

**DIMENSIONS AND DETERMINANTS OF POVERTY IN AGRO-
PASTORAL HOUSEHOLDS OF KABRIBAYAH DISTRICT, FAFAN
ZONE, SOMALI REGIONAL STATE, ETHIOPIA**

MSc THESIS

SHUGRI FARAH FALUG

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**Dimensions and Determinants of Poverty in Agro-Pastoral Households of
Kabribayah District, Fafan Zone, Somali Regional State, Ethiopia**

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Shugri Farah Falug

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SCHOOL OF GRADUATE STUDIES**

As Thesis research advisor, we hereby certify that we have read and evaluated this thesis entitled, **Dimensions and Determinants of Poverty in Agro-pastoral Households of Kabribayah District, Fafan Zone, Somali Regional State, Ethiopia**, prepared under our guidance, by Shugri Farah, we have recommended that can be submitted as fulfilment of the thesis requirement.

<u>Bosena Tegegne (PhD)</u>	_____	_____
Major Advisor	Signature	Date
<u>Abebaw Shimeles (PhD)</u>	_____	_____
Co-Advisor	Signature	Date

As member of the Board of Examiners of the Final M.Sc. Thesis Open Defense Examination, we certify that we have read and evaluated the thesis prepared by Shugri Farah, entitled **Dimensions and Determinants of Poverty in Agro-pastoral Households of Kabribayah District, Fafan Zone, Somali Regional State, Ethiopia**, and examined the candidate. We recommended that the thesis is accepted as fulfilling the thesis requirement for the degree of Master of Science in Agriculture (Agricultural Economics).

_____	_____	_____
Chairperson	Signature	Date
_____	_____	_____
Internal examiner	Signature	Date
_____	_____	_____
External examiner	Signature	Date

DEDICATION

I dedicate this thesis manuscript to my father **Farah Falug** and my mother **Fadumo Abdullahi**, for nursing me with affection and love and for their dedicated partnership in the success of my whole life and my child **Mohammedamin Shugri**, for his affection and love.

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my genuine work and that all sources of materials used for this thesis have been properly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced M.Sc. degree at Haramaya University in Agricultural Economics and is deposited at the University Library to be made available to users or borrowers under the rules of the Library. I confidentially declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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Name: Shugri Farah

Signature: _____

Date of Submission: _____

Place: Haramaya University, Haramaya

BIOGRAPHICAL SKETCH

The author was born in September 11, 1988 in Warder District particularly in Warder town, Dollo Zone of Somali Regional State. He attended his primary education in Warder town at Dollo Primary and Junior and Warder Senior Secondary and Preparatory School respectively and completed his secondary education in 2003. He joined Somali Region; Teachers Training Institute in 2004 and graduated with certificate of teaching skills in October 2004. Soon after his graduation, he was employed in the Somali Region; Danot District and served as a teacher for three years and at the same time he joined PESC Information Systems College in 2005 and graduated with Diploma in Marketing and Salesmanship Management in June 2007. Then, he joined Jigjiga University in 2007 and graduated with BA Degree in Economics in February 2011. Soon after his graduation, he was employed in the Somali Region; Technical, Vocational Education and Training Bureau and served as a finance coordinator for about nine months. Thereafter, in October 2011 he was transferred to Somali Region; Civil Service Bureau as Programs and Projects Development Senior Officer for nine months and later promoted to Recruitment, Promotion, Transfer and Structures Core Process Owner and served for about two and half years. He then transferred to Somali Region; Micro and Small Enterprise Development Agency in December 2014, as a job creation, clusters and business centers and market link development core process owner. He joined the School of Graduate Studies of Haramaya University in 2011 to pursue his MSc Degree in Agricultural Economics.

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ACRONYMS AND ABBREVIATIONS

ADLI	Agriculture Development Led Industrialization
AE	Adult Equivalent
AUC	African Union Commission
CSA	Central Statistical Agency
EHNRI	Ethiopian Health and Nutrition Research Institute
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FGT	Foster, Greer and Thorbeck poverty index
GDP	Gross Domestic Product
HICE	Household Income Consumption Expenditure
HCI	Head Count Index
HIPC	Highly Indebted Poor Countries
HPI	Human Poverty Index
ILRI	International Livestock Research Institute
ICPD	International Conference on Population and Development
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
KDAO	Kabribayah District Agriculture Office
MEDaC	Ministry of Economic Development and Cooperation
MoFED	Ministry of Finance and Economic Development
NGO	Non-Governmental Organization
PASDEP	A Plan for Accelerated and Sustained Development to End Poverty
PGI	Poverty Gap Index
PRSP	Poverty Reduction Strategy Program
SDPRP	Sustainable Development and Poverty Reduction Program
TLU	Tropical Livestock Unit
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
WDR	World Development Report

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DIMENSIONS AND DETERMINANTS OF POVERTY IN AGRO-PASTORAL HOUSEHOLDS OF KABRIBAYAH DISTRICT, FAFAN ZONE, SOMALI REGIONAL STATE, ETHIOPIA

