them to secure themselves against unexpected events (McKay, 2009). Asset endowment has multiple functions such as enhancing people's social status, acting as collateral and increasing access to financial services (Deere and Doss, 2006). According to Bebbington (1999), livelihood assets are a means of living which give meaning for individual's

lives and they are the resources used to build livelihood. Asset gives individuals or people the capability to pursue a range of livelihood options. Bebbington's capitals and capabilities framework views assets as "*vehicles for instrumental action (making a living), hermeneutic action (making living meaningful) and emancipatory action (challenging the structures under which one makes a living)*" (Bebbington 1999, p.2022).

Several studies (see Scoones, 1998; Carney, 1999; DFID, 2000; Serrat, 2008) indicated that there are five groups of livelihood capitals. These are the human, natural, physical, social and financial capitals. Human capital refers to the labor, health, knowledge, and ability of people to manage, work and pursue various livelihood strategies (DFID, 2000). Human capital determines people's ability to make effective utilization of other four livelihood capitals. Natural capitals are natural resource from which humans derive a wide range of services useful for livelihoods. Physical capital consists of assets that are created by physical production processes (Ellis, 2000). This comprises the basic infrastructure (example, transport and communication facilities) and produced goods needed to support livelihoods such as access to agricultural technologies, household durable assets, and farm equipment. Social capital refers to social resources or relationships that support households to achieve desirable livelihood outcomes. Financial capital denotes the financial resources that people use to obtain goods and services needed for their livelihoods (UNDP, 2017). It also refers to the availability of monetary resources that enables people to adopt different livelihood strategies.

According to Mazibuko (2013), these assets are not universally available in adequate quantities for all households. Households own assets to varying degrees since there are various opportunities and degrees of freedom to access these resources. The balance among the different forms of asset can be identified using a capital pentagon. Once their balance is investigated using graphic representation, it would be possible to explore the contribution of each asset to livelihood outcome, and at the same time, it would be easier to assess household's vulnerability to shocks and stresses (DFID, 2000). Another important point that should be clear is that a single asset can generate multiple benefits as, for example, access or possession of land can be used as collateral to secure access to credit thereby providing households with an opportunity to participate in different income generating activities. Similarly, livestock ownership may generate higher social status but at the same time can be used for animal traction (DFID, 2000).

Generally, household's ability to break out of poverty is highly dependent on the accessibility and ownership of balanced, and diversified, productive livelihood assets. All these assets can play a significant role in providing households with the desired wellbeing option. Acquisition of assets is an indicator of higher socioeconomic positions and better capacities to make investments in various longer term livelihood activities such as agriculture, education and health. Conversely, lacking assets or their depletion reflects a decline in wellbeing, enhances household's vulnerability to poverty, and reduces household's ability to recover from various shocks. Analysis of asset ownership would enable us to capture the wide range of household vulnerabilities as it can provide us better information on how households manage their vulnerability to poverty (Carter and Barrett, 2006). Therefore, it is against this background of asset ownership that this chapter attempts to answer the questions:

1. What is the existing livelihood asset portfolio of studied households?
2. What is the asset based socioeconomic status of households in the study area?

These research questions are addressed using data on possession of assets that were collected from surveyed households. Therefore, the remaining sections of this chapter are organized as follows. The next section deals with the methodology of constructing an asset index using Multiple Correspondence Analysis (MCA) and the methods for classifying households into socioeconomic groups using the computed asset index. Section 4.3 provides the descriptive analysis of human, natural, physical, social and financial assets of households. Section 4.4 discusses the results of MCA. Section 4.5 presented households classification into socioeconomic groups using cluster analysis. Finally, household's asset endowment structure is presented in section 4.6, which then summarizes the chapter.

4.2 Methodology

4.2.3 Building Asset Index Using Multiple Correspondence Analysis (MCA)

MCA is a descriptive data analysis technique that helps researchers to “... *investigate the pattern of relationships of several categorical dependent variables*” (Asselin 2002 cited in Njong and Ningaye, 2008, p.10; Dawit et al., 2014, p.1038). MCA make fewer assumptions on the distributions of the data as compared to principal component analysis which works better for continuous variables and it is more preferable approach to construct an index of exclusively

categorical variables (Greenacre, 2007; Booysen et al., 2008; Asselin, 2009) by transforming each level of responses into a binary variable (0 and 1).

MCA gives weights to every variable and category, and it also reduces data dimensionality whilst maintaining the highest amount of variance (Husson et al., 2010). This characteristic's is important to reduce the large number of categorical variables and retain useful variables. The dimensions of the MCA provide a condensed representation of the variables in decreasing order of significance. Therefore, the first dimension (which represents the household welfare 'dependent' variable in this paper) is the most important which signify the largest variance of all observed asset indicators and is the first dimension that represent all indicators included in the model, while the second dimension is the second most important principal axis/dimension (Abdi and Valentin, 2007). This approach is different from other common econometric approaches as the explained variable is latent and cannot be observed directly to estimate correlation coefficients. For this reason, it is assumed that household welfare is multifaceted unobservable variable (Ezzrari and Verme, 2012).

Two stages MCA were performed to exclude less relevant indicators from subsequent analyses and to identify the most relevant dimension that captures higher inertia or degree of variation to construct the index. Inertia is the percentage of variance explained by the model. All principal inertia values are expressed in terms of total percentage of inertia for each dimension. This principal inertia is also decomposed as values for every indicator category. The decomposed value is the contribution of each indicator which is important to interpret asset indicators.

Following this MCA procedure, asset indices were estimated on the data collected across households (an asset index was also calculated separately for each livelihood capital). The indices were used to rank households according to their socioeconomic status as households with high asset index score are expected to be better off than these who have lower asset index value. Filmer and Pritchett (2001) indicated that construction of asset index using equal weight is simple but arbitrary which is not theoretically supported. Equal weight means all asset variables are equally valued and can influence household's wealth status equally and this premise is wrong (Taylor and Yu, 2009). This means, for example, having land and radio or TV is equally important to households. Generally, to construct asset indices we have to decide about the

weights of variables. However, the application of MCA in the asset index construction generates weights (Canuel et al., 2014; Booysen et al., 2008) for each variable and their categories.

Asselin (2009) indicated that the construction of composite index must satisfy the property of First Axis Ordering Consistency (FAOC) which states that there must be an ordinal consistency between the ordering of categories and the ordering of weights across categories, either increasing or decreasing order. According to this axiom, the modality of the variables indicating welfare should have increasing scores on the selected first axis, which is in our case the welfare dimension. Finally, all indicators on the first axis were estimated and attempted to investigate those with respect to FAOC property or the ordinal structure of wellbeing with respect to this dimension. After applying this procedure, the second and final MCA was performed to obtain the final values of indicators.

Asselin (2002) cited in Booysen et al., (2008) also indicated that the process of index construction passes through four phases. The first phase is the development of indicator matrix constructed in the form of ‘yes/no’ to shows household asset ownership. The second phase is the computation of household asset profile. The third step refers to the application of MCA to the indicator matrix constructed in the first step, and providing weights to each asset category. The final phase is application of weights to household asset profile matrix thereby generating asset index using the following formula:

$$AIS_i = R_{i1}W_1 + R_{i2}W_2 + \dots + R_{ij}W_j$$

Where AIS_i is the i^{th} household's composite asset indicator score, R_{ij} is the response of household i to category j , and W_j is the MCA weight for the first dimension applied to category j . The finally constructed asset index was included negative values which make wealth interpretation unsuitable. Therefore, following literatures such as Booysen et al., (2008), Da Maia, (2012) and Sawira (2015), the asset index were adjusted by adding a value slightly more than the absolute value of the lowest (negative) score to each household's livelihood asset index score. This process converts the negative values in to positive asset values. Following this process, household asset index was computed.

4.2.4 Categorization of Households into Socioeconomic Groups

Socioeconomic status is a relative concept which refers to the combined social and economic position of households within the community. This paper attempted to capture household's socioeconomic status using asset endowments. Using MCA, a single asset index was developed and with this result, households were classified into three groups denominated as low, medium and high socioeconomic status.

The statistical procedure used to identify the three groups was cluster analysis. Cluster analysis is an important exploratory technique widely used in many areas of research. There are three types of cluster analysis methods which used a different procedure to classify observations into different groups. These are k-means clustering, hierarchical clustering and two-step clustering (a hybrid of hierarchical and partitioning methods). This paper applied k-means approach to cluster households into three groups because *“k-means is superior to hierarchical methods as it is less affected by outliers and the presence of irrelevant clustering variables”* (Mooi and Sarstedt, 2014, p.297). A k-means method of clustering is also one of the most popular and simple (to compute) clustering technique (Yan, 2005). K-means classify the whole observation into different groups represented by their centers and *“the center of each cluster is calculated as the mean of all the instances belonging to that cluster”* (Maimon and Rokach, 2005, p.333).

K-mean clusters the data into k groups where k is predefined before analysis is made (Mooi and Sarstedt, 2014), and this is the fundamental limitations of the tool which allow the user to decide the number of clusters to retain. Yan (2005) indicated that there is no fully acceptable method to decide the number of clusters as all methods give different results. Mooi and Sarstedt (2014) also indicated that all clustering methods are exploratory techniques and hence users should consider the practical significance of having specific number of groups. Grouping of households into various socioeconomic positions using income or monetary indicators collected at particular point can lead to wrong classifications of households as either poor or wealthy due to fluctuations. Thus, this study classified households into low, medium and high socioeconomic groups using asset endowment. Finally, although there is no formal method to assess differences in classifications (Kobrich et al., 2003), following Soltani et al., (2012), we used ANOVA test to check whether or not there is significant difference among the classified socioeconomic groups.

4.3 Description of Households Asset Profile in the Study Area

4.3.1 Natural Assets Owned by Households

Natural capital is the stock of environmentally provided productive assets of the rural poor. In areas where agricultural sector is dominant, existence and access to natural resources such as land and water are considered as the most crucial forms of natural asset. Hence, four indicators such as household's status of land ownership, cultivated farm land in hectare, land quality, and access to grazing land were identified to proxy natural capital. These are basic natural resources foundation of rural people on which their livelihoods are built.

4.3.1.1 Ownership and Size of Cultivated Land

Rural household wellbeing is highly determined by land ownership as their livelihood is mainly linked to various agricultural activities such as crop and livestock production. Land is a basic natural resource or key asset in the Ethiopian economy, as the country is highly dependent on agrarian economy with about 84% of Ethiopian population drawing their subsistence livelihood and money income largely from rain-fed agriculture (CSA, 2015). Small landholding is the prominent feature of the study District. Findings shows that great majority of surveyed households (93%) reported having land. This implies that households owned a very important productive asset which is crucial factor in maintaining household's food security and encouraging households to diversify and adopt modern technology to improve production.

However, looking at the size of cultivated land, households land ownership is generally small ranging from about 0.25 to 2 hectares with an average cultivated farm land of about 0.66 hectares. This is lower than the Region (Tigray) average (1.04 hectare) in 2015/16 (CSA, 2017). Looking at the distribution, the majority of respondents (59%) owned less or equal to 0.5 hectare while 38%, and 3% of households possessing more than 0.5 to 1.5 hectare. Besides, very few households (0.5%) reported having more than 1.5 hectare of land. This finding show that more than half of respondents (59%) owned cultivated land below the local average (see Table 4.1). Agro-ecologically, the average size of cultivated farm land in the District does not show significant variation as the lowland Kebele owned about 0.7 ha per household while households in both the midland and highland Kebeles owned about 0.6 ha each.

Although the percentage of landless households is small, it implies that these households are engaged in economic activities other than crop production. But, data obtained from FGDs shows that landless households suffered from food shortage and are denied credit opportunities as access to land is regarded as crucial for attaining food security and accessing credit. According to Rahman and Manprasert (2006, p54), “...landlessness often materializes in the manifestation of poverty, indebtedness and powerlessness of the majority of the rural households”. This means landlessness is a strong indicator of poverty since the link between landlessness and livelihood is direct as it impacts rural household’s wealth creation. Qualitative data obtained from interview and FGDs indicated that even though the majority of respondents owned land, most households possess very little land to raise food, they owned eroded and less productive land and were also influenced by fragmentation of farm plots, irregular rainfall and lack of irrigation facilities. This challenged the livelihood of households as it limited household’s capacity to produce food, generate income and generally decisions to invest. This finding is confirmed in the study made by Workneh (2006) which argues that small size of farm land influence households not to apply modern agricultural practices (such as crop rotation, agro-forestry, inter-cropping and soil erosion control that needs large farm size) and technologies (such as improved seeds, fertilizers and pesticides) in their plot.

Table 4.1: Distribution of households by ownership, size, quality and grazing land

Land ownership	Freq.	Percent	Land quality	Freq.	Percent
No	30	7	<i>Rekik</i> (Infertile)	79	20
Yes	390	93	<i>Ma’ekelay</i> (Moderate)	202	52
Total	420	100.00	<i>Reguid</i> (Fertile)	109	28
			Total	390	100.00
Cultivated farm land in hectare			Grazing land access		
≤ 0.5	229	58.7	No access	221	53
>0.5 - ≤ 1	147	37.7	Difficult to access	102	24
>1-≤ 1.5	12	3.1	Easy access	97	23
>1.5	2	0.5	Total	420	100.00
Total	390	100.00			
Mean = 0.66 ha.					

Source: Own computation, 2018

4.3.1.2 Land Fertility

Land fertility is one of the fundamental factors that influence smallholder's agricultural production. Higher agricultural output is obtained from healthy soil. Thus, Dercon and Christiansen (2011) indicated that greater emphasis is being given by the government to integrated soil fertility management which includes the application of modern agricultural technologies (such as fertilizers, improved seeds and pesticides) as potential way out for rural poverty. Based on the potential of their land to produce crops, households in the study area classify their land fertility in to three groups. These are *reguid* (fertile soil), *ma'ekelay* (moderately fertile) and *rekik* (infertile). With this regard, households were asked their perception to classify the fertility of the land they are cultivating. And as can be seen in Table 4.1, more than half of respondents (52%) said they have land with moderate fertility while 28% of households owned highly fertile land. Households who have low fertility land account for 20% of households suggesting that their land can't support crop growth or food production properly.

Soil degradation in Ethiopia is extremely high. According to Taha (2002) cited in Merkinch et al.,(2018), soil erosion affect more than 50% of Ethiopia's land, of which 25% are severely affected while 4% cannot support productivity. Although majority of household's owned moderately fertile and more fertile land, data obtained from interview and FGDs indicated that the District is severely exposed to land degradation and soil erosion. Village level watershed management and conservation activities (focused on soil, water and vegetation conservation) have been made for several years. However, given that the topography of the District is undulating and mountainous, the productive field and upper land cover is removed by flood. This has strong impact on the livelihoods of rural people since it reduces the size and fertility of cultivated land thereby reducing the capability of the land to sustainably produce high yields. Participants also indicated that once the soil quality is reduced, its water holding capacity decreases and manure requirement increases.

4.3.1.3 Access to Grazing Land

Next to crop production, livestock production is the major economic activity that the rural people use to generate livelihoods. Thus, rural households in Ethiopia use communal grazing lands as a main source of livestock feed. With this in mind, households were asked to indicate their access

to grazing land in their village. Result from Table 4.1 reveals that more than half (53%) of households had no access to grazing land, 23% replied that they had easy access, while the remaining 24% of them responded it was difficult to access it. Grazing land is highly restricted in the study District due to severe degradations. Unsustainable grazing pressure and unrestricted access to communal grazing land can contribute to degradation of land resources. Danano (2017) pointed out that population growth created massive pressure on communal grazing land especially in highly populated highlands of Ethiopia where grazing lands are changed into cultivated land. To reduce grazing pressure, Ethiopia has introduced grazing land management which includes fencing of grazing area to control open movement of livestock, preparing grazing land and planting different animal fodder species. This practice reduces grazing pressure and is a key to enhance food security and environmental services. However, result shows that greater proportions of households are not provided with alternative solutions such as the provision of restricted grazing areas, livestock feed development and other sustainable community grazing land management options.

4.3.2 Human Assets Profile of Respondents

Human capital is essentially considered as a generic livelihood asset which “... *encompasses the abilities, experiences, work skills and the good health that, when combined, allow populations to engage with different livelihood strategies and reach their own objectives*” (UNDP, 2017, p.4). It influences household’s ability and adaptability to achieve various livelihood outcomes. Rapsomanikis (2015) indicated that farmer’s awareness/knowledge and skill affect how they apply and adapt a variety of agricultural technologies. This study used different dimensions to assess household human capital endowments. These are head of household age, education, training, labor, health and extension services and all these are discussed below.

4.3.2.1 Household Head’s Age

An increase in age can lead to a rise in wellbeing through learning by doing. Khatun (2015) marked that the likelihood of being poor is high on those who are above productive age because of old age/dependency or below productive age as they have low education, experience and income. Results show that ages of household heads ranged from 30 to 80 with an average of 50 years. Looking at the age structure, Table 4.2 revealed that 37% of household heads were within the age range of 45 to 54 years of age, while 30% constitute the age group of 35 to 44 years. Of

sampled households, 15% were ≥ 65 years of age, 14% comprised the age group of 55 to 64 and only 4% of household heads were found <34 years of age. This shows that 85% household heads were found in the productive age group (15-64) which implies that household heads have the capability to work and engage in diverse income generating jobs to sustain livelihood.

Table 4.2: Percentage distribution of households by age of household heads

Household head age	Freq.	Percent
<34	18	4
35-44	127	30
45-54	154	37
55-64	58	14
≥ 65	63	15
Total	420	100.00
Mean age = 49.6 years		

Source: Own computation, 2018

4.3.2.2 Education

Education is a fundamental lifelong tool to improve income and productivity and thereby eradicate poverty. Maharjam and Chhetri (2006) indicated that people with higher education level obtained improved job opportunities and started to work in non-farm jobs. USAID (2006) also pointed out that education as a key demographic indicator significantly influences livelihood performance and creating positions to enhance wellbeing. This study used formal level of education completed by a household head and all members of household's highest level of schooling to assess household's education level assuming that a higher level of education can bring higher income and greater economic opportunities through influencing the choices of livelihood strategy. The more formal education level the household heads and any member of the household has, the less household wellbeing will be dependent on farming. However, Table 4.3 shows that the education level of household heads is generally low. Exactly half of surveyed heads (50%) are found with no formal education, 43% reported having primary level while 7% household heads have attained secondary level. The average years of formal education completed by household head is 2.5 with 0 minimum and 14 maximum years of schooling. This finding is similar to Rapsomanikis (2015) study that indicated the average education level of

Ethiopian smallholder farmers is 2 years. This implies that education level of household heads in the study area is low.

Concerning overall household's highest level of schooling, Table 4.3 shows that 55% of households have primary education, 38% have some secondary level, and 5% of households have at least a member who had completed tertiary level of education. Only few (2%) households were found with no household member having formal education. In general, the overall level of educational achievement among the study rural households demonstrates a low level of human capital development in education and a limitation on what can be sold in the form of skill and knowledge used for various household livelihood objectives.

Table 4.3: Percent distribution of households by years of education

Household heads formal education level	Freq.	Percent	Whole household's highest level of schooling	Freq	Percent
No formal education	210	50	No formal education	8	2
Primary	180	42.9	Primary	231	55
Secondary	28	6.7	Secondary	161	38
Tertiary	2	0.5	Tertiary	20	5
Total	420	100.00	Total	420	100.00
Mean = 2.6 Min=0 Max=14			Mean = 7.4 Min = 0 Max = 15		

Source: Own computation, 2018

4.3.2.3 Training and Extension Services

Participation of households in different training programs can affect household's skill and ability to use their labor. Training is considered as one means of empowering and capacitating people to engage in sustainable income generating activities. For this reason, ILO (2001 and 2008) suggested quality occupational training to realize labor productivity and capability and thereby reduce poverty. Households were asked whether they have received any training that supports their livelihood in the last two years. In view of that, the finding shows that 69% of the respondents reported having training, while the remaining 31% had not trained. Regarding the type of vocational training, Table 4.4 below shows that 93% of respondents were taken training on fertilizer application while 79%, 71% and 60% have training in natural resources management, health care and sanitation, and livestock production and development, respectively. Besides, 56% of respondents have training on post-harvest management while 53% of

households have training on pest and animal disease control (Table 4.4).

Table 4.4: Percentage of households who take training

Type of Training	Frequency	Percent
Fertilizer application	271	93.4
Natural resources management	229	79.0
Health care and sanitation	207	71.4
Livestock production and development	175	60.3
Post-harvest management	163	56.2
Pest and animal disease control	155	53.4
Seed production and storage	133	45.9
Entrepreneurship	94	32.4
Marketing	74	25.5

Source: Own computation, 2018

Majority of these vocational trainings were given by government aimed at increasing rural households' economic development. Data obtained from discussion shows that respondents who have received such types of training (particularly the entrepreneurship and marketing training) indicated that the training programs were helpful in encouraging them to participate in different non-agricultural jobs to increase their income. They also noted that it helped them to understand and upgrade their skill to properly manage their farms and apply modern agricultural technologies like fertilizer, pesticides and insecticides. However, majority of the discussants agreed that the training on livestock production, marketing and entrepreneurship (small scale business development and management) were highly important but not supported by financial service provisions (for example, credit) for post-training activities. Start-up capital is required to convert some of the trainings into effective livelihood strategy.

With respect to extension services, Ethiopia has made efforts to improve farmer's agricultural productivity through applying modern agricultural technologies and practices (MoFED, 2010). Transforming the existing subsistence agriculture into market oriented production system is one of the basic goals of recent Ethiopian development plans (Berhanu et al., 2006). This transformation process might be facilitated through agricultural extension services (ATA, 2017). Agricultural extension service helps farmers to access training, monitoring and advisory services on irrigation, improved agricultural technologies, livestock development, environmental

protection and marketing in order to improve their income and welfare. However, limiting the scope, this study used contact of households with agricultural extension agents and number of extension visits as proxy indicators for extension services. Therefore, Table 4.5 reveals that 84% of households had contact with extension agents, whereas 16% had not any kind of contact with extension workers of the District. This implies that good attention is given by the agricultural extension services. Findings also figure out that 45% of households reported the frequency of extension visits were 2 to 3 times per year while 25% of households were visited more than 3 times per year. The remaining 14% reported that agents had visited them once a year. This shows frequencies of extension visits were not always adequate as increasing agricultural production requires seasonal field visits, training and supervision. The degree of contact with extension agents is important to obtain reliable information on input utilization.

Table 4.5: Distribution of households by extension services

Contact extension agents	Freq.	Percent	Number of visits	Freq.	Percent
No	67	16	no contact	67	16
Yes	353	84	once/year	57	14
Total	420	100	2 to 3 times/year	191	45
			>3 times/year	105	25
			Total	420	100

Source: Own computation, 2018

4.3.2.4 Labor

Farming is the major task of rural household laborers. Labor is one of the substantial assets of the rural poor and smallholder farmers, and for those who have little other productive assets, it serves as an important means of gaining a living. In this study labor availability was assessed in terms of the total household members, number of cash income earning members, presence of economically active household laborers, and access to non-household labor.

Household size has a strong implication for household labor when majorities of the rural people are dependent on labor-intensive agriculture. It is a common knowledge that small size households will have small amounts of labor, while households with big size would have large amounts of labor to perform and diversify household activities. On the other hand, Aigbokhan (2008) and Khatun (2015) indicated that size of a household might inversely affect household wellbeing. If not properly managed, larger household size might involve a high percentage of

non-working members and demand larger amounts of resources per capita to obtain the basic necessities of life. As a result the probability of falling into poverty is higher as compared to households with smaller size.

Following Kamuzora and Mkanta (2000), household size was classified as small, medium and big. As shown in Table 4.6, 72% of households have medium (≥ 5 to ≤ 8) household size, while 20% and 8% of surveyed households were owned small (≤ 4) and large (> 8) size, respectively. The sizes of households ranged from 2 to 12 members. It was also observed that average household size in the District is 6 which are above the rural national average, 5.2 (CSA, 2017). In terms of labor, household labor is not necessarily a limitation as households may have an opportunity to access labor through extended families and social networks.

Table 4.6: Percentage distribution of households by household size and labor

Household size	Freq.	Percent	Cash income earning members	Freq.	Percent
Small (≤ 4)	84	20	< 2	124	30
Medium (≥ 5 to ≤ 8)	303	72	≥ 2	296	70
Big (> 8)	33	8	Total	420	100
Total	420	100	Mean = 1.8 Min=0 Max=3		
Mean = 6.1 Min=2 Max=12					
Access to non-household labor			Adequacy of active household laborers		
No	223	53	No	208	49.5
Yes	197	47	Yes	212	50.5
Total	420	100	Total	420	100

Source: Own computation, 2018

Regarding the number of cash income earning members, analysis of descriptive statistics shows that 70% of households have ≥ 2 cash income earning members while 30% have < 2 income earning members. The average cash income earning numbers of members of the households were 1.8. This implies that households were engaging in different off-farm activities to support their income and this supported households to reduce poverty and diversify income sources. Rapsomanikis (2015) indicated that in Ethiopia, households with a family of eight members have around three people working outside. With respect to adequacy of household laborers, 50.5% of households responded they have adequate economically active household laborers while 49.5% reported inadequate numbers. Although members of rural households spend their time working on their farms, some employ paid laborers on seasonal basis to support their farm activities.

Hence, 53% of households reported having access to non-household laborers while 47% of households have not (Table 4.6).

4.3.2.5 Health

Health reflects ability to do labor and good health enables households to perform their productive activities effectively and efficiently. This means healthier persons can use the skill and knowledge they acquired through education and training in household production. As OECD (2013, p.47) indicated, physical and mental health is essential to perform various activities to support wellbeing and *“being healthy affects the probability of having a job, earning an adequate income and actively participating in a wide range of valued social activities”*. With this respect, perceived health status of household head, experience of incapacitating disease and number of sick household members were used to assess health status of households as shown in Table 4.7. Regarding the self-assessed household head health status, 46% of household heads were in a good health status, 34% of heads health status were moderate, 15% extremely good, 3% heads had poor health status and 2% of them had extremely poor health status. The general pattern of heads’ health shows that majority of household heads have adequate health status to perform their roles properly given the knowledge and skill they have acquired.

Table 4.7: Distribution of households by self-assessed health status

Perceived health status of household heads	Freq.	Percent	Any member suffers from any incapacitating disease?	Freq.	Percent
Extremely poor	9	2	No	319	76
Poor	11	3	Yes	101	24
Fair	144	34	Total	420	100
Good	194	46	Number of sick household members		
Extremely good	62	15	<2	86	85
Total	420	100	≥2	15	15
			Total	101	100

Source: Own computation, 2018

The result also shows that in 2015/16, of the total sampled population, at least one member of 101 (24%) households suffered illness. Cognizant to the number of sick member, 85% of households reported having less than 2 sick household members while 15% of households reported they have encountered ≥2 persons with health problems in the specified year. This ill-health incidence forced households to remove their labor from productive work and sell assets to

cover medical costs which in return lead to considerable decrease in household's welfare and increase vulnerability to future shocks. Poor health also costs households not only income and labor of sick members but also time and productivity of persons who give care to the sick person. Generally, illness of a single household member can disrupt the socioeconomic stability of the household.

4.3.3 Physical Produced Assets Owned by Respondents

Like other livelihood assets, the presence of produced physical assets can generate multiple benefits in building up the wellbeing of rural households through, among other things, providing various services and incentives to improve productivity of their agriculture. On the other hand, absence of physical assets prevents households from having access to various basic services. Sen's (2003) study on "*Drivers of Escape and Descent*" marked that physical assets accumulation plays a big role in increasing the growth of poor households' incomes. He also noted that physical assets are one of the important factors influencing the escape from poverty. According to DFID (2000) and UNDP (2017), physical assets are the fundamental infrastructural services and production goods (inputs) needed to support (achieve) improved livelihoods.

In this study, information on ownership of physical assets was collected from households on a range of durable consumer goods, agricultural assets, basic publicly provided infrastructural services, toilet and housing characteristics. The following sub-sections summarize the distribution of households with these assets.

4.3.3.1 Durable Consumer Goods

Household durables comprise goods and tools that facilitate production and domestic activities. Once purchased, they are expected to last for considerable periods of time. Durable assets are important as insurance for households in times of unintended events and some durables can also generate income. Furthermore, durable assets provide '*an incredibly wide range of purposes*' (Alkire and Santos, 2010, p.16) and it shows material wellbeing of households. The study indicated that greater majority of households owned communication goods such as mobile telephones (82%) and radio (78%) which are sources of fast and updated information, solar lamp (82%), metal/wood bed (73%) and charcoal stove (55%). Conversely, an overwhelming majority of households are deprived of some basic household appliances and domestic goods such as

refrigerators (99%), satellite dish (99%), TV (99%), tape (62%), shelf (96%), table and chair (92%), and lantern (fanus/masho) (89%). Higher proportion of households also lack cooking and baking equipment such as gas stove (90%), electric oven (96%) and power saving oven (85%). Apart from these assets, it is also observed that no single household owned motor vehicle. This result shows that households are highly deprived in using the services obtained from the durable assets that are assumed essential indicators of socioeconomic status and quality of life.

4.3.3.2 Agricultural Produced Physical Assets

Agriculture is the dominant economic activity of Ethiopia where more than 80% of its population derives most of its income and employment from agriculture (CSA, 2015; Rapsomanikis, 2015). The success of this sector is dependent not only on the presence of fertile land, water and fertilizers, but also the use of modern and quality farm materials, equipment and machineries which are highly necessary to increase agricultural output. As Kumar (2011) indicated more advanced agricultural equipment improves farm productivity and lower the burden of farmers. Given the existing subsistence agriculture uses traditional equipment, more than 87% of sampled households owned traditional farm implements such as plowing equipment, hoe, mallet and mattock, shovel/spade, modern sickle and axe. Only small proportion of households have wheelbarrow (0.2%), saw (17.1%), digging chisel (melakino) (29%), hammer and pick ax (34%), modern beehives (31%), traditional beehives (26.2%), cart/animal drawn cart (1%) and water storage pit (9%).

Another important finding is that modern agricultural technologies such as generator, knapsack chemical sprayer, motorized tiller, mechanical water pump, and motorized water pump which are essential to higher agricultural production and livelihood development are totally absent. This shows that rural households were not equipped with improved farm technologies and equipment to improve their agricultural activities.

4.3.3.3 Basic Infrastructural Services

Adequate supply of infrastructural services directly affects human capital, agricultural productivity and rural people's quality of life (Khan, 2000). Rural infrastructure provides basic social services such as health, education, and communication that improve quality of life. Such infrastructural services support households to meet their basic needs and enable them to live

productive lives. Findings have revealed that all sampled households have access to elementary school in their domain, while only few (2.9%) households reported having access to secondary school.

Agricultural activities require strong and healthy labor. For this, health institutions play an important role in ensuring healthy labor that can work more effectively. Result shows that 60.7% of respondents have access to a health post. However, findings obtained from FGDs indicated the service given by the health posts were not sufficient to obtain timely and adequate health care. Households travelled long distance to Hagereslam (District Capital) to get better health services which costs them time and money. Result also shows that only 6.2% of households have access to veterinary services in their village.

Marketing infrastructure is an important means of people's livelihood. It particularly enables rural households to sell their agricultural or non-agricultural product and buy consumption goods and production inputs. Data indicates that a majority of households did not have access to market centers (75%) and livestock markets (96%) in their villages. Households travelled long distances to sell and buy products. Absence of such infrastructure also limited the ability of traders to communicate with rural households and at the same time poorer households have the biggest problem in marketing their products, selling labor, and obtaining agricultural inputs and consumption goods. Generally, poor market infrastructure development curtails households' socioeconomic activities in the study District.

DFID (2000) explained that transportation services are necessary to connect rural people with urban locations. It also determines how households access markets and distribute farm products and inputs. Safe, fast, secure and more comfortable transport is necessary for mobility of people, goods and services from one place to another. Accessing education and improved healthcare is also possible through efficient transportation system. Hence, households were asked whether they had access to public transportation services. Unfortunately, 98.6% replied they do not have this service in their localities which implies they can't maintain their health and wellbeing due to absence of this key rural infrastructure. Households travel long distance on foot to reach Hagereslam to obtain various services such as marketing and health services. Lack of adequate transportation infrastructure also hinders the development of improved business environment

through the efficient movement of goods and services hinder agricultural productivity and access to basic services such as health and education.

Other key produced physical assets assessed in this study are housing, electricity, water and sanitation facilities. The type of house and its construction materials directly indicates the capacity and wellbeing of household's because housing reflects store of wealth. Findings show that almost all (99.1%) of households live in dwellings with mud and dung flooring material. This is similar to findings from a study made by CSA (2015) which indicated about 97 % of houses in rural areas of Ethiopia have mud or dung floors. Stone and mud is considered as better wall material in the District compared to wood and mud, and wood and thatch. 62% households used stone and mud while 37% used wood and mud as a construction material of wall of their houses. Very few (1%) households had wood and thatch wall material. The roofing material of greater than half (53.8%) of households were iron sheets while 30.7 and 15.5% of households cover their roof with wood and mud, and grass/straw, respectively. Electricity is an important infrastructure service that provides households with the basis to engage in productive business. It also enables households to use household devices such as refrigerator, tape recorder, TV, and other electronic products that improve quality of life. However, majority of households (83.3%) are deprived of access to electricity. Of these households, 69.4% used solar energy while 30.6% used kerosene lamps as the most common sources of light. This finding is not much different from assessment made by CSA (2017) which revealed that 90% of Ethiopia rural areas used batteries, solar energy and kerosene as a sources of light.

Availability of improved water supply is a pre-requisite for healthy life. Concerning this, 57.4% of sampled households have access to improved/safe drinking water sources while 42.6% said they used unimproved water sources. This confirms the study made by CSA (2017) which indicated 57.6% of Ethiopian rural households have access to improved water sources. However, qualitative data indicates that the existing water sources are not sufficient for the total population. Some hand pumps dried and alternative sources are not constructed. During the drought season, the shortage becomes severe which cost households time and labor in search of drinking water. Easy access to water is necessary precursor for sustainable livelihoods. Households were asked the total time taken to collect water. This includes round travel time and waiting time to collect water. 38.8% of households reported that it takes between 30 and 60

minutes to collect water while 29.3% and 31.9% of households spent over 60 minutes and below 30 minutes, respectively, during the normal season.

With regard to sanitation, 44.3% households have access to improved sanitation which is similar to the rural Ethiopia average i.e. 45.2% (CSA, 2017), while 55.7% of households used unimproved sanitation (open defecation) which may cause and spread diarrheal diseases.

Finally, data shows that all households have access to cooperative organizations which are considered as key actors in providing better price for agricultural inputs, transport services and storage facilities to the rural farmers, while 97.6% and 98.1% of households also reported having access to grain mill and police station in their village, respectively.

4.3.4 Social Asset Profile of Households

Many authors have defined and described social capital differently. Grootaert et al., (2004, p.3) define social capital as *“the groups, networks, norms and trust that people have available to them for productive purposes”*. Social capital is also described as *“social connections”* (Stiglitz et al., 2009, p.51), *“membership in informal and formal clubs”* (Fafchamps, 2006, p.1185) and *“features of social organization, such as networks, norms and trust that facilitate cooperation for mutual benefit”* (Putnam, 1993, p.36). This indicates that people share trust, reciprocity and groups or institutions through various mode of interaction to seek livelihood opportunities for common benefits and to achieve greater welfare. According to Place et al., (2005), social capital assumes that livelihood is better achieved on social/interpersonal basis than individual basis. In this regard, multiple indicators have been used to measure household cooperation and social capital in the study site. These include social participation in various groups, mutual support, relationships, trust and remittances.

4.3.4.1. Social Participation

Iddir is common traditional, indigenous and voluntary based association found in both rural and urban areas of Ethiopia (Thomas, 2013). Studies (see Temesgen, 2008; MoEFD, 2008; Dejene, 2009) pointed out that the central objective of *iddir* is providing insurance or financial support in the form of aid to its contributing members and their families in time of adverse events such as death, property loss, illness, fire and theft. This enables the poor households to maintain their previous status. However, despite their potential insurance role only 39.8% of households were

members of *iddir* in their village while the majority (60.2%) didn't have *iddir* membership. This result is not consistent with the findings of Dercon et al., (2004) and Habtu (2012) which claims more than 80% and 85% of households in Ethiopia were members of *iddir*, respectively.

Equib is a voluntary informal local saving institution which provides service to its members by revolving the equally pooled money/saving among them (MoFED, 2008). *Equib* do not request conditions such as interest payments and collateral for loans in addition to the predetermined weekly/monthly cash payment. This addresses the financial problems of the poor who cannot be reached by formal financial institutions. Survey data shows that despite the benefit it offers only 32.4% were members of *equib* in their domain while the majority (67.6%) were non-members which may imply household's income or saving was too low to pay the pre-determined regular contributions.

Mahber is an orthodox religion followers' non-formal voluntary association in which members come together to pray to their God, talk about their problems and share information. As indicated by Moges (2006), members of *mahber* prepare food and drink for themselves and to feed the poor people once a month. Responding to unexpected events, conflict resolution and labor sharing is another responsibility of *mahber* which is very important to the rural people. Empirical result pointed out that 71% of surveyed households were members of any *mahber* while 29% were not during the field survey.

Conflict resolution refers to the process of handling disputes among or between individuals or groups. Peace is too crucial to achieve socioeconomic development, and various informal institutions might play an important role in preventing conflict, securing peace and ensuring smooth relationships among individuals. Accordingly, majority of households (79.8%) reported they have been participated in conflict resolution while 20.2% of households did not.

Soil and water conservation: Sustainable conservation of soil, water, and forests enhances the natural resource base of the rural people thereby increasing productivity and reducing poverty. Therefore, conserving and protecting natural resources such as water and soil is all about safeguarding agricultural production and maintaining wellbeing. As indicated by OECD (2008, p.17), natural resources are the “*sources of food, fodder, fuel, building materials, medicine plants and income*” for many rural poor and hence their proper conservation is a source of long

term growth and development of the poor. In view of that, almost all households (98.1%) participated in water and soil conservation which implies households' sought proper understanding of the return that can be generated from natural resource conservation.

4.3.4.2 Mutual Support

Ethiopia smallholder agriculture is highly dependent on seasonal rainfall without any form of formal insurance services. In the absence of formal safety nets, the people of Ethiopia have used indigenous type of mutual support based on cooperation to respond to risks and obtain necessities (Dejene, 2010; Berhane et al., 2017). Mutual support comprises various social obligations such as labor sharing and credit which are strongly supported by religious beliefs (Bernier and Meinzen-Dick, 2014) thus promoting solidarity and collective action. In this study, mutual support is measured by asking households whether they can get labor, oxen, and food help during times of illness and shortage.

Labor sharing (*Lifinti*) is common production practice of farmers in rural areas of Ethiopia since subsistence farmers cannot afford cash payments for hired labor. It is based on labor reciprocation in different agricultural and non-agricultural activities such as land preparation, weeding, sowing and house construction. Daniel (2003) indicated that labor sharing is an arrangement for agricultural work groups in rural Ethiopia. Households share labor to support those who face shortages of labor in times of plowing, cultivating, harvesting, constructing a house and other activities. These arrangements performed on reciprocal basis enable households to accomplish their tasks at the right time. Results confirmed that 95.5% of the surveyed households were members of labor sharing arrangements in their localities. This significantly increases household mutual support through redistributing work load among households. *Lifinti* is also utilized in time of labor shocks/illness. In this time, households obtained labor support from their community without any cost and precondition. This form of social capital is very important in the rural areas to reduce poverty and cope with uninsured shocks.

Oxen sharing: Subsistence farmers use oxen traction as their major source of ploughing power. Most poor rural households lack adequate traction power for ploughing. In a case where households own a single ox or an owned ox is injured/died before or during the plowing season, community members through their network loan their oxen to the household in need. Data from

the study area confirmed that 91.4% of households have been involved in, and practiced, such oxen sharing arrangements in their village. Information obtained from FGDs also shows that if households oxen are injured during the plowing season, either close relatives, neighbors or other network members lend oxen to the household in need to help it solve the problem. Whenever households lose their oxen due to illness, accidents, theft etc network members prepare ‘*Ritban*’ (a means of support in terms of money) to contribute some amount of money, based on their capacity, to buy new oxen. This reliable, but informal risk sharing, social support arrangements help poor farmers to cultivate their land on time.