ABSTRACT

Eradicating extreme hunger and poverty is one of the global pressing issues that stimulated global action exemplified by the first goal of the millennium development goals. In Ethiopia, different poverty reduction programs with their implementation strategies have been implemented to fight poverty but multidimensional poverty widely exists yet. Particularly the struggle to reduce poverty at household level in Somali Region agro-pastoral areas, which have been relegated in the waiting room of development by the successive governments, has continued as a challenge. Agro-pastoral households in Kabribayah District have faced multidimensional and persistent poverty. The design and implementation of effective measures to reduce household poverty in the district depends on an in-depth understanding of the dimensions, covariates and status of poverty. Therefore, this study was carried out in Kabribayah District of Somali Regional State with the objectives of estimating and examining the poverty status and its dimensions of the agro-pastoral households and identifying factors determining poverty, respectively. In order to achieve these objectives, cross-sectional data on demographic, socio-economic characteristics and institutional aspects were collected from 123 households drawn from three randomly selected sample kebeles through structured interview schedule and focus group discussion during July and August 2015. To analyze the data Descriptive statistics, FGT and Logit model were used. Consumption expenditure and CBN methods were used to measure poverty and construct poverty line, respectively. Accordingly, the food poverty line was 3117.64 Birr and the total poverty line was 5195.20 Birr per AE per year. The FGT poverty index was employed to examine the extent and severity of poverty. It revealed that nearly 52% of the sample households live below poverty line with poverty gap and poverty severity index of 0.1456 and 0.0462, respectively. Thirteen explanatory variables were included in the binary logit model to identify factors influencing household poverty status. Among the thirteen explanatory variables included in the model, number of livestock excluding oxen (TLU/AE), oxen ownership, sex, farm size, farm income, non-farm income, expenditure on improved seed, and expenditure on veterinary service showed a statistically significant and negative effect on poverty. Family size (in AE), distance to market and dependency ratio have a positive and significant effect on poverty. The empirical findings suggest that special attention should be given to improving livestock market, institutional services and gender equality. Interventions like capacity building, agricultural research, agricultural marketing as well as infrastructures that enhance non-farm activities in sustainable manner need to be designed to reduce poverty prevalence in the study area.

Keywords: Agro-pastoral, Poverty, FGT, Logit, Kabribayah

1. INTRODUCTION

1.1. Background

Poverty has become one of the most intractable economic and social problems in the twenty-first century. Chronic poverty is a multidimensional and complex phenomenon. Worldwide, up to half a billion people are chronically poor, most of them in South Asia and sub-Saharan Africa. Around one-third of all those who are extremely poor are poor over many years or even for their entire lives, and may well pass their poverty on to their children. In Africa, the problem of poverty is much deeper and far more widespread than in other major regions. Half of the population of Africa lives in extreme poverty and one-third in hunger (ODI, 2014).

Like other developing countries, poverty is a major social and economic problem in Ethiopia. The country is often reported as one of the poorest countries in the world almost by all dimensions of poverty. Data shows that the proportion of people living below the poverty line in Ethiopia has declined from 45.5 % in 1995/96 to 29.6% in 2011/12. While poverty in the rural areas is higher than the urban areas, the gap has narrowed down quite significantly over the last sixteen years (1995/96 – 2011/12), (GTP-MoFED, 2014).

The food and absolute poverty lines for 2010/11 were determined to be Birr 1985 and 3781, respectively while the proportion of poor people (poverty head count index) in the country was estimated to be 29.6% in 2010/11 and the proportion of the population below the poverty line stood at 30.4% in rural areas, it was estimated to be 25.7% in urban areas. The poverty gap index was estimated to be 7.8% while it is 8.0% for rural areas and 6.9% for urban areas. Similarly, the national level poverty severity index stood at 0.031 with rural poverty severity index (0.032) being slightly higher than that of urban areas (0.027). Furthermore, with regards to the other dimensions of poverty and welfare, Ethiopia is one of countries with the lowest access and coverage of basic public services (MoFED, 2013).

The Somali Regional Disaster Prevention and Preparedness Bureau (DPPB, 2012) divide the region into 17 'food economy zones'. Of these, eight are categorized as 'pastoralist', six 'agro-pastoralist' and three as 'agricultural' food economy zones which include Riverine basin and sedentary farming system. Major sources of income include livestock and livestock

product sales, crop sales, firewood and charcoal sales, petty trading activities in town areas of the region. Headcount poverty incidence in Somali region declined from 41.9% percent in 2004/05 to 32.8% percent in 2010/11. In the same period, the rural poverty head count index declined from 45.2% to 35.1% while urban poverty also declined from 35.3% to 23.1% which is one of the highest among regions of the country (MoFED, 2014).