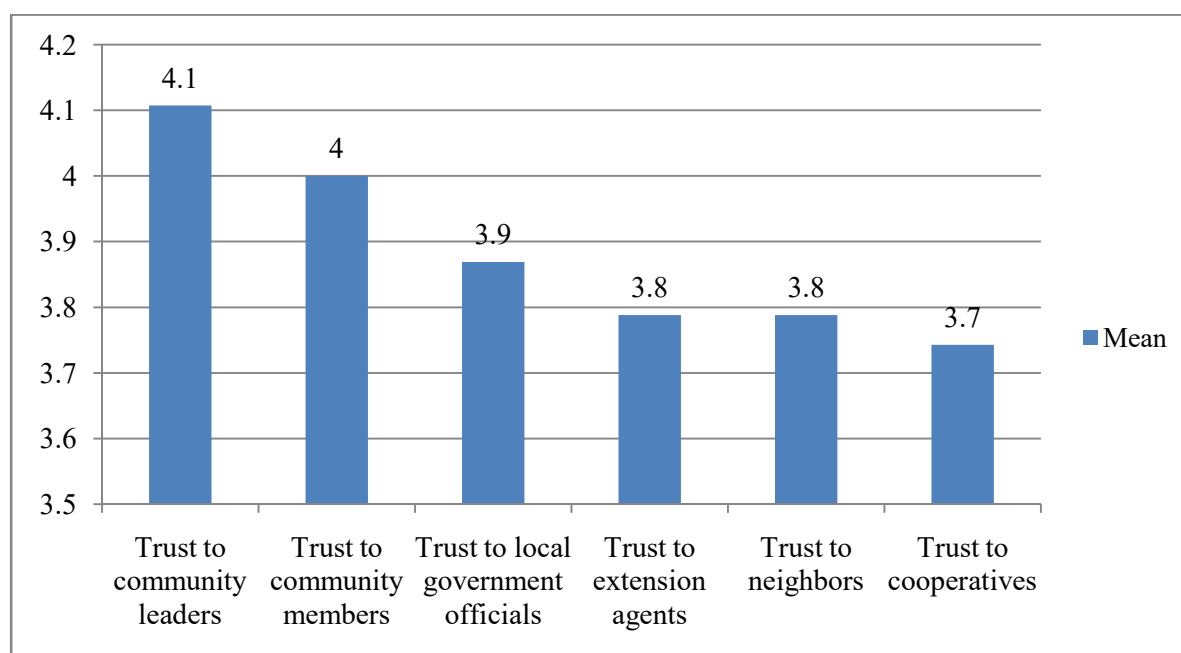
Food sharing: Food sharing reinforced by social bonds in time of shortage/deficit, is one important cultural and social custom of the rural people in Ethiopia. In time of shortage, households share food with different persons like relatives, neighbors and other persons. As explained by Morton et al., (2008), such food sharing practices are informal coping strategies to solve the problems of food insecurity and hunger. This particular practice is common among the surveyed rural households of the study area as the majority of households (77.4%) indicated they can get food help in time of food shortage from their extended families, neighbors and communities with no preconditions and expectations in return but influenced by tradition, sympathy and affective motivations. In general, rural households have used mutual support to access services and reduce costs and risks.

4.3.4.3 Trust and Relationships

Trust is a relationship based concept which refers to the belief that individuals, groups and institutions are honest and truthful. Fisher (2013) indicated that trust helps farmers to convert available information into knowledge that can be applied in the field. In this case, farmers or households trust to the information provider is highly important as their final decision to use the information relies on the degree of trust of informants. As a bonding factor of the community, trust among farmers helps them to cooperate, expand market activities and reduce transaction costs (Ruben et al., 2007) and strengthen their commitment to joint activities thereby improving the efficiency of economic relations. To assess trust level of farmers in various actors, households were asked to score their trust from 1 (trust to a very great extent) to 5 (trust to a very small extent). Since the Likert Scale is five-point scale, a mean score of 2.5 shows to neutral trust while the mean score of 1 and 5 indicates the extremely low and high level of trust (see Lee,

2011; Earles and Baldwin, 2017). The result shows that great proportion of households replied that they trust their neighbors (39.29%), community leaders (40.48%) and community members (37.86%) to a very great extent. Besides, high proportion of households that is 35.48%, 39.76% and 39.52% of surveyed households reported they trust their local government officials, cooperatives and extension workers to a great extent, respectively. Furthermore, as shown in Figure 4.1, the overall mean score of trust is higher than the neutral response that is 2.5 which leads to the conclusion that households tend to show a high level of trust towards their local government officials, community leaders, neighbors, community members, extension agents and cooperatives.

Fig 4.1: Average overall trust of each trust variables



Source: Own computation, 2018

Relationship refers to a state of households being connected with one another through formal social networks. Relationships of households with various institutions provide a range of socioeconomic incentives to secure livelihoods seeing that it serves as a means of accessing resources. The quality of relationship is determined by the level of trust and shared norms. Household relationship with input supplier, government officials, cooperatives firms and community members were used to measure relationships and response were categorized under three levels (i.e., high, medium and low). Accordingly, result shows that large number of

households had medium level of relationship with input supplier (56.4%), cooperatives firms (53.8%), and government officials (51.7%), while 52.4% of households had high/good relationship with their community members.

4.3.4.4 Remittances

A household's livelihood might be supported by the remittances received from their family members or others. Remittance reflects social obligation and expectation that any member of a family should meet and it is an indicator of good morale and high income. Some households also receive remittance in the form of cash or in kind from outside their families. Findings revealed that remittances was an important form of social asset being received by nearly half (46.7 %) of farming households in the study area, though the majority (53.3%) reported as being non-beneficiaries of remittance. Remittance is prominent form of insurance which provide households with the means of reducing poverty and vulnerability. Qualitative data also shows that there are some households who are dependent on their family remittances for their survival.

4.3.5 Households' Financial Assets Profile

Financial assets are fungible monetary resources that allow households to cover their livelihood needs that cannot be met from other assets. It includes loans, savings and other more liquid assets such as livestock and jewelry (Scoones, 2009). Savings and access to credit provide economic security and opportunity for investment and are also important indicators of access to overall financial capital (Ansoms, 2008). Although inadequately available to poor people, monetary asset is the most liquid asset which can immediately be used/converted into livelihood functioning. Financial capital determines a farmer's ability to implement decisions to invest, produce and apply more productive agricultural technologies and inputs. Access to financial instruments enhances farmers' investment choices because their livelihood strategies and productive activities can be significantly influenced by the amount and quantity of financial capital they own.

Hence, the study sought information on saving, credit, annual income, jewelry ownership and livestock ownership to measure households' financial asset capacity. Household income was obtained by adding the income found from sale of livestock and livestock products, sale of cereals, and other sources such as casual labor, trade, beekeeping and sale of eucalyptus.

Livestock ownership was measured in terms of TLU where a one TLU is roughly equivalent to 250 kilogram of live weight. Various type of livestock owned by households were identified and each livestock was converted to its equivalent TLU using conversion factors suggested by Storck et al., (1991) (i.e., 1 Ox=1 TLU; 1 Cow=1TLU; 1 Goat= 0.13 TLU; 1 Sheep= 0.13 TLU; 1 Heifer=0.75 TLU; 1 Donkey=0.7 TLU; 1 Calf=0.25 TLU and 1 Chicken = 0.013 TLU).

Monetary saving is a powerful tool of socioeconomic development. It helps households to accumulate capital which can be invested in productive jobs. According to Ahimbisibwe (2007), development cannot be achieved without saving. Because, more saving enables us to accumulate more capital and make investments, which are significant tools to break out of the vicious circle of poverty. Survey results indicated that majority of households (73.1%) are able to save while 26.9% responded negatively. Regarding the saving amount, on average, households savings of Birr 2942 with the minimum and maximum saving size of Birr 300 and 16000, respectively. Although majority of households are able to save some portion of their income, the average saving size shows that they have low saving capacity which constrained them from engaging in a spectrum of entrepreneurial and other productive activities. Qualitative data also indicated that household's doesn't have better saving services and needs secure saving places. Low financial literacy, saving habit and commitment, and the incidence of income and expenditure fluctuation and low saving rewards (interest rate) were also indicated as the major causes of low saving, and these have significant consequences on households economy as low saving constrained households to have better resilience to covariate and idiosyncratic livelihood shocks and limits productive or entrepreneurial investments.

Access to agricultural credit is another important indicator of financial capital. Given agriculture is the foundation of the Ethiopian economy, suitable specific agricultural finance helps rural people to increase farm productivity of smallholder agriculture thereby reducing poverty. Thus, providing credit to those farmers with low resources and incomes enhance their capacity to purchase agricultural inputs and technologies which support higher productivity. In the study area, it was mentioned that 58.1% of the households had taken agricultural credit while 41.9% responded they had not taken any credit in the past five years. The average credit size taken was Birr 7759 with minimum and maximum credit size of Birr 1000 and 29000, respectively. Unconducive credit environment or inaccessibility of credit by smallholders, the stringent

borrowing obligations, credit risk, high interest rate and inadequate supply of credit were the major reasons for why households didn't take credit from formal financial institutions. Absence of credit supply limited household's livelihood diversification, agricultural development and entrepreneurial activities and this also leads to low income, saving and investment.

Livestock are essential to the life of the rural people. They are easily convertible into financial assets and offer a wide range of benefits (such as income, food, manure, draft power, savings, insurance against shocks and use of collateral) to rural people (Rota and Sidahmed, 2010). Given such broad benefits and services, it is difficult to measure the contribution of livestock to the household wellbeing. Result shows that 87.4% of households owned livestock. However, in this study, livestock ownership in terms of Tropical Livestock Units (TLU) was also used to assess the livestock ownership of households. Accordingly, as shown in Table 4.8, on average households owned 4.2 TLU, which is a little lower than the study Region (Tigray) average, 4.46 (Asfaw and Mohammad, 2007). In addition, detailed analysis shows that on average households owned 1.7 oxen, 1.6 cows, 1.5 heifers and 1.7 calves. The mean ownership of donkeys, goats, sheep's and chicken were 2, 10.6, 8.5 and 7.7, respectively implying that livestock production is an important economic activity and source of livelihood in the study area.

Table 4.8: Mean livestock ownership of households

Livestock	Obs.	Mean	Std. Dev.	Min	Max
Number of oxen	303	1.7	.7	1	5
Number of cows	287	1.6	.8	1	4
Number of heifers	98	1.5	.7	1	4
Number of calves	188	1.7	1.	1	5
Number of donkeys	183	2.0	1.0	1	4
Number of sheep's	113	8.5	4.8	2	25
Number of goats	154	10.6	5.8	1	30
Number of chicken	323	7.7	4.4	1	28

Source: Own computation, 2018

Income is another form of financial asset available to households. Households deploy all livelihood capitals to generate livelihood income and meet all expenditures. In this study, different livelihood and income generating activities were identified. However, the five major income sources by percentages of households were crop production (93.1%), livestock production (76.0%), farm or nonfarm casual-labor (69.8%), poultry production (67.4%) and bee-

keeping (41.9%). In addition to this, households earn income from different sources such buying and selling of cereals and pulses (28.6%), eucalyptus sale (27.4%), trading in other commodities (25.7%), buying and selling of livestock (15.7%) and other sources (28.6%).

Looking at the percentage distribution of household annual income, majority of households (37.4%) earn an annual income between Birr >15000 to ≤ 20000 while 31.0% of household income is found under the category of Birr >10000 to ≤ 15000 . In addition, 14.8% and 11.7% of households obtain annual income ranged from Birr >20000 to ≤ 25000 and <10000 , respectively. Only few (5.2%) households' annual income was found above Birr 25000. Regarding the range and average, the annual household income ranges from Birr 4900 to 36270 with an average income of Birr 16161.9. Low income limits households in making choices and taking opportunities, and constrains their capacities to effectively participate in various socioeconomic activities.

Finally, jewelry is considered as a very liquid asset. Majority of households (57.9%) owned silver jewelry while 42.1% responded negatively. In addition, only 4.5% of households indicated having gold jewelry while 95.5% replied not.

4.4 Results of Multiple Correspondence Analysis (MCA)

Variables included in the MCA were classified in five livelihood dimensions (natural, human, physical, social and financial assets) based on literature. Table 4.10 lists the categorical asset indicators used in the MCA. All selected household assets were used in the MCA to observe the preliminary association patterns with the principal axis that is welfare. Initially, the MCA is excluded 16 indicators that do not show sufficient variation due to almost complete absence or presence. These initially eliminated indicators were land ownership, household members' illness, and possession of sofa set, wheelbarrow, vehicle, drip irrigation, generator, chemical sprayer, mechanical water pump, motorized water pump, hand-held motorized tiller, plus access to primary school, police station, cooperatives, flooring materials, and households participation in soil and water conservation. Then the primary MCA included 81 potential asset variables along with their categories representing various dimensions of household welfare (Table 4.10).

As shown in Table 4.9, dimension one scored highest amount of explained principal inertia while dimension two shows the second largest principal inertia and so on. The principal inertia shows

the relative importance of each dimensions and it explains the amount of inertia each dimensions explains. The total inertia is equals to the sum of all principal inertias of dimensions. The result of the first MCA reveals the breakdown of the total inertia in to 38 principal dimensions. The total inertia explained by all dimension is 0.0360211. In this context, the first axis alone captures and explains 22.3% of the total inertia of the latent variable (welfare) while the second and the third dimension captures only 11.6% and 7.8% of the total inertia, respectively. The remaining dimensions comprise a very small percent of principal inertias. In the first MCA, Dimension 1 and 2 explains 34.0% of the total inertia.

Table 4.9: First Multiple Correspondence Analysis results

Dimension	Principal inertia	Percent	Cumulative Percent
Dim 1	0.00804	22.32	22.32
Dim 2	0.0041937	11.64	33.96
Dim 3	0.0028051	7.79	41.75
Dim 4	0.0023333	6.48	48.23
Dim 5	0.0018459	5.12	53.35
...	...	...	...
Dim 38	1.92e-08	0.00	79.09
Total Inertia	0.0360211	100.00	

Source: Own computation, 2018

The detail of the different asset variables for the first dimension (first axis) is shown in Table 4.10. The state of household's lower socioeconomic status is described by modalities with negative scores. This means variable modalities that negatively associated with the first dimension reduce household's welfare. Looking at the existing first MCA result, households who had very low possession and access to natural, human, physical, social and financial assets are identified as poor since they have negatively correlated results with the first dimension. In specific terms, for example, household poverty (low level of welfare) is indicated by those households who have farmland less than local average, households who have fertile land and with no access to grazing land.

In terms of human capital, poor households have heads age below local average, heads with higher education, household's with ≥ 5 completed years of schooling, and households with no contact with extension agents. The counter intuitive result on both education variables shows that households may not benefited from their education level or the existing education level is too

low to convert it in to livelihood sources. In the physical asset category, MCA shows that the poor do not have tape recorder, TV, shelf, saw, charcoal stove, hammer and pick ax, cart/animal drawn, modern sickle, water storage pit, satellite dish, power saving oven, electric oven and refrigerator. Households with no access to health post, livestock market, veterinary center and electricity are also considered as poor. With regards to social capital, poor households are identified with low relationships with input suppliers and cooperative organizations.

On the other hand, non-poor households are generally those who have size of cultivated farm land above local average, easy access to grazing land, big (>8) household size, more than two cash income earning household members and more contact with extension agents. Households who owned durables such as tape recorder, TV, charcoal stove, power saving oven and electric oven were also found non-poor. These households also own agricultural implements such as saw, hammer and pick ax, cart/animal drawn, modern sickle, water storage pit, and have access to veterinary services, electricity, and improved sanitation. These households also characterized by having labor and oxen sharing arrangements, and a very high trust to their extension agents.

Table 4.10: First Multiple Correspondence Analysis Weights

Assets	Variable	Modality	Weights
Natural assets	Size of cultivated farm land	Below local average	-0.935
		Above local average	0.878
	Land quality	Infertile	1.450
		Fair	-0.486
		Fertile	-0.302
	Grazing land access	No access	-0.557
		Difficult	1.640
		Easy	0.189
Human Assets	Household head age	Below average	-0.772
		Above average	0.725
	Household heads formal education level	No formal education	0.864
		Primary	-0.778
		Secondary	-0.614
		Tertiary	-0.421
	Household's highest completed schooling	< 5	1.509
		≥5	-0.599
	Vocational training	Yes	-0.155
		No	0.459
	Total household size	Small (≤4)	-0.119
		Medium (≥5 to ≤8)	-0.311
		Big (>8)	3.044
	Cash income earning members	Less than two	-1.065
		Greater or equals two	0.445
	Adequacy of active household laborers	Yes	-0.274
		No	0.412

	Access to non household labor	Yes	-0.146
		No	0.209
	Perceived health status of household head	Extremely poor	-1.247
		Poor	-2.235
		Fair	0.119
		Good	1.473
		Extremely good	-1.859
	Number of sick household members	Less than two	-0.271
		Greater or equals two	1.447
	Contact with extension agents	No	-3.911
		Yes	1.249
	Number of visits	No contact	-3.911
		Once/year	-0.183
		2 to 3 times/year	1.857
		>3times/year	1.107
Physical Assets	Radio	No	1.342
		Yes	-0.358
	Tape	No	-0.378
		Yes	0.781
	TV	No	-0.075
		Yes	7.025
	Bed	No	1.677
		Yes	-0.599
	Table and chair	No	0.123
		Yes	-1.335
	Charcoal stove	No	-0.187
		Yes	0.235
	Gas stove	No	0.070
		Yes	-1.254
	Mobile phone	No	1.595
		Yes	-0.323
	Satellite dish	No	-0.075
		Yes	7.025
	Shelf	No	-0.088
		Yes	2.686
	Power saving oven (megogo)	No	-0.225
		Yes	2.445
	Electric oven (megogo)	No	-0.121
		Yes	3.698
	Refrigerator	No	-0.075
		Yes	7.025
	Solar lamp	No	2.451
		Yes	-0.696
	Lantern	No	0.317
		Yes	-3.029
	Plowing set	No	3.282
		Yes	-0.107
	Saw	No	-0.109
		Yes	0.688
	Hoe	No	0.076

		Yes	-0.004
	Digging chisel	No	-0.606
		Yes	0.993
	Hammer and pick ax,	No	-0.500
		Yes	0.819
	Mallet and mattock,	No	1.100
		Yes	-0.101
	Modern beehives,	No	0.428
		Yes	-0.928
	Traditional beehives	No	0.449
		Yes	-1.131
	Cart/animal drawn	No	-0.016
		Yes	1.482
	Modern sickle	No	-1.249
		Yes	0.115
	Axe	No	2.797
		Yes	-0.293
	Water storage pit	No	-0.299
		Yes	3.250
	Shovel/spade	No	2.176
		Yes	-0.071
	Secondary school	No	-0.049
		Yes	4.602
	Health post	No	-1.967
		Yes	1.370
	Livestock market	No	-0.049
		Yes	4.602
	Grain mill	No	0.517
		Yes	-0.023
	Veterinary center	No	-0.211
		Yes	4.789
	Electricity	No	-0.366
		Yes	2.796
	Public telephone services	No	0.163
		Yes	-4.990
	Transport station	No	0.061
		Yes	-2.814
	Village market center	No	0.587
		Yes	-0.741
	Drinking water sources	Improved	-0.722
		Unimproved	1.037
	Sanitation	Improved	2.285
		Unimproved	-1.274
	Housing (Wall material)	Wood and mud	0.057
		Stone and mud	-0.032
		Wood and thatch	-
	Housing (Roofing material)	Grass/wood and mud	0.697
		Iron sheet	-0.464
Social Assets	Iddir	No	0.072
		Yes	-0.074
	Equb	No	0.308
		Yes	-0.505
	Mahber	No	1.859
		Yes	-0.738

	Conflict resolution	No	2.466
		Yes	-0.788
	Labor sharing	No	-1.385
		Yes	0.045
	Oxen sharing	No	-2.417
		Yes	0.192
	Can get labor help in time of illness	No	-4.544
		Yes	1.369
	Can get food help in time of food shortage	No	-3.916
		Yes	1.555
	Relationships with community members	Low	-0.499
		Medium	0.822
		High	-0.610
	Relationships with Cooperatives firms	Low	-1.429
		Medium	0.398
		High	0.201
	Relationships with Government officials	Low	-1.090
		Medium	0.112
		High	0.224
	Relationships with Input suppliers	Low	-2.618
		Medium	0.326
		High	1.936
	Trust to cooperatives	To a very great extent	0.181
		To a great extent	-0.077
		Neither great nor small extent	0.543
		To a small extent	-1.773
		To a very small extent	-1.376
	Trust to extension agents	To a very great extent	1.474
		To a great extent	1.029
		Neither great nor small extent	-2.023
		To a small extent	-1.376
		To a very small extent	-4.205
	Trust to neighbors	To a very great extent	-2.124
		To a great extent	1.308
		Neither great nor small extent	2.649
		To a small extent	2.344
		To a very small extent	0.895
	Trust to community leaders	To a very great extent	-2.332
		To a great extent	2.418
		Neither great nor small extent	2.089
		To a small extent	2.344
		To a very small extent	0.895
	Trust to community members	To a very great extent	-2.276
		To a great extent	1.575
		Neither great nor small extent	2.961
		To a small extent	1.978
		To a very small extent	0.895
	Trust to local government officials	To a very great extent	0.902
		To a great extent	0.570
		Neither great nor small extent	-0.778
		To a small extent	-4.521
		To a very small extent	-4.947
	Remittance	No	-0.401
		Yes	0.485

Financial Assets	Income	≤10000	2.453
		>10000 to ≤15000	0.004
		>15000 to ≤20000	-1.232
		>20000 to ≤25000	0.261
		>25000	1.088
	Saving	No	0.145
		Yes	-0.044
	Credit	No	0.315
		Yes	-0.192
	Tropical Livestock Unit (TLU)	Below local average	0.780
		Above local average	-0.645
	Jewelry (gold)	No	0.017
		Yes	-0.393
	Jewelry (silver)	No	-0.198
		Yes	0.164

Note: Signs of the weights shows that assets with a negative sign and score reduces welfare, while a positive sign improves household welfare.

Source: Author computation based on own survey, 2018

Once the preliminary MCA were conducted, the characteristics of asset indicators were critically reviewed to improve, adjust or eliminate indicators that that do not respect MCA property. This method helps us to improve the model through retaining indicators that satisfy monotonicity. The model gives us the important components to choose indicators that are important to develop the asset index and the main selection criteria used to reduce the number of indicators is the First Axis Ordering Consistency (FAOC) property. This property is a necessary condition for the asset index formation to order households according to their welfare situation.

Asset indicators that satisfy the property of FAOC are those indicators that meet the assumption that households welfare reduces from the high level of socioeconomic status to a position of lower socioeconomic status (poverty) throughout the first dimension. For that reason, variables that did not meet FAOC property were excluded from the analysis. These excluded variables are land quality, household's highest completed schooling, vocational training, adequacy of household labor, access to non-household labor, head health, number of sick household members, possession of radio, bed, table and chair, gas stove, mobile phone, solar lamp, lantern, plowing set, hoe, mallet and mattock, modern and traditional beehives, axe, shovel/spade, access to grain mill, public telephone services, transport station and village market center, drinking water sources, wall and roofing materials, participation in *iddir*, *equb*, *mahber* and conflict resolution; relationships with community members, trust to cooperatives, neighbors, community leaders and community members, income, saving, credit, jewelry (gold) and TLU. Household

heads level of formal education, possession of satellite dish, refrigerator and cart were excluded from the analysis for having low frequency(less than one percent) in one of their modalities.

After this examination, 35 indicators with 83 categories that satisfy FAOC property were selected for final MCA to construct asset index. As shown in Table 4.11 below, the final MCA were conducted on the remaining asset indicators and this raised the explanatory power of the first dimension, which enlarges the descriptive power of its principal inertia from 22.3% to 42.4%. The cumulative inertia contribution of dimension 1 and 2 is raised from 34.0% to 58.5%. The first dimension is denominated as household's welfare axis as it has large principal inertia to explain welfare and this help us to differentiate the asset poor and rich households.

Table 4.11: Second Multiple Correspondence Analysis results

Dimension	Principal inertia	Percent	Cumulative Percent
Dim 1	0122365	42.42	42.42
Dim 2	0.004649	16.12	58.54
Dim 3	0.0016653	5.77	64.31
Dim 4	0.0013562	4.70	69.01
Dim 5	0.0010068	3.49	72.50
...	...	...	...
Dim 17	3.73e-06	0.01	78.67
Total Inertia	0.0288447	100.00	

Source: Own computation, 2018

Table 4.12 reports the final MCA weights for all asset modalities. The Table reveals asset types that reflect higher socioeconomic status and contribute positively to household's welfare while assets that show lower welfare are negatively associated to the first axis. For example, for natural assets, Table 4.12 shows that having access to grazing land and ownership of cultivated land above local average has the highest positive impacts on household welfare suggesting these assets are important to agricultural production in the study area. Heads age above average, having big household size (>8), having $\geq$ two income earning members, households with more than 3 times/year contact with extension agents, participation in labor and oxen sharing engagements, and having good relationships with cooperative organizations contribute positively to household welfare. Regarding physical assets, the MCA shows that having access to electricity, possession of consumer goods (such as tape recorder, TV, charcoal stove, power saving oven and electric oven), possession of productive assets (such as hammer and pick ax,

modern sickle, saw, digging chisel and water storage pit), and ownership of silver Jewelry and improved sanitation contribute positively to household's welfare.

All assets were expected to have positive impact and welfare improving effect reflected by its signs. However, results of the final MCA show that households who have remittance, access to market and secondary school were poor. These counter intuitive results is may be due to the fact that remittance may not be adequate for productive activities that enhance welfare, and households may not have the real capability and opportunity to use the existing market and secondary school infrastructure.

Table 4.12: Final Multiple Correspondence Analysis Weights

Variable	Modality	Weight
Size of cultivated farm land	Below local average	-0.537
	Above local average	0.644
Grazing land access	No access	-0.490
	Difficult	0.796
	Easy	0.279
Household head age	Below average	-0.359
	Above average	0.427
Total household size	Small (≤ 4)	-0.269
	Medium (≥ 5 to ≤ 8)	-0.036
	Big (> 8)	1.014
Cash income earning members	Less than two	-0.936
	Greater or equals two	0.392
Contact with extension agents	No	-4.669
	Yes	0.886
Number of visits	No contact	-4.669
	Once/year	-0.218
	2 to 3 times/year	0.824
	>3 times/year	1.599
Tape	No	-0.328
	Yes	0.538
TV	No	-0.029
	Yes	2.397
Charcoal stove	No	-0.304
	Yes	0.251
Shelf	No	-0.060
	Yes	1.511
Power saving oven	No	-0.270
	Yes	1.559
Electric oven	No	-0.109

	Yes	2.300
Saw	No	-0.384
	Yes	1.828
Digging chisel	No	-0.492
	Yes	1.202
Hammer and pick ax	No	-0.651
	Yes	1.248
Modern sickle	No	-1.077
	Yes	0.152
Water storage pit	No	-0.219
	Yes	2.333
Secondary school	No	0.017
	Yes	-0.576
Health post	No	-0.945
	Yes	0.611
Veterinary center	No	-0.016
	Yes	0.237
Electricity	No	-0.434
	Yes	2.168
Village market center	No	0.015
	Yes	-0.376
Sanitation	Improved	1.035
	Unimproved	-0.823
Labor sharing	No	-2.366
	Yes	0.112
Oxen sharing	No	-3.152
	Yes	0.295
Can get labor help in time of illness	No	-4.830
	Yes	0.852
Can get food help in time of food shortage	No	-3.556
	Yes	1.040
Relationships with Cooperatives firms	Low	-2.718
	Medium	0.397
	High	1.155
Relationships with Government officials	Low	-2.479
	Medium	0.177
	High	0.889
Relationships with Input suppliers	Low	-2.980
	Medium	0.445
	High	1.603
Trust to extension agents	To a very great extent	1.799
	To a great extent	0.279
	Neither great nor small extent	-1.303
	To a small extent	-1.338
	To a very small extent	-5.278

Trust to local government officials	To a very great extent	1.288
	To a great extent	0.242
	Neither great nor small extent	-0.695
	To a small extent	-2.594
	To a very small extent	-6.158
Remittance	No	0.187
	Yes	-0.214
Jewelry (silver)	No	-0.634
	Yes	0.462

Note: Signs of the weights shows that assets with a negative sign and score reduces welfare, while a positive sign improves household welfare.

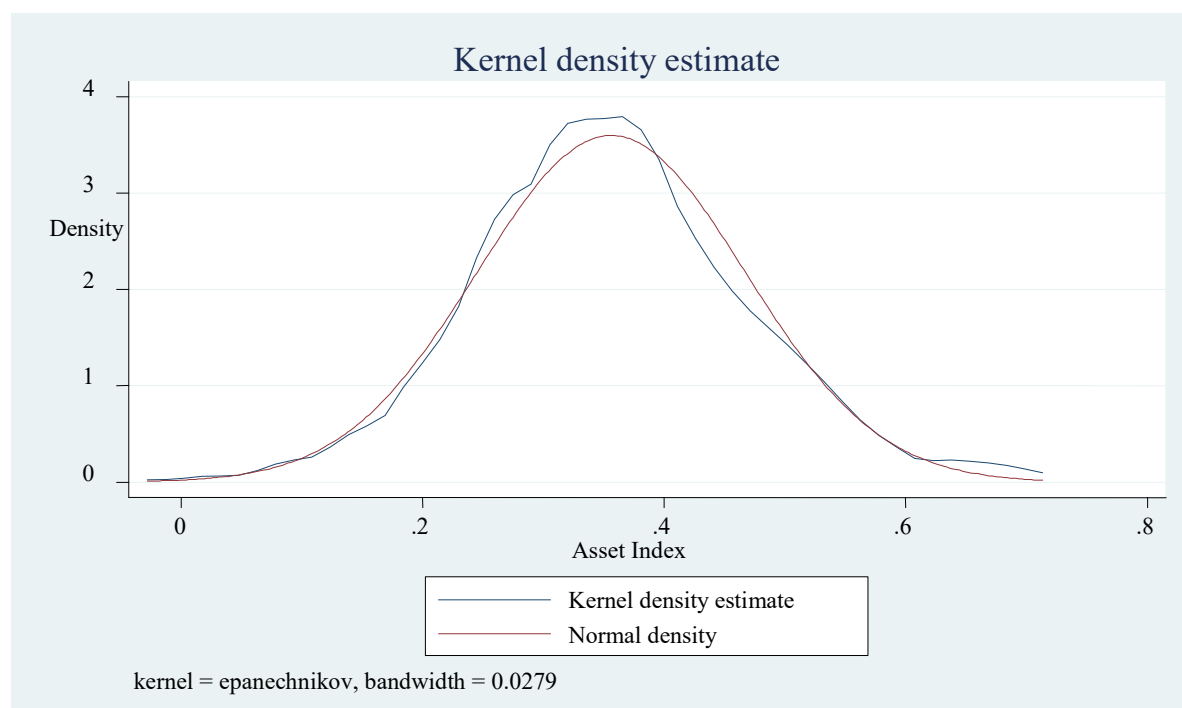
Source: Author computation, 2018

The size of the weights was critically observed to see the contribution of each asset indicator. As a rule of thumb, indicators with more than 2.5 weighting value were included in each household's asset index and these indicators were considered as major asset indicators to compute each rural household's asset index score in the study area. Finally, using the identified key asset indicators, asset indices were computed. The indices had a minimum value of -0.9879 and a maximum of -0.30219. To make the asset index positive, a slightly higher than the minimum absolute value i.e., 0.30220 was added to every asset index score (see Booysen et al., 2008; Da Maia, 2012; Sawira, 2015). This adjusted index was then used to analyze the socioeconomic positions of households in the study District. Similar procedure was followed to construct the index of the five livelihood assets to assess dimension based asset endowment capacity of households.

4.5 Typing of Households into Socioeconomic Groups

After the asset index is computed using Multiple Correspondence Analyses, the distribution of the index was observed to classify household's socioeconomic status into various groups. Thus, kdensity of the household asset index scores was drawn to observe the normality of the distribution of households' socioeconomic statuses as shown in Figure 4.2. The distribution of asset scores follows the normal curve which is not skewed to the right or left side suggesting household asset distribution are sufficient to differentiate households socioeconomic positions using the asset index score as shown in Table 4.13 below. The kdensity graph also shows that surveyed household's do not have a uniform socioeconomic status.

Figure 4.2: Distribution of Asset Index



Source: Own computation, 2018

Using k-means clustering technique, households' asset compositions were classified into three asset clusters. These clusters have similar traits within themselves and distinct characteristics among groups (Mooi and Sarstedt, 2014) and are important to look at relative socioeconomic positions of households. The mean of each socioeconomic group was calculated to create a distribution which is simple to interpret. The estimated groups were named as low, medium and high socioeconomic groups based on their average value. The cluster analysis reveals clear distinction with significant variation among the groups.

Socioeconomic status is a measure of household's relative economic and social ranking. As can be seen in Table 4.13, household's socioeconomic status was not uniformly distributed across all the three clusters. The result shows that 80% of the population represents low and medium socioeconomic groups. The highest proportion of households in the asset index cluster belongs to the middle socioeconomic group (45.7%) while the very low proportions of households were concentrated in the highest socioeconomic group (20%). The cluster technique classified 34.3% of households under the lowest socioeconomic positions. Overall, result shows that the mean value of the asset index is 0.36. The mean difference between the lowest and the highest

socioeconomic groups was 0.28 which indicates the distribution of asset ownership varies between the lowest and the highest socioeconomic groups. The mean difference between the lower and the medium, and the medium and the higher group was also shown that household's socioeconomic positions were distributed across these asset groups differently.

The low socioeconomic group is the most disadvantaged group while the highest group is the least deprived. Households from lower socioeconomic status are more likely to have low access to and control over key livelihood resources such as education, occupation, health. Particularly, households in the low socioeconomic groups have low financial security to face unexpected expenditures and life events due to low income, and this led to psychological stress and anxiety. The little ownership of asset adversely affects both households adaptive and coping capacity to buffer against multiple shocks and it generally affect households overall functionings. On the other hand, households in the higher socioeconomic position tend to have relatively better foundation to access education, health, economic and other social resources than households of lower status. They also have better ability to meet emergencies and cope with unexpected risks, thereby reducing vulnerability to poverty.

Table 4.13: Mean and percentage distribution of socioeconomic groups

Socioeconomic Groups	N	Percent	Mean	Std. Dev.	Median
Low	144	34.3	.241608	.0577511	.26191
Medium	192	45.7	.3717178	.0354769	.368835
High	84	20	.5172779	.0616014	.50423
Total	420	100	.3562207	.1108538	.35013

Sources: Own computation, 2018

As reported in Table 4.14, the percentage distribution of household asset compositions across Kebeles was explored using socioeconomic groups. Results revealed that the majority of households from Arebay (51.9%), Walta (52.6%) and Michael Abiy (40.8%) were in the lower socioeconomic groups of the total population, while more than half of respondents from Simret (58.7%) and the majority of respondents from Mizane Brhan (60.3%) were in the middle groups. As much as 66.1% of household's from Selam had asset index score that put them into the higher socioeconomic position. This is probably due to the fact that Selam is found relatively near to the District center (town), which may enable them access to different resources and services, while

households in the lower socioeconomic group (particularly Arebay and Walta) lives in a relatively isolated area which is far from the nearest road and District center which may constrained them to obtain labor (non-farm activities), market and other public services and infrastructures. The percentages of households in Selam shows increasing trend across socioeconomic groups while the clear decreasing trend in Arebay, Walta and Michael Abiy. The overall result of Chi-Square statistics test, $\chi^2 = 126.4351$, $P=0.000$, reported for socioeconomic groups shows that there is a statistical significant difference in households' socioeconomic status across Kebeles in the study District.

Table 4.14: Percentage distribution of household's socioeconomic groups by Kebele

Kebele	Socioeconomic Groups			Total
	Low	Medium	High	
Simret	30.4	58.7	10.9	100
Selam	10.2	23.7	66.1	100
Arebay	51.9	46.2	1.9	100
Walta	52.6	42.3	5.1	100
Michael Abiy	40.8	38.2	21.0	100
Mizane Brhan	17.5	60.3	22.2	100
Total	34.3	45.7	20.00	100
Pearson Chi-square (χ^2) statistic = 126.4351 Pr = 0.000				

Sources: Own computation, 2018

For further assessment of what households have, we also aggregated some specific assets into socioeconomic groups. Table 4.15 shows the proportionate distribution of household's belongs to each socioeconomic cluster across some selected household characteristics. Looking at the general characteristics of households' under the lowest socioeconomic groups, findings shows that higher proportions of households has tape (37%) and vocational training (38%). This cluster includes 36% of households owned both households head age and TLU above local average, while 35% of the households participated in oxen and labor sharing arrangements of the community. Among them, 34% of households have access to market. Besides, 29% of this group has land above local average, while 33% of them own radio and iron sheet roofed house. This category is also described with having improved sanitation (38 %) and more than five years of schooling (31%).

Compared to low and high socioeconomic groups, relatively larger proportions of households are classified under the medium socioeconomic clusters. For example, 46% of this group has age and TLU above local average each, while 49% of them have household size above local average. They have 45% of households completed more than five years of schooling. 54% of households in this group have farm land above local average and 50% of them have market access. Result also shows that 48% of households under the middle socioeconomic group possess tape, iron sheet roof and participated in oxen sharing arrangements each (Table 4.15).

Table 4.15: Percentage distribution of selected categorical assets by socioeconomic groups

Indicators	Obs.	Socioeconomic Groups		
		Low	Medium	High
Head age: above average (49+)	192	36	46	18
Household size: above average (6+)	260	32	49	20
If has >5 completed years of schooling	310	31	45	24
If has TLU above local average (4+)	212	36	46	18
Has farm land above local average(0.6+)	191	29	54	17
If participated in labor sharing	401	35	46	19
If participated in oxen sharing	384	35	48	17
If had vocational training	290	38	43	19
If has improved sanitation	186	38	51	11
If has iron sheet roof	226	33	48	19
If has market access	292	34	50	16
Has tape	159	37	48	14
Has radio	329	33	47	20

Source: Own computation, 2018

With regard to high socioeconomic status, lowest proportions of households are placed under this group. This cluster reported that 24% has completed more than 5 years of schooling, and 20% of households have radio and household size above 6 members each. 19% of the population had training, labor sharing and iron sheet roof each, while 18 % has both head age and TLU above local average. In addition, 17% of the households under this category participated in oxen sharing activities and has farm land above 0.6 hectares, each. Finally, a description of this cluster indicated that 16% of households have market access while few households (11%) have improved sanitation (Table 4.15).

Table 4.16 reported the mean distribution of some selected continuous household's asset indicators by socioeconomic clusters with ANOVA significance level. The distinct characteristics that describe the various household's socioeconomic groups are presented in this Table. The lower socioeconomic group comprises 34.3% of the population and is mainly characterized and discriminated from other groups by having low level of household's educational attainment. They have very low access to credit and owned low average cash income earning household members. This group also comprises households with low average number of sheep stock and cultivated crop type. Receiving high average income remittance from different sources (for example, families and friends) is another distinct characteristic of households in this socioeconomic position. This group is separated from others due to having higher dependency ratio, with an average of 1.15. However, it should be noted that in Ethiopia, although household members below the age of 15 years and greater than 65 years are assumed as dependents (MoFED, 2012), members aged between 7 to 15 years support their household by keeping livestock and doing simple domestic works. Furthermore, households in this group have significantly lower level of social capital comparing to other groups. Because of low average asset composition, respondents in this socioeconomic category has highly vulnerable wellbeing which needs due consideration.

Rural households in the medium socioeconomic group comprise 45.7% of households and have large average household size. In terms of land ownership, this cluster utilized relatively bigger average size of cultivated land (0.71 ha.), which is above the average landholding of the study District, compared to the low and high socioeconomic groups. This relatively larger hectare of cultivated land enables them to keep large average number of oxen comparing to low and high groups. Furthermore, the ownership of more number of plots enables households in this socioeconomic category to cultivate more crop types. These are some of the variables that differentiate the medium group from other socioeconomic groups (Table 4.16)

Table 4.16 also shows that the higher socioeconomic groups includes 20% of the rural households and are different from the other groups by having at least one better educated household member, with an average of 8 years of schooling. This shows the vital contribution that better level of education has in enhancing household wellbeing in rural areas. Amongst them they have higher average credit size and owned higher average savings, which is important to

finance livelihood activities to increase production. In terms of numbers of oxen ownership, they possess lower average number of oxen. Households under this group have obtained lower average cash remittance and this socioeconomic group have lower dependency ratio than any other groups. In addition to this, households in this welfare group possess significantly higher level of social capital as compared to low and medium clusters. This is important to facilitate learning through interaction and it helps scaling-up production technologies and innovations through creating links with other livelihood assets. In general, finding of the cluster analysis indicated that households in all socioeconomic groups have varied demographic and socioeconomic traits.

Table 4.16: Mean distribution of some selected household's assets by clusters

Indicators	Unit	Socioeconomic Groups			ANOVA P-value
		Low	Medium	High	
Household size	Number	5.81	6.34	5.99	0.0162**
Highest education attainment	Years	6.88	7.35	8.18	0.0163**
Credit size	Birr	6738.61	7536.02	10031.91	0.0002***
Saving amount	Birr	2808.69	2717.51	3707.93	0.0165**
Income remittance	Birr	3170.30	2309.19	1156.77	0.0031***
Oxen ownership	Number	1.60	1.76	1.47	0.0203**
Sheep ownership	Number	7.61	8.00	9.82	0.0000***
Size of cultivated land	Hectare	0.62	0.71	0.60	0.0020***
Number of plots	Number	2.30	2.60	2.27	0.0078***
Crop types	Number	2.54	2.88	2.63	0.0093***
Dependency ratio	Values	1.15	1.07	0.91	0.0934*
Social Capital	Value	0.29	0.41	0.44	0.0000***
Observation	Percent	34.3	45.7	20	

Note: ***, **, and * means statistically significant at 1%, 5% and 10% levels, respectively.

Source: Own computation, 2018

4.6 Asset Endowment Structure of Households

Livelihood capacities and structures of the surveyed households were summarized using pentagon to visually observe households strengths and interrelations among the five livelihood assets namely, human, natural, physical, social and financial assets. According to DFID (2000), the shape of the pentagon shows the difference in household's access to various livelihood capitals. This can provide us with richer information on who the poor are. The center of the pentagon shows the presence of minimum livelihood capital while the edge of the pentagon

represents the maximum access of the livelihood assets. Asset composition of households increases from the center to the border of the livelihood pentagon. Asset endowment structure shows how the average household's assets are distributed across each asset classification.

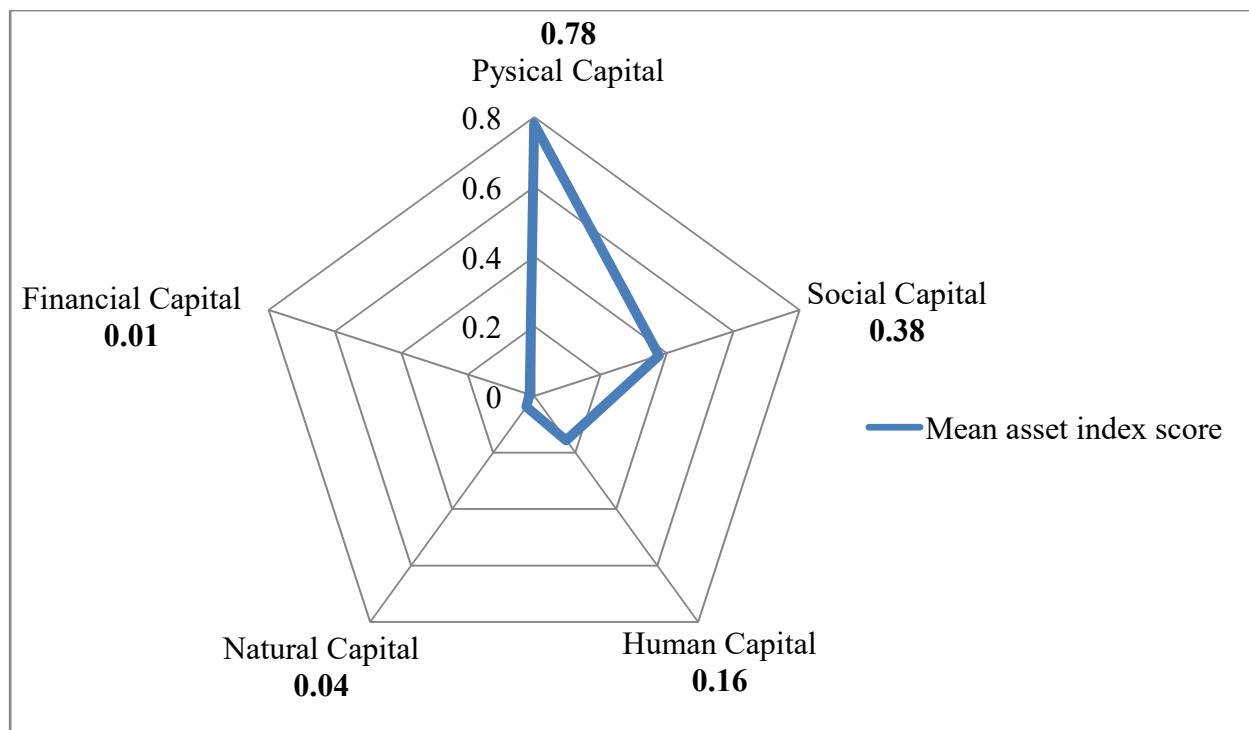
Therefore, Figure 4.3 clearly shows that there is marked difference in the possession of estimated value of the average household's asset dimensions. For each capital, the average possible value is computed and accordingly, the sides of the pentagon are drawn. With this result, comparison is made among the average value of each capital. The unequal line of the pentagon describes the ideal condition that households have optimal access to the varied type of livelihood assets. The estimated household's asset endowment index depicted by the pentagon is extremely skewed towards produced physical capital. As observed in the figure, the estimated index was higher for produced physical capital. This was followed by social capital, human capital and natural capital. Households have low financial capital asset index.

The relatively higher level estimated capacity of produced physical asset (0.78) suggests that households can generate different benefits to satisfy their basic needs that are produced physical asset intensive. These assets are basic infrastructural facilities, a stock of durable equipment and productive or agricultural tools that households use to function more effectively. Having good physical infrastructure in the rural areas helps farmers to have access to communication, market, and education institutions, thereby enable households to avoid time that spent on non-productive activities such as travelling long time to get water, transport, market and medical services. Availability of adequate produced physical assets minimizes the cost of transactions, increase the means of accessing market, employment and social relations. Some assets like consumer durables can also be used to buffer risks.

Social assets are social resources that play a significant role in facilitating economic relations among the rural households. It is also a means of accessing different forms of resources developed through networks, participation in group memberships and trust relationships. The estimated social capital index value (0.38) shows that households have considerably better accumulation of social capital as compared to human, natural and financial assets. This higher level of social capital accumulation facilitates the dissemination of agricultural technologies and innovations thereby create strong link with human capital to achieve their individual and community goals.

Having good stock of social capital also fosters the smooth distribution of common resources among the communities, minimize the costs of working together, facilitate individual engagement in labor force activities, determine the ability of households to use, control and make use of other assets. Furthermore, social capital institutions such as *iddir*, *equib*, *mahber*, labor and oxen sharing groups provide mechanisms for the rural households to help each other in time of stresses, shocks and conflicts, and they are best means of coping with such natural and social problems. Overall, social capital help poor households to access various resources through social networks to meet everyday needs and improve their welfare.

Fig 4.3: Livelihood Asset Pentagon of study households



Source: Own computation, 2018

Human asset with estimated index value of 0.16 is the third ranked asset dimension of households and this implies that the available human assets such as household's knowledge, skill and ability to labor enable households to moderately achieve their living, and support them to convert other form of assets in to their benefits. Higher levels of human assets have tremendous effect on accumulation of all other assets and are highly important to obtain higher cash and non-cash benefits. From the rural setting, having higher educational levels and awareness enable farmers to manage their farm effectively, protect their health properly and engage in multiple

income earning jobs. Generally, it is believed that human asset is the major source of knowledge which is a fundamental to poverty reduction. But it is insufficiently available in the study area to facilitate and guide the utilization of the other four livelihood assets in the production process.

Natural resources especially farm land is considered as the major and important natural assets of households in the study area where they can drive their livelihood. However, natural assets endowments were quit low among rural households with an estimated value of 0.04. Land size, land quality, number of fields and access to grazing land were the major natural resource indicator considered in the index formation. Although possession of natural resources like land is a key for the development of rural households, the index value indicated that households are not well endowed with natural capital and it is not sufficiently available and accessible to rural households in the study area. Besides, the general landholdings of the study District were found very small because of land fragmentation and soil erosion. Lack of such productive resources may negatively affect the livelihood households through constraining food production. Households with small and fragmented farm land might not engage in diversified farm activities to generate income and sustain their livelihood.

Financial capitals that enable households to acquire different goods and services are key to improved wellbeing. Financial asset with estimated index value of 0.01 is at a relative disadvantage and is the least ranked asset dimension of households which implies that the financial resources of households such as savings, supplies of credits and TLU ownerships are extremely inadequate to pursue the direct (example, purchasing food) or indirect (example, investing in education) livelihood objectives. The index value also implies that households have low financial capability and have very little control over other productive assets. For example, lack of financial capital limit households to actively participate in group memberships, purchase productive agricultural technologies, engage in various income generating activities, and generally constrained wealth accumulation in the study District. DFID (2000) indicated that financial assets are the least available resources to the poor.

Households may not endow well in all dimensions of livelihood resources. However, the balance among all resources is associated with better options and higher overall wellbeing performance as they influence a wide range of livelihood outcomes. With this regard, households possess relatively better physical capital base which enables them to influence the household's ability to

earn an adequate livelihood. This may be in part because of the fact that some physical capital assets such as access to road, market and schooling are non-exclusive and provided by the government while the agricultural equipments and fixed assets may generally owned with low difference between households in the rural areas. The analysis of the asset pentagon also revealed that households have better level of social capital endowment which implies the existing social relations and networks are good to keep households work together and generate new socioeconomic opportunities. However, the pentagon shows that households have very low natural, financial and human capital asset endowment implying that either household have small assets or they are reliant on a very few assets. This poses various developmental risks. The very small human capital is a bottleneck for improvement and utilization of human capabilities while the low endowment of natural capital reduces household's agricultural production. The lowest levels of financial capital also contribute to the limited accumulation of other livelihood assets. These small capital assets generally constrain the development of households in the study District because households with low control and ownership of these assets cannot have varied livelihood options and strategies. Overall, the extremely lower level of financial, human and natural capital, and the imbalance between all livelihood assets limited households to possess productive life and impedes households to successfully escape from poverty and increase household's extent of vulnerability to poverty.

4.7 Summary

This chapter has discussed both the productive and non-productive household's livelihood assets. MCA was used as indexing method and the index was important in providing clear picture of what livelihood assets were generally possessed by households. The main advantage of this approach is that it avoids the limitations of socioeconomic measurement using income and consumption. Asset accumulation is essential to escape poverty and enhance current and long term household's wellbeing. Therefore, in this chapter, we have made household's asset endowment profile using descriptive statistics and we also classified them into various socioeconomic groups based on their asset endowment.

Regarding natural asset, findings shows that 93% of households owned cultivated farm land which is very important productive asset. But the average cultivated farm land ownership was 0.66 hectares which is very low. Majority of households owned cultivated land below this local average. 52% of households have land with moderate fertility while 28% of households owned fertile land. Households who have infertile land accounts for 20% suggesting their land cannot produce food for their household. 53% of households had not access to grazing land while 23% and 24% of households had easy and difficult access to grazing land, respectively.

Concerning the human assets the average age of household heads was 49.6 years and majority (85%) of household heads was under the productive age group which implies they are capable to engage in various income generating activities. Education levels of heads were found discouraging and very low as 50% of heads have no formal years of education, while 42.9% and 6.7% heads have primary and secondary level of education, respectively. At a household level, 55% of households have any member completed primary education, while 38% and 5% have secondary level and tertiary level of education, respectively. Data also shows that the majority of households were reported having training on various agricultural and non-agricultural activities, although training was not supported by a kind of financial support. Labor is an important asset for those rural households who are engaged in farming activities and household size have an implication on this. With this respect, 72%, 20% and 8% of households have medium, small and big household size, respectively, with an average size of 6 members. Results also show that the general health statuses of household heads were good to engage in farming activities. 84% of households had contact with extension agents. But data shows 45% of households had extension

visits 2 to 3 times per year while 25% of households were visited >3 times per year. The remaining 14% had been visited by agents once a year. This shows the extent of extension visit were inadequate.

Regarding the physical assets, great proportion of household's owned mobile phone, radio, solar lamp, metal/wood bed and charcoal stove. Conversely, more than 90% of households do not own important household appliances and domestic goods such as refrigerator, satellite dish, TV, shelf, table/chair and gas stove. Given households major economic activity were agriculture, >87% of a household owned traditional farm implements such as plowing equipments, hoe, mallet and mattock, shovel/spade, modern sickle and axe. Modern agricultural technologies such as generator, chemical sprayer, hand-held motorized tiller, mechanical and motorized water pump were totally absent. Concerning infrastructural services, all households have access to cooperatives and majority of households have access to health post, grain mill, and police station in their village. On the other hand, high proportion of households didn't have access to secondary school, veterinary services, market centers, transport and electricity services. Only 57.4% of households have access to potable water sources. With regard to sanitation, 44.3 % households have access to improved sanitation while 55.7% of households used unimproved sanitation. Findings also shows that 99.1% of households used mud and dung flooring. 62% households used stone and mud wall while 37% have wood and mud. Only 1% households had wood and thatch wall material. The roofing material of greater than half (53.8%) of households were iron sheet while 30.7 and 15.5% of households used wood and mud, and grass/straw roof, respectively.

With respect to social assets, only 39.8% of households were members of *iddir*, 32.4% were members of *equib* and 71% surveyed households were members of *mahber*, and 79.8% of households have been participated in conflict resolution activities, and almost all households (98.1%) were participated in water and soil conservation in their village. Besides, results indicated that 95.5% of households were members of labor sharing arrangements, 91.4% of households have been members of oxen sharing arrangement, and majority households (77.4%) can get food help in time of shortage from their families, neighbors and communities. In addition, high levels of households trust tendency were observed to community leaders, community members, local government officials, neighbors, cooperatives and extension agents.

Regarding to financial assets, result indicated that 73.1% of households able to save, 58.1 % of the households had agricultural credit, and 87.4% of households owned livestock. The average households TLU ownership were 4.2. On average, households saving amount were Birr 2942.3 while average credit size were Birr 7758.6. The annual household income ranges from Birr 4900 to 36270 with an average income of Birr 16161.9. It is also found that 57.9% of households owned silver jewelry while only 4.5% of households have gold jewelry.

Result of cluster analysis shows that 45.7% of the population represents the medium socioeconomic groups while 34% and 20% of the population belongs to the low and high socioeconomic groups. Decomposition of household's socioeconomic status across location and household assets shows that majority of households from Arebay, Walta and Michael Abiy were in the lower socioeconomic groups, higher proportion of households from Simret and Mizane Brhan were in the middle groups, while the majority of households living in Selam grouped in the higher socioeconomic position. In general, households in the study District are relatively well endowed with physical capital followed by social capital. Finally, the analysis of the asset pentagon shows that households have very low natural, financial and human capital endowment which constrains the socioeconomic development of rural households.

Chapter Five

Household Multidimensional Poverty in Degu'a Tembien District

5.1 Introduction

Persistent poverty becomes one of the most complex development challenges of policy makers. For decades, income distribution statistics were used to assess and analyze poverty (Sen, 1976). However, recently it is recognized that both monetary and non-monetary components are crucial to understand and measure individual's and household's poverty level (Bourguignon and Chakravarty, 2003). This indicates poverty is increasingly recognized as multidimensional concept which fundamentally requires holistic/comprehensive approach to design anti-poverty policies, strategies and programs.

Ethiopia is considered as one of the fastest growing economies in the world. At the same time, Ethiopia is one of the poorest countries in the world where its poverty creates various socioeconomic problems. Due to this reason, the priority development agenda of the government is poverty reduction and improving the living standard of the people through ensuring sustainable development. As a result, the government has put in place various poverty reduction policies, strategies and programs such as the Sustainable Development and Poverty Reduction Program (SDPRP) (2002/03-2004/05), Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005/06 to 2009/10), Growth and Transformational Plan I (GTP I) (2010/11 to 2014/15) (MOFED, 2010), Growth and Transformation Plan II (GTP II) (2015/16 to 2019/20) (MOFED, 2016).

Ethiopia has recorded remarkable and consistent economic growth between 2006 and 2013 (IMF, 2014; World Bank, 2013). The recent World Bank report also shows that the country has experienced more than 10% average economic growth per year between 2008 and 2015 (World Bank, 2018). Under five child mortality has declined from 110 to 68 deaths per 1,110 births between 2005 and 2016, while the adjusted net primary school enrolment rate increased from 40.2% in 2000 to 86% in 2015 (UNICEF, 2018). The proportion of women with no schooling declined from 77% in 2000 to 49% in 2016, while the proportion of men with no schooling decreased from 62% in 2000 to 35% in 2016. Child mortality decreased from 97 deaths per 1,000 live births in 2000 to 48 deaths per 1,000 live births in 2016, which shows about a 50% decline

in the past 16 years. Married women contraceptive use has gradually risen from 6% in 2000 to 35% in 2016 (CSA and ICF, 2016).

Regardless of such progress, UNDP (2015) and OPHI (2015b) indicated that Ethiopia remained one of the poorest countries in the world. UNDP (2014) Human Development Index (HDI) value for 2013 also shows that Ethiopia falls within the low Human Development category in the world, ranking 173th out of 187 countries. Taking DHS data of 2011, OPHI (2015b) study indicated that 56.4% of Ethiopian population was multidimensionally poor. About 64% of Ethiopian rural population was also found multidimensionally poor. Using a unidimensional measure of poverty, the 2010/11 Household Income, Consumption and Expenditure Survey shows that 29.6% of the total population were below national poverty line and higher poverty was observed in rural areas (30.4%) than urban areas (25.7%) (MoFED, 2012). This figure reveals that poverty in Ethiopia is persistent, deep-rooted and complex which requires thorough investigation.

The official methods of assessment and measurement of poverty in Ethiopia were historically dependent on monetary approach which provides limited focus on multidimensional poverty. Thus anti-poverty policies and strategies were focused on enhancing monetary attributes (measures) of the poor. This approach fails to show the comprehensive picture of socioeconomic problems, capabilities and functionings. Other potential dimensions of poverty have been neglected because majority of preceding studies in Ethiopia have followed unidimensional strategy which overlooked the multifaceted nature of people's wellbeing. Such poverty approach leads to partial understanding of the problem and has incomplete ability to effectively explain the nature of poverty. For this reason, Sen (2000, p. 3) suggested that when conducting poverty evaluations "*we must look at impoverished lives and not just at depleted wallets*". Therefore, for having a comprehensive poverty reduction strategy, conducting a multidimensional poverty analysis in rural Ethiopia is required.

In spite of the fact that poverty is persistent in Ethiopia, some studies (such as Gebretsadik, 2013; Bruck and Sindu, 2013; Tassew, 2014; Alemayehu et al., 2015; Mekonnen and Heshmati, 2016) have looked at multidimensional poverty and related topics. Majority of studies on multidimensional poverty make use of secondary data on education, health, living standard and durable asset dimensions of poverty in their analysis. However, the current study incorporated

country specific indicators such as land and livestock ownership which are significant indicators of wellbeing for Ethiopian rural households. Cooperative membership and decision making on income were also added as empowerment dimensions of poverty in the analysis. These indicators are, according to Alkire (2007a), the missing dimensions of poverty in the global MPI (Multidimensional Poverty Index) which complement the Human Development Report and not included in previous estimates of multidimensional poverty using the AF methodology. Therefore, the use of appropriate indicators in measuring poverty has paramount importance in poverty reduction efforts as it might help us to the effective targeting of the poor. For this reason, it is argued that multidimensional poverty assessment which focused on household's capability and functioning evaluation space would have strong justification for measuring poverty status of households. Furthermore, although it is extensively used globally, to the best of the researcher's knowledge no empirical research is documented for multidimensional poverty concepts in the study District. Given this background, this chapter attempted to answer the following questions.

1. What are the incidence and intensity of multidimensional poverty of households in the study area?
2. Which dimensions and indicators are contributing more to household multidimensional poverty?
3. What are the major characteristics of households with multidimensional poverty?

Therefore, the following sections of the chapter are outlined as follows. Section 5.2 presents the methodology of the chapter which includes the process of selecting dimensions, indicators and deprivation cutoffs, and followed by discussing the methods of identification and aggregation. Section 5.3 presents empirical results and discussions on household multidimensional poverty analysis including the raw headcount ratio, indices of multidimensional poverty, dimensions and indicators contributions to multidimensional poverty, and household's composition of poverty across various socioeconomic and demographic characteristics. Finally, section 5.4 summarizes.

5.2 Methodology

5.2.1 Selection of Poverty Dimensions, Indicators and Cutoff Points

Sen (2008) pointed out that the choice of functionings and capabilities to measure poverty is highly dependent on intuitive decisions. It is very difficult to cover all domains of poverty in this paper as poverty comprises various economic, social, political, cultural, psychological and

environmental realms. Hence, dimensions that are believed by this researcher to be highly relevant for the studied population were identified. Through assessing the extensive literature on the choice of dimensions, Alkire (2007b) came up with a list of five factors on which researchers can base their decision to select indicators. These criteria are availability of data or convention; selection of dimension based on implicit or explicit normative assumptions; public consensus; ongoing deliberative participatory processes; and empirical evidence regarding people's values. Therefore, a list of dimensions and indicators were selected on the basis of both normative assumptions and empirical evidence (see Table 5.1). The selected variables are supported by the United Nations MDGs (Millennium Development Goals) and the newly designed Sustainable Development Goals (SDGs) that provide strong grounds for their incorporation in the poverty analysis.

Decancq and Lugo (2008) indicated that the selection of values in developing a multidimensional poverty index is a difficult task and are highly sensitive to the choice of weights. Some empirical and theoretical literature has proposed multivariate statistical weights, such as the Multiple Correspondence Analysis, Factor Analysis, Principal Component Analysis, normative weights, regression based weights, frequency based weights and equal weights, as potential weighting systems. However, Batana (2008) remarked that none of these weighting systems have proved to be the best. Although Atkinson (2003) argued equal weighting is an arbitrary normative weighting system that is appropriate only in some situations, other studies such as Decancq and Lugo (2008), and Alkire and Foster (2008) pointed out that equal weighting is the most commonly and widely used approach. But this does not mean that it is free from any criticism.

According to Chowdhury and Squire (2006), equal weighting is adopted in the HDI convention, upon which a critical literature has developed. Moreover, Foster (2007) indicated that equal weighting system is a justified way when there is no convincing reason to weight one dimension more than another. Thus, following Alkire and Santos (2010), this dissertation applies equal weighting structure across dimensions and equal weights within dimension indicators to construct Adjusted Head Count Ratio (MPI). This methodology is convenient, easy to interpret, widely accepted and allows us to have internationally comparable findings. Generally, the dimensions and indicators selected for this particular study are defined as follows.

Education: Education is a very important development capability for everyone. It can equip us with required knowledge and skills through its basic and influential value which in turn have an impact on increasing future income, employment and productivity. This study uses years of schooling and child school enrolment as measures of household deprivation in education. The inspiration for the second indicator is the MDG 2 which has a goal of universal primary education that Ethiopia sought to achieve by 2015, and currently continues in the UN SDGs and Ethiopian GTP II. A household was considered as deprived in years of schooling if no household member has completed five years of schooling. This indicator follow the concept of “*external capabilities*” at the household level (see Foster and Handy, 2008) which indicates that other household members can benefit from the capacity and ability of at least one literate member through their direct family relationship. Regarding the second indicator, a household was considered deprived in child school enrolment if at least one school aged child (6 to 14) in the household was not going to school. The thresholds selected for the two education indicators are based on the principle that children and other members of the household should go or have gone to school.

Health: Good health is relevant for better socioeconomic development while bad health aggravates household poverty, undermines employment and lower production if it curtails households pursuing new livelihood opportunities. Ariana and Naveed (2009) indicated that health is one of the major factors that determine individual’s attainment of various capabilities. While better health improves wellbeing, losses in health enhance deprivations in other indicators of life. Hence, this study identified health care access, health functioning and child mortality as three indicators for measuring health status of households. Regarding the deprivation threshold, a household were considered as deprived in health care access if it doesn’t have access to health care facilities in their village. A household was considered as deprived in health functioning if health becomes a limiting factor for any member of the household to pursue household regular activities due to sickness in the last three months before the time of interview. Finally, a household was considered as deprived in child mortality if there has been at least one child death in the household in the past five years prior to this survey. The underlying assumption for this deprivation cutoff is that, in most cases, child deaths are preventable.

Living standard: This dimension comprises four indicators. These are access to safe drinking water, access to improved sanitation, access to electricity, and form of energy for cooking.

- i. *Good access to improved water* is a prerequisite for improved health and productive livelihood activities. Access to better quality water supply is endorsed as critical element of human rights and socioeconomic growth (ADF, 2005). However, United Nations (2015) indicated that 29% of world population used unimproved water drinking water sources. Hence, a household was considered as deprived in water if they have been using unimproved (such as unprotected spring and surface water) drinking water sources.
- ii. One other indicator of living standard is *sanitation*. Zwane and Kremer (2007) indicated that lack of improved sanitation is one of the major factor that causing higher incidence and burden of diarrheal disease in many developing countries. According to United Nations (2015), 61% of world population used unimproved sanitation services and 892 million people have used open defecation in 2015. Thus, in this paper, a household was considered as deprived in sanitation if they used unimproved sanitation facility such as open defecation
- iii. *Access to electricity* improves the quality of life and socioeconomic development of rural people through providing them modern power sources and services. It replaces kerosene as a light source, reduces indoor air pollution, and allows students to study in the evening. Moreover, as indicated by Alkire and Seth (2009), some household assets like electronic devices are extremely dependent on electric power supply. The ADB (2010) and World Bank (2008) indicated that rural electrification significantly contributes to the welfare of rural households. Therefore, households without access to electricity are seen as deprived.
- iv. *Cooking fuel:* World Energy Outlook (2006) report shows that around 2.5 billion people in developing countries relied on biomass, such as charcoal, animal dung, fuel-wood and agricultural waste to meet their energy requirements for cooking in the early 2000s. This produced emission of carbon monoxide, hydrocarbons and other particulate matter (Smith et al., 2000) which are hazardous to the environment and harm humans respiratory systems. WHO (2014) also reported that over half of deaths among children below 5 years old from severe lower respiratory infections are due to particulate matter inhaled from indoor air pollution. In Ethiopia, women and children are primary victims of this problem as they are

more likely to be present in areas involved in preparing food for their households. Therefore, a household was considered as deprived in cooking fuel if it used animal manure, charcoal, and/or wood.

Wealth: Wealth dimensions point towards the possession of land and livestock. Land is one of the most precious natural assets as many livelihood activities depend on it and it serves as a springboard for many rural people to escape from poverty. According to World Bank (2014), 81 percent of Ethiopian population is resident in rural areas where agriculture is a dominant form of production. Access to land for this huge percentage of the population is indispensable for ensuring poverty reduction and wealth creation. A study by Carter (2003) summarized that access to land has poverty reducing effects as it serves as a key source of household income and food security. Therefore, since land is central to many Ethiopian rural people, a household was identified as deprived in land if it owns less than 0.66 hectare of land (i.e., local average owned landholding).

The other wealth indicator refers to livestock ownership. Livestock play a significant role in the livelihoods of rural people. According to ILRI (2003), the roles of livestock keeping revolve around providing draught power, providing food and nutritional security, storing wealth, transport and manure, and serving customary social functions. Dorward et.al, (2005) also added that livestock served as a source of income, consumption, collateral for borrowings and insurance for unexpected events. Therefore, a household was considered as deprived in livestock ownership if it does not possess Tropical Livestock Units (TLU) below local average of 4 TLUs.

Empowerment: Empowerment is a very broad concept which includes social, economic, political cultural and psychological dimensions. Empowering the poor is seen as an essential precondition for poverty eradication. Thus, cooperative membership and individual participation in household decision making on income was used to proxy empowerment dimension for households. Collective actions like agricultural cooperatives, saving and credit cooperatives and consumer cooperatives are believed to be the best institutional interventions to eradicate poverty in the rural areas. Cooperatives are defined as “... *an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise*” (ICA, 1995, p.1). This definition emphasizes that individuals who cannot solve their own problem by their own means can form

collective action to empower themselves to solve their difficulties by sharing resources, knowledge and abilities. Therefore, a household was identified as deprived in this indicator if it doesn't have any household member in any cooperative society.

Table 5.1: Selected dimensions, indicators and deprivation cut-off values

Wellbeing Dimensions(Weight)	Deprivation Indicators(Weight)	Household Deprivation Cut-offs
Education (1/5)	Years of schooling (1/10)	1= if no household member has completed five years of schooling; and 0 otherwise
	Child school enrollment (1/10)	1= if any school-aged child* in the household is not attending school; and 0 otherwise
Health (1/5)	Health care access (1/15)	1= if a household does not have access to health care services in their village and 0 otherwise
	Health functioning (1/15)	1= if any member unable to pursue household main activities due to serious disease for at least three months; and 0 otherwise
	Child mortality (1/15)	1= if any child had died in the household in the past five years prior to this survey; and 0 otherwise
Standard of Living (1/5)	Access to safe drinking water(1/20)	1= if households use unimproved drinking water sources ; and 0 otherwise
	Access to improved sanitation (1/20)	1= if the household's sanitation facility is not improved ; and 0 otherwise
	Energy for cooking (1/20)	1= if the household cooks with dung, wood, or charcoal; and 0 otherwise
	Electricity (1/20)	1= if the household has no electricity; and 0 otherwise
Wealth (1/5)	Land ownership (1/10)	1 = if the household does not own more than local average (i.e., 0.66 ha. of land); and 0 otherwise
	Livestock ownership in TLU (1/10)	1 = if the household does not own TLU more than local average (4); and 0 otherwise
Empowerment (1/5)	Decision making (1/10)	1 = if household decision making on the use of income is not participatory; and 0 otherwise
	Cooperative membership (1/10)	1= if any member of the household is not member of cooperatives; and 0 otherwise

*According to FDRE (2009), the compulsory school age for children in Ethiopia is 6-14 years

Parveen and Leonhouser (2004) recommend household members' participation in household's decision making as one of the best indicators of a household's empowerment. Everyday life can

be seen as an on-going process of making household decisions. Therefore, in this paper a household was considered as deprived in this indicator if the household decision making process on the use of income is not participatory. Generally, Table 5.1 above summarizes the dimensions, indicators and deprivation cutoff points identified for a household's multidimensional poverty analysis for the purposes of this research.

Preliminaries: As an introduction to the identification methodology, *MPI* refers to the Multidimensional Poverty Index which was developed after data is collected to measure poverty. Alkire et al., (2015d) clearly described that *MPI* measures poverty in d indicators across a population of n individuals/households. Assume that $y = [y_{ij}]$ represents the $n \times d$ matrix of *MPI* performances, where n refers to the number of sampled rural households, d is the number of dimensions and $y_{ij} \geq 0$ is the performance of household i (i.e, $i = 1, 2, 3, \dots, n$) in indicator j (i.e, $j = 1, 2, 3, \dots, d$). Each row vector $y_{ij} = y_{i1}, y_{i2}, \dots, y_{id}$ gives the household's i 's scores in different dimensions, whereas each column vector $y_j = y_{1j}, y_{2j}, \dots, y_{nj}$ gives the distribution of indicator j performance across the set of rural households. A vector $z = (z_1, z_2, \dots, z_d)$ of deprivation threshold was used to decide whether the sampled household is deprived in each dimension. This means for every dimension j , there was deprivation threshold z_j defined as the minimum achievement required in order to be non-deprived. Therefore, whenever household performance in a given indicator j becomes below the predetermined deprivation threshold z_j , the sampled household was considered as deprived in that indicator (i.e, if $y_{ij} < z_j$). Contrary to this, if the household's achievement is greater than the predetermined deprivation cutoff, the household was considered as non-deprived in that specific indicator.

5.2.2 Identification Methods and Deprivation Cut-offs

According to Alkire and Foster (2011), the assessment of multidimensional poverty incorporates an identification (k) and aggregation methods (MPI). The identification method explores who is poor and who is not considering the number of dimensions with deprivation they experience. Alkire and Foster (2015d) indicated that the identification method follows the dual cutoff method. After the deprived and non-deprived households are identified using single dimensional deprivation cutoffs (any score of one), multidimensional poor households would be distinguished using the second cut-off across all dimensions (number of scores of one for a particular household).

Following Alkire and Foster (2007), to identify a poor household, the vector c of deprivation counts is compared against a cutoff k , where k can equal anything between $1 \dots d$. A column vector $c = (c_1 \dots c_n)'$ of deprivation counts reflects the breadth of each household's deprivation. Deprivation count of the i^{th} household refers to the numbers or values of all deprivations suffered by this household. Poverty cutoff k satisfying $0 < k \leq d$ was used to determine whether a household has sufficient deprivations to be considered poor. If a household's deprivation count c_i falls below k , the household was considered as non-poor; if the household's deprivation count is k or above, then it was considered as poor. Therefore, the poverty identification function $p(y_i; z)$ was defined as:

$$p(y_i; z) = \begin{cases} 1 & \text{if the household is multidimensionally poor} \\ 0 & \text{otherwise} \end{cases}$$

And this equation can be re-written as: $p(y_i; z) = \begin{cases} 1 & \text{whenever } c_i \geq k \\ 0 & \text{whenever } c_i < k \end{cases}$

Where, c_i - denotes the number of deprivations experienced by household i

k - represents a poverty cutoff point.

For identification of unidimensional poor households, a second poverty cutoff (aggregate poverty cutoffs) was used. The unidimensional (union) criterion is one of the widely used poverty identification method. This means a household is identified as unidimensional poor whenever it is deprived in any one indicator (i.e., the poverty cutoff $k=1$) (Atkinson, 2003; Alkire et al., 2015d). Such a criterion tends to register large numbers of households as poor, especially when there are many dimensions (Batana, 2008). In contrast, the intersection criterion identifies individuals as multidimensional poor only if they are deprived in all dimensions (Alkire et al., 2015d). In this case, $k = d$, and this strategy would tend to classify relatively few households as in poverty (Batana, 2008). To minimize such problems in either direction, an intermediate poverty cutoff (k) that lies somewhere between the two extremes is highly important (Alkire et al., 2015d). This intermediate poverty threshold is selected through observing the sensitivity or change of the poverty measures to various multidimensional poverty cutoffs.

5.2.3 Aggregation and Decomposition Methods

Once individual poor households are identified through the above counting methodology, the aggregation method generates a set of poverty measures (MPI) by bringing together the data on all surveyed households into an aggregate indicator of poverty (Alkire and Foster, 2011). The

headcount ratio which measures the proportion or percentage of households that are identified as multi-dimensionally poor was calculated as:

$$H = \frac{q}{n}$$

Where, H denotes the head count ratio, q is the number of households who are identified as poor according to the thresholds vector z and the cut-off k , and n represents the total population. The headcount ratio has many problems. Haughton and Khandker (2009) indicated that the headcount indexes do not consider the breadth of poverty and it does not show how poor the poor are. Thus, the headcount does not change if only already poor individuals suffered deprivation in another new indicator. Moreover, headcount ratio is not decomposable into constituent dimensions and indicators. To fix such problems, additional information on the breadth/intensity of deprivations experienced by the poor is required. Therefore, the intensity of multidimensional poverty measures the average share of weighted indicators in which poor rural households are deprived. This was calculated as:

$$A = \sum_{i=1}^n ci(k) / q$$

Where, A stands for intensity of multidimensional poverty (the breadth of poverty), and $c_i(k)$ denotes the censored deprivation score of household i . Therefore, the Adjusted Headcount Ratio, MPI , is given by:

$$MPI = H \times A$$

The MPI value summarizes information on the multiple deprivations into a single number. Alkire and Santos (2010) indicated that one of the attractive features of MPI is its decomposability by population subgroups. Given two distributions x and y corresponding to two population subgroups of size $n(x)$ and $n(y)$, the weighted sum of the subgroup poverty levels (weights referring to the population shares) equals the overall poverty level obtained when the two subgroups are merged as $n(x,y)$:

$$MPI(x, y, z) = \frac{n(x)}{n(x, y)} MPI(x; z) + \frac{n(y)}{n(x, y)} MPI(y; z)$$

Considering this description, the contribution of each group (Example, contribution of each Kebele) to overall poverty was calculated as:

$$Contribution\ of\ x\ to\ MPI = \frac{[n(x)/n(x,y)] * MPI(x,z)}{MPI(x,y,z)} * 100$$

Another quality of AF methodology is that it also allows us to breakdown overall multidimensional poverty measure to reveal the contribution of each indicator i to the overall poverty. Assume that the MPI of the District is given as:

$$MPI = w_1CH_1 + w_2CH_2 + w_3CH_3 + \dots + w_iCH_i$$

Where, w_i is the weight of indicator i , CH_i is the censored headcount ratio computed by adding up the number of people who are poor and deprived in that indicator and dividing by the total population. Therefore, the contribution of indicator i to overall poverty can be expressed as:

$$\text{Contribution of indicator } i \text{ to MPI} = \frac{w_iCH_i}{MPI} * 100$$

The dimensional contribution to overall MPI can also be obtained by adding up the MPI share of each variable within the dimension (see Alkire et al., 2015d). In general, the AF counting methodology described above was applied to the analysis of multidimensional poverty in the study District.

5.3 Results and Discussions

5.3.1 Unidimensional Headcount Ratios

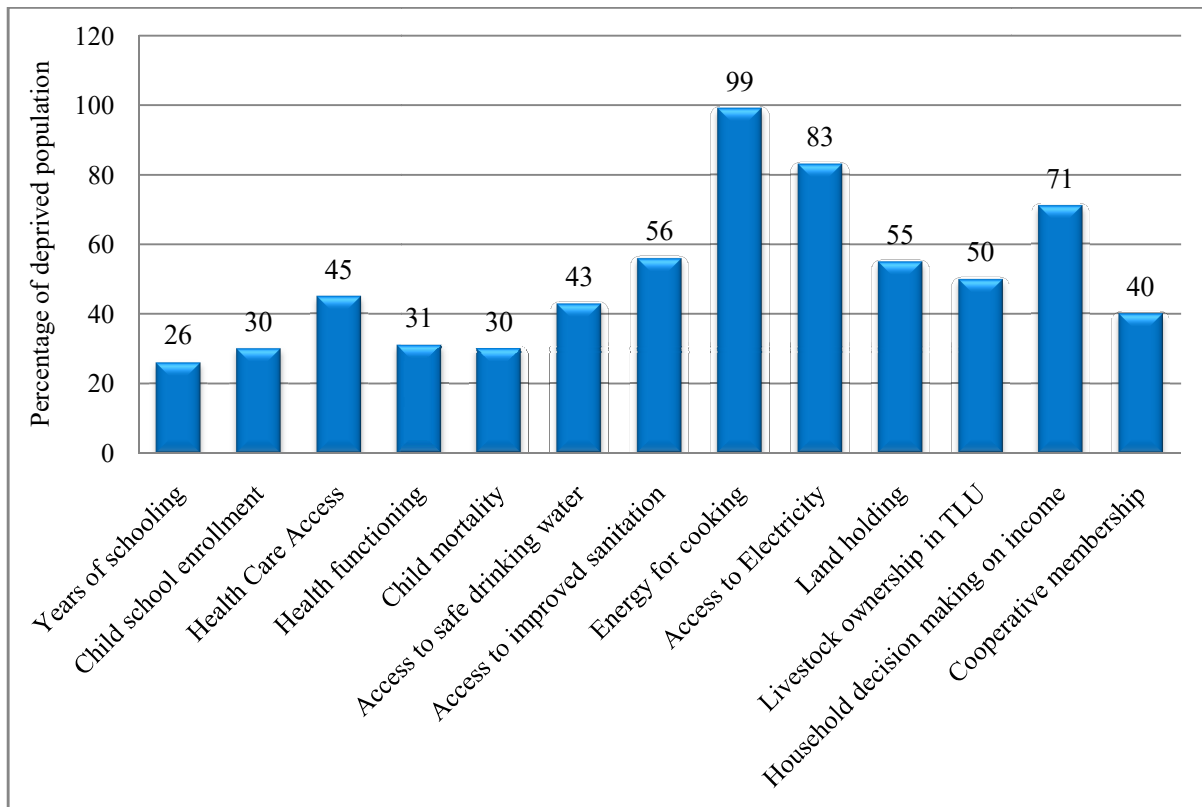
Unidimensional headcount ratios (uncensored headcount ratio) show the prevalence of a given group of households' deprivation in a single indicator, regardless of whether they are multidimensionally poor or not. It reveals the percentage of households deprived in each indicator. Figure 5.1 illustrates the first information on the fractional incidence of deprived households in education, health, living standard, wealth and empowerment dimensions of multidimensional poverty across all sampled households. All selected poverty indicators were dichotomized and given the value of '1' and '0' representing 'deprived' and 'non-deprived', respectively. Looking at the general characteristics of households' deprivation, findings shows no very low (i.e. <10%) incidence of deprivation for the whole sample. The incidence of deprivation was generally moderate (i.e. 25-55%) in years of schooling, child school enrollment, health care access, access to safe drinking water, landholding, livestock ownership, health functioning, child mortality and cooperative membership. Largest percentage of deprivation (i.e. >70%) were observed in households' decision making on income, access to electricity and energy for cooking, which suggest higher general levels of deprivation. Specifically, the description of each indicator is presented as follows.

Education is one of the fundamental necessities of human being which influence the various dimensions of poverty. Education as a human capital also affects household's skill, knowledge and wellbeing as good educational background reduce the probability of a household's poverty. Two indicators were selected to assess education dimension of poverty. Regarding the first indicator, result shows that the level of deprivation in terms of years of schooling is found to be relatively low as only 26% of households did not have at least one household member who had completed five years of schooling. This implies that majority of households benefit from the literacy level of at least one household member in their daily household interactions.

Regarding child school enrolment, majority of households (70%) were found non-deprived and their school aged children were exposed to schooling, while 30% (N=125) of households had children who were deprived of school enrolment seeing that they have at least one school-age child not currently attending school. Incidence of deprivation in this indicator curtails continuous child development and reduces the current and future capabilities of the household. More than half (55%) of child school enrolment deprived households indicated that the major reason for non-attendance is that children had to help domestic work, followed by school distance (30%), financial problems (18%), interest of the children (17%) and illness/disability(5%), in decreasing order. These two education indicators are “... *good proxy of functionings that require education: literacy, numeracy, and understanding of information*’ (Alkire and Santos, 2010, p.14) but do not show the quality of education and skills derived from schooling.