According to regional report by DPPB (2012), poverty situation in Fafan Zone was high, the zone was suffering from water and food related problems. This has been happening frequently in the zone due to shortfall precipitations of rain, complemented by higher prices of basic food grains. Similarly, MoA (2014) report revealed that, in Fafan Zone a significant reduction in the crop production in agro-pastoralist and sedentary farming livelihood zones due to erratic rainfall. Crops like sorghum and maize are highly affected and the zone lost 60 to 70 percent of the expected harvest from these crops. Thus, staple cereal availability is expected to be constrained by the previous drought conditions and access to food is expected to be impacted by high prices that critically affect poor agro pastoral households. The only food supplies expected to be available in the cereal markets will be relief food.

To have a meaningful intervention and assist the poor in the area it requires identifying the factors determining the poverty in locally specified context and need to measure the magnitude of poverty. Therefore, it is high time to investigate the poverty status and disentangle the interwoven factors that determine household poverty in the agro-pastoral areas of the region. In addition, it could help to tighten the information and knowledge gaps that are hampering in identifying and addressing the poor appropriately through implementation of appropriate policy and development interventions. Hence, this study was proposed to fill this gap.

1.2. Statement of the Problem

Poverty still poses a major problem in most of the developing world, especially in Sub-Saharan Africa. In Ethiopia, poverty and destitution have become chronic problems. Poverty is significantly more widespread and severe in rural areas than in urban ones. Major changes in the political climate, upheavals and migration caused by civil conflict, and the increased frequency and severity of drought since 2001 have all taken their toll on the country's poor

rural households and continue to affect them. The majority of the rural population lives far below the internationally recognized absolute poverty threshold of less than 1.25 dollar a day, and most of these people are chronically, or at least periodically, food insecure. In order to survive, most households resort to seasonal or permanent migration to urban areas in search of wage employment (IFAD, 2011).

The Somali region is among the poorest regions in Ethiopia. Reliable data on living standards is extremely difficult to come by and the CSA (2005) report provides health data that is indicative of the extent of poverty. The region is one of the most vulnerable regions in the country. It is subject to numerous shocks and stress mainly drought, human and livestock diseases, poor infrastructure and conflict. According to the 2007 Population and Housing Census, the region has total population of 4.44 million, of which 86.1% of the region's population lives in rural area (CSA, 2008).

The livelihoods of the rural Somali are made up of pastoralism (60%) and agro-pastoralism (25%) and the remaining (15%) are sedentary and riverine area farming. Agriculture particularly livestock are the main sources of livelihood for the region. Despite considerable livestock potential and various efforts made to improve its performance, still productivity of livestock in terms of milk and meat remained very low. Somali Region has been affected by droughts that have resulted in heavy livestock losses and depletion of the wealth basis of local communities. These droughts have come in quick succession, leaving no time for herds to reconstitute and pasture to regenerate (BOFED, 2012).

There is relatively little employment to be found outside the towns, other than seasonal agricultural labour, and sometimes livestock herding. Households may send members to seek work in towns as a coping strategy, but it does not usually generate much extra cash once living expenses have been accounted for. The major employers are the regional and federal governments, NGOs and the private sector (particularly urban services like restaurants). Overall, the skilled labour force is extremely limited. With regard to social services and infrastructures – roads and access to health, education and drinking water – are poor throughout the region (SCUK/DPPB, 2011).

The study area, Kabribayah district has been experiencing different types of problems that have strong association with agro-pastoral households' livelihoods and households' poverty.

These include crop and livestock disease prevalence, range land degradation, recurrent drought and its related negative outcomes, low agricultural productivity, ineffective and inefficient agricultural marketing system and shortage of agricultural inputs (supplies) are the critical ones among the long list. Poverty has become the defining feature of agro-pastoralism in Kabribayah District (KDAO, 2015).

In order to address the problem of poverty, properly designed and detailed investigation should be undertaken. To date, only one study focusing on identification of factors contributing to the pastoral households' poverty in Fafan Zone had been undertaken. However, some poverty generating factors are specific to locations, production and livelihood systems. Therefore, this study envisaged the extent of poverty in Kabribayah district to narrow the existing information gap and to suggest appropriate policy and development intervention options aimed at reducing poverty in the district.

1.3. Scope and Limitations of the Study

The study was conducted in one district, namely Kabribayah of Ethiopian Somali Regional State. The study covered only three agro-pastoral kebeles of the 29 kebeles of the district from which a total of 123 sample households were randomly selected. Additionally, the study focused on the agro-pastoral households in the study area. It does not include pastoral households in the study area. The study was limited in the use of cross-sectional survey data that was conducted for the study purpose. Household is the unit of analysis in this study. The study has assessed and estimated the status and dimensions of poverty of agro-pastoral households of Kabribayah district by using CBN method. It also identified the determinants of poverty in the study area.

Poverty is not a pure economic phenomenon because it is the syndrome of assetlessness, landlessness, joblessness, deprivation and helplessness. It has social, cultural, political, historical, and geographical dimensions. The social dimension include lack of livelihood security and food security, hunger, starvation, and vulnerability, lack of shelter, and lack of education, and lack of access to health care. Poverty is losing a child to illness brought about by unclean water. Poverty is powerlessness, lack of representation and freedom. The dimensions of poverty refer to experiences of people, inherently subjective to nature, lack of

security and dignity, etc. In general from its definitional dimension, it has to be restricted to those human needs whose satisfaction depends on economic conditions. Otherwise poverty gets confused with other dimensions of human suffering. This is due to the perceptions dealt on poverty research areas are broad, more focused issues in its necessity from the view point of policy makers, it also needs data intensive work, and hence it requires multidisciplinary research approach. In addition, poverty decomposition by different socio economic groups and village level variables may provide a lot of insight to understand poverty.

The study emphasizes on welfare indicator of poverty using consumption as proxy measure. So this study does not capture complexity, multidimensionality and dynamic nature of poverty. Nevertheless, the result of the study could be used for other areas which might have similar socio-economic circumstances.

1.4. Significance of the Study

As indicated above, the country in general and the study area in particular has been facing poverty problem. Identifying and understanding factors that cause and/or influence the problem as well as its severity at the household level deserves rigorous empirical research where poverty has been pronounced and has great importance for policy implications and interventions.

The main reasons for focusing on rural agro-pastoral households' poverty is that the vast majority of the poor reside in rural areas, where the incidence and intensity of poverty is usually higher than in the urban areas. Similarly, MoFED (2012) report shows that physical assets are not readily available in rural areas. In addition, deficiency in human capital in the form of low education and functional skills, coupled with poor health care, serve as barriers to escape from poverty. Furthermore, the outcome of this study might contribute towards better understanding of the situation, the factors and conditions which determine this situation more specifically which specific factors are more relevant for policy purpose and developing appropriate strategies. It also contributes to the knowledge of poverty status of agro-pastoral and rural households at local level. Therefore, the outcome of this study would contribute towards perception of the extent of poverty problems in the society, its distribution and underlying features so as to help as base information in reducing poverty in the study area as

well as areas with similar characteristics. By providing the above understandings this study may contribute to the poverty reduction efforts of the region and hence the country. Consequently, researchers, local government, non-government organizations and relevant stakeholders may benefit from the result of the study to direct their efforts of alleviating poverty.

1.5. Objectives of the Study

The general objective of the study was to assess the dimensions and determinants of poverty status of agro-pastoral households of Kabriyah district of the Somali Regional State.

The specific objectives of the study were:

1. To estimate the agro-pastoral households poverty status based on consumption expenditures;
2. To measure the dimensions of poverty in the agro-pastoral households; and
3. To identify the determinants of agro-pastoral households' poverty status in the study area.

2. LITERATURE REVIEW

2.1. Concepts and Definitions

According to literature review, there is no consensus on any meaningful definition of poverty. Many evidences suggested that poverty is multi-dimensional phenomenon. In the simplest definition poverty is the lack of household income (or consumption). Poverty never results from the lack of one thing, but from many interlocking factors that cluster in poor people's experience. It encompasses not only low monetary income and consumption but also low human development, such as education, health and nutrition. More generally, poverty means the inability to meet basic needs, including food, shelter, clothing, water and sanitation, education, and healthcare. In this sense, poverty generally reflects a combination of income poverty at the household level and poverty at the community level in the provision of basic infrastructure and public services (SDSN, 2012).

There are two common types of poverty namely absolute and relative poverty. The absolute concept of poverty refers to a standard of living defined in absolute terms. In this case, poverty is usually measured by the value, in real terms, of a given level of goods ensuring some form of minimum subsistence (e.g., the value of basic food or the minimum income required to have decent lives). The first attempts to define poverty as an absolute concept have taken into account the minimum diet cost, i.e. the minimum cost, for each household, to achieve a given energy intake (FAO, 2010), whereas, relative poverty reflects the differences in the level of living between the top and bottom strata of the society. A relative poverty line is usually set at an arbitrarily selected fraction of the average income or expenditure in a country. So, the relative poor are defined as those people whose mean expenditure per annum falls below two-third of the national average expenditure per adult equivalent; and it varies with the level of average income in the country.

In general, poverty has a multi-dimensional facet and is not characterized only by income status of households or per capita food production but also by other non-monetary social dimensions. It is characterized by inadequate food and calorie intake and lack of access to health, nutrition, education, domestic water supply, and sanitation. Thus, poverty in general can be defined as to include all dimensions of the hardship people face in different income and employment categories (World Bank, 2011).

2.2. Theoretical and conceptual framework of the multidimensionality of poverty

Based on previous literatures and researches, the Poverty has many dimensions and facets. Different authors and researchers analyzed poverty in different ways and there is no universal rule of thumb for conceptualizing the poverty. According to UNDP (2011) categorized poverty into four major clusters of poverty concepts.

The first is *income-poverty* or its common proxy (because less unreliable to measure) consumption-poverty. This needs no elaboration. When many, especially economists, use the word poverty they are referring to these measures. Poverty is what can be and has been measured, and measurement and comparisons provide endless scope for debate.

The second cluster of meanings is *material lack or want*. Besides income, this includes lack of or little wealth and lack or low quality of other assets such as shelter, clothing, and furniture, personal means of transport, radios or television, and so on. This also tends to include no or poor access to services.