Access to improved health care service is precondition for healthy and productive lives. Health problems can disrupt sustainability of household livelihoods. Hence, access to healthcare facilities is important to enjoy better health status, lower child mortality and enhance healthy functioning. Result shows that 55% of households have access to healthcare facilities while 45% lack healthcare access in their village. This indicates that a little lower than half of households were not obtaining health treatment. This worsened health status of households through increasing time and costs associated with travelling and accommodation to obtain better medical services which in turn lead to poverty.

Figure 5.1 Percentage of households deprived in each poverty indicators



Source: Own computation, 2018

Health functioning or the overall health status of the households determines the ability to perform the regular tasks of household members. In the study area, 31% of households were deprived in health functioning in that they had experienced health problem in the past three months (from the time of interview) which limited the ability of household members to participate in household daily activities.

Another indicator of health dimension refers to whether households had experienced child mortality in the past five years. As can be seen in Figure 5.1, majority of households (70%) were not deprived in terms of child mortality, while 30% reported they had experienced it. Such incidence of deprivation shows that these tragic events disturbed households' health functioning. They resulted partially from absence of quality health care access, though most diseases that lead to child death are preventable through simple interventions such as improved water, and better sanitation and hygiene (WHO, 2014).

Easily accessible and safe drinking water supply is highly important for better health and livelihood development. Unimproved water sources can create the risk of health problems. Thus, access to clean drinking water is one of the policy priorities of Ethiopia. According to WHO (2014) and WHO/UNICEF(2006), improved water sources includes piped water close to plot or yard, protected spring, bottled water, hand pump, public standpipe, protected well, and piped water into dwelling. Unimproved water sources comprise unprotected well, cart with small tank, unprotected spring, tanker, and surface water. In this regard, household's access to safe and improved drinking water facility were found unsatisfactory. Findings revealed that only 57% of households had access to improved drinking water, while 43% of respondents obtained water from unprotected sources. Households used unimproved water for drinking, preparing food, personal hygiene and for other domestic purposes which can lead them to various water borne diseases.

Household sanitation facilities are very important factors in healthcare as they reduce the risk of illness. Following WHO (2014)and WHO/UNICEF (2006) guideline, improved sanitation facility includes flush to piped sewer system, flush to pit, bucket, pit latrine, and composting toilet. Unimproved sanitation facilities include open defecation. In this respect, results show that 56% of the study households were without access to improved toilet facility in their home. These households go out for open defecation, a practice which can cause the contamination of drinking water sources, and the spread of diseases such as diarrhea and cholera (WHO, 2014). This result is consistent with the study made by (CSA, 2017) which indicated 56% of Ethiopian rural households use unimproved toilet facilities. Only 44% of households have access to improved sanitation (i.e. pit latrine).

Another worrying finding was obtained in relation to household cooking energy. Large deprivation was observed in cooking fuel as almost all households (99%) were relying on inefficient or traditional cooking energy sources such as animal dung, charcoal, fire wood and straw which demands lots of time to gather and produces toxic emissions. This finding is similar to the study made by CSA (2012) which shows 99% of Ethiopian rural population used biomass-based energy for cooking. This might cause respiratory disease and damage to a clean and healthy environment due to higher pollution load (IEA, 2014). It is important also to note that the time burden of collecting cooking sources was predominantly demanding on women.

Concerning electricity, 83% of the total 420 randomly sampled households lack access to electricity sources. This is exactly similar to the study made by CSA (2012) which indicated 83% of Ethiopian population lack access to electricity. This is also another striking finding which prevents household members from performing a wide range of activities such as studying, refrigerating and communicating. The operation of other modern appliances such as radio and television were also limited due to lack of access to electricity.

Land and livestock were used to measure household wealth status. Land is the major and critical asset of the rural people which determines the wellbeing of households in the study area. Although land is fundamental means of realizing food security, employment and income generation in agriculture dominated economy, more than half of surveyed households that is 55% were deprived in ownership of cultivated land as they owned land below 0.66 hectare (local average). Only 45% owned cultivated land above the mean. Small landholding is a potential constraint on poverty reduction because it exposes households to the risk of low production and subsistence food access.

Livestock ownership is another indicator of household wealth as livestock are crucial means of storing wealth. It provides households with a kind of insurance against future shocks, while also fulfilling part of household's consumption and production requirements. To describe household livestock ownership, the different sizes of animal species were converted in to a common unit that is Tropical Livestock Unit (TLU). Concerning this, half of the studied households (50 %) owned TLU below the local average that is 4.

The global multidimensional poverty analysis tends to neglect the empowerment dimension of poverty in its analysis. This study used decision making and cooperative membership as two indicators of household's empowerment. Understanding who usually makes decisions in the household is important. Participatory decision making empowers all household members to make decisions on significant issues for the household. Household's decision-making process on income was considered as one important aspect of empowering equality. Results indicated that the majority (71%) of households members were deprived in decision making on income as decisions was made by only the head of the household. This implies that most household members were suffering from powerlessness in deciding on income related decisions/ aspects of the household.

Cooperatives are voluntary and independent associations of individuals joined together to satisfy their common interests. For subsistence-oriented and agrarian societies like Ethiopia, cooperative organizations can play an important role in the acquisition and distribution of improved agricultural technologies and inputs like fertilizers, pesticides and modern farm equipment, and assist in sales of agricultural produce. Such institutional innovations help farmers to solve market failures (Hazell et al., 2010), raise agricultural incomes and reduce rural poverty (Bernard and Taffesse, 2012) through inclusive development of rural households' livelihoods. In this regard, result indicates that although all households had access to cooperatives, only 60% of households were found non-deprived in terms of at least one household member in any cooperatives in their domain. 40% of households are deprived in cooperative membership. This implies that these households are not benefitting from the joint socioeconomic empowerment obtained from working together. Collectively, cooperatives empower their members through providing sustainable rural employment opportunities, credit and saving services, input supply, training and education.

5.3.2 Analysis of the Incidence, Intensity and Multidimensional Poverty Index

Households' indices of multidimensional poverty were constructed using five dimensions and thirteen indicators of deprivation. Quantifiable indicators were chosen on the basis of normative judgments and empirical evidence. Each indicator has defined deprivation cutoffs. Similar to the global MPI and HDI weighting structure, this study adopted equal weighting system as it is internationally accepted when there are no clear reasons for unequal weighting. Finally, poverty cut-off in terms of number of indicators showing deprivation was used to determine household's status of multidimensional poverty.

Redundancy due to closely correlated indicators poses some problems in poverty analysis within the multidimensional framework. Hence, before proceeding to the construction of multidimensional poverty indices, the correlation between the selected MPI indicators were assessed. The purpose of calculating MPI is to show the various forms of poverty in the study District. Hence, there should not be significant correlation between indicators. Strong correlation between any two indicators refers that those indicators do not represent independent aspects of wellbeing but similar features of poverty. Alkire and Foster (2008) suggested correlations less than 0.4 are acceptable. Accordingly, Table 5.2 contains the pair-wise correlations among the

thirteen indicators used in the MPI. As it can be seen from this Table, all selected MPI indicators have very low and weak correlation coefficients, and no correlation coefficients exceeds 0.22. This avoids the fear of highly correlated indicators. This means deprivation in one indicator is not significantly explained by deprivation in any other indicator, and the index would contain different dimensions of poverty.

Table 5.2: Spearman correlation between MPI indicators

	CSE	YS	HCA	HF	CM	ADW	AIS	EC	EL	LH	TLU	COP	DEC
CSE	1.000												
YS	0.110	1.000											
HCA	0.011	-0.024	1.000										
HF	0.049	-0.071	0.081	1.000									
CM	0.067	-0.053	0.049	0.139	1.000								
ADW	0.039	0.067	0.067	0.027	-0.069	1.000							
AIS	-0.091	-0.156	0.166	0.037	-0.014	-0.094	1.000						
EC	-0.043	0.058	-0.010	0.013	0.012	0.085	0.061	1.000					
EL	-0.016	0.208	0.171	0.065	-0.051	-0.093	0.180	0.219	1.000				
LH	0.009	-0.043	0.005	-0.061	-0.039	-0.064	0.052	-0.090	0.130	1.000			
TLU	0.095	0.125	0.085	-0.025	-0.045	0.032	-0.028	-0.001	0.072	0.006	1.000		
COP	0.060	0.139	-0.072	-0.025	0.026	-0.096	-0.015	0.029	0.087	0.044	0.056	1.000	
DEC	0.046	0.056	0.097	-0.052	-0.013	-0.068	0.036	-0.008	0.167	0.053	0.125	0.041	1.000

Note: CSE-Child School Enrollment; YS-Years of Schooling; HCA-Health Care Access; HF-Health Functioning; CM-Child Mortality; ADW Access to Drinking Water; AIS-Access to Improved Sanitation; EC-Energy for Cooking; EL- Electricity; LH-Landholding; TLU-Tropical Livestock Unit; COP-Cooperative Membership; DEC-Decision Making on Income

Source: Own computation, 2018

Table 5.3 presents the estimates of incidence of poverty (H), the average intensity of poverty (A) and the index values for MPI of study households across varied poverty cut-offs. The Multidimensional Headcount Ratio (H) shows the proportion of households that are counted as poor while the Intensity of Multidimensional Poverty (A) shows the average proportion of indicator deprivations experienced by households. One of the most important components of multidimensional poverty indices is the Adjusted Head Count Ratio (MPI) which reflects those households in acute poverty. The MPI is the product of the percentage of the households identified as poor (H) and the average percentage of the weighted indicators that poor household's experience (A). MPI is the index value for multidimensional poverty which summarizes households multiple deprivations in a single indicator.

As suggested by Alkire (2007b), Table 5.3 shows that the value of multidimensional poverty measures decreases as the poverty cutoff (k) increases. It also displays the variation in the percentage of households who are identified as poor (H), average deprivation (A) and the value for multidimensional poverty (MPI) of households given the value of $k=1, 2, 3 \dots 13$. The highest value of k (13) is equal to the number of indicators used in this study. The change in MPI, H , and A is computed under different k values and finally robust and internationally accepted value of k was selected to identify the contribution of each dimensions and indicators to MPI.

Table 5.3 also shows the sensitivity of multidimensional poverty indices to different poverty cutoffs. Deprivation in a single indicator can be compared to suffering from multiple deprivations at the same time. Looking at the percentage distribution of household deprivations, all households suffer in at least one deprivation, 99% from two, 91% from three and 73% of households suffer from four deprivations. Few households from the total sample population, i.e., 7% and 1% of households suffer from deprivations in seven and eight indicators, respectively. The proportion of households identified as MPI poor declines at an increasing rate as the number of multidimensional poverty cutoffs (k) increases up to eight. And at k equals 9 to 13, no deprived and poor households were observed i.e., all multidimensional poverty indices becomes zero. The value of MPI decreases as the percentage of deprived households declines; whereas the average intensity of multidimensional poverty increases among the households still labeled as deprived with increasing values of k .

Whenever deprivation in one indicator is taken as poverty line ($k=1$), the poverty measures follow the unidimensional approach, and can be seen as overestimating the more multidimensional headcount ratio (H) which reflects the percentage of households who experience multidimensional poverty over a given population. In this study, H has the value of 1 which implies that all studied households are deprived in at least in a single indicator. Conversely, at $k=13$, poverty measures follow an intersection approach in which a household has to be deprived in all dimensions to count as being in overall deprivation which can be seen as underestimating the amount of poverty. $K=13$ provides zero value of H indicating that no household is deprived in all dimensions. Therefore, as recommended by Alkire et al., (2015d), an intermediate poverty cutoff that lie somewhere between the two extremes is considered to reduce over or under estimation of deprived households.

Table 5.3: Change in multidimensional poverty indices at different poverty cutoffs

Aggregate poverty Cutoff Point (k)	No. of MPI poor households	% of MPI poor households	Incidence of Poverty (H)	Average Intensity of Poverty (A)	Adjusted Multidimensional Headcount(MPI) = H*A
1*	420	100	1	0.482	0.482
2	415	98.81	0.981	0.488	0.479
3	381	90.71	0.888	0.514	0.457
4	307	73.10	0.712	0.557	0.396
5	207	49.29	0.498	0.609	0.303
6	103	24.52	0.252	0.675	0.170
7	31	7.38	0.057	0.771	0.044
8	4	0.95	0.017	0.833	0.014
9,10,11,12,13**	0	0	0	0	0

Note: * refers to value of cut-off k=1 (Union approach) and ** refers to 13 (Intersection approach)

Source: Computed from own field survey, 2017

Table 5.3 also indicates that the percentage of poor households (H) and the value of multidimensional poverty (MPI) decrease as k increases from one to thirteen. Results revealed that with equal weighting system and given poverty cut-off (k) equal to 2, almost all (98%) of the surveyed households are identified as deprived with an average of 49% of the possible indicators, so that households MPI is 0.48. At k=3, the multidimensional headcount ratio was 0.89 indicating that 89% of the population were deprived in at least three of the weighted dimension indicators. Once this is adjusted with the intensity of deprivations (A = 0.51) suffered by these deprived households, the Multidimensional Poverty Index becomes 0.46 which means the multidimensionally poor households experiences 46% of the total deprivations that would be experienced if all households were deprived in all indicators. When we take deprivation in 4 indicators as poverty line (k=4), the level of poverty is still high. At this point, 71% households are identified as poor and the average deprivation score of households is 56% of all the indicators. As a result the MPI is about 0.40 and falls slightly from the values for k=2 and k=3 suggesting the significant fall in proportion of deprived households as k increases is heavily offset by increase in average number of deprived factors. However, no household is deprived in nine or more indicators so the MPI drops dramatically as k increases above 4.

One remarkable finding observed from Table 5.3 is that the value of multidimensional poverty varies across poverty cut-offs suggesting that Adjusted Headcount Ratio (MPI) value is highly

sensitive to the choice of multidimensional poverty cut-off. As k is increased above 4, the MPI score decreased dramatically. The AF methodology in the global MPI used $k=33.3\%$ of indicators as a poverty line value of k which means that if a household has above 33.3% of indicators showing deprivation then it is stated to be multidimensional poor. This means households are considered as multidimensionally poor if they are deprived in at least 33% of the selected indicators. The current study used 13 indicators and one-third of these indicators are equals to 43%. Therefore, we choose $k=4$ as a poverty score for k for this particular study to categorize households as multidimensionally poor and non-poor. Hence Table 5.4 shows the overall multidimensional poverty status of households.

Table 5.4: Poverty incidence, intensity and MPI (at $k=4$)

Poverty Cutoff (k)	Poverty Indices	Value	Std.Err	Confidence Interval (95%)	
$k=4$	Adjusted Multidimensional Headcount (MPI) = $H \cdot A$	0.351	0.014	0.323	0.380
	Incidence of Poverty (H)	0.602	0.024	0.556	0.649
	Average Intensity of Poverty (A)	0.583	0.006	0.572	0.595

Source: Computed from own field survey, 2017

Table 5.4 presents the value of H , A and MPI at poverty cut-off (k) value of 4, that is, requiring the poor to be deprived in approximately one-third of the weighted indicators to declare multidimensional poor. The value of H is 0.60 which means about 60% of studied rural households are poor when deprivation in four indicators are needed to declare a household is multidimensional poor. Household's average intensity of multidimensional deprivation, which shows the share of deprivations each poor household's experiences on average, is 58%. Given that MPI is both the product of A and H , it gives an index value of 0.351. This means the multidimensional poor households in the study District experience 35% of the total deprivations that would be experienced if all households were poor and deprived in all selected indicators of poverty. Although this finding shows a severe multidimensional poverty situation in the study District, it is largely lower than the MPI reported by OPHI (2018) which shows 55% of Ethiopian rural population was multidimensionally poor in 2016. The OPHI reported headcount ratio (92.2%) and average share of deprivations of the weighted indicators poor households

experienced at the same time (59.6%) is also higher than the District estimates. The MPI of each study Kebeles were also lower than the MPI of Ethiopian rural areas (i.e., 0.55) estimated by OPHI, which implies the multidimensional poverty in the study area is less severe than the wider rural Ethiopia (MPI for each Kebele is shown in Table 5.6).

As can be seen in Table 5.5, using deprivation in at least one-third of the weighted indicators as a poverty cutoff, households poverty status were grouped in to two categories, and findings revealed that higher proportion of households (60%) were classified as multidimensionally poor, while 40% of households found multidimensionally non-poor. This shows that greater parts of surveyed households are suffered by acute multidimensional poverty as they are deprived in a basic and multiple human services and functionings. Households are suffered by multiple deprivations in education, health, living standard, wealth and empowerment dimensions of wellbeing. Such severe deprivation in these dimensions led to functioning failure and low quality of life which in turn leads to higher incidence and intensity of multidimensional deprivation of poor households. Although prior study on multidimensional poverty in the study District is not found, this finding is largely higher than the official poverty report of Ethiopia which is 29.6% (World Bank, 2015).

Results on Table 5.5 also show that the overall multidimensional poverty in the study District is high with significant variation across Kebeles. The distribution of poverty across the six Kebeles shows that the percentage of multidimensionally poor households in Simret, Selam, Walta and Michael Abiy is very much higher than non-poor households in these study Kebeles. For example, a very higher proportion of multidimensional poor households live in Selam (76%) and Walta (76%). This was followed by Simret (63%) and Michael Abiy (55%), in decreasing order. The result also shows that higher percentage of households from Arebay (65%) and Mizane Birhan (51%) was multidimensional non-poor. In general, this result shows that the distribution of poverty in the study area is deep and complex.

Table 5.5. Percentage distribution of households by multidimensional poverty status (k=4)

Kebele	Multidimensional Non-poor		Multidimensional Poor		Total	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Simret	34	37	58	63	92	100
Selam	14	23.7	45	76.3	59	100
Arebay	34	65.4	18	34.6	52	100
Walta	19	24.4	59	75.6	78	100
Michael Abiy	34	44.7	42	55.3	76	100
Mizane Brhan	32	50.8	31	49.2	63	100
Total	167	40	253	60	420	100
Pearson Chi-square (χ^2) statistic= 32.6002 Pr = 0.000						

Source: Own computation, 2018

Pearson chi-square statistic, a non-parametric test, was used to determine whether the existing variation in multidimensional poverty status across different study Kebeles were statistically significant. The overall Chi-Square statistics ($\chi^2 = 32.6$, Pr=0.000) which compare the poor and non-poor households distribution across study Kebele shows that there is substantial and statistically significant difference in multidimensional poverty status across poor and non-poor groups in each study Kebeles.

5.3.3 Censored Headcount Ratio

A uni-dimensional deprivation headcount ratio does not reflect the complex deprivations of poor households because some households might be deprived only in a single indicator (Alkire and Santos, 2010). Households who experienced deprivations in several indicators are poorer than those who are deprived in a single indicator. Hence, the censored deprivation headcount ratio would give us additional and more precise information about the nature of deprivation. This means censored headcount shows the proportion of households who are poor and deprived in each indicator. Poverty indicators with higher censored headcount ratio are higher drivers of multidimensional poverty. Such data is helpful for policy analysis in finding effective ways to prioritize key indicators for the poorest people to reduce the degree of deprivation and guide policy makers on where to put limited public resources.

Figure 5.2 provides graphical illustration of the percentage of households who are multidimensional poor and deprived in each wellbeing indicator. The overall censored headcount

ratio of households in the study District is extremely high implying that household's multidimensional poverty is acute. Findings shown from the figure revealed that deprivation in energy for cooking exhibits the highest deprivation level among the surveyed households as 60% of them are multidimensional poor and are also deprived in cooking energy. Fire wood, dung and crop residues are the major fuel resources of households and these are sometimes collected over a long distance. This is striking result which shows poor households share a challenge in meeting their basic fuel consumption. They relied on inefficient and polluting sources of fuel. Second largest censored headcount ratio is observed in electricity as about 55% of the population is multidimensionally poor without access to electricity. Lack of access to electricity for lighting, production, communication and cooking reduces economic growth and welfare.

Households are a building block of a society where various livelihood decisions are made. Hence participation in household's decision-making processes on income is very important for empowering members as it reflects the actual use of household member's capacity to plan livelihood activities. However, 51% of the population live in multidimensional poor households and suffer from lack of control and participation in household decision-making on income generated from different sources such as crops, livestock and non-farm activities as decisions are made by the household head. This suggests half of the population are poor and have high incidence of gender disparity in household's decision making which stifled household member's autonomy, and compromises the concept of equality, thereby portraying disempowerment of women and other household members.

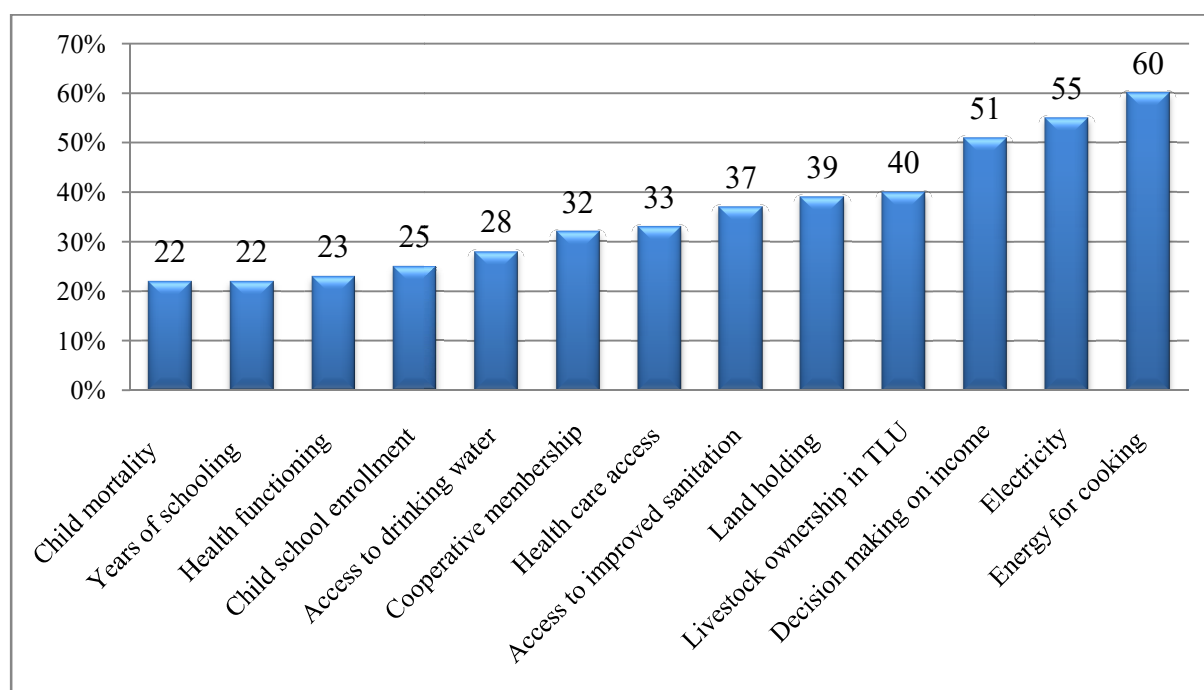
Livestock production is an integral part of agricultural system in the study District as more than 85% of studied households keeps livestock though the multidimensional poor who are deprived in terms of TLU make up 40% of the total households. This is also a significant indicator of poverty as livestock production and development is the major economic activity of households in the study District next to crop production. Another discouraging headcount ratio result was obtained in landholding. 39% of the population lives in a household that has been identified as poor and deprived as they have cultivated size of land below the local average. This aggravates rural poverty because land as productive asset is the basis for food, income and employment security in particular and livelihood/socioeconomic development in general for rural people.

The figure also shows that of the total population, 37% and 28% of households are multidimensionally poor and suffer from poor access to improved sanitation and potable drinking water services, respectively. The poor have low sanitation services with unsafe disposal of human waste and this have direct or indirect impacts on the health of households and communities. These poor households rely on subsistence activities and may not be able or willing to spend on latrine construction though they may understand the importance of having improved sanitation facility. They may prefer to secure basic necessities such as food rather than spending on a latrine. In addition to this, the poor is affected by unsafe drinking water sources such as unprotected well, unprotected spring and surface water which are probably the leading causes of diseases in the study area. Qualitative data obtained also indicated that many people are encountering sickness and death from easily preventable disease causing diarrhea because of using unsafe drinking water. This also forced poor households to divert their low income towards medication. Absence of health care access aggravates the situation where households are expected to travel a long distance to get medical services.

The graphic illustration of the censored headcount ratios also show that 33% of the $k=4$ population live in poverty and do not have healthcare access. And 32%, 23% and 25% of the population live in multidimensional $k = 4$ poor households and are deprived of cooperative membership, have members unable to pursue household activities due to health problem, and have any school non-enrolled child, respectively. Note that lowest levels of deprivation were observed in years of schooling and child mortality. 22% of the population are identified as $k = 4$ poor households and do not have anyone who has completed five years of schooling, and 22% live in poor households that experienced infant mortality in the last five years. These results provide insights to the focus areas for intervention in reducing multidimensional poverty in the study District.

Although the overall censored headcount ratio observed in each multidimensional poverty indicators are high, the result for years of schooling, child school enrollment, child mortality, access to electricity, sanitation, water, and cooking fuel is significantly lower than the censored headcount ratio of these deprivation indicators observed in 2011(Alkire and Santos, 2011) and 2016 (Alkire and Kanagaratnam, 2018).

Figure 5.2: Censored headcount ratios for k = 4 poor households



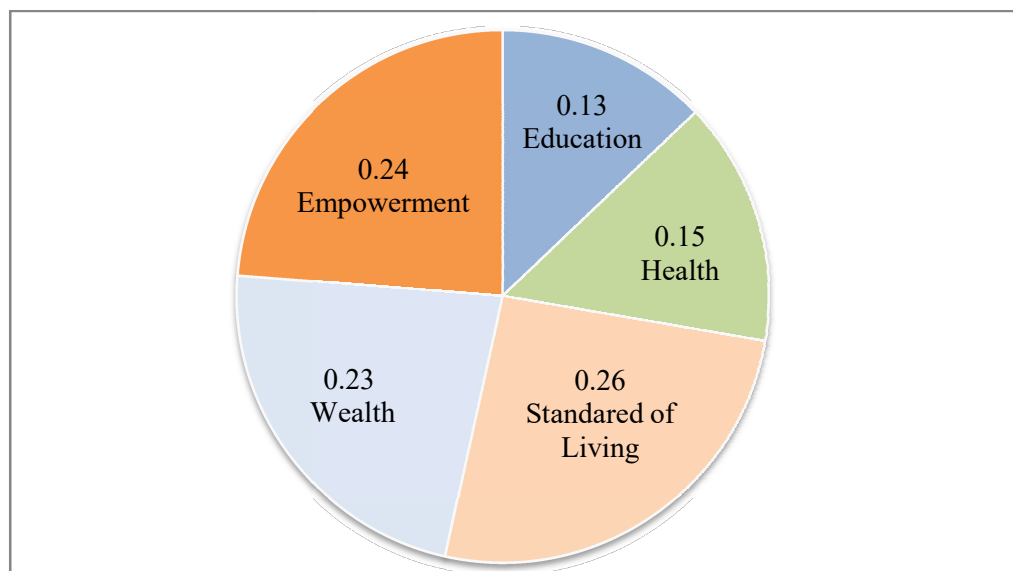
Source: Computed from own field survey, 2018

5.3.4 Dimensions and Indicators Contribution to Overall Adjusted Headcount Ratio

The adjusted headcount ratio can be decomposed into wellbeing dimensions to assess how the overall multidimensional poverty is influenced by the deprivations in each dimension. The share of each dimension to the overall adjusted headcount ratio was computed by summing the share of each indicator of each dimension to adjusted headcount ratio. As shown in figure 5.3, the highest contributor to MPI was standard of living that contributes 26% of overall multidimensional poverty. This shows that the selected living standard indicators that is access to safe drinking water sources, access to improved sanitation, fuel used for cooking and access to electricity were quite relevant for the overall multidimensional poverty and the result of deprivation in this wellbeing dimension make the life of the rural households difficult. The larger share of the standard of living dimension to overall MPI in the study District shows that households lack the basic infrastructural services that support welfare. The weight given for living standard indicators is lower than other wellbeing indicators as the dimension value (1/5) is equally divided to its four indicators. However, this dimension exhibits relatively higher percentage of poverty and deprivation contributions. This was followed by empowerment dimension of poverty which contributes 24%. Wealth dimension was found as the third larger

contributor as it accounted 23% of the overall poverty while deprivation in health and education dimensions accounted 15% and 13%, respectively.

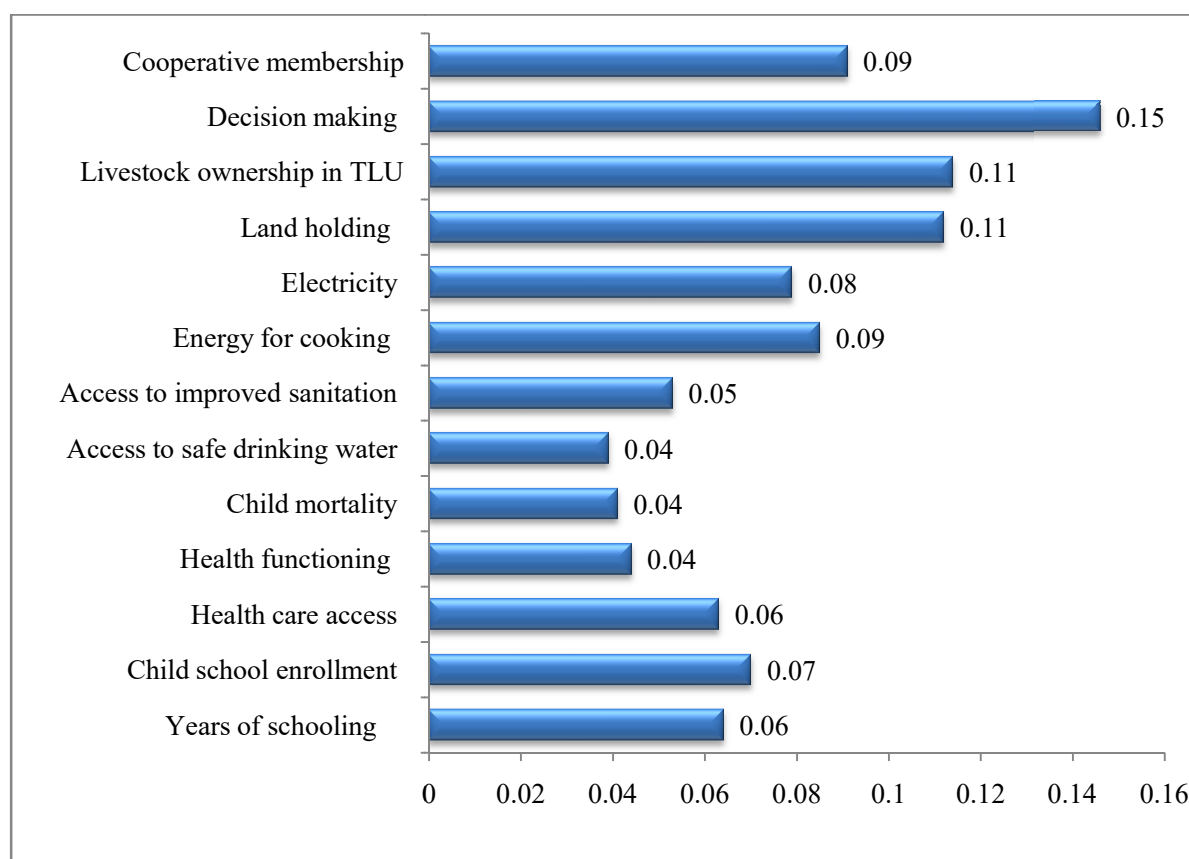
Figure 5.3 Dimensional contributions to MPI



Source: Computed from own field survey, 2018

Regarding the percentage contribution of each of the thirteen indicators, the overall adjusted headcount ratio was decomposed for each indicator to assess the lowest and the highest contributor to poverty of households in the study District. Figure 5.4 revealed that deprivation in households decision making on income which accounted 15% of the total MPI was found the larger contributor followed by deprivation in livestock ownership (11%), landholding (11%) and cooperative membership (9%), in decreasing order of importance. The graph also shows that the next largest contributor to total multidimensional poverty were energy for cooking (9%) followed closely by electricity (8%), then child school enrolment (7%), years of education (6%), healthcare access (6%) and access to improved sanitation (5%), in decreasing order. Lastly, deprivation in health functioning, child mortality and access to safe drinking water was found the least contributors to overall value of multidimensional poverty.

Figure 5.4: Indicators contributions to overall MPI



Source: Computed from own field survey, 2018

Generally, Alkire and Santos (2011) indicated that if the contribution of each wellbeing indicator to overall multidimensional poverty become above their weight, it reflects that the study households are highly deprived in these indicators. Hence, the poor households in the study District are more deprived in decision making on income, livestock ownership, cultivated size of farm land, and energy for cooking and access to sanitation services than in other indicators. These indicators contribute more to multidimensional poverty above their weight.

5.3.5 Profiles of Households Multidimensional Poverty

5.3.5.1 Decomposition of Poverty Indices by Agro-ecology and Kebele

Decomposition is one of the most important characteristics of Alkire and Foster Methodology that enables us to breakdown and analyzes subgroups multidimensional poverty. Poverty decomposition by Kebele and agro-ecology has been made to identify which location is affected by high incidence of deprivation. The analysis shows the proportion and incidence of

multidimensional poverty varies significantly across all agro-ecologies and Kebeles at 1 percent level of significance.

Table 5.6 displays the absolute value and distribution of the poverty indices in each agro-ecology and Kebele with respect to their population share. Results indicated that 34% of the total population was found in Qolla agro-ecology while 40% and 26% of the population was from Woinadegu'a and Degu'a agro-ecology. It is observed that Qolla records significantly higher incidence of poverty (H) with as many as 64% of household in poverty, followed by Woinadegu'a agro-ecology, where 60% of households are deprived in 1/3 of the weighted MPI indicators. Lowest poverty incidence was observed in Degu'a agro-ecology where 57% of households are poor. Although all recorded high poverty level, comparatively the lowest headcount ratio in Degu'a agro-ecology is probably because it is located near Hageresalam (the capital of the District), where households can engage in various non-agricultural economic activities.

The overall value of multidimensional poverty (MPI) is also significantly higher in Qolla (39%) followed by Woinadegu'a agro-ecology with 34% MPI poor households. Degu'a agro-ecology is ranked third in terms of MPI score of 0.32 which means households in Degu'a agro-ecology are deprived in 32% of the total potential deprivations it could experience overall. However, there is relatively large population share in Woinadegu'a. Ignoring the population share, the percentage contribution of each agro-ecology shows that the larger that is about 38% of the overall value of adjusted headcount ratio is attributable to Woinadegu'a followed by Qolla (37%) and Degu'a (24%) agro-ecology.

Like poverty distribution across all agro-ecological zones, all poverty indices were not evenly distributed across studied Kebeles. Mapping the total MPI and the percentage contribution of each Kebele shows that the highest prevalence of multidimensional poverty value was observed in Walta (47%) followed by Selam (45%) and Simret (37%), in decreasing order. This result is above the study District MPI of 0.35. The major reason for the high MPI value in Walta and Selam is probably due to the fact that higher proportion of households possesses a very small plot of land compared to other study Kebeles. Particularly, Walta is an isolated area and found at far distant from the District center (24.3km from Hageresalam) which has limited access to different economic resources and infrastructural facilities such as education, health and market.

About 30% and 29% of households in Michael Abiy and Mizane Birhan was also found to be MPI poor. Finally, Arebay contribute relatively less MPI (18%) and low population share as compared to other study Kebeles. Deprivation in decision making in household income contribute the most to MPI in all studied Kebeles. Next to this, the high MPI in Walta was contributed by years of schooling and size of land (12% each). Deprivation in size of cultivated land was the major contributor to multidimensional poverty in Selam (14%) and Arebay (11%) while TLU (14%) was the larger contributor to Simret MPI. With a contribution of 13%, lack of at least one household member who joins a cooperatives organization is the higher contributor to Michael Abiy and Mizane Birhan Kebeles multidimensional poverty.

Table 5.6: Agro-ecology and Kebele wise decomposition of poverty indices

Indices by agro-ecology (absolute) at pop. share (%)				Contr. of agro-ecology to indices (%)		
Agro-ecology	MPI	H	Pop. Share	Agro-ecology	MPI	H
Qolla	0.39	0.64	0.34	Qolla	0.37	0.36
Woinadegu'a	0.34	0.60	0.40	Woinadegu'a	0.38	0.40
Degu'a	0.32	0.57	0.26	Degu'a	0.24	0.25
Total	0.35	0.60	1.00	Total	1.00	1.00
ANOVA P-value = 4.67***						
Indices by Kebele (absolute) at pop. share (%)				Contr. of Kebele to indices (%)		
Simret	0.37	0.63	0.22	Simret	0.23	0.23
Selam	0.45	0.76	0.14	Selam	0.18	0.18
Arebay	0.18	0.35	0.12	Arebay	0.06	0.07
Walta	0.47	0.76	0.19	Walta	0.25	0.23
Michael Abiy	0.30	0.55	0.18	Michael Abiy	0.16	0.17
Mizane Birhan	0.29	0.49	0.15	Mizane Birhan	0.12	0.12
Total	0.35	0.60	1.00	Total	1.00	1.00
ANOVA P-value = 11.85***						

Note: *** Significant at 1%

Source: Computed from own field survey, 2017

Regarding the proportion of population that is poor (H), Selam and Walta score the highest proportion of poor (76% each) followed by Simret (63%). Arebay were found with the lower proportion of poor that accounted 35%. Generally, Walta and Arabay were the two study Kebeles which were attributed higher and lower proportion of multidimensional poor households, respectively. The percentage contribution of each Kebele to multidimensional poverty indices is also presented in Table 5.6 without considering the population share. Referring

to this, Walta was also the larger contributor (25%) to MPI followed by Simret (23 %) and Selam (18%). Michael Abiy, Mizane Birhan and Arebay contribute about 16%, 12% and 6% to total multidimensional poverty in decreasing order.

5.3.5.2 Decomposition of Poverty Indices by Socioeconomic Characteristics

Poverty indices decomposition by various demographic and socioeconomic indicators is highly important to identify the characteristics of the poor and answer ‘who the poor are’ in the study District. This trait is extremely important for targeting purposes as the information obtained from breaking the adjusted headcount ratio is useful to know which population group has higher proportion of overall poverty and help development planners to direct public budget and efforts among the different Kebeles. It also shows the extent to which the various groups of households are affected by multidimensional poverty. Therefore, having assessed the multidimensional poverty status among households, the poverty measures were also further considered along with the various household’s characteristics. Table 5.7 presents the results of indicators specific aggregated poverty measures along with population share. Indicators such as gender, age, education and health status of household head, household size, size of land, TLU, vocational training, credit utilization, application of improved seeds and market access were used to decompose multidimensional poverty indices.

Result in Table 5.7 shows the existence of statistically significant gender disparity (at 1 percent level of significance) in the decomposed poverty indices. 80% of the studied population comprises male headed households. In this case, the incidence of poverty (H) is higher (69%) for female-headed households as compared to male headed households (58%). Additionally, decomposition of poverty by gender of household heads shows that 42% of the population live in female-headed households and are multidimensional poor (MPI) while only 33% of male headed households are multidimensional poor. This shows that female-headed households are significantly more likely to be MPI poor than male counterparts. This result is contradicted with the study made by Mekonnen and Heshmati (2016) which found higher incidence of multidimensional poverty for male-household heads in Ethiopia. When we disaggregated multidimensional poverty measures by age, result shows that household heads with age below the mean (50 years) have higher proportion of poverty (H) (65%) as compared to these who have age above the mean. This was also reflected in the value of multidimensional poverty as 38% of

household heads whose age below the mean are found MPI poor, with significant difference at 10 percent level.

Table 5.7: Decomposition of poverty indices by socioeconomic characteristics

Characteristics	Category	H	MPI	Pop. Share	P-value
Head gender	Male	0.58	0.33	0.80	8.54***
	Female	0.69	0.42	0.21	
Heads age	Below average	0.65	0.38	0.54	3.32 *
	Above average	0.55	0.32	0.46	
Head education	No formal education	0.61	0.36	0.50	0.9
	Primary	0.60	0.35	0.43	
	Secondary	0.57	0.31	0.07	
	Tertiary	0.00	0.00	0.01	
Household size	Small	0.71	0.43	0.20	5.44***
	Medium	0.58	0.34	0.72	
	Big	0.49	0.27	0.08	
Head health	Poor	0.45	0.26	0.05	3.77 **
	Medium	0.65	0.39	0.34	
	Good	0.59	0.34	0.61	
Training	Yes	0.58	0.34	0.69	2.98 *
	No	0.65	0.38	0.31	
Size of land	< local average	0.72	0.43	0.55	54.66***
	≥ local average	0.46	0.26	0.46	
TLU	≥ local average	0.40	0.22	0.51	114.11***
	< local average	0.81	0.48	0.50	
Credit utilization	Yes	0.62	0.36	0.58	1.18
	No	0.57	0.34	0.42	
Improved seed	Yes	0.55	0.32	0.52	11.60 ***
	No	0.66	0.39	0.48	
Market access	Yes	0.56	0.32	0.70	23.13***
	No	0.71	0.43	0.31	

Note: ***significant at 1%, **significant at 5%, and *significant at 10%

Source: Computed from own field survey, 2017

ANOVA test on household size shows that there is a statistically significant difference (at 1 percent level) between the different groups in multidimensional poverty indices. Larger multidimensional poverty (43%) and proportion of poor (71%) was exhibited in those households having fewer household members (≤ 4) although the represented population share is

small (20%). The reason for high poverty among these households is probably because of lack of economically active household labor which can pursue household activities. 58% of the medium size households (≥ 5 to ≤ 8) are identified as poor (H), and 34% of this household category was MPI poor. Households with big family size had proportionately low poverty status although they have small population share.