A third cluster of meanings derives from Amartya Sen, and is expressed as *capability deprivation*, referring to what we can or cannot do, can or cannot be. This includes but goes beyond material lack or want to include human capabilities, for example skills and physical abilities, and also self-respect in society.

A fourth cluster takes a yet more broadly multi-dimensional view of deprivation, with material lack or want as only one of several mutually reinforcing dimensions.

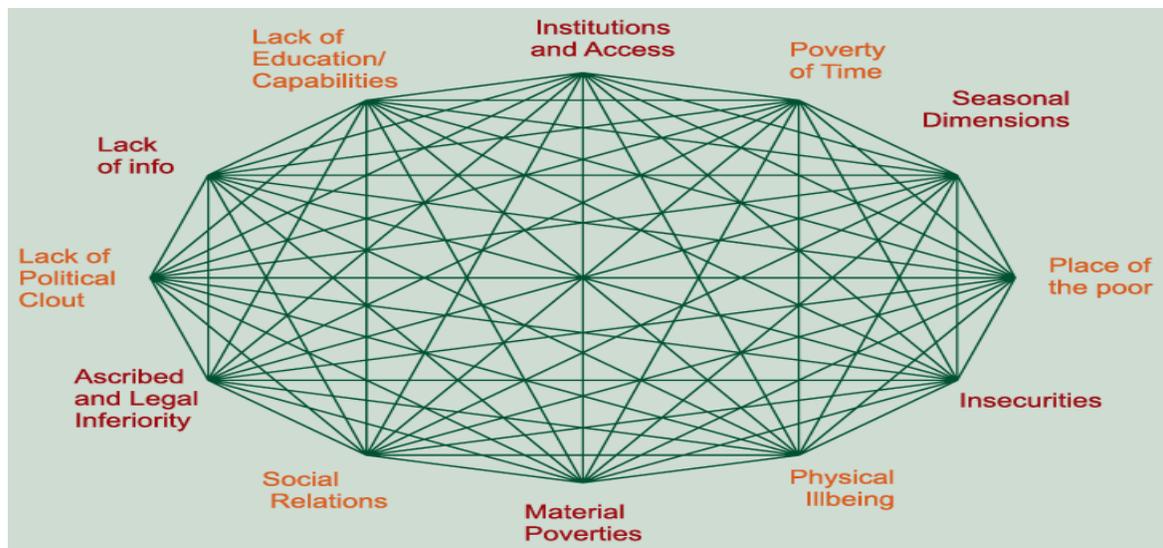


Figure 1: The conceptual frameworks and multidimensionality of poverty

Source: UNDP, 2011

2.3. Measurement and Indicators of Poverty

According to the existing literature on the subject like (Yohannes, 1995), poverty is said to exist in a given society when one or more persons do not attain a level of material wellbeing deemed to constitute a reasonable minimum by standard of that society. As a result, according to the same source, the starting point in any poverty study is the question of how to measure or assess wellbeing and based on that at what level of measured wellbeing that a person is poor or non-poor. Similarly, Ellis (2000) and FAO (2001) indicated presence of controversy in measuring poverty, which arises from its complexity and multifaceted nature.

Regarding the measurement of poverty, two approaches were debated amongst economists in terms of objective and subjective measures (Erikson, 1993) and the welfarist and non-welfarist measures (Ravallion, 1992; Ayalneh, 2002). Poverty can be measured at national, regional, community and household/individual levels. Poverty at national or regional levels is often the reflection of poverty at the household levels. Despite the problems existed in its measurement, a number of alternative measurements are used in the development literatures (Glewee and van der Gaag, 1988; Yohanes, 1995; Sowa *et al*, 2002).

According to Datt and Ravallion (1992), it is important to identify the poor and desirable to measure the intensity of their poverty. Thus, the measurement of poverty involves two distinct problems: (1) specification of the poverty line—the income level below which one is considered to be poor, and (2) construction of an index to measure the intensity of poverty suffered by those whose income is below that line. Since the publication of Sen's (1976) article on the axiomatic approach to the measurement of poverty, several indices of poverty have been developed. The indices use three poverty indicators: the percentage of poor, the aggregate poverty gap and the distribution of income among the poor.

2.3.1. Poverty Measurement Procedures

Literatures indicate that three ingredients are required in computing a poverty measure. First, one has to choose the relevant dimension and indicator of well-being. Second, one has to select a poverty line, that is, a threshold below which a given household or individual will be classified as poor. Finally, one has to select a poverty measure to be used for reporting for the population as a whole or for a population subgroup only (Goedhar, 2010).

When estimating poverty using monetary measures, one may have a choice between using income or consumption expenditure as the indicator of well-being. FSS (2002) and Sowa *et al.* (2002), stated that most analysts argue that, provided the information on consumption obtained from a household survey being detailed enough, consumption is a better indicator of poverty measurement than income for the following reasons.

First, consumption is a better outcome indicator than income. Actual consumption is more closely related to a person's well-being in the sense defined above, that is, of having enough to meet current basic needs. On the other hand, income is only one of the elements that will allow consumption of goods; others include questions of access and availability.