Education of farmers is an important factor to improve rural household's wellbeing through enabling farmers to adequately utilize modern agricultural technologies available to them. However, looking at education level of household heads, no significant difference were observed in multidimensional poverty across the various level of household heads formal education. Examining poverty by vocational training shows that households who had not training has larger proportion of poor (65%) and value of multidimensional poverty (38%), while households who take any type of vocational training have lower multidimensional poverty status with statistically significant difference (at 10 percent level) though there is significant difference in their population share.

Decomposition of poverty occurrence by household head health status shows that heads with medium health status have larger poverty incidence (65%) and adjusted headcount ratio (39%). However, 61% of household heads H and MPI value were 0.59 and 0.34, respectively. This means 59% of household heads with good health status are multidimensional poor (H) and at the same time 34% of this household heads are MPI poor.

Poverty seems to be closely associated with asset endowment. Land and livestock holding are considered an important socioeconomic asset of the rural people. Households with average cultivated land size below the study District average has higher incidence of poverty (72%) and value of multidimensional poverty (43%) as compared to those who possess cultivated land greater or equals to local average, with statistically significant difference (at 1 percent level). Likewise, households who have livestock ownership in TLU less than local average has significantly higher poverty status in both poverty measures (H and MPI) as compared to the households who owned TLU greater than or equals to local average (i.e, 4) with significant difference (at 1 percent level).

Unexpectedly, no statistically significant difference in H and MPI were observed between households who have used credit and those who did not take credit in the past five years from the time of survey. This could be probably due to the fact that either the amount of credit was inadequate or borrowed for non-productive purposes. Findings also revealed that households who did not use improved seeds in the last cropping season shows significantly larger value of H and MPI as compared to non-users, at 1 percent significance level. Finally, households with no market access have large proportion of poor (H) and MPI though their population share is small as compared with these who have access, with significant difference (at 1 percent level).

5.4 Summary

The objective of this chapter was to estimate and discuss the incidence, intensity and multidimensional poverty of households in the study District. The raw and censored headcount ratio was also assessed. Furthermore, household multidimensional poverty profile was depicted using demographic and socioeconomic indicators which are relevant for policy action. Multidimensional measurement methodology of Alkire and Foster (2007, 2011) was used to estimate household poverty. The merit of using this methodology is that it avoids the limitations of poverty measurement and estimation using unidimensional approach i.e., income and consumption. The MPI was computed using five broad wellbeing dimensions (i.e., education, health, living standard, wealth, and empowerment) and thirteen measurable indicators; livestock ownership, land ownership, cooperative membership, cooking fuel, electricity, child school enrollment, years of schooling, health care access, access to improved sanitation, health functioning, child mortality, access to drinking water and decision making on income.

Therefore, looking at the raw headcount ratio the study found that the deprivations are highest in cooking fuel (99%), followed by access to electricity (83%), decision on income (71%), access to improved sanitation (56%), and land ownership (55%), then livestock ownership (50%). The least raw headcount ratio was found in years of schooling (26%). Censored headcount ratio which shows the percentage of people who are poor and deprived in each indicator shows that higher level of poverty and deprivation were also found in cooking energy (60%), electricity (55%), decision making on income (51%), TLU (40%) and land size (39%). Relatively small censored headcount ratios were found in both years of schooling and child mortality (22% each). Taking deprivation in one-third of the weighted indicators as poverty threshold, 60% of the

population become poor (H). The average proportion of deprivations experienced by poor people is 58%. When adjusted with this poverty intensity, 35% of the population becomes MPI poor.

Contribution of each indicators to MPI also shows that deprivation in household's decision making on income was found the larger contributor, followed by deprivation in livestock ownership, landholding, cooperative membership, and then energy for cooking. Deprivation in access to safe drinking water was the least contributor to overall value of multidimensional poverty. If aggregated by dimensions, the largest contribution is due to standard of living which contribute 26% to overall multidimensional poverty (MPI), followed by empowerment dimension of poverty which contributes 24%. Wealth dimension was the third larger contributor (23%) while deprivations in health and education dimensions contributed 15% and 13%, respectively.

Poverty decomposition by agro-ecology and Kebeles shows that the overall value of multidimensional poverty (MPI) is higher in Qolla agro-ecology followed by Woinadegu'a and Degu'a. Highest Kebele MPI was observed in Walta followed by Selam, Simret, Michael Abiy and Mizane Birhan. Arebay have relatively low MPI compared to other study Kebeles. Poverty decomposition by socioeconomic characteristics shows that female-headed households, household heads with age below the mean, household with small size, households who had not training, head with medium health status, households with land size below the study District average, households with less than local average TLU, households who did not used improved seeds, and households with no market access have large proportion of poor and multidimensional poverty in the study District.

Chapter Six

Determinants of Household Multidimensional Poverty in Degu'a Tembien District

6.1 Introduction

Chapter four of this study attempted to assess asset capacity and structure of studied households. Following this, households' multidimensional poverty status was assessed using five wellbeing dimensions in the previous chapter. The analysis provides important information on the contemporary discussions on poverty and its measurement in developing countries like Ethiopia. Results of chapter five revealed that there is a significant degree of household's multidimensional poverty which impedes socioeconomic developments of studied households. Analysis of poverty decomposition by household's location and socioeconomic characteristics also shows significant variation in overall poverty incidence. This result raises two essential questions. These are: What are the major determinant factors of households' multidimensional poverty in the study District? Which indicators have the decisive marginal effect as determinants of multidimensional poverty?

Although various more aggregated studies have been conducted in Ethiopia, understanding the local level determinants and constraints of poverty is important to address the complicated problem of rural poverty through designing site specific development interventions. Furthermore, various studies have investigated the relationship between poverty and households' socioeconomic and demographic characteristics in Ethiopia, but usually only employ income or consumption indicators. Such analysis is important but lead policy makers to focus on increasing income which is a single dimension of poverty. However, as Sen (2005) indicated, without having adequate and balanced policy on various poverty dimensions such as health, education and social protection, people would not have valuable capability opportunities to realize various functionings. Therefore, grasping and documenting the factors that determine rural household's multidimensional poverty in the study District is important to provide additional insights for multidimensional poverty reduction effort.

The remaining sections of this chapter are organized as follows. Section 6.2 presents brief description of the model used to estimate household's multidimensional poverty. Section 6.3

defines the variables used in the estimation. In section 6.4, results of the logistic regression diagnostic tests are briefly presented. Section 6.5 discusses the empirical results of the study and these are summarized in section 6.6.

6.2 Modeling Correlates of Multidimensional Poverty

Given the unit of analysis is a household, the censored deprivation scores, c_i are highly important to identify multidimensional poor and non-poor households (Alkire et.al, 2015e). All households are assigned a deprivation score in all selected multidimensional poverty indicators. A deprivation status score of 1 is assigned if the household is deprived in any indicator and a status score of 0 is given otherwise. This process is called censoring the deprivation score of households (Alkire et.al, 2015d). According to the Alkire and Foster (2007, 2011) methodology, if the deprivation score c_i of a household is equal to or greater than the multidimensional poverty cutoff ($k=4$), i.e., 33% of the weighted indicators, the household is considered multidimensionally poor. This is expressed by a dummy variable (y_i) that takes the value of 1 if the household is identified as multidimensional poor and 0 otherwise, as follows:

$$y_i = \begin{cases} 1 & \text{if the household is multidimensionally poor } (c_i \geq k = 4) \\ 0 & \text{otherwise} \end{cases}$$

Therefore, after categorizing households as multidimensionally poor and non-poor using y_i , we can employ binary logistic regression to explore the major determinants of multidimensional poverty among rural households in the study District. The application of logit analysis is preferred because it is a standard method of analysis when the outcome variable is dichotomous (Hosmer and Lemeshow, 2000). Many authors (see Gujarati, 2004; Gill, 2001; Hardin and Hilbe, 2001) noted that there exist hardly any difference between logit and probit model since they provide similar inferences. However, logistic regression is preferred due to its comparative mathematical simplicity and easy interpretability (Gujarati, 2004). Thus, logistic regression is chosen to analyze major determinant factors of household multidimensional poverty. Following Gujarati (2004), the cumulative (logistic) distribution function is given as:

$$P_i = E(Y=1|X_i) = \frac{1}{1 + e^{-(\alpha + \beta_i X_i)}} \dots \dots \dots \text{equation 1}$$

Where, P_i - is the probability that household i ($i= 1,2,3,\dots,n$) is multidimensionally poor given X_i
 X_i is the i^{th} explanatory variables

e is the base of natural logarithms, which is approximately equal to 2.718

α is constant of the logistic regression equation

β_i are unknown regression coefficients interpreted as marginal changes of the logit due to a one unit change in X_i .

For simplicity, we can write equation 1 as,

$$p_i = \frac{1}{1+e^{-Z_i}}, \text{ where } Z_i = \alpha + \beta_i X_i$$

The probability that a given household is multidimensionally non-poor is given as

$$1 - p_i = \frac{1}{1+e^{Z_i}} \dots \dots \dots \text{equation 2}$$

Therefore, odds ratio in favor of being multidimensionally non-poor is given as

$$\frac{p_i}{1 - p_i} = e^{Z_i} \dots \dots \dots \text{equation 3}$$

Taking natural logarithm, equation 3 can be rewritten as

$$L_i = \ln\left(\frac{p_i}{1-p_i}\right) = Z_i = \alpha + \sum_{i=1}^n \beta_i X_i + \mu_i \dots \dots \dots \text{equation 4}$$

Where,

- L_i is the logarithm of the odd ratio which is assumed linear for both variables and parameters
- Z_i is a function of independent variables
- p_i is the probability of being multidimensionally poor
- $1 - p_i$ is the probability of being multidimensional non-poor
- μ_i denotes the disturbance term

Therefore, the probability of households being multidimensionally non-poor depends on a set of indicators denoted as X . Finally, marginal effects after logit model were estimated.

According to Hyeoun-Ae (2013), logistic regression doesn't make many of the assumptions of ordinary least squares regressions such as normality, homoscedasticity, or linearity of the predictor variables within each category of the predicted variable. It can also handle non-linear relationships between the predicted and predictors, as it applies a nonlinear log transformation of the linear regression. The error terms do not need to be multivariate normally distributed—although multivariate normality yields a more stable solution. The variance of errors can be

heteroscedastic for each level of the explanatory indicators. Logistic regression can also handle both continuous and categorical data of predictors. However, as it is indicated by Bewick et al., (2005), proper coding of predicted variable, low correlation among the independent variable (little or no multicollinearity), linearity in logits (linear relationship between the independent variable and the log odds), and adequate sample for reliability of the estimation are highly demanded assumptions. Therefore, various diagnostic tests were conducted to check the robustness of the model. The variables used in the logistic regression are described as follows.

6.3 Variables Used in the Estimations

6.3.1 Dependent Variable

Household's multidimensional poverty status is the dependent variable of the estimation and is a binary outcome which takes the value of 1 if households are multidimensionally poor and 0 otherwise. The value of the adjusted head count ratio (MPI) for a poverty cutoff k equals to one-third of the weighted indicators (i.e, $k=4$) were taken as the poverty threshold to categorize households as multidimensionally poor or non-poor (see Table 5.4 of chapter 5).

6.3.2 Explanatory Variables

Age of household head: This is a continuous variable, defined as the household heads age at the time of interview measured in years. Haile et al., (2005) indicated that older household heads have stable economy as a result of their good knowledge, skill and experience in various agricultural activities. They also indicated that older household heads have better access to land than younger heads while the younger heads are expected either to share with families or wait for land distribution. Contrary to this, Babatunde (2007) marked that younger heads of households are strong and may be able to cultivate large farm lands. Gang et al., (2004) adds that the saving, income and productivity of household heads declines as their ages become older. Hence, this study hypothesized that age of household heads has either positive or negative impact on poverty status of respondents.

Size of the household: Household size is a continuous variable which refers to the number of individuals living in the household and share common kitchen. Anyanwu (2012) indicated that large households are associated with poverty while Aniceto (2005) asserted there is a negative relationship between large family size and incidence of poverty. Nevertheless, it is expected that

household size affects the dependent variable positively if larger household size refers to more working force and negatively if it implies higher dependency ratio.

Dependency ratio: Dependency ratio is a continuous variable computed as the number of dependents in a household (aged between 0 to 14, and aged 65 and older) divided by the number of working age groups (15 to 64). Higher dependency ratio means the household faces burden of dependents of non-economically active members which is difficult to support children and aging population and thus high dependency ratio positively associated with greater poverty due to the fact that household with more dependents or non-working members tends to exert more pressure on household resources and likely to have less welfare.

Access to non-household labor: Access to non-household labor is a dummy variable which refers to the presence of non-household workers who provide their labor on payment to pursue various household activities such as farm and non-farm tasks. Farm production demands high labor investment. Given the high demand for labor in crop production and in the absence of adequate household labor, households need to employ non-household labor. Therefore, it is proposed that having access to non-household labor reduces poverty status of households.

Household annual income: Income is an important means of achieving a wide range of livelihood objectives such as food, health, and education. In this sense income is a means to address a number of important dimensions of poverty. Household income refers to the combined income of the households obtained from farm and non-farm activities that are expressed in Ethiopian Birr per year. Households with higher income would have low probability of being multidimensionally poor. Hence, negative relationship is expected between household income and household multidimensional poverty status.

Contact with agricultural extension agents: Agricultural extension services assist farmers to build their capacity to improve their productivity and wellbeing through the dissemination of knowledge, information and technologies. Gregory and Sewando (2013, p.740) indicated that extension services “... *catalyze awareness, organization, exchange information and technology adoption among farmers*” thereby enhancing productivity and income. Hence, it is assumed that households who had extension contact during their production process are expected to increase agricultural productivity and diversify their income sources thereby reducing poverty. Therefore,

contact with extension agents is a dummy variable hypothesized to have negative relationship with household multidimensional poverty.

Number of plots: Number of plots as an indicator of land fragmentation has varied impact on a household's livelihood. On the one hand, households who owned large number of agricultural plots may have the likelihood of obtaining different type of land or soil quality which is important for diversification and reducing the impact of pest attacks or crop failure. On the other hand, as indicated by Messay (2009), higher land fragmentation costs time and labor to protect and transport inputs and crop outputs from one place to another place. Therefore, number of plots is expected to have either positive or negative influence on household's poverty status.

Vocational training: Training is essential to learn new production techniques to increase productivity. It improves the skill and level of farmer's knowledge on agricultural practices such as application of inputs (fertilizers, improved seeds, and pesticides), crop rotation and irrigation practices that can be useful in increasing productivity and income which is associated with poverty reduction. Trainings on rural entrepreneurship and marketing can be also an important human resource development which support households diversify livelihood and obtain additional employment opportunity in the non-agricultural sector. Hence, training is a dummy variable expected to be positively associated with households' wellbeing.

Education level of household head: This refers to the level of schooling a household head attained and is a continuous variable. Better education facilitates upward economic and social mobility (Harper, Marcus, and Moore, 2003), enhance the probability of being employed and getting higher income. This leads to less probability of falling in to poverty (Berg, 2008). Anyanwu (2011) have found that rural households in India whose main earning member does not have formal education or has attended only up to primary school are more likely to be poor than households whose earning members have attended secondary school and beyond. This fact shows that education can break several features of poverty cycle and have different effect on individuals and household wellbeing. Therefore, it is hypothesized that the higher the educational status of household heads, the lesser the poverty as they are expected to have more exposure to the external environment and accumulate knowledge which contribute positively to farming through diversifying income and adopting new technologies.

Participation in off-farm employment: This refers to all activities which do not have direct relation with agricultural activities. A study by Janvry et al., (2005) in rural china shows that participation in off-farm activities remarkably reduced the intensity and severity of poverty through enhancing income and narrowing income disparity among the poorest households of china. A study by Katega (2013) has also established that rural non-farm activities contributes to alleviating poverty of participating households by providing significant share to the income and investing the earned income in other productive resources such as purchasing agricultural inputs. Therefore, this variable is a dummy variable which takes the value of 1 and 0, and it is predicted to negatively impact the welfare of the households.

Credit utilization: Credit is an important form of financial capital used to meet the financial needs of households in the rural areas. Households utilizing credit can purchase yield increasing modern agricultural equipments/inputs, invest in asset building, better education, health and nutrition, and expansion of small farm and non-farm businesses (Ashcroft, 2008), and diversify their income generating activities thereby reducing the risk of falling in to multidimensional poverty. Particularly, agricultural credit is a prime mover for agricultural development. Ariwa (2014, p.51) stated that “*robust economic growth cannot be achieved without putting in place well focused programs to reduce poverty through empowering the people by increasing their access to factors of production, especially credit*”. Therefore, credit utilization is a binary variable expected to negatively affect multidimensional poverty status of rural households and it scores the value of 1 if households have utilized it and 0 otherwise.

6.4 Result of Logistic Regression Diagnostic Tests

Binary logistic regression model was employed to estimate factors that determine the probability of being multidimensionally poor. The major results of these estimates for surveyed rural households are presented in Table 6.2, along with their marginal effects and standard errors. However, before presenting logistic regression results and drawing conclusions it is important to verify the data meet the basic assumptions of the model, unless results may be misleading. Bewick et al., (2005) indicated that low correlation among the independent variables is required before running the model. Hence, different multicollinearity diagnostics tests were performed to check the level of collinearity between each explanatory variable for both continuous and dummy variables. As a rule of thumb, for continuous variables, Chatterjee and Hadi (2012)

indicated that if any of the Variance Inflation Factors (VIFs) exceed 10, the regression coefficients are poorly predicted due to high multicollinearity. Based on this rule, result of the diagnostic test shows very low collinearity between explanatory variables with 1.11 mean VIF (Appendix A). Coefficient of contingency was used to check multicollinearity among the discrete variables. According to Healy (1984) cited in Paulos (2014), contingent coefficient with a value 0.75 and above indicates a high collinearity. Hence, result shows that none of the variables correlation between any two explanatory variables exceeded 0.1 implying that dependencies or the extent of relationships between explanatory variables is not a serious problem in our analysis (Appendix B).

Archer and Lemeshow (2006, p.97) also stated that “*once a logistic regression model has been fitted to a given set of data, the adequacy of the model is examined by overall goodness-of-fit tests, area under the receiver operating characteristic curve, and examination of influential observations*”. Therefore, following the logistic regression results, specification errors test and goodness-of-fit tests were diagnosed. The link test was conducted after the logistic regression to identify specification error. This test regresses the independent variable on its predicted value ($\hat{\mu}$) and the predicted value squared ($\hat{\mu}^2$). The outcome of the link test (specification errors test) in Table 6.1 indicates that the model equations were properly specified as predicted by the hat-statistic ($\hat{\mu}$) as the p-value is 0.000. The variable $\hat{\mu}$ should be a statistically significant predictor, unless the model is completely miss-specified. On the other hand, if the model is properly specified, the prediction squared ($\hat{\mu}^2$) should be insignificant. Therefore, our link test result shows no problem with the specification.

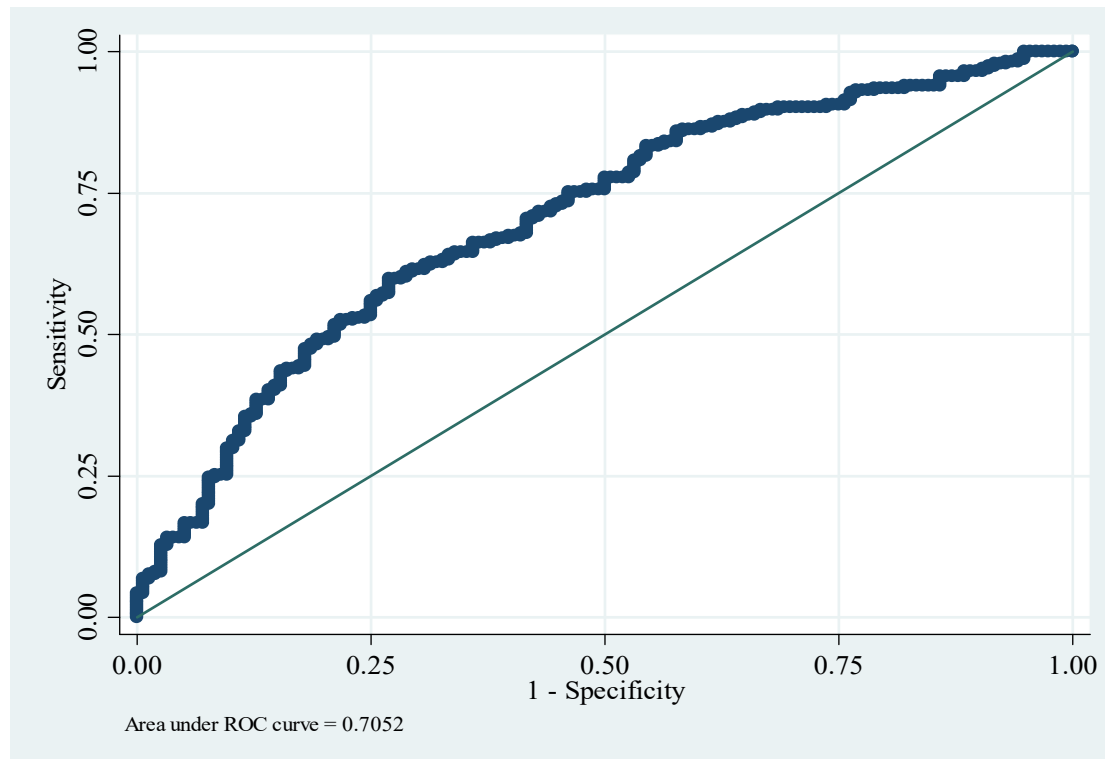
Table 6.1: Link test output of the regression model

MD Poverty Status	Coef.	Std. Err.	Z	P > Z	[95% Conf. Interval]	
_hat	1.017002	.2021478	5.03	0.000	.6207993	1.413204
_hatsq	-.0204152	.1504731	-0.14	0.892	-.315337	.2745066
_cons	.0065256	.1323161	0.05	0.961	-.2528092	.2658604
Number of obs =390		LR chi2(2) = 48.82		Log likelihood = -238.06495		
Prob > chi2 =0.0000		Pseudo R2 =0.0930				

Source: Computed from own field survey, 2017

As depicted in Figure 6.1, the Receiver Operating Characteristic (ROC) curve was also used to validate the assumptions of the model specification (tests for predictive accuracy). As indicated in StataCorp (2013), the graph of the ROC curve is a graph of sensitivity (the ability of the model to predict an event correctly) versus one minus specificity as the possible cutoff is increased from 0 to 1. Sensitivity refers to the fraction of observed positive-outcome cases that were correctly classified, while specificity is the fraction of observed negative/false-positive cases that are correctly classified. The greater the predictive power, the more bowed the curve, and hence the area under the ROC curve is used to measure the predictive power or accuracy of the diagnostic test. A model with no or worthless predictive power has area 0.5 while a ROC area with 1 represents a perfect model. According to Weiss (2008), if area under ROC curve is 0.5 it means no discrimination, 0.6-0.7 poor, 0.7-0.8 acceptable, 0.8-0.9 excellent and >0.9 outstanding. With this regard, figure 6.1 indicates that the model has acceptable predictive power as the area under the curve is 0.7052.

Figure 6.1: Receiver Operating Characteristic Curve of the logistic regression model



Source: Computed from own field survey, 2017

Another important test of model fit used was the Hosmer and Lemeshow's goodness-of-fit test which answer the question how good the existing data fits the model. The Hosmer and Lemeshow's goodness-of-fit test require large p-value to prove a good fit model. Hence, the result of the goodness-of-fit test shows that with a p-value of 0.68 the model was correctly specified and fitted the data adequately (Appendix C). Overall, it is concluded that all diagnostic tests assessed above confirmed that the logistic regression model is adequate and well fits to the observed data.

6.5 Logistic Regression Results of Determinants of Multidimensional Poverty

Examining the incidence and extent of poverty using multidimensional measure of poverty provides essential evidence on the scope or extent of multidimensional poverty in the study District. However, it does not tell us the other factors which would most affect poverty status of the household. Hence, the probability of households falling into multidimensional poverty is described as a function of household head age, household head education, household size, access to non-household labor, dependency ratio, number of plots, vocational training, contact with extension agents, households annual income, credit and off-farm employment. These explanatory variables were selected considering previous studies on poverty determinants in developing countries including Ethiopia. Table 6.2 presents the final output of the logistic regression analysis for multidimensional poverty measure and their marginal effects. Looking at the model statistic, the model, as a whole, is statistically significant at one percent level of significance (as the p-value is 0.0000). For direct interpretation of results we also estimates the marginal effect after logit and result of the marginal effect shows the effect of all independent variables on the probability of being multidimensionally poor.

Table 6.2: Logistic regression estimates of determinants of multidimensional poverty

Multidimensional Poverty Status	Estimated Coefficients	Marginal Effects
Household head education	-.0802748 (.0372294)**	-.0189972 (.00879)**
Household head age	-.0181975 (.011506)	-.0043065 (.00272)
Household size	-.1301312 (.0696428)*	-.0307959 (.01647)*
Contact with extension agents (1 if had contact, 0 otherwise)	-1.096061 (.3645401)***	-.2264628 (.06172)***
Dependency ratio	.0106571 (.1452841)	.002522 (.03438)
Number of plots	-.3069721 (.1190033)***	-.0726456 (.02811)***
Participation in off-farm employment (1 if yes, 0 otherwise)	-.1910874 (.4032025)	-.0459539 (.09832)
Credit utilization (1 if yes, 0 otherwise)	.2872666 (.2350508)	.06831 (.05605)
Vocational training(1 if trained, otherwise)	-.009889 (.2610535)	-.0023391 (.06172)
Access to non-household labor (1 if has access, 0 otherwise)	-.7754257 (.2292875)***	-.1823098 (.05286)***
Households annual income	-.0000392 (.0000229)*	-9.27e-06 (.00001)*
Constant	4.905682 (.9447432)***	
Number of obs = 390 LR chi2(11) = 48.80 Log likelihood = -238.07408 Prob > chi2 = 0.0000 Pseudo R2 = 0.0930		

Note: Standard errors are in parenthesis; ***, ** and * indicates that coefficients and marginal effects are significant at 1%, 5% and 10% level of significance

Source: Computed from own field survey, 2018

Household size: Similar to the earlier propositions, household size is found an important demographic factor that significantly and negatively influenced multidimensional poverty. Result of the marginal effect tells us that, ceteris paribus, a unit increases in household size reduced the likelihood of being multidimensional poor by 3%. This result is contradicted with the many previous studies such as Anyanwu (2012) and Tsegaye et al., (2014) which associate poverty

with large household's size. However, the finding is consistent with Dawit et al., (2011) who found out negative association between family size and household's poverty in rural Ethiopia. This is probably due to the fact that households with large number of economically active members can engage in a range of labor intensive farm and non-farm activities to support wellbeing.

Household head education: Education is important to improve human productivity through enhancing efficiency of labor and make aware of various livelihood opportunities. The coefficient of household head education is negative and statistically significant at 5% probability level which shows education as important determinant of poverty. The marginal effect also shows that, other things being constant, for each additional years of household head education, the probability of falling into multidimensional poverty decreases by 2%. The logic is that education increase awareness to adopt modern agricultural technologies, enhance employment opportunities, and promote livelihood diversification to mitigate the risk of poverty. The result is similar with studies such as Alemayehu et al., (2005), Bogale et al, (2005) and Tsegaye et al, (2014) which indicated educational attainment of household heads help households to exit from poverty.

Contact with extension agents: As hypothesized, household contact with extension agents is statistically significant at 1% and negatively associated with household's multidimensional poverty status. Contact with agricultural extension agents is the first most determinant of household's multidimensional poverty in the study area. The size of marginal effect shows that households contact with agricultural extension agents reduce the probability of being multidimensionally poor by 23%, holding other factors constant. The logic behind this is that households who had contact with extension agents could receive information or trainings on improved crop production techniques, apply modern agricultural technologies to increase agricultural output and diversify income generating activities, and thereby reduce poverty. This result is similar with the findings of Adugna and Sileshi (2013). In addition, the more households had contact, the more they acquire advisory services on crop and livestock production and institutional support such as mobilizing of agricultural and financial cooperatives, and veterinary services which are important to reduce household's poverty.

Access to non-household labor: In the rural area, family members are the main sources of household's labor. However, households may face seasonal labor shortage due to the fact that household labors may spend the year away from the farm in search of paid work to maintain the household. Contrary to this, some households may not have adequate household labor to pursue farming activities. Here, households need additional labor to run farming activities such as sowing, weeding, harvesting and livestock rearing which demands employing non-household labor. Accordingly, this variable is significant at 1% probability level and has a negative association with poverty. The negative correlation shows that households with access to non-household labor are less likely to be poor than those who have not. Other things being constant, marginal effect shows that for those with access to non-household labor the probability of being multidimensionally poor dwindles by 18%. This made access to non-household labor as the second significant determinant of multidimensional poverty in the study area. This is probably due to the fact that in addition to mobilizing local reciprocal labor, households with access to non-household workforce helped to avoid their labor demand to achieve their farm and non-farm tasks in time of labor shortage, particularly for crop cultivation and livestock production.

Number of plots: Result of the logistic regression also shows that number of fields is significant at 1% probability level and negatively correlated with household's multidimensional poverty suggesting that households who has more plots of land are less likely to be poor than these who have few one. This coincides with our proposition that households with additional farm plot are more likely to have less multidimensional poverty. Because, considering the topography and repeated drought, having more number of fields (from the demand side) help farmers to avoid the risk of crop failure through crop diversification. It also enables to leave some land fallow and promotes the use of more fertilizers. The different soil type and land slope spread out the risk of total harvest failures. Marginal effect also indicates that an increase in plots of land owned decrease the probability of being multidimensionally poor by 7%, *citrus paribus*. However, number of fields as an indicator of land fragmentation could also have negative impact on wellbeing of households since it prevent households to mechanization of agriculture and creates inefficiency in the allocation of labor and capital, thereby decreasing investment and productivity.

Household annual income: Result also shows that household's income influence household multidimensional poverty. As proposed, income is significant at less than 10% probability level and is negatively associated with the poverty status households in the study area. Figures of the marginal effect show that each addition to household income reduces the probability of households being multidimensionally poor. The logic is probably that income is a means of obtaining various livelihood goods and services. Income allows households to function financially, maintain their health and living standard, and strengthen household safety nets through creating new opportunities. A unit increase in household's annual income could be resulted in total production increase. Furthermore, income is financial asset which households can save its portion to serve as insurance against risks to adverse events, such as drought. This finding is similar with the result of Adugna and Sileshi (2013) who revealed that household's annual income is negatively correlated with the probability of being poor.

6.6 Summary

This chapter was aimed at identifying the major socioeconomic variable that determines household's multidimensional poverty in the study District. Alkire and Foster (2007, 2011) multidimensional measurement methodology was used to set the poverty line and classify households as multidimensional poor and non-poor. A household was categorized as poor if it is deprived in one-third of the weighted indicators used to construct MPI. To examine the parametric relationships and identify determinant factors, binary logistic regression was used. Result of the model indicated that out of eleven explanatory indicators used in the model, six variables have the power to predict multidimensional poverty up to less than 10% probability level. As a result, access to non-household labor, number of plots and contact with extension agents are significant at 1% and negatively correlated with poverty; education level of the household head is statistically significant at 5% and negatively associated with households multidimensional poverty; and finally household size and annual income of households are found to be significant at 10% probability level and are negatively associated with household multidimensional poverty.

Chapter Seven

Rural Household Vulnerability to Multidimensional Poverty in Degu’a Tembien District

7.1 Introduction

Globally, poverty is considered as “*deprivation in wellbeing*” (Haughton and Khandker, 2009, p.1) and the United Nations have designed a goal and strategy to end all modes of poverty by 2030 (UNDP, 2018). Various developmental organizations and several national governments are making an effort to reduce extreme poverty. However, a number of people are living in chronic poverty (FAO, 2015 and United Nations, 2015a) and the road to reduce poverty is also still challenging as people who are currently out of poverty may fall into poverty in the near future and people in poverty may also remain in poverty over time. As a result, vulnerability analysis has obtained significant attention in the international arena due to various shocks which push households into poverty and constrain improvement towards the minimum acceptable necessities of sustained wellbeing as indicated in the United Nations SDGs.

Households are exposed to a range of risks originating from different sources. Natural shocks, social stress, economic problems and physical illness are some of the stresses or risks that pose threats to households’ material and subjective wellbeing. Such shocks and stresses also affect individuals, communities and regions in unexpected ways, and consequently, they cause and aggravate poverty and vulnerability. Holzmann and Jorgensen (2001) indicated that the poor are highly exposed to risk and have inadequate risk management capacities. Therefore, it is extremely important to focus on vulnerability assessment to design pro-poor poverty reduction policies as it enables us to identify those who may fall into future poverty below a poverty threshold. The currently poor people may escape from poverty and the non-poor may be prone to fall into future poverty due to unexpected events. Thus, exploring household’s vulnerability from multidimensional wellbeing perspectives is valuable for *ex-ante* poverty prevention programs.

Calvo and Dercon (2005) indicated that one of the major reasons to focus on vulnerability to poverty analysis is that addressing the existing rate of poverty and the extent of the risk of poverty measured in advance is extremely helpful and provides powerful information to poverty alleviation efforts. Empirical findings indicated that poverty prevention is the most effective way

of avoiding poverty rather than reversing it once it has occurred (Chaudhuri et al., 2000). The static approach to household wellbeing does not assess a household's risk of future poverty and it also does not help us to explore the sources and forms of risks that households face to design appropriate safety net programs or policy interventions to improve wellbeing (Chaudhuri, 2003). Identification of the static but high level of multidimensional poverty in the study District (see Chapter five) indicates the inadequacy of the existing poverty reduction interventions to move the poor households out of the poverty trap. Thus, in this dissertation, vulnerability is operationalized as the probability of experiencing future multidimensional poverty. This clearly recognizes that poverty is a stochastic phenomenon where the currently poor households may or may not be poor in the near future and the currently non-poor households may become poor due to unexpected events (Chaudhuri, 2003; Ozughulu, 2014). Therefore, although analyzing current poverty rate is an important indicator of households' wellbeing, it doesn't give a clear indication of future poverty. Whether a household is in danger of becoming poor in the future is influenced by the household's current asset capacity, its exposure to shocks, and ability to efficiently manage shocks (Feeny and McDonald, 2016).

Examining households' vulnerability to weather variations in the study region (Tigray) is highly important as agriculture is the main sector of the economy which supports more than 80% of the population in terms of employment and means of livelihood. Agricultural systems of the region are subsistence, rain-fed and dominated by smallholders with average size of holding less than one hectare per household, who have been adopting low agricultural external inputs and undertake mixed farming with farm technologies totally reliant on animal draught (Tagel and van der Veen, 2013). Tigray was the most severely affected region by the well-known famine of 1983-1984 in Ethiopia (Webb et al., 1992) due to long standing crop failure which led to chronic depletion of assets and food stocks (Wright, 1983). The study region has been suffering from recurrent and severe droughts. "*Severe drought events occurred in 1982, 1983, 1985, 1987, 1988, 1989, 1991, 1999, 2000 and 2009*" (Tagel et al., 2011, p.314). Almost every year, the region faces natural shocks causing harvest failure which in turn impedes socioeconomic development (Tagel and van der Veen, 2013). Dependence on traditional economic systems (rain-fed agriculture) also makes the region susceptible to weather or climate induced shocks, and these have substantial influence on households' poverty status.

At the national level, the Tigray region's comparative vulnerability is generally recognized in many studies. However, as far as the researcher knowledge is concerned, no empirical study is documented on rural household's vulnerability using the multidimensional poverty context in Ethiopia. Beside, how vulnerability at the national and regional level appears at the household level also requires careful assessment. Furthermore, national or regional studies ignore variations in socioeconomic development at local level due to the high level of data aggregation. Neglecting heterogeneity which may be found in micro studies may lead to loss of important information. The present study is therefore significant for having better understandings of vulnerability components as it provides households multidimensional poverty and vulnerability estimates that can be aggregated at a District level. With this perspective, this chapter attempts to address the following important questions:

1. What are the major shocks that rural households experienced in the study area?
2. What shock coping responses are adopted by households in the study area?
3. What is the level of vulnerability of rural households to multidimensional poverty?
4. What are the correlates of vulnerability to multidimensional poverty?

Therefore, this study measures the *ex-ante* risk as households' probabilities of experiencing multidimensional poverty in the future relative to specific poverty and vulnerability thresholds. Since cross-sectional data is used, the paper employs Chaudhuri et al., (2002) methodology to estimate household vulnerability to multidimensional poverty. The Alkire and Foster's (2007, 2011) methodology for computing Multidimensional Poverty Index (MPI) deprivation score was used to identify the multidimensional poverty status of households. Using MPI deprivation score as a proxy for wellbeing avoids the fundamental limitations of using monetary measurement of wellbeing in Ethiopia. The rest of this chapter is organized as follows. Section 7.2 presents the methodology to estimate household vulnerability to multidimensional poverty. Section 7.3 presents the empirical results while section 7.4 summarizes.

7.2 Methodology

7.2.1 Estimating Household Vulnerability to Multidimensional Poverty

According to Hoddinott and Quisumbing (2003), there are three economic approaches to assessing vulnerability to poverty. These are Vulnerability as Expected Poverty (VEP), Vulnerability as Low Expected Utility (VEU) and Vulnerability as Uninsured Exposure to Risk

(VER). Holzmann et al., (2003) stated that vulnerability is best assessed through using longitudinal or panel data gathered over adequately long period to obtain detailed information at various levels. Nonetheless, Chaudhuri et al., (2002), and Jha and Dang (2009) proposed VEP as a best option whenever we use single visit household survey. Therefore, following literature (see Chaudhuri, 2003; Suryahadi and Sumarto, 2003; Jha and Dang, 2008; Azam and Imai, 2009 and 2012; Abrham and Siegfried, 2012; Adepoju and Yusuf, 2012; Agbaje et al., 2013; Dereje, 2013), this dissertation adopts the VEP theoretical framework to assess and measure households' vulnerability to multidimensional poverty in the study District. However, these authors used a single poverty measure i.e, consumption expenditure for assessing household vulnerability to poverty. Chaudhuri et al., (2002, p.4) have developed a method for estimating household consumption variance from cross-sectional data and defined vulnerability, in the context of poverty eradication, *“as the ex-ante risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty”*.

Although Chaudhuri et.al (2002, p.4) use consumption approach to address vulnerability to poverty, they admit the drawback of unidimensional approach by reminding that *“poverty reflects deprivation on multiple fronts, and hence vulnerability to poverty ought also to be a multidimensional construct”*. For this reason, to address vulnerability to poverty, this study uses a multidimensional measure of household deprivation in evaluating household vulnerability and the whole model and estimation of vulnerability to poverty follows the methodology developed by Chaudhuri et al., (2002). According to Hoddinott and Quisumbing (2003), this method is not limited to the use of only consumption as welfare measure. It can be used to measure non-consumption measures such as education and health. In this context, each household i deprivation at time t given various characteristics can be estimated and expressed using the following simplified formula:

$$d_{it} = f(X_i, S_{it}, R_{it}, e_{it}) \dots \dots \dots \text{equation 1}$$

Where, d_{it} is the households weighted deprivation score computed using the Alkire and Foster's (2007, 2011) method for calculating the MPI; X_i captures a bundle of observable households demographic and socioeconomic characteristics; S_{it} symbolizes the observed covariate and idiosyncratic shocks experienced by household i between $t-1$ and t ; R_{it} stands for household i means of coping with shocks between $t-1$ and t ; and e_{it} is the error term standing for unobserved household characteristics. Then we have to define the vulnerability context of each household i

at time t . Hence, following Chaudhuri (2003) and Tesliuc and Lindert (2004), for a given household, the vulnerability of household i at time t (V_i, t) is calculated as the probability that the level of weighted deprivation score one period ahead, $w_{i, t+1}$, will be above a critical threshold, Z . This can be expressed as:

$$V_{i,t} = Pr(d_{i,t+1} > Z) \dots \dots \dots \text{equation 2}$$

Estimating vulnerability from a cross-sectional data needs some strong assumptions about stochastic process generating household deprivation. The stochastic process that generates the deprivation of household i or the expected level of deprivation of household i was expressed as:

$$d_i = X_i\beta + e_i \dots \dots \dots \text{equation 3}$$

Where, d_i stands for the expected level of deprivation of household i ; X_i denotes a vector of observable household demographic and socioeconomic characteristics, community level and individual household shocks, and their ability to withstand those shocks; β is coefficients to be predicted using OLS; and e_i is the mean-zero disturbance term that captures all other unobserved effects.