Secondly, consumption may be better measured than income. In poor agrarian economies, incomes for rural households may fluctuate during the year, according to the harvest cycle. In urban economies with large informal sectors, income flows also may be erratic. This implies a potential difficulty for households in correctly recalling their income, in which case the information on income derived from the survey may be of low quality.

Thirdly, consumption may better reflect a household's actual standard of living and ability to meet basic needs. Consumption expenditures reflect not only the goods and services that a household can command based on its current income, but also whether or not that household can access credit markets or household savings at times when current income is low or even negative, perhaps because of seasonal variation, harvest failure, or other circumstances that cause income to fluctuate widely.

2.3.2. Determination of a Poverty Line

The non-welfaristic approach often used for drawing a poverty line is based on the basic needs or minimum caloric requirement: direct calorie intake, food energy intake, and cost of basic need methods. In the case of direct calorie intake method, a poverty line is defined as the minimum calorie requirement for survival. Individuals who consume below a predetermined minimum level of calorie intake are deemed to be under poverty. Hence, this method equates poverty with malnutrition. The drawback of this method is that it does not take into account the cost of getting the basic calorie requirement. It totally overlooks the non-food requirement. If poverty has to be measured by a lack of command on basic goods and services, measuring poverty by calorie intake only is unlikely to reveal the extent of impoverishment of a given society.

The second non-welfaristic method of setting a poverty line is the food energy intake method. The basic idea in this method is to find the per capita consumption at which a household is expected to fulfil its calorie requirement. In this case, the poverty line is then defined as the level of per capita consumption at which people are expected to meet their predetermined minimum calorie requirement. It is normally determined by regressing the per capita consumption expenditure on calorie intake. Then the predicted value of the per capita consumption expenditure at the predetermined calorie intake level is taken as the poverty line. This method is an improvement over the direct calorie intake in terms of representativeness of the poverty line as it now provides the monetary value rather than purely nutritional concept of poverty. However, if this method is applied to different regions and periods within the same country, the underlying consumption pattern of the population group just consuming the necessary nutrient amount will vary. Hence, this method yields differentials in the poverty line in excess of the cost of living facing the poor. In other words

this method does not yield a consistent threshold (poverty line) across groups, regions and periods.

The third method of setting a poverty line is the cost of a basic need method. First, the food poverty line is defined by selecting a 'basket' of food items typically consumed by the poor. The quantity of the basket is determined in such a way that the given bundle meets the predetermined level of minimum caloric requirement. This 'basket' is valued at local prices or at national prices if the objective is to arrive at a consistent poverty line across regions and groups. To account for the non-food expenditure, the poverty line is divided by the food share of the two poorest quartiles or quintiles as the case may be. This method yields a representative poverty line in the sense that it provides a monetary value of a poverty line that accounts for food and non-food components. Unlike the food energy intake method, the latter provides consistent poverty lines across regions. Adjustments for spatial and inter-temporal variations could be made to set a poverty line that is consistent across regions, groups and periods. Then a specific allowance for the non-food component consistent with the spending patterns of the poor is added to the food poverty line (Fields, 1993).

Each of these approaches has had its disciples and critics, and a great deal of research has been carried out. Work in the societal, quantitative and socio-economic fields has given rise to international standards, such as the poverty thresholds and lines used by the World Bank (1999) and the human development indices developed by the UNDP (2000).

The present study employed consumption expenditure as an indicator of well-being to measure poverty and cost of basic needs method to construct poverty line. The major reasons for selecting the CBN approach is having the advantage over the other alternative methods. Among others, it is the most commonly used and widely accepted method that ensure consistency (treating individuals with the same living standards equally) and adjustments for spatial and inter-temporal variations could be made to set a poverty line that is consistent across regions, groups and periods.

2.4. Poverty Profile in Ethiopia

Studies related to poverty profile constitute an important element in the information kit of the policy makers. Poverty profile assesses the magnitude of poverty and its distribution across geographic and socio-economic domains, provides information on the characteristics of the poor, illustrates the heterogeneity among the poor, and helps in identifying empirical correlates of poverty. The government conducts HICE Analytical works in every five years to check the progress on poverty reduction endeavours of the government and academic and non-academic researches are highly available in Ethiopian poverty profile. The available ones are mostly descriptive, focus on explaining the extent of poverty and most are associated with studies that relate to food and non-food entitlement failures.

The most of the last decade studies carried out by Ministry of Finance and Economic Development (MoFED, 2009) is primarily based on the 1999/2000 Household Income and Consumption Expenditure (HICE) and Welfare Monitoring Survey results. Empirical results indicate that incidence of poverty is higher in rural than in urban areas with poverty head count ratio of 45.4 and 36.9 percents, respectively. Following the implementation of the comprehensive poverty reduction strategy, poverty levels have declined steadily reaching 38.7 percent in 2004/05, and are estimated to further decline to 29.6 percent in 2009/10. However, the decline in rural poverty since 1995/96 is substantial compared to the rising poverty levels in the urban areas. The headcount, poverty gap and poverty severity indices in 2004/05 for rural areas were lower than the levels five years ago, by 13%, 31%, and 41%, respectively. The urban poverty headcount index increased by 11 percent between 1995/96 and 1999/2000 but declined slightly (by 5% only) between 1999/2000 and 2004/05. Income Poverty is slightly higher in the rural areas (39.3 percent) than in the urban areas (35.1 percent). The poverty gap index was 8.3% in 2004/05 and was slightly higher (8.5%) in rural than in urban areas (7.7%).