According to Chaudhuri et al., (2002), making two powerful assumptions is highly relevant to estimate household vulnerability from a cross-sectional data set. One, it is assumed that household wellbeing remains the same across time and the future distribution of idiosyncratic shocks to wellbeing is assumed to be identically distributed over time for each household. Second, it is also necessary to assume that the structure of the economy is relatively stable over time (without any macroeconomic shocks). However, the variance of household deprivation will not be identically distributed across households and will depend upon observable household characteristics. Chaudhuri et al., (2002) also argued that since households face different risks and have different risk management strategies, the variance of household welfare should be heterogeneous across households. Therefore, to have a consistent (non-biased) estimate of the parameters they allow heteroskedasticity (i.e, the variances of the disturbance term to vary between households) in the model by assuming that the variance of the disturbance term, $\sigma^2 e_i$, depend on the observable characteristics of the household X_i and this is expressed as:

$$\sigma^2 e_i = X_i\theta + u_i \dots \dots \dots \text{equation 4}$$

Where, θ is a vector of parameters to be estimated by OLS.

Due to the presence of hetreoskedastic errors, OLS yields inefficient estimates of the coefficients. Therefore, to estimate the parameter θ of equation (4) and β of equation(3), a three-

step Feasible Generalized Least Squares (FGLS) procedure was employed as promoted by Amemia (1977) cited in Chaudhuri et al., (2002) and Feeny and McDonald (2016). The intuition of the three-step method is to obtain consistent estimates of the error term and then to use these estimates to transform the original model such that the error terms become homoscedastic.

The three step FGLS procedure is explained as follows. First, equation (3) was estimated by OLS and the generated residuals (error terms) from this equation was then squared and used as dependent variable in equation (4), which was estimated again using OLS.

$$\hat{e}^2_{OLS, i} = X_i \theta + \mu_i \dots \dots \dots \text{equation 5}$$

The second step is to transform equation (3) to produce the asymptotically efficient feasible generalized least squares estimate of the variance of future wellbeing ($X_i \hat{\theta}_{FGLS}$). In order to do this, equation (3) was transformed using the predicted values from equation (4).

$$\frac{\hat{e}^2_{OLS, i}}{X_i \hat{\theta}_{OLS}} = \left(\frac{X_i}{X_i \hat{\theta}_{OLS}} \right) \theta + \frac{\mu_i}{X_i \hat{\theta}_{OLS}} \dots \dots \dots \text{equation 6}$$

This transformed equation is estimated using OLS to obtain $\hat{\theta}_{FGLS}$

Note ($X_i \hat{\theta}_{FGLS}$) is a consistent estimate of the variance of the idiosyncratic component of household deprivation.

$$\hat{\sigma}_i = \sqrt{X_i \hat{\theta}_{FGLS}} \dots \dots \dots \text{equation 7}$$

The third, and final, step is to use the predicted standard deviations (Equation 8) to transform Equation (3) in order to yield the asymptotically efficient estimate of $\hat{\beta}_{FGLS}$.

$$\frac{d_i}{\hat{\sigma}_i} = \left(\frac{X_i}{\hat{\sigma}_i} \right) \beta + \frac{e_i}{\hat{\sigma}_i} \dots \dots \dots \text{equation 8}$$

Finally, household's vulnerability to multidimensional poverty one period ahead is provided by the following generalization of the equation (2):

$$V_{i, t} = pr (d_{i, t+1} > Z | X_i) = \Phi \left(\frac{X_i \hat{\beta}_{FGLS} -}{\hat{\sigma}_{i, t+1}} \right) \dots \dots \dots \text{equation 9}$$

Where, V_i represents the probability that a household with characteristics X_i will experience weighted deprivation counts in excess of Z and it is an index which lies between 0 and 1; Z is the threshold for multidimensional poverty applied in MPI estimates; Φ stands for the probability density function of future household deprivation which is the cumulative density function of the

standard normal distribution; $X_i\hat{\beta}FGLS$ denotes the expected mean of household deprivation; and $\hat{\sigma}_i, t + 1$ represents the estimated variance in household deprivation.

7.2.2 Selection of Indicators of Vulnerability to Multidimensional Poverty

Dercon (2001) has indicated that data on outcomes, assets, risks, coping abilities and strategies are needed and should be gathered to measure, examine and explain vulnerability quantitatively. Various studies (see Feeny and McDonald, 2016; Suryahadi and Sumarto, 2003; Azam and Imai, 2009; Chaudhuri et al., 2002; Chaudhuri, 2003) used different indicators of household vulnerability to poverty in a vector of household demographic characteristics, asset endowments, income sources, observed experiences of shocks and their responses mechanisms. Depending on theoretical underpinnings, indicators that were considered highly relevant to assess vulnerability of study households were selected for this research. These are household characteristics, household assets, shocks and coping strategies.

Household characteristics refer to a bundle of demographic attributes that are expected to affect vulnerability to poverty in differing ways. Household characteristics such as age, gender, education of household heads, household size, and dependency ratio were used in the estimation. Household's level of vulnerability is also dependent on assets like the human, natural, physical, social and financial assets of households. The physical asset index, social asset index and financial asset index were constructed using the Multiple Correspondence Analysis (MCA) procedure to construct an asset score using various indicators. Moser (2011) stated that vulnerability is closely related to lack of asset possession of households. Households with more asset endowment are less vulnerable than those with less and insecure assets. Thus, various forms of assets were indexed to assess their impact on vulnerability of households to multidimensional poverty, and households with greater asset score are expected to have lower vulnerability.

Households' exposure to shocks is an essential element of vulnerability analyses. Shock is an event that can trigger decline in wellbeing and affect group of households, communities or villages, regions or nations (World Bank, 2001). Based on the scope of its impact on household's livelihood, shocks can be categorized under two broad groups: idiosyncratic and covariate shocks (Dercon, 2002). Household idiosyncratic shocks are household specific shocks while covariate shocks are negative events that affect the village or the community of the District.

Shocks that occurred during the previous 24 months from the time of interview as reported by households were considered in the analysis. Depending on households' perceptions, idiosyncratic and covariate shocks were separated. Hence, a shock variable scores the value of 1 if a household has experienced a particular shock and 0 otherwise.

Coping strategies are an array of strategies or actions adopted by households in order to cope with and react to various experienced shocks so that their adverse impacts would be relieved. According to Naude (2009, p.185), '*means of coping*' should be evaluated when vulnerability to various shocks are assessed. Therefore, coping strategies were dummy variables which take the value of 1 if a household adopted any coping strategies and 0 otherwise. Table 7.1 summarizes the description and measurement issues of the selected indicators of vulnerability estimation.

Table 7.1: Description and measurement issues of variables used in the estimation

Dimensions	Indicator descriptions	Measurement	Exp.Sign
Weighted MPI deprivation score (DV)	Multiple deprivation score that poor household experience at the same time	Score	
Household Characteristics			
Gender head	Sex of the household head	0 = Male 1 = Female	+/-
Age head	Household heads age at the time of interview	Years	+/-
Dependency ratio	The ratio of dependent household members (> 64 and <15) to working age household members	Ratio	+/-
Head years of education	Formal years of education completed by head	Years	-
Household size	Number of persons living in the household	Number	+/-
Household Asset			
Physical Capital Index	Composite of durable consumer goods, agricultural Assets & basic Infrastructural services	Index	-
Social Capital Index	Composite of social participation, mutual support, trust, relationships & remittance	Index	-
Financial Capital Index	Composite of households financial Resources	Index	-
Number of plots	Number	Continuous	-

Shocks experiences	Hail	0= no; 1= yes	+
	Flood	0= no; 1= yes	+
	Decreases in output prices	0= no; 1= yes	+
	Drought	0= no; 1= yes	+
	Pest attack before harvest	0= no; 1= yes	+
Shock Coping Mechanisms	Reducing food consumption	0= no; 1= yes	-
	Draw down on savings	0= no; 1= yes	-
	Sold livestock	0= no; 1= yes	-
	Formal borrowing of money	0= no; 1= yes	-
	Joining safety net program	0= no; 1= yes	-

Source: Own computation, 2018

7.2.3 Multidimensional Poverty and Vulnerability Grouping

As defined in equation (9), vulnerability is the probability of falling into, or remaining in, poverty. For any meaningful assessment of household's vulnerability, a choice of vulnerability threshold is very important to identify whether a household is vulnerable or not. For this reason, Chaudhuri et al., (2002) suggested a threshold of 0.5 to determine household's vulnerability to poverty. The reason for using a threshold of 50% is that a household faces a 50% chance of falling into poverty in the future. This threshold is used by many authors as the most common, preferred and natural candidate for the vulnerability threshold (see Suryahadi and Sumarto, 2003; Azam and Imai, 2009; Jha and Dang, 2009; Jha et al., 2010). Therefore, household's vulnerability to multidimensional poverty is evaluated using this standard vulnerability threshold. As can be seen in Table 7.2, households who have estimated vulnerability levels above 0.5 were considered as highly vulnerable; those households with an estimated vulnerability level lower than 0.5 of the estimated vulnerability but in current poverty were considered as relatively vulnerable; and those households with an estimated vulnerability level below 0.5 and not in current poverty were considered as non-vulnerable. This classification differentiates the vulnerable from the non-vulnerable and helps in drawing meaningful comparisons of vulnerability to multidimensional poverty across the household's characteristics. Tesliuc and Lindert (2004) indicated that this classification of vulnerability is loosely associated with the more familiar classification of chronic poverty and transient poverty, though the two are not exact substitutes.

Table 7.2 Vulnerability and poverty classification

Category	Estimated Vulnerability (Predicted probability of being poor one period ahead)	Sources of vulnerability	Poverty equivalent
High vulnerability	In excess of 50%	Households vulnerable to future poverty due to relatively high risks and weak coping mechanisms	Chronic poor
Relative vulnerability	Lower than 50% and currently in poverty	Households vulnerable to staying in poverty due to volatility in their expected wellbeing	Transient poor
Non- vulnerable	Lower than 50% and currently not in poverty	Households with low vulnerability to falling into poverty in the next time period	Non-poor

Sources: Constructed based on Chaudhuri et al., (2002), Suryahadi and Sumarto (2003) and Feeny and McDonald (2016)

7.3 Empirical Results

7.3.1 The Exposure of Households to Shocks in Degu'a Tembien District

Shocks are sudden, temporary and totally unpredicted events that can have damaging impact on a household's wellbeing. It is an event that erodes household wellbeing and can lead to the loss of life and households resource base. Ethiopia, as one of the most '*shock-prone country*' (Dercon et al., 2005, p.23; Zelalem, 2015, p.9) regularly affected by various shocks such as drought, illness, pests and soil erosion. Some shocks like drought and illness adversely affected household wellbeing for a long period of time. The occurrence of shocks particularly uninsured shocks adversely affect households wellbeing through reducing income, consumption and asset, thereby push households in to poverty (Dercon et al., 2005). The rural people are more vulnerable to agricultural shocks as agriculture is their main source of living, income and employment. When agricultural sector and the rural people are hit by any form of shocks, many households would be shifted out of their previous equilibrium. Although the productivity and profitability of agricultural sector largely affects the livelihoods of the rural people it also affects the lives of the urban population.

In conceptualizing household vulnerability as the probability of experiencing future poverty (particularly consumption poverty), various studies addressed shocks experienced by households

as a source of vulnerability (see Azam and Imai, 2009; Chaudhuri, 2003; Chaudhuri et al., 2002; and Dercon, 2001). Some studies have been analyzed the prevalence, scope and welfare consequence and implications of shocks in Ethiopia (Dercon et al., 2005; Zelalem, 2015; Yilebes, 2015). Acquiring in-depth understanding of the risks/shocks experienced by households, identifying the consequence of various shocks and investigating the contribution of these shocks in increasing poverty is highly valuable to design effective social protection policies (Chaudhuri et al., 2002; Dercon et al., 2005; World Bank, 2014; Bonfrer and Gustafsson-Wright, 2016). Therefore, given a cross-sectional data, this study assesses and characterizes what forms of welfare shocks households in Degu'a Tembien District faced over the past two years from the time of survey.

Findings show that significantly large percentage of the population had experienced at least one type of shock which shows they are living in a risky environment. Figure 7.1 displays the incidence of shocks experienced by households in the study District. It is found that 96% households identified drought as a major shock. This shows that nearly the entire households experienced drought in the last two years (particularly in 2015/2016). Drought is climate/weather induced and most common type of shock which is top ranked by households in the study District. It is the most severe shock to subsistence farmers as it directly affects food production and income through harvest failure. In the short run, it increases household's hunger and food insecurity while in the long run it enhances rural people dependency on food aid. This finding is similar with Dercon et al., (2005) study who identified drought as a common climatic shock experienced by Ethiopian households between 1999 and 2004. Recently, Birhan (2018) also documented that drought was the major shock experienced by Ethiopian rural households in 2016 where 32.5% rural households were exposed to it.

Data obtained from the report of Degu'a Tembien District Bureau of Agriculture (2017) shows that total crop production of the District had decreased by 76% in the recent drought year of 2015. As a result, 29,276 individuals were beneficiaries of Productive Safety Net Programs (PSNP) in 2015, and the number increased to 29,775 in 2016. This figure is higher than the number of PSNP beneficiaries in 2005 as a non-drought year i.e., 22,159 which shows the District is highly affected by drought and households had not built resilience to food insecurity. Previous studies was also indicated that Ethiopia is drought prone country and has long history

of droughts (Webb et al., 1992; Tagel et al., 2011; Tagel and van der Veen, 2013) that challenge the ability of households to resist future shocks.

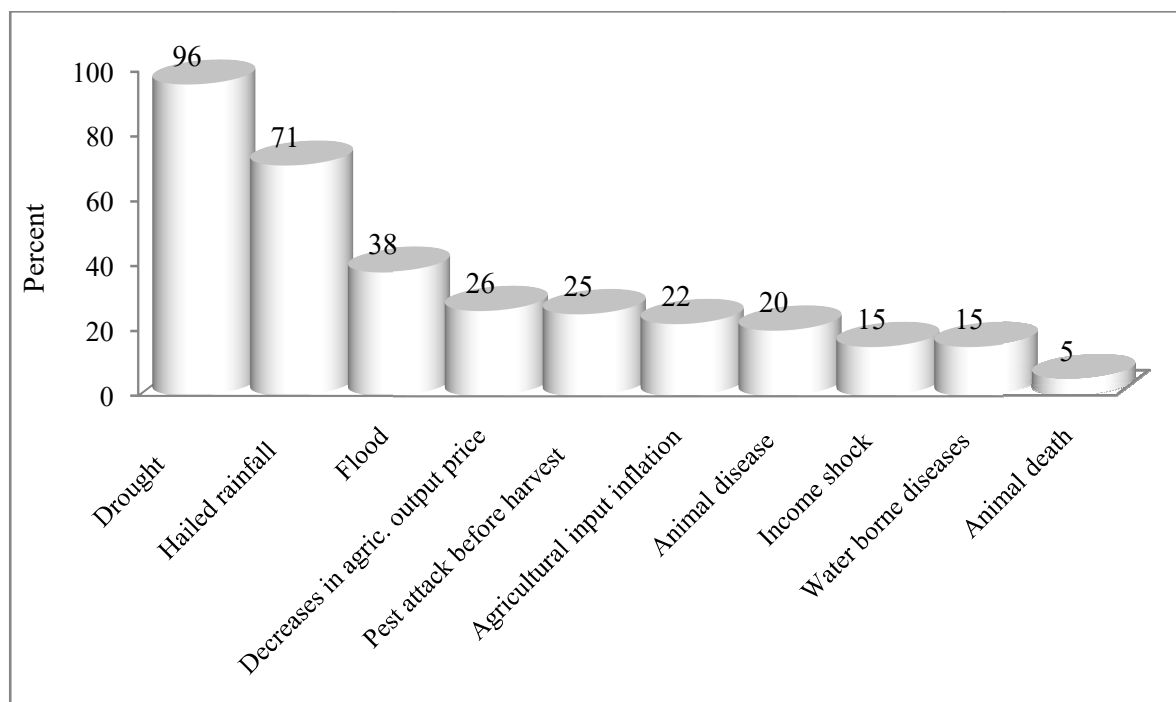
Next to drought, 71% of households identified hail as a shock and this shock indicator was reported with the second highest incidence. Large hail stones directly damage the major staple crops of the District such as wheat, barley, taff, horse beans and peas.

Flooding was reported as the third major shock experienced by 38% of surveyed households. Households were affected by rainfall induced flood or too much rain that destroys and erodes fields into rivers and streams which also caused food and income reductions. Households, during FGDs, indicated that during the dry season they have been participated in soil and water conservation campaign programs for the last 20 years. The conservation was done through building of stone terraces and constructing hillside terraces. Discussants explained that they engaged in such activities because they believe that the conservation would be profitable through increasing yields and pastures in normal years. In some cases, the conservation was efficient but because the topography of their District is hilly and mountainous, they cannot protect their small plots of land from soil erosion. Periodic flooding wipes out farmers staple crops and poses threats especially to those who have small size of land on the hills. Investment in soil conservation continued for two decades not only because households get food aid, but also as a means of reducing the impact of land degradation. Nyssen et. al., (2005) indicated that high rain related erosion in the study District is due to heavy rainfall.

Decline in the price of agricultural products due to limited market access were reported by 26% of households as one of the most negative shocks affected households in the study District. Data obtained from discussions indicated that farmer's products such as crops and animals are not supported by any marketing systems and cooperatives, and households are expected to cover all transport and transaction costs associated with marketing of their farm or non-farm outputs. This severely harms poor farmers who cannot afford marketing costs for their products. The presence of poor infrastructure and thin local market is another problem which benefits the few traders who control local output markets. Considerable proportion of households (22%) has also experienced agricultural input price inflation. Discussants also indicated that input price inflation such as higher prices of fertilizers and improved seeds are among the major factors determining

low agricultural productivity. Farmers were unable to afford the price of inputs and they did not apply adequate fertilizer to their small plots of land. This has led to low crop yields.

Figure 7.1: Percentage distribution of shock prevalence



Source: Author computation, 2018

Severe pest attacks before harvest adversely affected 25% of surveyed households. Pest infestation leads to loss of crops and reduces food production through damaging food crops. In addition to such economic loss, FGD participants indicated that pests and insects are serious challenges to their crop production which lead to food shortage. As a result, households are forced to divert their resources towards purchasing pest control inputs. The measures taken to manage and control pest (such as purchase of pesticides and insecticides) demands farmers to meet additional costs and time. Discussants also indicated that households that rely on a single crop are more vulnerable to crop damage due to crop specific pests.

In terms of other shocks, 20% and 15% of households was affected by animal and water born disease outbreaks, respectively. Livestock diseases intensified by absence of veterinary medicine and other agricultural extension services are indicated as important shocks that affect the utilization of draught power, and this also directly affects households crop production and food

security. Water born disease might be caused by drinking contaminated or unprotected water which can have significant impact on the health and socioeconomic conditions of households.

Farmers are engaged in risky and subsistence rain-fed agricultural activities which are highly vulnerable to various shocks. Their vulnerability results are not only from natural shocks but also from income shocks. The prices of agricultural outputs are volatile and can lead to unforeseen household income reduction. In the study District, 15% of households were negatively affected by income reduction shocks. This adversely affects the wealth and health status of those households. Although many households' unexpected wellbeing decline resulted from crop failure due to drought, the other discussed shocks also contribute directly or indirectly to household income reduction (see Figure 7.1). For example, illness of a household member due to water born disease requires transportation and medical costs, reduce employability which in turn lead households into an income losses.

Diversified agro-ecological zones and Kebeles are important to diversify economic activities and help farmers to adopt area specific strategies necessary to increase farm and non-farm production. It provides the opportunity to identify the priorities of development as it is helpful to identify the less-favored areas in which rural households are ecologically and environmentally disadvantaged. FAO (2018, p.6) stated that *“agro-ecological approaches address root causes of hunger, poverty and inequality, helping to transform food systems and build resilient livelihoods through a holistic, integrated way that balances the three dimensions of sustainability - social, economic and environmental - ensuring no one is left behind ”*. Hence, it is important to conduct location based analysis to look at the influence of agro-ecology on household's poverty. Furthermore, exploring shock incidence across agro-ecologies and Kebeles is also essential to develop location specific risk prevention strategies that promote more efficient and less-depleting uses of environmental resources.

Table 7.3 presents the percentage distribution of households experiencing shocks across the conventional agro-ecological zones of the study District. Findings show significant differences in prevalence of shocks across zones. Some shocks are more prevalent in some zones than others. Result shows that while drought shock is the most commonly prevalent shock in all agro-ecologies, it was most prevalent in the highland and lowland areas. Hail was mainly prevalent in the midland zone reported by 89% of the households, while flood (53%) and animal disease

(39%) are more prevalent in the lowland zones. Decreases in output prices (35%), pest attack before harvest (49%), agricultural input inflation (35%), income reduction (32%) and animal death (12%) are more prevalent in the highland agro-ecology. Only water borne diseases were found equally prevalent in the highland and lowland agro-ecological zones (23% each). Result of Pearson Chi-Square test of all shock types except for output prices shocks shows that there is statistically significant variation (at 1 percent level) in shock prevalence across agro-ecologies, whereas output price shock is significant at 5 percent level.

Table 7.3: Percentage distribution of shocks by agro-ecology

Shocks experiences	Highland	Midland	Lowland	Pearson χ^2
Drought	99.1	91.7	100	18.6***
Hailed rainfall	43.2	88.7	72.3	67.4***
Flood	43.2	22.6	53.2	31.8***
Decreases in output prices	35.1	25	19.9	7.7**
Pest attack before harvest	48.7	18.5	13.5	47.2***
Agricultural input inflation	35.1	24.4	9.2	25***
Animal disease	20.7	4.2	39	57.7***
Income reduction	32.4	14.3	3.6	39.9***
Water borne diseases	23.4	3.6	23.4	30.3***
Animal death	11.7	1.2	4.3	15.8***

Notes: ***,**significant at 1% and 5% levels, respectively; The Pearson Chi-Square (χ^2) test examines the significant differences between the frequencies by different categories.

Source: Author computation, 2018

Looking the prevalence of household shocks at Kebele level, Table 7.4 shows that all surveyed households in Selam, Walta and Mizane Brhan were affected by drought. Hail rainfall was more prevalent in Simret (92%), while flood (78%), pest attack before harvest (83%) and animal death (22%) were more frequent in Selam. Decrease in output prices (56%), agricultural input price inflation (54%), and income reduction shock (64%) were more prevalent in Arebay. High incidence of water related diseases (51%) were more prevalent in Mizane Brhan, while animal disease (55%) was a major shock experienced by Walta. The Pearson Chi-Square statistics shows that there is significant difference in shock prevalence across all studied Kebeles at 1 percent significance level.

Table 7.4: Percentage of shock incidence by Kebele

Shocks	Simret	Selam	Arebay	Walta	M/Aby	M/Brhan	Pearson χ^2
Drought	90.2	100	98.1	100	93.4	100	20.1***
Hailed rainfall/frosts	92.4	27.1	61.5	60.3	84.2	87.3	97.2***
Flood	27.2	77.9	3.9	38.5	17.1	71.4	113.9***
Decreases in output price	45.7	16.9	55.8	28.2	0.00	9.5	80.8***
Pest attack before harvest	32.6	83.1	9.6	1.3	1.3	28.6	163***
Agric input inflation	44.6	18.6	53.9	11.5	0.00	6.4	93.4***
Animal disease	4.4	15.3	26.9	55.1	3.9	19.1	88.1***
Income reduction shock	26.1	5.1	63.5	1.3	0.00	6.4	134.3***
Water borne diseases	1.1	3.4	46.2	1.3	6.6	50.8	135.2***
Animal death	2.2	22	0.00	0.00	0.00	9.5	51.1***

Notes: ***significant at 1% level

Source: Author computation, 2018

It is believed that households shock exposure can be influenced by their poverty status. For example, poorer households may be more exposed to health shocks due to low income and inability to afford medical costs. This study aggregated households' multidimensional poverty status on the basis of MPI poverty across shock incidences to examine households' shock exposure by poverty status. Accordingly, Table 7.5 presents the percentage of poor and non-poor households that experienced various shocks. The result shows that non-poor households are more exposed to various shocks than poorer households. Although drought is a serious problem in both poverty groups, it affects 99% of the non-poor households and 95% of the poor households, with significant statistical difference (at 5 percent level). Non-poor households are more affected by input and output price shocks, and income shocks than the poor households, while poor are more likely affected by pest infestation, with statistically significant difference (at 1 percent level). This may be due to the fact that non-poor households are better producers and hence fluctuations in prices and income affect their production level. These shocks may also limit their capacity to use additional farm technologies which support their agriculture. Whereas the poor households are more affected by pest infestation as they have low financial capability to adequately cover costs associated with pest control inputs such as pesticides and insecticides. Non-poor households were also more frequently victims of water born human disease than their poorer counterparts at 5 percent significant level.

Table 7.5: Percentage distribution of households' shock incidence by poverty status

Shock type	Multidimensional Non-poor	Multidimensional Poor	Pearson χ^2
Drought	98.8	94.9	4.5 **
Hailed rainfall	75.5	68.4	2.5
Flood	34.7	40.7	1.5
Decreases in output prices	32.9	21.3	7***
Pest attack before harvest	15.6	30.8	12.6***
Agricultural input inflation	29.3	17.4	8.3***
Animal disease	19.2	20.9	0.2
Income reduction shock	22.8	10.7	11.2***
Water borne diseases	19.8	12.7	3.9**
Animal death	4.2	5.5	0.4

Notes: ***, **significant at 1% and 5% levels, respectively.

Source: Author computation, 2018

7.3.2 Nature of shocks

Analyzing the nature of shocks on the basis of how widespread they are or the distinction between idiosyncratic and covariate shocks has valuable policy implication. It is very helpful to understand the available shock coping responses. For example, if any covariate shock such as crop failure occurs in a given village, food sharing through social network may not be appropriate coping strategy since a whole village is also affected. In this regard, Table 7.6 shows the extent or scope to which the reported shocks are idiosyncratic or covariate. The result shows that drought, hailed rainfall, decline in output prices, input inflation and pest invasion are covariate or community level shocks with 86%, 62%, 70%, 57%, and 86% of affected rural households indicating the scope of these shocks covers all surveyed households in a particular Kebele. These shocks severely harm households' livelihoods through significant loss and reduction in crop production, income and food consumption. Flood, animal disease, income shock, water borne diseases, and animal death are idiosyncratic shocks with 52%, 73%, 58%, 57% and 62% of affected households reported that the extent of these shocks covers at least only some surveyed households in each Kebele, respectively. Looking at the exact scope of shocks, we find water borne diseases shock as the most idiosyncratic shock as the majority (32%) declared that it affects only the household itself, implying that this health shock is not epidemic. Such types of shock are more common in low income countries where weak physical infrastructure such as lack of drinking water and sanitation facilities are common. In contrast,

drought and input price inflation shocks were found more purely covariate shocks as 60% and 38% of the respondents reported that they affect areas beyond their village.

Table 7.6: Percentage distribution of scope of shocks

Shocks	N	Idiosyncratic ←————→			Covariate
		Only my household	Some households in this Kebele	All households in this Kebele	Areas in and beyond this Kebele
Drought	405	0.3	13.6	26.1	60.0
Hailed rainfall	299	0.3	37.5	42.5	19.7
Flood	161	9.3	42.8	25.5	22.4
Decline in output prices	109	6.4	23.9	35.8	33.9
Pest invasion	104	1.9	12.5	67.3	18.3
Input price inflation	93	7.5	35.5	19.4	37.6
Animal disease	85	9.4	63.5	12.9	14.2
Income shock	65	24.6	33.8	33.9	7.7
Water borne diseases	65	32.3	24.6	21.5	21.5
Animal death	21	23.8	38.1	33.3	4.8

Source: Author computation, 2018

7.3.3 Shock severity

Households were asked their perceptions to evaluate the impact of each type of shock on their household's welfare. This is important to measure severity of the experienced shocks as it has the tendency to push households into poverty (Alwang et al., 2001). As shown in Figure 7.2, higher proportion of households reported that drought, pest attack before harvest and decreases in agricultural output prices highly impacted the welfare of subsistence households. Hail, animal disease, water borne diseases, flood, income reduction shock, and agricultural input inflation have medium impact on household welfare, while a considerable proportion of households reported that animal death had low severity on households' welfare.

Figure 7.2: Shock severity



Source: Author computation, 2018

Data obtained from focus group discussants and key informants indicated that agricultural shocks (mainly drought) that they experienced have diverse effects on rural households' livelihoods, mainly on crop production, livestock production and water availability. They explained that annual rainfall is critical for agricultural production of the District as they do not have irrigation. The failure of rainfall due to drought in 2015 and 2016 severely affected crop production. This also reduces household income and food availability. As a result, the local prices of staple food raised and this eroded food deficit households purchasing capacity.

Discussants also indicated that drought significantly reduced livestock productivity due to shortage of pasture. In time of drought, animals are chronically starved and spent the day under trees. Drought made animal feed less available, increases its price and reduces water availability. Consequently, households were forced to sell their livestock at very cheap prices because they had to feed their children. This distressed sales reduced the value of livestock and the productive capacity of the household in the future.

Another critical effect discussed was the effect of natural shocks on water availability. During the study year, there was acute water shortage in the study District. Hand pump wells, streams and rivers were dried-up which led to reduction of household water consumption by households and livestock. Informants from Arebay and Mizane Birhan also indicated that decline in water availability negatively affected the hygiene and sanitation practice of households and this led to prevalence of various diseases like diarrhea. Discussants also added that water scarcity also increased the burden of women and children. They travelled a longer distance and spent long hours collecting water because they are considered as the guardians of household water supply, and this also forced girls to lose a number of schooling days.

7.3.4 *Ex-post* Shock Coping Responses Employed by Households

Households were not passive to respond or manage the effect of past multiple shocks. Rather, they were employed a combination of different *ex-post* shock coping strategies to avert the negative impact of shocks. Many studies indicated that households adopt a mix of different coping strategies when experienced shocks (Chambers, 2006; Moser, 1998). For example, Nikoloski et al., (2018) indicated that relying on own savings, searching additional work (sometimes migration), informal social assistance and a very limited government assistance are the major shock coping strategies of households in Sub-Saharan Africa. In Ethiopia, households used sale of livestock, reduction in savings and food consumption, borrowing, and social and government safety nets to manage shocks (Dercon et al., 2005; Ali, 2015; Zelalem, 2015), among the others.

Households in the study District are operated in risky subsistence farming with small and marginal agricultural land. The agricultural sector is severely constrained by several natural shocks such as drought, pests and flooding. These setting led household's to undertake a particular set of short term *ex-post* coping responses to maintain wellbeing and to relieve the negative effects of shocks. The type of response and ability to cope with shock is dependent on the existing resources endowment and the nature of shocks that has occurred. Therefore, obtaining a greater understanding of household capacity or ability to respond to various types of shocks demands an assessment of multiple coping strategies to a shock. In this regard, sampled households were provided with a list of shock coping strategies during the field survey and the different coping strategies adopted by households across different agro-ecologies and poverty

groups are presented in Table 7.7. The Chi-Square test for all strategies, except for those who use formal borrowing and relied on relief support, shows that there is a statistically significant variation among the highland, midland and lowland agro-ecology in terms of what strategy they use to cope with shocks.

Results show that reducing food intake and consuming lower quality food were prominent households shock coping actions in the study District. Largest proportion of sampled households (85%) reduced the frequency and quality of food consumed to smooth the effect of shocks on their wellbeing and to protect their assets. This means households consumed cheaper and lower quality of food in time of shock occurrence. A 78 year old elder from Walta explained that households reduce the frequency and quality of food intake to survive and avoid total skipping of meals during the peak crop growing season. He also indicated that this strategy is helpful to prepare household members for more challenging times. Results of Pearson χ^2 test shows that there was statistically significant difference across the three agro-ecologies at 5 percent level of significance. Agro-ecologically, this strategy is dominantly practiced in the lowland area (91%) followed by midland (83%) and highland (79%) agro-ecology. With respect to poverty, no statistically significant difference was observed between the multidimensional poor and non-poor households in using this major coping mechanism.

Relying on saving was the second important coping strategy, being employed by 82% of the shock affected households in the study District. Although the average savings is very low, households reported their savings were accumulated through the sale of various products such as sale of crops and livestock and relied on their own accumulated savings to cope with shocks. Some households reported they were not able to save due to meager earnings. The results also revealed that coping with shocks by using savings is more prevalent in households living in the lowland zone, with statistically significant difference (at 1 percent level).

The third dominant shock coping response adopted by 82% of the households was sale of livestock which includes the sale of sheep, cattle, goats and poultry. In addition to the provision of manure and draft power, livestock serves as a buffer against household shocks. Birhan (2018) documented that in rural households Ethiopia in general and Tigray in particular have used saving and sale of livestock as most important coping strategies to multiple shocks in the periods of 2012, 2014 and 2016. Discussants indicated that households attempt to safeguard major

productive assets such as oxen and cows when experiencing shocks like drought. However, if they do not have adequate fodder supply and water accessibility, households sell their assets to obtain income during the lean season for their survival. The decision to sell key assets like oxen is a clear indication of absence of alternative coping options. Sale of livestock may not provide a large buffer to poor households owing to limited number of livestock. Coping with shocks by selling of livestock were predominantly used by households living in lowland zones, with significant difference (at 1 percent level). Non-poor households were more likely to respond by selling livestock assets following a shock than poor households with statistically significant variation (at 5 percent level).

Borrowing money from formal financial institutions was used by 55% of rural households who reported that they borrowed money from saving and credit cooperatives (SACCOs) and MFIs to respond to shocks. Pearson χ^2 test shows no significant difference in using this strategy across agro-ecologies. However, non-poor households were statistically more likely to respond by formal borrowing of money than poor households, with significant difference (at 10 percent level).

Another frequently used coping strategy was participation in Productive Safety Nets Program (PSNP) in the form of food-for-work program. This was found to be an important resilience strategy against shocks for 44% of vulnerable households in the study District. Large proportion of households in the highland agro-ecology, with statistically significant difference (at 10 percent level), was more likely to respond by joining this program. Devereux et al., (2006) remarked that Ethiopia's PSNP is aimed to guard households against recurrent drought through smoothing household food consumption, protecting household assets, creating community assets, strengthening household and community resilience to shocks, and breaking the country's chronic dependence on food aid.

Table 7.7: Percentage distribution of household coping strategies by agro-ecology and poverty

Coping strategies	%	High land	Mid land	Low land	Pearson χ^2	Non poor	Poor	Pearson χ^2
Reducing frequency and quality of food consumed	85	79.3	83.3	91.5	7.9**	86.8	83.8	0.7
Draw down on savings	82	87.4	73.2	88.7	15.3***	82.6	81.8	0.1
Sold livestock	82	84.7	75	88.7	10.4***	87.4	78.7	5.3**
Formal borrowing of money	55	60.4	49.4	56.7	3.6	60.5	50.9	3.7*
Food-for-work	44	50.5	46.4	36.2	5.8*	40.1	46.6	1.7
Reliance on relief support/aid	39	33.3	36.3	45.4	4.4	41.9	36.4	1.3
Short term migration	30	18	41	26.2	18.3***	24.6	33.6	3.9**
Sold crop stock	29	38.7	22	30.5	9.2***	36.5	24.5	7***
Sold fixed assets	26	50.5	15.5	19.9	46.7***	26.9	25.7	0.1
Reduce spending on cloth	25	38.7	33.9	2.1	58.4***	29.9	20.9	4.4 **
Informal borrowing of money	15	14.4	11.3	21.3	5.9*	11.9	17.8	2.6
Consumed seed stock	12	11.7	6.6	19.9	12.6***	19.8	7.5	13.9***
Sold firewood and charcoal	6	10.8	7.1	0.7	12***	3.6	7.5	2.8*

Note: ***, **, *significant at 1%, 5%, and 10% levels, respectively.

Source: Author computations, 2018

Data obtained from key informant interviews indicated that PSNP benefited rural households either in the form of food-for-work program or direct welfare support. The beneficiaries of direct support are elders, orphans, disabled persons and households with no labor to supply. Those who can contribute labor when experiencing food shortage are screened for food-for-work program to cope with shocks. Food-for-work program is focused on conservation of natural resources and is the most common type of safety net in the study District. This includes rural road construction, soil and water conservation, reforestation, and digging wells. Chronic food insecure households who faced continuous food shortage were selected by District officials using administrative guidelines and community knowledge. Beyond increasing income and food of the household, the program is significant in rehabilitating the environment.

Reliance on support from families and friends forms a coping strategy for 39% of the sampled households. Increasing wage work or temporary migration to towns in search of wage

employment were important responses to the effect of shocks for 30% of respondents, and this was significantly more adopted in the midland agro-ecology at 1 percent significance level. Migration of any household members occurred due to absence of local employment opportunities. It is also quite evident that some households were employing various strategies such as selling crops (29%), sale of fixed asset (26%), reducing spending on clothes (25%), and sale of firewood and charcoal (6%) to deal with adverse events, and these strategies were more likely to be adopted by households in the highland zone, while informal borrowing (15%) and consuming seed (12%) held for the next season were more prevalent option in the lowland agro-ecology, with a statistically significant difference. Across wellbeing categories, the use of migration and sale of natural resources such as firewood and charcoal were more dominantly used by the poor households, while sale of crops, reduction of spending on clothes, and consumption of seed stock held for the next season were significantly more used by non-poor households to avoid the effects of shocks.

The above result shows that households were not passive in facing unforeseen events. They attempted to design well defined *ex-post* shock coping strategies to reduce the negative impact of shocks to recover their previous status quo. Results also show that households in the study District follow a mix of erosive, reversible or regenerative *ex-post* coping strategies to resist the adverse effect of shocks. Reduction in food consumption, relying on savings, formal and informal borrowing of money, sale of crops, and reducing spending on non-essential items like clothes are reversible coping strategies practiced by sampled households. However, strategies like eating less and consuming less quality of food may disturb household's health status. Some strategies may be erosive and exert negative consequences on household's wellbeing and future growth. Erosive coping strategies practiced by households includes sale of fixed assets, sale of livestock, migration, and consuming seed stocks preserved for the next cropping season. Sale of productive assets mainly sale of oxen and cows reduces households' future productive capacity while migration leads to loss of household labor. Positive or regenerative coping strategies used by households were sale of firewood and charcoals and joining Productive Safety Net Programs. These regenerative strategies were more practiced in the highland agro-ecology.

Qualitative data obtained from key informant interviews shows that households employed sequenced coping strategies mainly to cope with crop failure as a result of drought, hail, flood

and pest. They consider the resources they have and follow structured strategy to cope with shocks. During the initial period, households first reduce non-essential expenditures and draw down on savings. And then they normally sell small ruminants like goats and sheep. The money obtained from this sale is used to buy food. If severity of the problem is increased, households follow less reversible strategies and sell whatever they have, starting with small assets such as chickens and extend to selling donkeys and heifers, and finally households sell their major productive assets such as cow and oxen. The sale of oxen forces households to deplete their production capacity in the next agricultural season, while the sale of cows is harmful with respect to household food consumption as it leads to loss of milk and milk products. Some households also consume seed reserves. This also might lead to severe seed shortage during the next cropping season. In aggregate, such coping strategies have severe impacts on household livelihood sustainability and increase the household's vulnerability to subsequent shocks.

7.3.5 Correlates of Household Vulnerability to Multidimensional Poverty

Table 7.8 shows the predicted coefficients on the determinants of vulnerability to multidimensional poverty that form the basis for the computation of the aggregate vulnerability discussed in the next sections. Household vulnerability to multidimensional poverty was estimated using expected mean and variance of household's weighted MPI deprivation score. Determinants of vulnerability to multidimensional poverty are addressed based on the assumptions articulated in section 7.2.1. The predicted residuals of the model satisfy the properties of normal distribution. This was tested using various normality tests such as histogram, probability plots and Shapiro-Francia W' test (Appendix D). The result shows good performance of the model, with statistically significant F-value. R-squared for the level of expected deprivations shows that 49.7% of the variation in the values of predicted deprivation score are explained by the selected independent variables. The specification of the model was also checked by testing the problem of multicollinearity using Variance Inflation Factor (VIF) for continuous variables and contingency coefficients for dummy variables. Result of the VIF shows that there is no strong correlation among predictors in the regression model. The VIF values range between 1.03 and 1.21 with mean VIF 1.10. This value is significantly lower than the VIF threshold of 10 (Chatterjee and Hadi, 2012) (Appendix E). Result of the coefficient of contingency also shows that the maximum correlation between any two dummy variable is very low indicating that multicollinearity is not a problem to our analysis (Appendix F).

The estimated results from Table 7.8 provide key insights into the relative importance of different factors to household vulnerability and multidimensional poverty. Controlling all other determinants, households with a better social capital index tend to be less vulnerable owing to their lower rates of expected multidimensional poverty. This is probably due to the fact that households in the rural areas have strong informal social networks and cooperation's that may help them to build fertile ground for mutual insurance against idiosyncratic uncertainties or adverse events such as drought, pests and floods. Social capital is also an important asset for safety net, risk management, mutual assistance, and it facilitates the creation of informal credits in the rural areas. Moreover, rural areas have strong social capital that enables them to join together, mobilize resources and act collectively to protect themselves from a range of risks and vulnerabilities.

Holding everything else constant, households that are relatively well endowed with financial assets are less vulnerable and have lower level of expected multidimensional poverty. This is probably because financial capital increases farmers' investment choices and has direct vulnerability reducing effect through increasing the ability of households to deal with risks and vulnerabilities.

The number of plots has significant impact on household vulnerability to poverty. The negative coefficient implies that households with greater number of plots are found less vulnerable owing to their lower rates of expected multidimensional poverty. An increase in a household's number of plots decreases its weighted MPI deprivation score by around 0.04, other things kept constant. This may be due to the fact that the study District is highly exposed to soil erosion due to its sloping and hilly topography. Thus, though it is very difficult to apply modern agricultural technologies to ensure even the smallest economies of scale with fragmented, small plots of land, households with more dispersed plots of land reduces the risks of harvest failure through diversifying crops and land types. This made substantial contribution to lowering the probability of households being multidimensional poor in the future.

On the other hand, households with greater physical capital index are found to be more vulnerable owing to a higher average level of deprivation with lower volatility of expected MPI deprivations. The significant and positive coefficient of physical assets index suggests that the index is positively correlated with household's vulnerability to MPI poverty, and the negative

and significant variance shows that this asset reduces the variance of expected MPI poverty. The existing physical infrastructure of the study District is inadequate and do not support households to reduce vulnerability and improve wellbeing. The resulting physical assets increase vulnerability is contradicted with previous studies (see DFID, 2000; Sen, 2003; McKay, 2009; Alkire and Santos, 2010; Moser, 2011) which indicated access and supply of infrastructural services and production goods support household's wellbeing. This is probably due to the fact that households in the study District have very poor and inadequate access to various infrastructural facilities such as market, transportation, electricity and irrigation dams to achieve valuable functioning. The traditional nature of household's productive assets mainly the low quality of farm implements may also contribute to lower crop productivity. Thus, households with a larger, but poor quality, stock of farm assets cannot increase agricultural production which in turn increases vulnerability to poverty.

Gender as a demographic characteristic provides an important insight into household's vulnerability to future deprivation in wellbeing. When controlling for all other factors, female-headed households are more likely to be vulnerable to future poverty than male-headed households. This reflects common knowledge that most female-headed households in rural Ethiopia are poor and vulnerable due to many factors. Lemlem et al., (2011) indicated that women play an important role in agricultural production (crop and livestock production). However, despite their contribution, they historically had limited access to productive resources such as land, livestock, farm implements, knowledge and financial capital. Teshome (2015) also indicated that the socio-cultural and legal factors are some of the possible explanations for women's weak rights to access and control land as compared to their male counterparts.

Result of the regression analysis shows that households' experiences of hail shocks is associated with increased vulnerability to multidimensional poverty as it is correlated with higher expected levels of wellbeing deprivation. Hail and too much rain are two of the major devastating shocks experienced every year by subsistent farmers in the study area. It poses considerable damage and destroys crops such as taff, wheat and horse beans, thereby reducing food availability. It is also evident that households that experienced drought shocks are highly vulnerable with higher average level of deprivation and lower expected level of volatility in future wellbeing. This is probably due to the fact that drought as the most commonly reported natural shock reduce crop

income and other productive asset holding capacities (example, livestock) of households which also adversely affect future income generation. Households that experienced pest attack were found more vulnerable to multidimensional poverty. This shows that pest invasions stress crops, reduce yields and households expected wellbeing. Overall, the excessive dependence of households livelihood on small scale agriculture (crop production and livestock farming) make them highly vulnerable to adverse effect of climate related natural hazards such as drought, hail, and pest invasions which mainly affects household's wellbeing through disrupting and lowering food production, income generation, and asset creation.

Turning to households' experiences of shock coping strategies, *ceteris paribus*, households who coped through running down savings and formal borrowing of money from financial institutions such as MFI's and cooperatives were found to be less vulnerable, because the coefficients of these coping strategies are associated with a lower expected level of MPI deprivations. Relying on savings and credits fulfill the immediate financial needs to manage households' exposure to shocks in timely manner and enhances household welfare through increasing investments, improving income and assets accumulation. Formal borrowing is also associated with higher expected volatility in household's future level of wellbeing. This finding also suggests that access to such financial services may be an instrument to increase production and income generating activities thereby reducing the likelihood of experiencing multidimensional poverty. Finally, households that sold livestock following shocks were observed less vulnerable to multidimensional poverty. This implies that those households who owned livestock have better capacity to cope with future deprivation in wellbeing. Rural households kept and made investment in livestock such as goats and sheep in normal times and these investments can be easily converted into monetary value to respond to adversity. These help households reduce the probability of experiencing future poverty.

Table 7.8: Estimation of household's vulnerability to expected multidimensional poverty

		Weighted MPI	
	Variables	Deprivation Score	Variance
Household characteristics	Sex of household head	0.080509***	-0.148971
	Household size	-0.005217	-0.012095
	Age of household head	0.000200	-0.003979
	Head years of education	-0.002347	-0.007942
	Dependency ratio	0.000706	0.066911
Assets	Physical capital index	0.743978***	-2.705799**
	Social capital index	-0.332179***	0.406202
	Financial capital index	-1.384706**	5.231976
	Number of plots	-0.044803***	0.064937
Shocks	Hail	0.067956***	-0.195288
	Flood	0.005273	-0.005091
	Decreases in output prices	0.003715	-0.096248
	Drought	0.231182***	-3.009473***
	Pest attack before harvest	0.115121***	-0.180025
Coping strategies	Reducing food consumption	-0.022976	-0.093655
	Draw down on savings	-0.063077***	0.246295
	Sold livestock	-0.157016***	0.32094
	Formal borrowing of money	-0.130928***	0.334272*
	Joining safety net program	0.008845	0.108946
Kebele (Simret is base)	Selam	-0.005127	0.082152
	Arebay	-0.015070	-0.226528
	Walta	0.109477***	-0.07061
	Michael Abiy	-0.022304	-0.096276
	Mizane Brhan	0.037642	-0.161591
Constant		0.129815	5.642367***
Observation		390	390
R-squared		0.497124	0.090013
Adjusted R-squared		0.464058	0.030178

Legend: ***, **, *significant at 1%, 5% and 10% levels, respectively. Negative sign of the deprivation score coefficients indicated a reduction in predicted multidimensional deprivations and thus an improvement in households' wellbeing.

Source: Author computation, 2018

7.3.6 Aggregate Poverty and Vulnerability Profile

As shown in Table 7.9, the analysis of the vulnerability index shows that the mean vulnerability or the average vulnerability level of the studied households is 0.55, and the standard deviation is 0.17, which means that the distribution of vulnerability index is skewed to the right side and the mean of the vulnerability index, is typically greater than the median. According to Chaudhuri et al., (2002), the mean vulnerability should be closer to the estimated multidimensional poverty rate to have proper vulnerability estimates. Hence, the predicted households' multidimensional poverty rate is 0.60, which is reasonably close to the average vulnerability. Households with higher vulnerability index score are more likely to be vulnerable to multidimensional poverty. Many households have vulnerability index score greater than the average vulnerability index which implies that those households have higher deprivation score than the average level. Result also shows that the average vulnerability index score of the poor households (0.60) is greater than the average vulnerability index of the non-poor households (0.47), which implies the correlation between current poverty and vulnerability to future multidimensional poverty is positive.

Table 7.9: Mean vulnerability index for poor and non-poor households

Multidimensional Poverty Status	Number	Percent	Mean vulnerability
Multidimensional non-poor	156	40	0.47
Multidimensional poor	234	60	0.60
Total	390	100	0.55

Source: Author computation, 2018

Household vulnerability to multidimensional poverty is computed as the probability of a household falling into future poverty based on predetermined poverty threshold. For vulnerability to poverty, there are two primary causes. One, households can be vulnerable through having an extremely low level of current wellbeing. Most of the time, this includes households that have a high vulnerability because they are currently poor and are expected to remain poor in the future. Second, currently non-poor households can also be vulnerable due to having high variation in their expected wellbeing (i.e., households with a severe form of vulnerability who may not be currently poor, but because of their exposure to risk, face a sufficiently high likelihood of being pushed into poverty in the future) (Feeny and

McDonald, 2016). These two sources of vulnerability should be considered in vulnerability analysis as they give an important insight on what preventive actions should be taken.

Generally, high expected mean deprivation in a population and volatility in wellbeing are the major sources of household's vulnerability to multidimensional poverty. In line with this, it is important to have a standard vulnerability threshold to characterize more vulnerable households for policy targeting. Therefore, as Chaudhuri et al., (2002) proposed, 50% likelihood of falling into future poverty and the prevailing poverty line (43% of the weighted deprivation indicators in our case) were used as two different thresholds for determining the vulnerable and poor households, respectively. Employing these two thresholds, Chaudhuri et al., (2002) divided the entire population into three different vulnerability groups (see Table 7.2). Based on this characterization, it is possible to examine the relationship between poverty and vulnerability and compare the various types of vulnerability with the observed poverty. The classification of households into poor and vulnerable is also important to identify the extent and sources of poverty and vulnerability which are significant for devising anti-vulnerability strategies.

As presented in Table 7.10, households' vulnerability is cross tabulated with households' multidimensional poverty status to assess which households are vulnerable to future poverty. The Table also demonstrates the overlapping categories of households which enable us to differentiate the chronic poor from poor households, and the highly vulnerable non-poor and relative vulnerable non-poor households, along with their sources of vulnerability. In this regard, the result shows that while a high proportion of households (60%) were poor, a majority of these (44.6% of the total population) are chronically poor (poor due to high vulnerability). This means nearly 75% of households who are poor are highly vulnerable with high probability of experiencing future multidimensional poverty. High dependence of households on small-scale rain-fed agriculture and the existence of extremely high uncertainty about future risks may be possible explanation for this high estimated vulnerability at current observed multidimensional poverty incidence. While 11.3% of the poor households are transitorily poor (at risk of becoming poor due to high expected variation in their wellbeing), only 4.1% of the poor are defined as infrequently poor (or defined as poor, with low vulnerability and therefore might become non-poor in the future).

Coming to the vulnerability level of non-poor households, Table 7.10 shows no significant difference in percentage distribution between the high and relative vulnerable of the non-poor households. Of the 40% of non-poor households, 12.1% of households are vulnerable to poverty (non-poor with high expected volatility in their wellbeing). Only 15.6% of households are found as non-poor and non-vulnerable. In aggregate, 56.9% of the population is estimated to be highly vulnerable to future multidimensional poverty, while 23.4% and 19.7% of the households are found in the relative vulnerable and non-vulnerable groups, respectively.

Table 7.10: Estimates of poverty and vulnerability to multidimensional poverty grouping

		Observed Multidimensional poverty		
		Current Poor 60%	Current Non-Poor 40 %	
Estimated vulnerability	Total Vulnerability 80.3%	Chronic poor (current poor with high vulnerability due to inordinately low expected level of wellbeing) 44.6%	Vulnerability to chronic poverty (current non-poor with an inordinately low expected level of wellbeing) 12.3%	High vulnerability 56.9%
		Frequently poor (poor with high expected volatility in their wellbeing) 11.3%	Vulnerability to frequent poverty (non-poor with high expected volatility in their wellbeing) 12.1%	Relative vulnerability 23.4%
	Not vulnerable 19.7%	Infrequently poor (poor but not vulnerable) 4.1%	Not vulnerable and not poor 15.6%	

*Shaded area comprises total vulnerability; Numbers may not sum to 100% due to rounding.

Source: Own computation based on Chaudhuri et al.,(2002), Suryahadi and Sumarto (2003) and Feeny and McDonald (2016).

As shown in Table 7.11, another important finding is that 80.3% overall vulnerability incidence exceeds the current multidimensional poverty incidence of 60%. This shows the chance of experiencing future multidimensional poverty is significantly greater than the present multidimensional poverty incidence of households and this signifies that the current poverty level underestimates the fraction of households who are susceptible to multidimensional poverty. The magnitude of underestimation is examined by computing the vulnerability to poverty ratio, which is 1.34. Chaudhuri et al., (2002, p.11), stated that “... a higher vulnerability to poverty ratio indicates a more dispersed distribution of vulnerability, whereas a lower ratio suggests that vulnerability is concentrated among a few”. Hence, findings on vulnerability to

multidimensional poverty ratio of each study Kebele indicated that vulnerability is generally more widespread or dispersed than current poverty in Arebay, Michael Abiy and Mizane Brhan, respectively, with estimated vulnerability greater than observed multidimensional poverty. In contrast, the result revealed a lower level vulnerability to poverty ratio in Selam (0.72) which suggests vulnerability to poverty is highly concentrated in this study Kebele, followed by Simret and Walta.

Table 7.11: Comparison of observed poverty and estimates of vulnerability

Kebele	Percentage of Population		Vulnerability to Poverty Ratio
	Vulnerable	Poor	
Overall	80	60	1.34
Simret	46	61	0.75
Selam	57	79	0.72
Arebay	50	35	1.43
Walta	70	78	0.89
Michael Abiy	65	52	1.25
Mizane Brhan	53	47	1.13

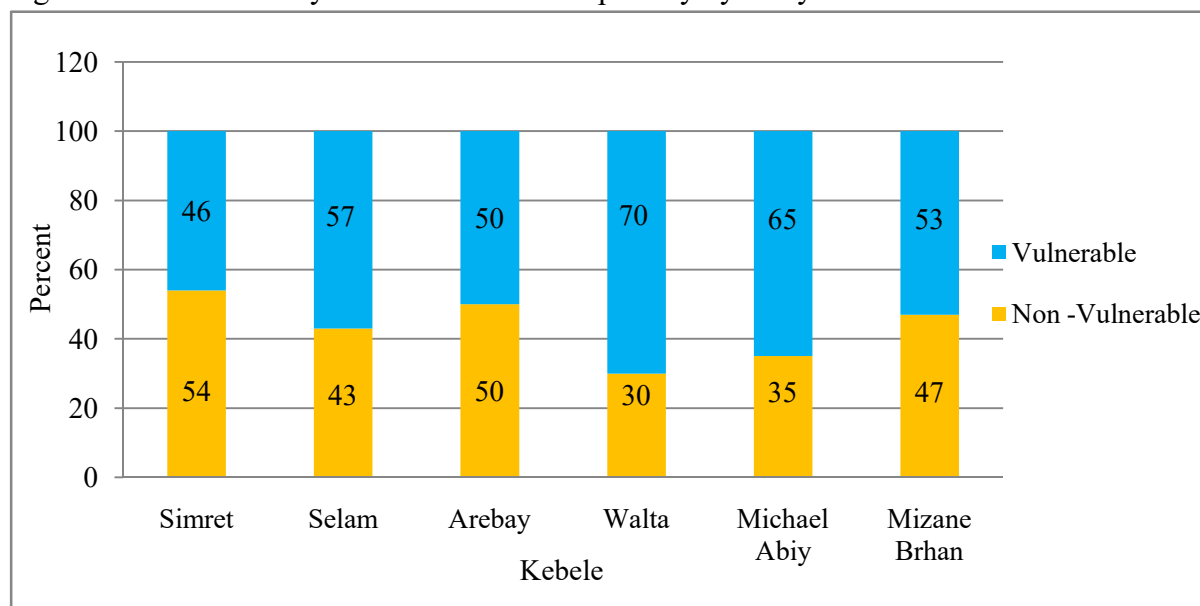
Source: Author computation, 2018

7.3.7 Vulnerability to Multidimensional Poverty by Locations and Socioeconomic Characteristics

This section decomposes household vulnerability by Kebele, gender, age, household size, education, landholding, livestock holding, contact with agents, credit, training and market access. Looking at the distribution of households' overall vulnerability to multidimensional poverty by locations and households' socioeconomic characteristics is important for poverty reduction targeting purpose as the incidence of vulnerability provide helpful insight on who is more vulnerable to future poverty. Kebele wise estimates of household's vulnerability to poverty are presented in Figure 7.3. Variations in vulnerability were observed among all study Kebeles. The highest vulnerability rates were observed in Walta, where about 70% of the population is vulnerable to multidimensional poverty. This was followed by Michael Abiy with 65% of vulnerable households. Selam and Mizane Brhan ranked third and fourth in terms of aggregate vulnerability to multidimensional poverty estimates, respectively. Although with high percentage of vulnerable households, the lowest incidence of vulnerability to poverty is estimated for Simret. The overall result in the figure shows the extremely high level of vulnerability to poverty

in each study sites. This is probably due to the fact that these study villages are exposed to different shocks and are found in a mountainous area that requires households to travel long distance to reach the District town to obtain basic services like marketing services.

Figure 7.3: Vulnerability to multidimensional poverty by study Kebeles



Source: Author computation, 2018

As shown in Table 7.12, vulnerability decomposition by gender of household head's shows that female-headed households (69.6%) are more vulnerable to multidimensional poverty than male-headed households (54.2%), with statistically significant difference (at 5 percent level). Less access to and less control over vital productive resources such as land, credit and employment opportunities are probably some of the reasons that may contributed to their higher level of vulnerability to multidimensional poverty. In Ethiopia, female-headed households emerge when married women are separated from their respective husbands (mainly by divorce) and become heads of their own households (Yigremew, 2002). Even if they possess a small plot of land, they did not cultivate it by themselves due to many factors (example, labor problem to run farming activities due to smaller family size) and hence they rented it out to others. Given the absence of local markets and the low productivity of the land, it is difficult to produce adequate food for the household. The strong cultural beliefs and traditional practices may also constrain women's active involvement in all socioeconomic activities, which in turn increases women's vulnerability to multidimensional poverty.

Distribution of vulnerability to poverty across household size indicates that households with less than four members are more vulnerable to multidimensional poverty than households with medium and big size, at 1 percent level of significance. This is probably due to the fact that small size households may lack the family labor for farm and non-farm activities which are a key to drawing welfare.

Better attainment of education increases household's knowledge and skill that influence productivity and earning capacity. Education is also important to develop effective response mechanisms against uncertainties through enhancing risk perceptions and awareness which is directly related household's capacity to plan the future. Assessment of vulnerability to multidimensional poverty by formal years of education of household head's shows that the extent of vulnerability is high in households having less than five years of schooling, which is estimated to be 74.3% of the total population. In contrast, a little more than half of households (50.9%) who completed $\geq$ five years of education are also vulnerable to poverty, with significant difference (at 1 percent level). This is probably due to the reason that either agricultural activity implemented in the study area does not need more education or the acquired level of education does not help household heads to obtain better job in their District.

Vulnerability to poverty assessment by size of cultivated land shows that 63.8% of households having less than local average that is 0.66 hectare of land were found under the vulnerable category, while majority of households (52.8%) who owned $\geq$ 0.66 hectare of land were non-vulnerable, at 1 percent level of significance. The possible explanation for this may be land is one of the most valuable factors of production in agricultural societies and households with greater size of land have the possibility of increasing production and securing livelihoods, and thus reduce future poverty.

Table 7.12 Vulnerability to multidimensional poverty across socioeconomic characteristics

	Non vulnerable		Vulnerable		Total		Pearson χ^2
	Number	Percent	Number	Percent	Number	Percent	
Overall	168	43.1	222	56.9	390	100	
Head gender							
Male	147	45.8	174	54.2	321	100	5.5**
Female	21	30.4	48	69.6	69	100	
Head age							
Below average(<49)	96	45.5	115	54.5	211	100	1.1
Above average($\geq$ 49)	72	40.2	107	59.8	179	100	
Household size							
Small(<4)	20	26.7	55	73.3	75	100	10.2***
Medium(5-8)	134	47	151	53	285	100	
Big(>8)	14	46.7	16	53.3	30	100	
Completed years of education							
< grade five	26	25.7	75	74.3	101	100	16.7***
$\geq$ grade five	142	49.1	147	50.9	289	100	
Landholding							
< local average(0.66)	83	36.2	146	63.8	229	100	10.6***
$\geq$ local average(0.66)	85	52.8	76	47.2	161	100	
TLU							
< local average(4)	62	33.3	124	66.7	186	100	13.8***
$\geq$ local average(4)	106	52	98	48	204	100	
Contact with agents							
Yes	146	44	186	56	332	100	0.7
No	22	38	36	62	58	100	
Credit							
Yes	104	44.6	129	55.4	233	100	0.6
No	64	40.8	93	59.2	157	100	
Training							
Yes	123	44	156	56	279	100	0.4
No	45	40.5	66	59.5	111	100	
Market access							
Yes	133	48	144	52	277	100	9.5***
No	35	31	78	69	113	100	

Note: ***,**significant at 1% and 5% levels, respectively. The vulnerable households are those who face more than 50% probability of being multidimensional poor next year.

Source: Author computation, 2018

Findings from the result Table also indicated that higher proportion of households (66.7%) having TLU less than local average (i.e., 4) fall into the vulnerable group, while majority of households (51.2%) who owned $TLU \geq 4$ are found in the non-vulnerable category, at 1 percent level of significance. This shows that livestock ownership is a safety net that helps households to escape from future poverty through securing households food, income and employment. Decomposition of household's vulnerability by access to market shows that higher proportions of households who do not have market access (69%) were found in the vulnerable groups, at 1 percent level of significance. Access to credit is important to build up assets and enhance the purchase of modern agricultural technologies such as inputs while training and access to extension services are decisive to diversify income sources, understand and acquire new skills on how to use and apply improved farm techniques and new production systems, thereby increases farmer's productivity. Absence of such essentials tends to increase households vulnerability to multidimensional poverty. However, Pearson Chi-Square test of these variables shows no significant difference between households who had training, credit and extension services and those who are non-beneficiaries of these services.

7.4 Summary

The aim of this chapter was assessing rural household's vulnerability to multidimensional poverty. To do that, we first identify the information on major shocks that rural households experienced along with their dominant coping strategies. Following this, correlates of household's vulnerability to MPI poverty were assessed using three step FGLS method, and then, household vulnerability index was developed to define the vulnerable and non-vulnerable households. The results show that 96% of surveyed households had experienced drought and this directly affected the food production and income of households. Hailed rainfall was reported the second major shock that affected 71% of households. This was also damaged major staple crops of the District such as Barley and wheat. Rainfall induced flood was the third major shock experienced by 38% of surveyed households and it erodes fields to rivers and streams. The analysis also shows that some households had also experienced different shocks such as agricultural output and input shocks, pest attacks, animal and water born disease outbreaks and income reduction shocks. Drought was the most prevalent shock all across agro-ecologies and study Kebeles. Except for drought, shock prevalence variation was observed across Kebeles. For

example, hail was more prevalent in Simret, while flood and pest invasion mostly occurred in Selam. Shock exposure across welfare level shows that although drought is a severe problem in both poverty groups, non-poor households are more exposed to various shocks than poorer households. For example, non-poor households are more affected by input and output shocks, income shocks and human disease, while the poor are more affected by pest infestation, with statistically significant difference. The result also shows that drought, hailed rainfall, decline in output prices, input inflation and pest invasion are covariate shocks which affect agriculture production, while flood, animal disease, income shock, water borne diseases, and animal death were reported as idiosyncratic shocks.

Households who are exposed to various shocks were not passive to respond. They employed a range of coping strategies against shocks. Household's was reported that reducing the number and quality of food, relying on savings and sale of livestock are the three dominant coping strategies following shocks. Analysis also shows that some households were taken erosive coping strategies such as sale of livestock and consuming seed stocks, while other used reversible (such as savings, borrowing and reduction in food consumption) and regenerative coping strategies (such as sale of firewood and charcoals, and joining productive safety net programs) to mitigate the impact of adverse events.

Turning to household's vulnerability to multidimensional poverty, the results show that, households with a greater social capital, financial asset and number of plots tend to be less vulnerable owing to their lower rates of expected multidimensional deprivation. However, households with greater physical capital are found highly vulnerable, with physical asset owing to a higher average level of deprivation with lower volatility of expected multidimensional deprivations. Analysis also shows that female headed households are more vulnerable to future poverty than male headed households. With respect to household's experience of shocks, those who faced hailed rainfall and pest attack are also associated with increased vulnerability. Households that experienced drought shocks are found highly vulnerable with higher average level of deprivation, and lower expected volatility in their well-being. Regarding coping strategies, households that draw down on savings and sale of livestock following a shock are found less vulnerable to MPI deprivations. In addition to this, households that relied on formal borrowing of money are less vulnerable with high expected variation in wellbeing.

As far as linkage between poverty and vulnerability is concerned, findings shows that of the 60% of poor households, 44.6% were chronically poor, while 11.3% and 4.1% of the poor households are grouped as frequently and infrequently poor, respectively. In contrast, of the 40% of non-poor households, around 12% of households were vulnerable to chronic and frequent poverty each, while 15.6% of households were defined as non-poor and non-vulnerable. Another important finding is that the predicted likelihood of experiencing multidimensional poverty in the near future exceeds the current incidence of multidimensional poverty of households. While more dispersed vulnerability is observed in Arebay, highly concentrated vulnerability is observed in Selam. Finally, classification of household's vulnerability to poverty by various socioeconomic characteristics shows that female-headed households, higher proportion of household with less than four people, households having less than five years of schooling, households with less than local average size of land and TLU, greater part of households who have access to market were found in the vulnerable groups.

Chapter Eight

Conclusion and Policy Recommendation

8.1 Introduction

This chapter presents the overall conclusion and policy implication of the study resulting from a comprehensive assessment of rural household's multidimensional poverty and vulnerability in Degu'a Tembien District. Poverty reduction is a top priority agenda item for developing economies like Ethiopia. Many developing countries have made some progress in reducing poverty in the last two decades. Ethiopia was one of poorest countries that had high poverty rates in the world in 2000. Using national poverty line, Ethiopia has made significant progress in reducing monetary poverty as the proportion of poor has declined from 44% in 2000 to less than 30% in 2011 (World Bank, 2015). The monetary approaches to poverty were dominant in the last century (World Bank, 2010). However, recently greater emphasis was given to multidimensional poverty approaches.

Poverty prevention has become difficult task for governments and policy makers as it is very difficult to identify the risk of falling in to poverty or back in to poverty using *ex-post* poverty measures. Thus it is generally recognized that poverty prevention strategy should focus not only on the currently observed poverty but also on the probability of falling into future poverty. Regardless of this understanding, many studies continued addressing only *ex-post* poverty and this analysis neglects the prevalence and sources of future poverty. However, the prevalence of various socioeconomic and nature related shocks limits improvements in wellbeing and can push significant proportion of households into poverty. In addition to this, vulnerability of households to multiple deprivations has been given less focus. Hence, this study assesses household's poverty and vulnerability using multidimensional poverty measures to reduce the basic limitations of using monetary poverty and focusing on *ex-post* poverty in a particular context. In doing so, household's multidimensional poverty which directly focused on capabilities and functioning's was addressed using education, health, living standard, wealth and empowerment dimensions of poverty. Household's vulnerability to multidimensional poverty were explored by combining information's on household characteristics, livelihood assets, shock experiences and the varied shock coping strategies. The following sections of this chapter are structured as follows: Section 8.2 presents the overall empirical conclusions of the study. Section 8.3 forwards

policy recommendations derived from the research results. Section 8.4 presents the contributions of the study. Finally, section 8.5 closes the dissertation by presenting limitations and further research perspectives.

8.2 Empirical Conclusions

The study has attempted to assess household's asset endowments, measure the level of multidimensional poverty, investigate the major determinants of poverty, and finally it estimate household's vulnerability to multidimensional poverty in Degua Tembien District. Assets endowment or acquired possession signifies household's capability to cope with shocks and their accumulation plays an important role in avoiding or escaping poverty and enhancing current and long-term household's wellbeing. It is therefore important to examine household's access to, and endowment of, various assets to identify better strategies to reduce poverty and vulnerability. Empirical results on household assets endowment show that there are significant differences in the possession and access to different type of livelihood assets. Households who possess relatively higher level of produced physical asset are better able to sustain livelihoods and achieve basic needs. Access to physical capital enables households to have better access to communication goods, primary education, health and other basic services. The study also found that households owned considerable social capital. Social capital helped rural households to access and distribute different forms of resources such as agricultural inputs and labor through facilitating economic interactions with other rural households. Through social networks and mutual support mechanisms, households were helping each other in time of shocks and stresses.

Households were less endowed with human, natural and financial capital. The existing human capital stock of households was relatively low as compared to physical and social capital. The low level of household's formal education and the low number of extension visits are the reasons for low level of human capital, among the others. This constrained households in accumulating, producing and earning better livelihoods, as poorer human capita cannot help households to convert existing resources (means) into functioning's (ends) that improve livelihood outcomes.

Natural capital, particularly land, is the major productive resource of rural households. However, findings show inadequate availability of natural capital to rural households in the study District. The overall low landholding, land fragmentation and degradation and absence of grazing land are

factors that contribute to a low stock of natural capital in the study area and this adversely affected household livelihoods through constraining produce diversification and limiting food production.

Findings also show that financial assets were the least available resources of households which inhibits investments in different livelihood capitals particularly investment in human capital and purchased inputs and agricultural equipment. The low level of household cash income, credit (with high interest rate) and the small amount of savings are the major signs of a low level of household's financial capital. This extremely inadequate financial asset capacity prevents households to achieve the different livelihood objectives and enable them to own insignificant control over other resources, as it is a key means of entitlement to realize overall household livelihood potential and cope with shocks.

Asset analysis also shows that the highest proportion of households was found in the middle socioeconomic groups while very low proportions of households were concentrated in the highest socioeconomic groups. Households' socioeconomic position was not uniformly distributed across the low, medium and high socioeconomic groups. The lowest levels of financial, human and natural capital and imbalances between all livelihood assets impede households from enjoying productive lives and avoiding poverty. Likewise, low asset ownership also hinders poorer households in effectively reducing poverty, and exacerbates all households' vulnerability to poverty.

Development literature has recognized poverty as a multidimensional deprivation in a range of dimensions that, when improved, can broaden individuals, households and communities' freedom to enjoy a better wellbeing. Specifically, poverty is operationalized in this research in terms of deprivations in health, education, wealth, standards of living and empowerment. This perspective was important to the development of alternative approaches to multidimensional poverty measurement aimed at poverty prevention. The need to measure the incidence and intensity of household's multidimensional poverty has increased over the last decade and the Alkire and Foster methodology is a new advance developed in response to this point of view. Therefore, this study assessed household's multidimensional poverty using this methodology through addressing the incidence and intensity of multidimensional poverty. Poverty was

decomposed across the various indicators and groups to show the composition of poverty within and among groups.

Results shows that multidimensional poverty in the study area is deep rooted and chronic which demands substantial resources to help poor households reduce poverty. The highest percentages of deprivation were found in cooking fuel, followed by access to electricity, decisions on increasing income, access to improved sanitation, and land ownership, then livestock ownership (measured as Total Livestock Units). Higher levels of poverty and deprivation were found in cooking energy, followed by electricity, decision making on income, TLU and land size. The percentage of poor and deprived households in each of these indicators ranges from 39% to 60%. The overall households' Multidimensional Poverty Index (MPI) was 0.35, meaning the multidimensionally poor experiences 35% of the total deprivation that would be experienced if all households were poor and deprived in all selected indicators of poverty, considering deprivation in one-third of the weighted indicators as poverty threshold. The aggregate MPI was broken down into a headcount ratio (H) of households in multi-dimensional poverty and an average intensity of deprivation among those poor (A). Accordingly, 60% of the households were poor and on average, the poor were deprived in 58% of all the indicators. With regard to contribution of each dimension to overall MPI, data shows standard of living as the largest contributor, followed by lack of empowerment and wealth dimension of poverty. Similarly, the contribution of each indicator to MPI shows deprivation in household's decision making on income as the larger contributor, followed by deprivation in livestock ownership and landholding.

The study examined the determinant factors of multidimensional poverty in the study District. First, the weighted deprivation score of each household was computed and classified into two groups by applying deprivation in at least one-third of the weighted indicators as a multidimensional poverty cutoff to investigate the multidimensionally poor and non-poor households. Once this dichotomization is generated, the socioeconomic factors that determine household's multidimensional poverty were analyzed using binary logistic regression. The findings of this analysis shows that households multidimensional poverty is significantly and negatively associated with access to non-household labor, number of plots, contact with

extension agents, education level of the household head, household size and household's annual income.

The study also estimated household's vulnerability to multidimensional poverty. Given the wider recognition that poverty is multidimensional, this study employed a multidimensional approach to address vulnerability to multidimensional poverty and this is an important but different approach to looking in to vulnerability. In the process of estimating the linkage between poverty and vulnerability, the various shocks that households experienced and the coping strategies they adopted to mitigate these shocks were assessed. Combining together the evidence on household's characteristics, shock experiences and coping responses enable us to analyze household's vulnerability to future multidimensional poverty using three-step Feasible Generalized Least Squares Method.

The results of the shock analysis shows that households were exposed to a range of shocks due to the fact that the District is found to be a recurrently shock affected region, and hilly and mountainous area which is exposed to various risks. Drought, hail and rainfall induced flood were found to be the three major shocks which adversely affected households wellbeing through reducing food production and income. Some households also experienced more individual effects of agricultural output and input shocks, such as pest attacks, animal and water borne disease outbreaks and household specific income reduction shocks. Households were not passive when facing different shocks. They attempted to reduce the impact of shocks by employing a range of coping strategies. Reducing the amount and quality of food, relying on savings and sale of livestock, formal borrowing of money and joining safety net programs were the dominant coping strategies employed by households following shocks in the study area.

With respect to the linkage between multidimensional poverty and vulnerability, empirical results show that 80% of rural households were vulnerable to multidimensional poverty. Poverty reduction effort must consider not only the currently poor households but also those non-poor who are vulnerable to future poverty. Therefore, finding shows that out of the total vulnerable households, 24% of the currently non-poor households are at risk of becoming multidimensional poor, while 56% of households who are currently poor will remain vulnerable to staying in future multidimensional poverty. This key result shows that the probability of falling into future multidimensional poverty is greater than the current rate of households in multidimensional

poverty. In other words, the proportions of vulnerable households are higher than the currently poor households because this includes the poor and non-poor who face vulnerability to remaining or becoming poor in the future.

Analysis of correlates to households' vulnerability to multidimensional poverty indicated that, holding all other determinants constant, female-headed households and households with a greater social capital, financial asset and number of plots are associated with reduced vulnerability to multidimensional poverty while households with only better physical capital are found highly vulnerable. Households exposed to drought, hailed rainfall and pest attack were found highly vulnerable to multidimensional poverty with higher average level of MPI deprivation and with lower expected variance in their wellbeing. Our estimated finding also shows that households that relied on savings, sale of livestock and formal borrowing of money to manage the encountered shocks are correlated with reduced vulnerability to future multidimensional poverty.

In general, findings of the study indicated that despite the poverty reduction efforts made by the government, the prevalence of multidimensional poverty and vulnerability in the study area remains substantial which needs effective and different policy interventions. Thus, assessment of household's asset base, identification of the existing deprivations and associated factors, and holistic approach to understand the linkage between poverty and vulnerability is an important starting point for targeting households that are vulnerable to poverty.

8.3 Policy Recommendations

The overall low level of financial, natural and human assets, the high level of rural multidimensional poverty and vulnerability is the fundamental reality this study uncovered. Building livelihood asset base for all vulnerable households, increasing households' multidimensional wellbeing and reducing vulnerability should be the top development priority of Ethiopia. There is, therefore, a dire need to devise practical, comprehensive and mutually-reinforcing vulnerability reduction policies to enhance households' sustained socioeconomic development. This policy can help households to improve access to basic infrastructure, reduce susceptibility to different risks, and strengthen asset endowment capacity to increase the resilience of households in coping with shocks. It is very difficult to derive practical policy implications on the basis of all the findings. Hence, it is imperative to provide some plausible policy considerations based on the major findings.

Findings shows that the general asset endowment of households is low, and the incidence and intensity of multidimensional poverty and vulnerability to such poverty in the study District are high which calls for regional and federal governments to devise rural vulnerability reduction program as a strategic effort to increase human and financial capital, rather than piecemeal dimension by dimension interventions targeted only on the currently poor.

Assets are significant to improve household's wellbeing through reducing both poverty and vulnerability. Levels of livelihood asset endowments influence directly or indirectly how households capability to escape poverty and reduce vulnerabilities to uncertain shocks. The study found out that asset holding of households were generally low suggesting that households in the study area have limited livelihood resources to create better and more secure livelihoods. However, although all assets are important, priority should be given to the development of human and financial capital for all as they are key means of stimulating and generating the development of other livelihood capitals. Existing social capital should ensure subsequent gains and are relatively widely distributed among households at village level. Mechanisms to strengthen the existing social capital (such as consolidating the existing farmers associations and the establishment of new community based organizations) should be designed to provide security and support households access resources in times of unforeseen events as they are effective means of protecting certain kind of risks.

Findings also imply that poverty reduction interventions should not be passive to the probability of falling in to future multidimensional poverty. Because higher proportion of the currently poor and non-poor households in the study District (i.e., 80%) are likely to face the risk of overall capital assets deprivation in their future wellbeing, which demands an integrated focus on vulnerability and the risk of falling into future multidimensional poverty. Both *ex-post* poverty reduction and *ex-ante* poverty prevention measures should be promoted to reduce household's observed poverty and prevent the non-poor from becoming multidimensionally poor, respectively.

The major reason for focusing on human capital assets, such as education, health and skill development training, is that they provide the basis for coping with shocks. The existence of inadequate levels of human capital made other assets less productive in terms of decisions on how to deal with shocks. Education creates better employment opportunities and is important to

create awareness on how to make more efficient and productive use of other capitals, while capacity-building training is important to improve agricultural and non-farm productivity. Adult training on new products, businesses, production technologies, techniques and systems are significant to improving household's income and reducing vulnerability. It also enables households to reduce extreme dependence on a single livelihood sector i.e., subsistence agriculture. The major idea is that human assets contribute positively to households economic and non-monetary (such as household's social, moral and personal status) welfare development. This means households with better human capital stock can solve various structural problems to have better life opportunities.

The positive effect of contact with extension workers on households wellbeing call for providing a wide range of extension services supporting household livelihood, particularly focusing on increasing productivity through adopting modern agricultural practices and technologies, capacity building and awareness creation. Capacity building trainings on extension systems and developing incentive mechanism to extension agents would be supportive in this regard.

Identifying the current chronically poor and vulnerable households in the poverty reduction intervention should be only the first step in reducing the vast majority of households' susceptibility to future poverty. As discussed above, providing skill training on how they can build-up livelihood assets using improved knowledge and technology, and the provision of financial services can help all vulnerable households to build-up productive assets. Given that vulnerability to poverty is associated with low asset endowments, inclusive development action that raises poor households' agency and capability to control livelihood resources may directly improve their wellbeing and reduce vulnerabilities. Therefore, reducing poverty in human and financial capitals is critical to increasing multidimensional wellbeing of households to reduce risks of future poverty.

Building human and financial capital is also significant to reduce household's deprivation in cooking energy, access to electricity, decision on income, cooperative membership, and land and livestock ownerships. Regional and local government should introduce alternative sources of clean energy technology for both cooking energy and electrification, and the traditional energy sources such as animal dung and fire wood should be replaced by modern energy sources (solar and biogas energy). This will reduce the energy and time spent to gather unclean energy sources

and avoids the negative impact of indoor air pollution which damage respiratory system of the poor, particularly women and children. Awareness creation on the health and environmental impact of such improved energy sources should be conducted by the government through extension services. Increasing awareness on the importance of using improved latrine can help households construct proper sanitation facility in their home, instead of using open defecation. This will eliminate the health problems of unhygienic sanitation facilities such as children's diarrhea and water born diseases, which are largely responsible for child mortality in developing countries.

The high deprivation of households in income decision making and cooperative membership, and the higher multidimensional poverty and vulnerability of female-headed households has implication for gender policies. Promoting women economic empowerment through designing interventions and programs that prioritize and create better economic opportunities for women can build the assets of women and reduce their vulnerability to poverty. Focus should be given to increase the awareness of women to participate in women self-help groups and cooperatives to enhance their decision making capability. This may contribute to increase women access to productive resources thereby ensures gender equality in the household's income decision making. Interventions that support the provision of education, training, credit and market are also significant to reduce women's vulnerability.

Analysis of the multidimensional deprivation of households also indicated that households are highly suffered in land and livestock ownership. Poverty and vulnerability decomposition also shows that households with less than local average size of TLU and land were with higher multidimensional poverty and found vulnerable to future poverty. Given the overall small landholding and considering the multiple roles of livestock in household's livelihood, government and development organizations of the region (such as Relief Society of Tigray and Tigray Developmental Association) should design poverty reduction focused livestock development interventions aimed at income generation, food security and buffering against shocks. The intervention should also comprises the issue of increasing husbandry knowledge and skill, livestock marketing, veterinary medicines and fodder crop productions which are important elements of livestock development, among the others. In addition to this, support need to be provided for increasing smallholder's land productivity by rising investment on full agricultural

packages such as investment on modern agricultural technologies and practices, supply of extension services, agricultural credit and large-scale utilization of high-yielding varieties of seeds, among the others.

Investment in financial capital would enable households to engage in different livelihood activities such as farm and non-farm activities to generate income. To build-up households financial assets, local government should provide microfinance loan facilities and establish strong Saving and Credit Cooperatives for all in the District. Microfinance loans can support households to engage in diversified economic activities such as livestock production and small scale business which can support households to generate productive assets and enhance their wellbeing. Saving and Credit Cooperatives can be productive way for all households to gradually accumulate savings and facilitate availability of access to fairly priced credit to its members on convenient terms and conditions.