What all the above studies have in common is that the extent of poverty in Ethiopia is pervasive and one clearly sees the overwhelming task and challenge that has to be addressed by the Government of Ethiopia, development practitioners, NGOs and the people to achieve sustainable development and poverty reduction. The development strategy should, therefore

seek to promote rapid and equitable growth by targeting the impoverished rural people, so that they will be empowered and the choice and control over their lives be expanded.

2.5. Poverty Reduction Strategy Programs in Ethiopia

The World Bank and IMF initiated poverty Reduction Strategy Program in 1999, in the context of debt relief for World's poorest countries to provide debt relief and lending under the enhanced Highly Indebted Poor Countries (HIPC) initiative. Wholly, the major principles underlying the PRSP focuses on the importance of country's poverty reduction strategy as paramount, enhancing the participation of civil society in the adoption and monitoring of Poverty Reduction Strategy tailored to country's circumstances, for sustainability. To summarize the above, integrated institutional, structural and sectoral interventions and a consistent macroeconomic framework are needed. The achievement also requires the concerted efforts of the concerned government partners, the World Bank and IMF; besides, that of Africa/regional development banks and other multilateral, bilateral assistance agencies, NGOs, private sector organization, academic and mass media (World Bank, 1999; MoFED, 2002).

The Ethiopian PRSP, which was Sustainable Development and Poverty Reduction Program (SDPRP), has been built on four building blocks. These are ADLI, Justice and Civil Service Reform, Decentralization and Empowerment and Capacity Building. In the second stage, "Plan for Accelerated and Sustained Development to End Poverty" (PASDEP) spanning the five year period 2005 – 2010 anchoring development objectives directly to a longer-term strategy for achieving the MDGs that are the core government's poverty reduction strategies designed to improve the lives of the poor people, taking a holistic view putting the growth agenda at the centre of its poverty reduction endeavour, and aimed to reduce the total poverty head count and food poverty from 39 and 38 percent in 2004/05 to 29 and 28 percent by 2009/10 respectively (MoFED – PASDEP, 2006).

In the third stage, Growth and Transformation Plan (GTP) was developed from the 2010/11-2014/15 over the five years period, aimed to sustain broad based, fast, and equitable economic growth so as to eradicate poverty. The GTP had the major objectives of Maintaining at least an average real GDP growth rate of 11% and attain MDGs; expand

and ensure the qualities of education and health services and achieve MDGs in the social sector; establish suitable conditions for sustainable nation building through the creation of a stable democratic and developmental state; and ensure the sustainability of growth by realizing all the above objectives within a stable macroeconomic framework with main implementation strategies for sustaining rapid and broad-based economic growth path are dependent on the strategic pillars such as sustaining rapid and equitable economic growth, maintaining agriculture as major source of economic growth, creating conditions for the industry to play key role in the economy, enhancing expansion and quality of infrastructure development, enhancing expansion and quality of social development, building capacity and deepen good governance and Promote gender and youth empowerment and equity (MOFED-GTP, 2010).

2.6. Poverty Profile and Livelihood of the Somali Regional State

The Somali region has diverse and varied livelihood systems. These livelihood systems includes: pastoralism, agro-pastoralism, farming (sedentary and riverine) and urban. Pastoralism is the most prevalent, comprising about 60% of the region's rural population. The term pastoralism is a method of agricultural exploitation based upon extensive herding including the system in which the movement of the herds and men are major components. Pastoralism is life system which entirely depends on livestock and rangeland communal resources, mobility of livestock and communal resources of the rangeland are the key factors to differentiate pastoralism from sedentary styles of livelihood. Agro-pastoralism comprises about 25% of the total rural population, and is a mixture of extensive livestock rearing and rain-fed crop production; some may be better described as pastoralists with opportunistic crop farming activities – as in Fik and some parts of Liban Zone. The remaining 15% of the rural population comprises sedentary (mainly in Jigjiga) and riverine (Shabelle and Dawa-Ganale) farmers. Both farming and agro-pastoral groups keep some livestock but farmers' herds do not migrate and are sometimes hand-fed, only migrating with other groups if there is a severe drought (DPPB, 2012).

The head count ratio of poverty of Somali region is estimated about 32.8 percent of the population of which 35.1 and 23.1 percent live in rural and urban areas respectively. The

poverty gap and severity of the region are estimated to be 9.9 and 3.8 percent respectively (MOFED, 2012).