Saving and Credit Cooperative is important in a situation where households cannot access formal financial institutions such as banks and MFIs due to not having security to offer against loans. Saving and Credit Cooperative is not promoted only to solve household's financial capital constraints but also help members to access education, health and build social networks. It also empowers households to fully develop their productive capacity through providing training on different areas such as project development and rural entrepreneurship. Hence, the establishment of Saving and Credit Cooperatives in less attractive areas is an important way to decrease households' vulnerability to poverty.

Households were generally experiencing agricultural shocks such as drought, hail, flood and pest attack. This finding has two policy implications. First, given the study District is a drought prone region and the mountainous characteristics of the District, local and regional governments should increase household resilience to agricultural shocks through enhancing non-crop activities such as training in commercial beekeeping and livestock production. These will reduce household's dependency on food assistance and contribute to local development. The study also found that savings and credit reduces vulnerability to poverty. This calls for government, cooperatives, regional developmental organizations and other financial institutions to strengthen household's financial capital through the provision of saving and timely credit services (with fair interest rate and maturity period) to support households who are engaging in non-farm activities. Second,

household's major source of livelihood that is crop production is adversely affected by agricultural shocks. This also calls for policies that combine the use of training and financing support in modern farm practices and technologies, early maturing and drought resistant crops, innovative water harvesting techniques and early risk warning systems for desirable livelihood outcomes. Through both mechanisms, households can diversify income sources, ensure food security, safeguard their wellbeing during and after shocks, and can reduce vulnerability to poverty.

Given households' landholding is extremely small, investments in human and financial capital are essential to increase livelihood options for the rural vulnerable in the study area. With better human and financial capital, households can seek long term livelihood objectives to transform their lives through increasing their ability to face financial, social, and psychological risks (including feelings of helplessness and powerlessness), and finally reducing vicious cycles of vulnerability to moving in and out of poverty. Overall, policy makers should focus on investment in basic village level infrastructural service to have stable and multiple source of income. They should also devise interventions that help build household assets mainly human and financial capital. Strategically, improving human and financial capital will not only reduce current poverty but reduce vulnerability to poverty among a much larger group of rural people in Ethiopia. This calls the government to design well targeted forward looking multidimensional vulnerability reduction policy.

8.4 Contributions of the Study

The major contribution of this dissertation can be explained as follows. First, despite the availability of many research works on poverty and vulnerability, household's multidimensional poverty and its determinants, and vulnerability to multidimensional poverty using recent evidence in rural Ethiopia is less explored. This addresses some important informational gap through providing timely evaluation on the impact of the recent shocks on household wellbeing using detailed primary data directly collected from the study District. This also shows the linkage between the recognized national level vulnerabilities of households with the household vulnerability in the study District. At national level, there are various studies on vulnerability to poverty but such studies have less relevance to Degua Tembien District given the remarkable

heterogeneity in socioeconomic status and geographic locations across Ethiopia. Hence, this research contributes to more understanding of local multidimensional poverty and vulnerability.

Second, Chambers (2006, p.34) stated that "*unlike poverty, vulnerability lacks a developed theory and accepted indicators and methods of measurement*". In the IDS paper titled "*Does vulnerability create poverty traps?*" Barrientos (2007, p.3) also indicated that although there are growing studies on vulnerability, still there are important gaps in vulnerability literature. He also noted that "*there are no standard methodologies*" to address poverty and vulnerability. These two quotations clearly shows that the conceptualization and methodology of vulnerability is still open to new contributions and this continued knowledge gap is attempted to be addressed in this thesis as the study exposes the sources of vulnerability to poverty (i.e., the covariate and idiosyncratic shocks) and measures vulnerability to multidimensional poverty to help policy makers to design better vulnerability reduction policy interventions as indicated in the post-2015 Sustainable Development Goals. In addition, vulnerability to multidimensional poverty is a complex topic in the current dominant literature of poverty prevention and hence detailed local case studies can provide an important contribution to vulnerability literature.

Third, another important contribution of this research is that it provides basic information to policy makers to create different policy interventions. Poverty reduction is the major objective of growth and development policy of Ethiopia. For effective poverty reduction, policy makers should focus less on the *ex-post* poverty alleviation and more on *ex-ante* poverty prevention policy interventions. Implementing these two strategies requires different targeting mechanisms to both multidimensional poor and vulnerable households, and both groups have different needs which attract separate policy interest. Hence, this thesis provides evidences for policy makers which are significant for targeting and prioritizing the poor and vulnerable household's. The study proposes different policy actions and offers insights into disadvantaged households who require special attention.

8.5 Limitation and Future Research Perspectives

The study encounters different limitations in all empirical chapters related to methodologies which need readers to be aware and consider. For example, the computation of asset index using MCA and FAOC property is highly sensitive to omissions of variables which may lead to

omission of important household assets. The method applies normative decisions to select key asset indicators to compute the index. In some cases, indicators are not standard which make difficult to have regional and national comparison. Moreover, the classification of household in to asset based socioeconomic positions doesn't show the absolute socioeconomic status of households rather it assesses the relative positions of households.

The other limitation of the study is that although the computed MPI include relevant information on the multidimensional headcount ratio (H) and the intensity of multidimensional poverty (A), it doesn't show average adjusted multidimensional poverty gap (M_1) and multidimensional poverty severity (M_2) the households could experienced. This is due to the fact that calculating these indices require all the poverty indicators to be cardinal. For this particular dissertation, we used dummy variables to construct the MPI indices. It should be also noted that our analysis doesn't reflect intra-household poverty inequalities because the unit of analysis is a household.

Another critical challenge we acknowledge in this study is the limitation of measuring households vulnerability to multidimensional poverty using cross sectional data as it doesn't allow us to identify the inter-temporal variations of multidimensional poverty at the household level. Longitudinal data can directly estimate the inter-temporal variance of multidimensional poverty without the need for any assumptions. However, in this study, strong assumptions were used to deal with the problem. That is the study assumes that households wellbeing is stationary or the structure of the economy is relatively stable over time and the future distribution of risks and risk management strategies are assumed to be similar over time for each household. Moreover, the study used more stable indicators of multidimensional poverty which ultimately reduce the variation of poverty at household level across time.

Research is like an economic activity which needs substantial investment. Collecting empirical data was challenging with the provided financial resources. Recall bias can also affect the quality of data generated from households. Although it is difficult to entirely avoid it, triangulation of the quantitative data with qualitative data was made to check the reality of the data. Finally, given the study is conducted in six rural Kebeles of a single District, it may not represent the actual situation of the country. Hence, more nationally representative sample would therefore increase the robustness of similar studies in the future.

The limitations of this research also pointed out some future research perspectives and directions which can be explored by other studies as follows:

- Household's vulnerability to multidimensional poverty should be investigated using longitudinal data (panel or time series data) to better estimate the trend and vulnerability of household's to multidimensional poverty.
- More understanding is required on the impact, contribution and effectiveness of the existing poverty reduction interventions in reducing multidimensional poverty and vulnerability in the study area.
- Detailed analysis is essential to identify the impact of the major shock on specific household assets such as consumption and fixed assets.
- Lastly, given the unique vulnerabilities of women, research on gender disparity in household vulnerability to multidimensional poverty would give an important insight for better social protection policy.

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Appendices

Appendix A: Variance inflation factors for continuous variables

Variable	VIF	1/VIF
headage	1.19	0.841594
headeduc	1.12	0.893199
hysize	1.12	0.894872
income	1.08	0.924750
DepRatio	1.08	0.925096
nofields	1.04	0.958165
Mean VIF	1.11	

Source: Own computation, 2018

Appendix B: Contingency Coefficient for dummy variables to test multicollinearity

Variable	nonhhlab	training	cntagent	offarm	credit	_cons
Nonhhlab	1.0000					
Training	0.0238	1.0000				
Cntagent	0.0893	0.0006	1.0000			
Offarm	-0.0497	-0.0350	0.0704	1.0000		
Credit	0.1258	-0.0115	0.0667	0.0960	1.0000	
_cons	-0.3713	-0.4020	-0.7616	-0.1397	-0.3897	1.0000

Source: Own computation, 2018

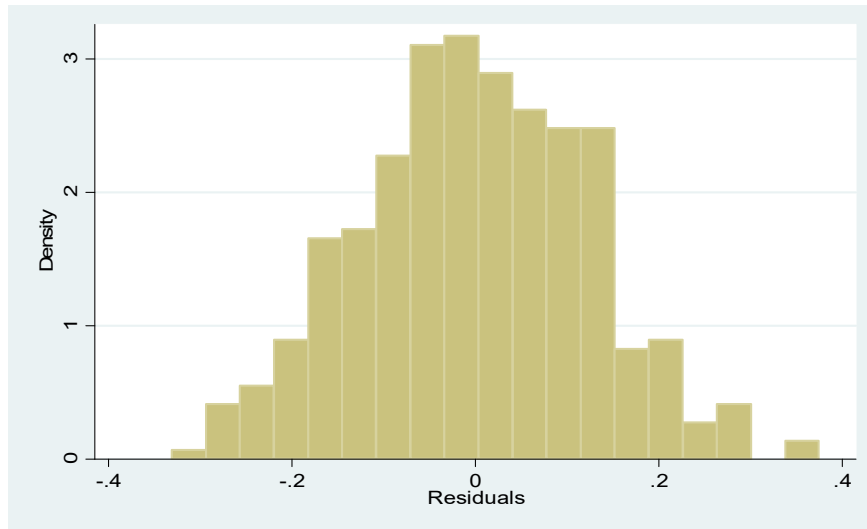
Appendix C: Hosmer-Lemeshow test of logistic regression

number of observations	390
number of groups	10
Hosmer-Lemeshow chi2(8)	5.74
Prob > chi2	0.6762

Source: Own computation, 2018

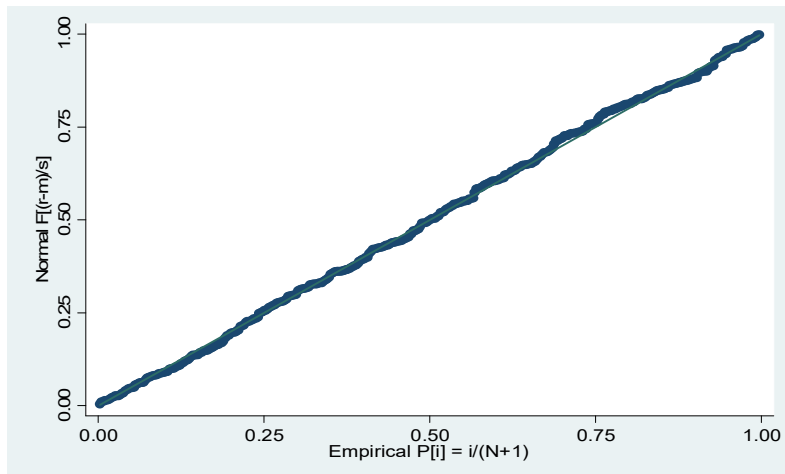
Appendix D: Normality test of predicted residuals

Appendix D1: Graphical representation of the estimated residuals



Source: Own computation, 2018

Appendix D2: Normal probability plot of residuals



Source: Own computation, 2018

Appendix D3: Shapiro-Francia W' test of residuals

Variable	Obs	W'	V'	Prob>Z
R	390	0.99794	-1.116	0.86785

Source: Own computation, 2018

Appendix E: VIF for continuous FGLS

Variable	VIF	1/VIF
Headage	1.21	0.824629
Headeduc	1.15	0.873296
Nofields	1.12	0.895470
Hhsize	1.11	0.899926
AJFCIR	1.11	0.900176
DepRatio	1.05	0.951204
AdjSCIR	1.05	0.951716
ADJPCIR	1.03	0.973941
Mean VIF	1.10	

Source: Own computation, 2018

Appendix F: Contingency coefficient for dummy variables of the FGLS

	Headsex	expdrght	Exphail	Experos	expdecpr	exppest	rredco~p	savingl	rsoldl~e	formalb	rfoodw~k	kebele
headsex	1.0000											
expdrght	0.0796	1.0000										
exphail	0.0919	-0.1808	1.0000									
experos	0.1190	-0.0594	-0.0098	1.0000								
expdecpr	0.0086	-0.1012	-0.0920	-0.0296	1.0000							
exppest	-0.0648	-0.0652	0.0344	-0.2701	0.2804	1.0000						
rredco~p	-0.0136	0.0011	-0.0713	0.0610	0.0855	-0.0874	1.0000					
savingl	-0.0024	-0.0569	0.0643	0.0576	-0.0048	-0.0894	-0.1918	1.0000				
rsoldl~e	0.1565	-0.1430	0.0121	-0.0517	-0.1106	-0.1080	0.1444	0.0038	1.0000			
formalb	0.0135	-0.1613	-0.0229	-0.0314	-0.1349	0.0092	0.0764	0.0497	-0.0063	1.0000		
rfoodw~k	-0.1328	0.0291	-0.0601	-0.0035	-0.0956	0.0667	0.0822	0.0704	0.0976	-0.0504	1.0000	
Kebele	-0.0374	-0.1079	-0.0755	-0.1623	0.3314	0.4361	-0.2127	-0.0974	-0.1233	0.0371	0.1830	1.0000

Source: Own computation, 2018

Appendix G
Addis Ababa University
College of Development Studies

Household Survey Questionnaire for PhD Dissertation on Rural Households
Multidimensional Poverty and Vulnerability in Degu'a Tembien District, Tigray, Ethiopia
Kebele: _____ **Kushet:** _____
Survey Date: _____ **Surveyor Name:** _____

Introduction and Consent:

Dear respondent. My name is _____. I am a PhD candidate at Addis Ababa University, College of Development Studies. I am conducting a survey about multidimensional poverty and vulnerability in Degu'a Tembien District. All of the answers you give will be confidential and will be exclusively used for academic purpose. Your household is selected randomly and the researcher would like to ask you some questions about your household. I hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question. Thank you for your kind cooperation in advance.

General Instruction for Enumerators

- ✓ Make brief introduction to the respondent before starting the interview and make them clear the objective of the study
- ✓ Please encircle or make tick(✓) on the answer chosen for all close-ended questions
- ✓ Fill up open ended questions according to the respondents response
- ✓ Ask the respondent clearly and patiently until they understand the point

Part I: Households Basic Information

1. Relation of the respondent with household head: _____
2. I would like to ask a few questions about all members of the household. Please include all persons who live in the household.

<u>Code (A)</u> 1=Male 2=Female	<u>Code (C)</u> 1= Illiterate 2=Grade 1 3= Grade 2 4= Grade 3 5= Grade 4 6= Grade 5 7= Grade 6 8= Grade 7 9= Grade 8 10= Grade 9 11= Grade 10 12= Grade 11 13= Grade 12 14= Diploma 15= Degree & Above	<u>Code (D)</u> 1= Too young to marry 2=Single 3=Married 4=Widowed 5=Divorced	<u>Code (E)</u> 1= Below age 2=Students 3=Unemployed 4= Farmer 5= Professional 6=Carpenter 7=Pensioners 8=Trader 9=Casual laborer 10=House worker 11= Petty trader 12=Elder 13=Others (specify)
<u>Code (B)</u> 1=Head 2=Wife 3=Son/Daughter 4=Grand mother/father 5=Brother/Sister 6= Relatives 7=Servants 8=Other non relative 9=Others			

S/ N	Household Member Name	Sex (A)	Relation with Head (B)	Age	Education level (C)	Marital Status (D)	Employment Status (E)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

3. Religion of the household head:
1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Other (Specify) _____
4. Number of non working household members: _____
5. Who is the major breadwinner of the household? _____
6. Agroecology of the village: _____

Part II: Household Livelihood Activities and Strategies

7. In the last 12 months, which types of work or activity did the members of your household do in order to earn lead their livelihood (in terms of food and income)?

Livelihood Activity		1. Yes 2. No	Rank five most important livelihood sources
Farming	Crop production (for consumption and sale)		
	Livestock production		
	Poultry production		
	Bee-keeping		
	Eucalyptus sales		
Labor	Salaried employment		
	Casual labor (farm and non farm labor)		
Trade	Buying and selling of cereals and pulses		
	Buying and selling of livestock		
	Trading in commodities		
Beverage preparation and sales	Sewa		
	Miese		
	Areki		
	Tea and coffee		
	Beer		
	Other drinks		

Handcraft	Spinning or weaving		
	Carpentry/Masonry		
	Pottery		
	Metal work		
Others	Renting out pack animals		
	Sale of charcoal and woods		
	Aid		
	Pension		
	Others(Specify)		

8. Does the most important livelihood source listed in question 7 above account for more than 50 percent of your household's livelihood? 1. Yes 2. No

Part III: Household Asset Endowment Profiles

3.1 Household's Human Assets

9. Does any member of your household take any vocational training in the last two years?
1. Yes 2. No → [go to question "12"]

10. Does your household received training on the following issues? (Multiple answer is possible)

Training Type	1. Yes 2. No	Who provide the training?	
		1. Government 2. NGOS	3. Private organizations 4. Others (Specify)
Seed production and storage			
Fertilizer application			
Pest and animal disease control			
Livestock production and dev't			
Health care and sanitation			
Natural resource management			
Postharvest management			
Marketing			
Entrepreneurship			
Others(specify)			

11. How many times do you take training in the previous year?
1. Absent 3. 2 to 3 times per year
2. Once per year 4. > 3 times per year
12. If the household do not attend any of the trainings indicated above what are the reasons for non-attendance? 1. Too old/ too young 4. Training center is too far away
2. Training is too expensive 5. Training is useless
3. Illness 6. Other (Specify) _____
13. Total family labor in number/ Number of working members of the household: _____
14. How many female adult laborers does the household have? _____
15. Does the household have access to non-household labor? 1. Yes 2. No
16. Does the household have adequate household laborers to run the day to day household activities?
1. Yes 2. No

3.2 Household's Natural Assets

19. Does your household own land? 1. Yes 2. No → [go to question “29”]
20. Please indicate the type of land your household owned?

Land Type	Unit in Local Measure (<i>Tsimadi/Hectar</i>)
Total cultivated farmland	
Total Land rented in	
Total Land rented out	
Total Land shared with others	
Total non-agricultural land	
Total size of land holding	
Others (specify)	

21. If you have cultivated land, please answer the following questions.

Perception on Land Quality 1. Very poor/ infertile 2. Poor/slightly infertile 3. Fair/normal 4. Good/slightly fertile 5. Very good/ fertile	Number of fields the household owns	Number of crop types grown by household	Is field under extension program? 1. Yes 2. No

22. How did you acquire this cultivated land?
- | | | |
|--------------|----------------------------|--------------------------|
| 1. Inherited | 3. Allocated by Government | 5. Shared with relatives |
| 2. Rented | 4. Purchased | 6. Other (specify) _____ |
23. What happened to your household land holding size over the last five years?
- | | | |
|--------------|--------------|--------------|
| 1. Increased | 2. No change | 3. Decreased |
|--------------|--------------|--------------|
24. What happened to the agricultural production in the last 5 years?
- | | | |
|--------------|-------------|--------------|
| 1. Increased | 2.No change | 3. Decreased |
|--------------|-------------|--------------|
25. If the response for question No. “24” is increased, why? (Please tick as much as relevant)
- | |
|--|
| 1. Quality of seeds |
| 2. Increased application of fertilizers and pesticides |
| 3. Usage of improved irrigation |
| 4. Other, please (specify) _____ |
26. If the answer for question No. “24” is decreased, why decreased? (please tick as much as relevant)

Production Constraints	Rank
Lack of agricultural inputs	
Inadequate capital	

Lack/cost of labor	
Erosion and poor soils	
Inadequate rains	
Small land	
Ill health	
Diseases of crops/livestock	
Marketing constraints (low prices, lack of information, distance to market)	

27. Do women in your family own/inherit land? 1. Yes 2. No

28. If the answer for question No. "27" is yes, can they sell/decide how to use it?

1. Yes 2. No

29. How do you evaluate grazing land access in your village?

1. No access 3. Sometimes difficult

2. Difficult 4. Easy

30. If you do not have access to these different types of land, why? _____

3.3 Household's Physical Assets

31. Does your household own livestock? 1. Yes 2. No

32. If the answer for question No. '31' is yes, please indicate the type and number of livestock your household possesses?

Livestock Type	1.Yes 2.No	Number	Equivalence in cash
Plough oxen			
Crossbreed cows			
Local cows			
Calf			
Heifer			
Bull			
Donkeys			
Sheep			
Goats			
Mules			
Horse			
Camel			
Chicken			

33. Have you received any training on livestock production and development?

1. Yes 2. No

34. If the answer for question No. '33' is yes, what areas of livestock production were covered?

1. Disease control 3. Breeding
2. Feeding and its formulation 4 Housing 5.Other
specify) _____

35. Does your household owned household durable assets? 1. Yes 2. No

36. If the answer for question No. "35" is yes, please indicate the type of assets your household possess.

Household Durable Assets	1. Yes 2. No	Quantity	Equivalence in cash
Radio			
Tape recorder			
Television			
Wooden bed/metal bed/leather Bed			
Refrigerator			
Sofa set			
Chairs and tables			
Jewelry (Gold)			
Jewelry (Silver)			
Charcoal stove			
Gas cooker/stove			
Lantern (Fanus/Masho)			
Solar lamp			
Oven			
Power saving oven			
Shelf for storing goods			
Satellite Dish			
Mobile telephone			
Motorbike			
Wireless telephone			

37. Does your household own any of the following productive assets?

Agricultural Assets	Qn.	Value at Current market Price	Agricultural Assets	Qn.	Value at Current market Price
Plowing set			Shovel/Spade		
Saw			Mallet, Mattock		
Hoe			Cart/ animal drawn		
Sickle			Digging chisel (Melakino)		
Hammer and pick-ax			Hand-held motorized Tiller		
Modern Beehives			Wheelbarrow		
Traditional beehives			Axe		
Water storage pit			Drip irrigation		
Generator			knapsack chemical sprayer		
mechanical water pump			motorized water pump		
Other(specify)					

38. How do you evaluate your households knowledge to various agricultural technologies?

1. None 2. Low 3. Medium 4. Good

39. How do you evaluate the household access to various agricultural inputs?
 1. No access 2. Low access 3. Medium access 4. Good access
40. Did you use fertilizer inputs for your farm in the last cropping season?
 1. Yes 2. No → [go to question '43']
41. How many kg/quintal of inputs did you use in your cultivated land? _____
42. What was the cost of the fertilizer inputs used? 1. Unit price _____ (Birr/quintal).
 2. Total cost _____ (Birr).
43. If you did not use fertilizer, what are the possible reasons?(Multiple answers are possible)
 1. High selling price 4. No credit arrangement
 2. Low fertilizer supply 5. I used animal dung and compost
 3. Risky if shortage of rain 6. Other(specify) _____
44. Did you use improved seeds in your farmland in the recent harvest year? 1. Yes 2. No
45. If your answer for question No. 44 is "yes", in how many *Tsimadi/ha* of land did you use improved seeds? _____ (*Tsimadi/ha*).
46. What motivated you to apply chemical fertilizer/improved seeds in your land?
 1. To increase the productivity of land 4. Fear of exclusion from irrigation schemes
 2. Fear of exclusion from safety net 5. Other, specify _____
 3. Fear of denial of credit opportunities
47. Have you used pesticides/insecticides for your cultivated land in the last cropping season?
 1. Yes 2. No
48. How do you get the source of agricultural inputs?
 1. Cooperatives 4. Subsidy from gov't
 2. Local market 5. Other specify _____
 3. Local traders
49. Does your household have access to healthcare services? 1. Yes 2. No
50. Does your household have access to market for your products? 1. Yes 2. No
51. How do you evaluate the existence of market for the goods and services produced by the households?
 1. Cannot reach 3. Difficult
 2. Sometimes difficult 4. Near
52. Do you have the access to market information on your village? 1. Yes 2. No
53. If the answer for question No.52 is "yes", what is your basic source of market price information?
 1. Radio 3. Development agents 5. Others(specify) _____
 2. Traders 4. Neighbors/friends/relatives
54. Have you contacted with any extension agent during the last cropping season?
 1. Yes 2. No
55. If the answer for Q. "54" is yes, for how many days per year you frequently visited extension agents?
 1. No contact 3. 2–3 times/year
 2. Once/year 4. >3 times/year
56. Do you receive any agricultural advice on your farm?
 1. Yes 2. No
57. If the answer for question "56" is yes, is the advice was adequate to make you successful in your farming? 1. Yes 2. No
58. Does your household have access to agricultural information services? 1. Yes 2. No
59. Do you have access to irrigation? 1. Yes 2. No

60. If the answer for question No.59 is “yes”, did you receive any training on irrigation farming?
1. Yes 2. No
61. Does the household have access to any of the following socioeconomic infrastructures/facilities in your Kebele?

Facility	1. Yes 2. No	Is this service sufficient for the current population?	
		1. Sufficient	2. Not Sufficient
Primary school			
Secondary school			
Health post			
Livestock market			
Grain mill			
Veterinary center			
Telephone facilities			
Transportation			
Pharmacy			
Police post			
Village market center			
Cooperative center			

2.4. Household's Social Assets

62. Does your household actively participate in various social institutions and organizations?
1. Yes 2. No
63. If the answer for question 62 is “yes”, how do you evaluate your level of participation in the community activities?

Social engagement	Participate? 1. Yes 2. No	Level of participation				
		Low	Poor	Medium	Good	High
Iddir (Funeral societies)						
Equib (Saving groups)						
Mahber (Church groups)						
Conflict resolution						
Soil and water conservation						
Lifinti (exchange work groups)						

64. How willing are village community members to help each other?
1. Not willing 2. Reasonably willing 3. Very willing
65. Are there oxen/draught power sharing arrangements in your village?
1. Yes 2. No
66. Is there labor sharing/exchange work groups activities/arrangement in your village?
1. Yes 2. No
67. How are feelings of mutual trust among community members in the village?
1. Low 2. Medium 3. High (most people are trustworthy)
68. If your household had a problem and needed food urgently, would you be able to get it from people in your community or from relatives?
1. Yes 2. No

69. If someone in your household fell ill or was injured, and you needed help with farming or other work, would you be able to get it from people in your community or from relatives?

1. Yes 2. No

70. Would you share seeds with others who need it during the time of harvest?

1. Yes 2. No

71. Does your household able to get grain and loan during deficit period?

1. Yes 2. No

72. How close are the relationships you have with:	Low	Medium	High
Input suppliers			
Cooperatives/agricultural firms			
Government officials			
Community members			

73. How much do you trust:	To a very great extent	To a great extent	Neither great nor small extent	To a small extent	To a very small extent
Local gov't officials					
Cooperatives					
Extension agents					
Neighbors					
Community leaders					
Community members					

2.5. Household's Financial Assets

74. Have you taken credit service in the past five years?

1. Yes 2. No ⇒ [go to question '77']

How many times have you taken loans?	What was the amount of credit you obtained (in ETB)?	How do you rate your repayment performance? 1. Loan repay on time 2. Mostly on time but sometimes delays 3. Mostly delays but sometimes on time 4. Mostly delays 5. Could not repay	From which agency did you borrow the money? 1. Private money lenders 2. Iddir/Equb 3. Friends/Relatives 4. MFI 5. Bank 6. NGOs 7. Cooperatives	Purpose of credit?(Multiple answer is possible) 1. To purchase agricultural inputs 2. To pay salaries for labor 3. For livestock production 4. To start or invest in a non-agricultural business 5. To pay health care/ school fees 6. To pay for social event (funerals, weddings) 7. To purchase food for household consumption 8. Others(specify)

75. What was the interest rate you paid per year for the loan that you have taken? _____(%).

76. Have you begun to repay this loan as yet? 1. Yes 2. No

77. If the answer for question No. 74 is “No”, what is the reason for not taking credit?

78. Has your household being able to save any portion of income in the last two year?

1. Yes 2. No → [go to question “82”]

79. If yes, what is the total amount of saving held by the household? _____(Birr)

80. Where did you save this money?

1. Home 3. Cooperatives 5. Iddir/Equib
2. MFI 4. Bank 6. Others (specify) _____

81. What other forms of saving does your household used?

82. During the past 12 months, have you received any remittance/transfer from any person who is not a member of your household? 1. Yes 2. No

83. If the answer of question No. 82 is “yes”, has your household received any of the following types of assistance from anyone outside the household in the last year?

Type of remittance	1. Yes 2. No	Value in Birr	Type of remittance	1. Yes 2. No	Value in Birr
Cash remittance from abroad/domestic			Free use of donkey / mule / horse		
Cash for work payment			Free use of oxen or plough		
Gifts			Seed loan		
Food for work payment			Inheritances		
Grain loan (no interest)			Food and non food aid		
Seed gift			Others(specify)		

84. How important are these remittances for the survival of your household?

1. Important 2.Neutral 3. Not important at all 4.Don't know

85. How much did your household spend on the following food items in the last one month?

Food Type	Source of Expenditure	Value in Birr	Food Type	Source of Expenditure	Value in Birr
Cereals	Wheat		Spices	Sugar	
	Finger Millet			Onions	
	Taff			Pepper	
	Barley			Garlics	
	Maize			Korerima/ Zingibil	
	Sorghum			Oil	
	Adengua're			Shiro	
	Lentils		Beverage	Coffee	
	Cow peas			Local drink(Sewa)	
	Chick peas			Local drink(Areki)	
	Hourse been			Tea	
	Dekoko			Soft drink	
Oil-crops	Vetch			Tomato	
	Sunflower			Potato	
	Seasam			Salad	
	Linseed			Kosta	

	Nug		Fruits and vegetables	Gomen	
Animal product	Milk			kariya	
	Meat(Beaf)			Carrot	
	Meat(Mutton)			Orange	
	Egg			Papaya	
	Chicken			Banana	
	Butter			Turngo	
				Lemon	

86. How much did your household spend on the following non-food items in the last one year?

Source of Expenditure	Annual Expense in Birr	Source of Expenditure	Annual Expense in Birr
Child care items/ Clothes		Agricultural labor	
Cloths for adults		Furniture	
Shoes for adults		Transportation expenses	
Personal care items (soap/cosmetics, etc.)		Contributions to Iddir	
Bed sheets and Blankets		Savings/credit scheme	
Education expenditure		Cooking equipments	
Ceremonial expenses		Kitchen equipments	
Medical expenditure		Labour for herding	
Compensation/penalty		Livestock feed	
Repair & maintenance		Expenditure for firewood	
Taxes		Fuels and electricity	
Veterinary services		Matches	
Agricultural tools purchase		Batteries	
Seeds		Erteban	
Fertilizers		Others(specify)	
Pesticides		Others(specify)	

87. Please describe the amount of household income from various sources during the last year.

Income Sources		Annual Income in Birr
Income from livestock production and sales of livestock products	Cattle	
	Sheep	
	Goats	
	Donkeys	
	Milk	
	Egg	
	Chickens	
	Others (specify)	

Income from crop production and sales	Crop type grown in the last cropping season	Total production in quintal?	Quantity consumed	Quantity Sold	Quantity Stored	Income from Total Production (Birr)
	Teff					
	Maize					
	Wheat					
	Finger Millet					
	Sorghum					
	Barley					
	Horse bean					
	Lentils					
	Sunflower					
	Seasam					
	Linseed					
	Dekoko					
	Vetch					
	Cow peas					
	Chick pea					
	Others (specify)					
Income from other sources	Salaries/payments from piece works					
	Petty trade					
	Transfers					
	Honey production					
	Handicrafts/weaving/spinning/					
	Selling firewood, dung cakes, charcoal etc					
	Selling straw					
	Shuruba sira (traditional hair dresser)					
	Sale of natural resources like Eucalyptus					
	Total income from other sources (specify)					

88. How has each income sources changed during last year?

1. Increased 2. Decreased 3. Same

89. What do you consider to be the minimum monthly income with which your household can live well? _____

90. How do you rate your monthly income against your monthly expenditure?

1. My income covers my expenditure 2. My income does not cover my expenditure

91. What do you do if your household income does not cover your household expenditure?

Part IV: Households Multidimensional Poverty Indicators

92. What is the highest years of schooling completed in your household? _____

93. Are there school aged children in your household who do not attend school?

1. Yes 2. No

94. If the answer for question 93 is 'yes' what are the possible reasons?

1. School is too far away 4. Not willing to attend

106. Would you tell us the problems you encountered in relation to water use at household and community levels? _____

107. What kind of toilet facility do members of your household usually use?

Toilet Facility	Tick
Open	
Flush to piped sewer system	
Flush to pit	
Bucket	
Pit Latrine	
Composting toilet	
Bush or field	
Others (specify)	

108. Do you share this toilet facility with other households? 1. Yes 2. No

109. What type of fuel does your household mainly use for cooking?

Energy for Cooking	Tick	Energy for Cooking	Tick
Electricity		Fire wood	
Biogas		Charcoal	
Kerosene		Animal dung	
Straw/shrubs/grass		Other (specify)	

110. Does your household have access to electricity? 1. Yes 2. No

111. If the answer for question No. 110 is “No”, what is the main source of lighting for your household?

1. Kerosene 2. Solar 3. Others (specify)_____

112. Is there any type of cooperative in your locality? 1. Yes 2. No

113. If the answer for question 112 is “yes”, is any of your household members becomes a member of it? 1. Yes 2. No

114. Who decides about the use of your household income?

1. Only the head of the household 2. Some members of the household
3. All members of the household

115. Who made a major purchase decision in your household?

1. Only the head of the household 2. Some members of the household
3. All members of the household

116. What is the main flooring material of your house?

1. Mud and dung 2. Cement 3. Other (Specify)_____

117. What is the main wall construction material of your house?

1. Wood and mud 4. Wood and cement
2. Stone and mud 5. Stone with cement
3. Wood and thatch 6. Other (specify)_____

118. What is the main roofing material of your dwelling?

1. Grass/straw 2. Wood and mud 3. Iron sheet 4. Other (specify)_____

119. How many rooms in this household are used for sleeping? _____

120. How do you evaluate the quality of your household house?

Roof Condition	1. Yes 2. No	Walls Condition	1. Yes 2. No
Good		Good	
Medium		Medium	
Poor		Poor	

121. Does your household faced drought/crop-failure in 2015/16? 1. Yes 2. No

122. If the answer for question 121 is “yes”, during this worst stress months/seasons, how many times a day did your household members eat?

	Number of meals per day (circle one for each row)				
Adults	0	1	2	3	4
Children	0	1	2	3	4
0 = sometimes passed a whole day without eating anything					

123. If the answer for question 121 is “yes”, for how many months did the food shortage last in your household? _____

124. In the previous two years, how many times has your household bought clothes?

	Number of times purchased clothing (circle one for each row)				
For adults	0	1	2	3	4
For children	0	1	2	3	4

125. Has the household poverty status improved or deteriorated in the past one year?

1. Improved 2. Worsened 3. Remain unchanged

126. According to your perception, how do you categorize your household poverty status among the community?

1. Very poor 2. Poor 3. Moderate 4. Rich 5. Very rich

127. If the answer for question No.126 is “very poor or poor”, what factors/causes do you think that aggravates the poverty situation of your household in your village?

Causes of poverty	1. Yes 2. No	Rank
Draught/crop failure		
Small land/landlessness		
Lack of socioeconomic infrastructure (eg. health, education, water, market, transport, electricity facilities)		
lack of farm materials		
Laziness		
Low education/skills		
Low household labor capacity		
Illness		
Lack of social support networks		
Low income		
lack of credit		
High general prices		

Part V. Shocks and Stresses

128. Over the past two years, have the living conditions of your household been affected by shocks? 1. Yes 2. No

129. If the answer for question No.128 is “yes”, identify the type of shocks you faced at the household and community level?

<u>Code 1</u>	<u>Code 2</u>	<u>Code 3</u>
1. Loss of productive assets 2. Loss of household income 3. Reduction in household consumption 4. Asset and income loss 5. Asset loss and reduced consumption 6. Income loss & reduced consumption 7. Asset, income loss & reduced consumption 8. Other effects	1. Very Low 2. Low 3. Medium 4. High 5. Very High	1. Only my HH 2. Some HH in this village 3. All HHs in this village 4. Areas beyond this village

S/N	Shock/Stress Events	1. Yes 2. No	Result of these shocks Code 1	Severity Code 2	Who is affected? Code 3	Rank five frequent shocks
1	Drought					
2	Hailed rainfall/frosts					
3	Pest attack before harvest					
4	Animal disease					
5	Animal death					
6	Soil erosion					
7	Household income reduction					
8	Agricultural input inflation					
9	Decrease in farm output prices					
10	Water borne diseases					
11	Other(specify)					

130. Have you received any help from outside when your household face shock?

1. Yes 2. No

131. If your household is highly vulnerable to shocks, what are the possible reasons?

132. Is there any early warning system in your locality? 1. Yes 2. No

133. If the answer for question No. 132 is “yes”, how often have you been informed about the potential risk of natural disasters? 1. Frequently 2. Occasionally/seasonally 3. Rarely

134. How sever was the impact of these shocks on the following issues?

	No impact	Slight impact	Moderate impact	Strong impact	Worst ever happened
Crop yield					
Household income					
Household assets					
Food consumption					
Livestock production					

135. How long does your household take to recover from the shock?

- | | |
|------------------|----------------------|
| 1. Less 1 month | 4. 6 to 12 months |
| 2. 1 to 3 months | 5. Not yet recovered |
| 3. 3 to 6 months | |

136. Following the shocks you just mentioned in question '129', to what extent does your household able to recover?

1. Did not recover 2. Partially recovered 3. Fully recovered 4. Not affected

137. How would you characterize the form of the risks your household faces?

1. Short term 2. Seasonal 3. Perpetual

138. Generally, how much vulnerable is your household to the risks associated with poverty?

1. Low 2. Moderate 3. High

Part VI: Shock-Coping Strategies

139. If your household has experienced various shocks, what of the following things did your household do to cope with the shocks? (Multiple answer is possible)

S/N	Response	1. Yes 2. No	Frequency 1.Often 2.Sometimes 3.Rarely 4.Never	Rank five most frequently used coping strategies
1	Reducing the frequency and quality of food consumed			
2	Sold fixed assets			
3	Reliance on relief support			
4	Sold livestock			
5	Draw down on savings			
6	Removed children from school			
7	Sold firewood and charcoals			
8	Formal borrowing of money			
9	Informal borrowing of money			
10	Borrowing food from relatives and neighbors			
11	Food for work			
12	Cash for work			
13	Sent children to work outside the household			
14	Sold crop stock			
15	Sent children to relatives/friends			
16	Short term migration another place in search of job			
17	Consumed seed stocks held for next season			
18	Reduced spending on clothes			
19	No coping response			
20	Others(specify)			

140. What was the effectiveness of the coping strategies adopted by your household?

1. Very helpful 2. Some what helpful 3. Not help full at all

Thank You!

Appendix H

Individual Interview and Focus Group Discussions Checklists

Part I: Checklist for group discussions

A. Perceptions on poverty

- How do you perceive and understand poverty? How big a problem is poverty in your society?
- What are the causes and/or consequences of poverty in the society?
- What are the most important poverty related development challenges in your village?

B. Discussion points on livelihood resources

- How do you describe household access to various livelihood resources?
- What are the main constraints to increasing household incomes?
- What are the social, institutional, environmental and economic factors that determine asset accumulation in your District?

C. Discussion points on rural infrastructures and services

- Do rural households have access to various infrastructures such as education, health, electricity, water, road, telecommunication and market? How do you evaluate the accessibility and quality such facilities and services?

D. Questions related to agricultural production

- How do you describe landholding of households in your District?
- Did most of the farmers apply agricultural inputs in the previous production season?
- What are the most serious agricultural production problems in the community?
- What should be done by farmers, development agents, administrators, financial institutions and other stakeholders to improve agricultural production and income?

E. Issues related to household shocks and coping strategies

- What are the major shocks that have affected your household's life in the last two years?
- What was the impact and consequence of these adverse events? How did it exactly affect your household and livelihood?
- How did you respond to that event in terms of changing your behavior/activities and re-organizing the household's assets?
- Are there public sector actions that could be taken to either strengthen existing coping mechanisms, or to mitigate their impact and speed the recovery from the shock?
- What should be done to reduce household exposure to shocks?

Part II: Checklist for key informant interviews

A. Checklist for interview with elders

- How do you understand/perceive and characterize poverty? How do you describe the poor and rich households in your village?
- How do you evaluate the existing infrastructural and basic services of the District?
- What resources are owned by poor households in this Kebele?
- What are the major shocks and coping strategies adopted by households in your village?
- What should be done to increase the wellbeing of the rural people?

B. Checklist for interview with extension agents

- What extension services are delivered to households? How do farmers assess the extension services?
- How did you evaluate the achievement of the planned activities (crop, livestock and natural resource)? How effective are extension systems in providing new technologies to farmers?
- What are the major constraining factors for agricultural productivity and production?
- What should be done by all agents at the Kebele and District level to enhance agricultural production and income?

C. Checklist for interview with District level agricultural and rural development officials

- What is the nature of poverty and socioeconomic hardship in this District?
- How do you evaluate the provision of various rural infrastructures and social services?
- What are the major shocks that this District faced in the last two years? What was the impact and consequence of this shock on the livelihood of rural households?
- What are the general shock response strategies adopted by the government? What are the local strategies for dealing with such shocks?
- What should be done to reduce poverty and build sustainable and resilient livelihoods of households in your village?