2.7. Review of Empirical Studies on Poverty

A number of studies have sought to examine the status and extent of poverty in Ethiopia. The government's 2010/11 Household Income and Consumption Expenditure Survey is the most extensive survey available on the status and extent of poverty. It indicates that the incidence of poverty has declined substantially between 2004/05 and 2010/11 and much of the decline in 2010/11 in national poverty level was attributed to a decline in urban poverty in contrast to the decline in poverty in 2004/05 which was mainly due to a decline in rural poverty (MOFED, 2012).

Ayanleh *et al.* (2009) have studied extent and the determinants of poverty in three districts in rural areas of eastern Ethiopia. They pointed out, among others, three main reasons that explain the extent and variation in poverty levels across households studied: (1) poverty being location-specific (2) Access to irrigated land (not land per se) and non-farm incomes being strongly correlated with lower probabilities of being poor. (3) Involvement in networks being a strong predictor of the probability of being poor.

Shibru *et al.* (2011) studied the Dimensions and Determinants of Agro-pastoral households' Poverty in Dembel District of Somali Regional State, Ethiopia. In identifying the determinants of poverty, they employed a binary logistic regression model. They found that access to irrigation, distance from market center, farm land size, non-farm activities, educational status, livestock holding, and herd diversification having a significant effect on the probability of a household to be poor.

Moreover, Dercon (1999) found access to infrastructure, education and land ownership being important variables explaining the movement of households out of poverty. The results also indicated that more female household heads and older people staying poor or experienced greater poverty compared to male and younger people.

Stefan and Krishnan (1998) revealed that households with substantial human and physical capital, and better access to roads and town both have lower poverty levels and are more likely to become better off over a period of time. Human capital and access to roads and towns also reducing fluctuations in poverty across the seasons was indicated. The same study also reported that households with better physical capital, in terms of land and oxen, having lower poverty levels and experiencing larger poverty declines.

Tassew and Tekie (2002) conducted a study on national poverty profile of Ethiopia and found that poverty incidence, depth and severity being higher for those engaged in farming than those engaged in non-farming activities; poverty incidence, depth and severity are higher for the illiterate than for the literate in both rural and urban areas; the consumption poverty incidence, depth, and severity sharply declines in accordance with the households' level of education; and the incidence, depth and severity of poverty increases with the increase in family size.

Fitsum (2003) found age of the household head negatively and significantly correlated with welfare. Education of the household head was also found to be significant and positive. Asset holdings of households were closely related with the households' welfare status. Households with larger asset holdings such as farm, livestock holdings per adult equivalent and have got members with primary education having significantly higher consumption expenditures. Oxen holding were also found to be highly significant and negative sign with poverty.

Hilina, (2005) carried out a study in Eastern Ethiopia, in Siti zone of Somali Regional State with specific objectives of exploring the dimension and determinants of poverty. From 14 variables the following had significant role on poverty status of the households: age of household head, age at first marriage, dependency ratio, pasture management practice, family size in terms of adult equivalent per household, animal disease incidence, number of livestock owned per adult equivalent, sales of milk, non-farm income per AE and income from livestock and livestock products sale per adult equivalent.

Indris (2012) carried out study on assessment of food insecurity, its determinants and coping mechanism among pastoral household of Afar National Regional State the case of zone one, chifra district. Logistic regression model was applied in the study and found that large family

size, dependency ratio, age of the household head affect food insecurity positively where non-farm income affect household food security negatively.

Dereje (2008) carried out a study on Determinants of Poverty in case of Rural Dire Dawa Administration, Eastern Ethiopia. The binary logit model results indicated that among the explanatory variables included in the model, income from non-farm activities, tropical livestock unit, size of irrigable land, credit experience of a household head and number of ox owned influencing poverty status of the households negatively whereas family size and dependency ratio influence household poverty status positively. The possible explanation is that a family with large family size could not be able to provide sufficient basic needs to family members because most of them are children and not economically active.

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

Somali Regional State is the second largest in the country after Oromia and covers a total area of 350,000 km². It is located in the east and southeast of the country and lies between 4 and 11 degrees north latitude and 40 and 48 degrees east longitude. The Region has 9 administrative zones consisting of 68 districts and 4 town councils, which is further divided into 786 *kebeles*. The zones are Fafan, Siti, Liban, Afder, Shabelle, Korahe, Dollo, Jarar and Nogob. It shares borders with Somalia to the east and southeast, Kenya to the south and Djibouti to the north. To the northwest and west, it borders with Afar and Oromia Regions respectively. Climate is arid in most parts of the region and weather is therefore hot in most parts of the year, with mean temperatures ranging from 18 to 45C°. Temperature is cooler in areas of high altitudes like Fafan Zone and parts of Afder zone (e.g. Elkare) and hotter in areas around the main rivers of the region. Annual rainfall ranges from 150mm in the low-lying areas of the region to 660mm received in high altitude areas (BoFED, 2014).

The region is divided into two ecological zones namely the "*Deyr*" receiving areas and the *karan* receiving areas. The first consists of 7 zones namely, Jarar, Korahe, Dolo, Shabelle, Afder, Liban and Nogob. This receives the *gu* rains, the main rainy season of the year, from April to June followed by the *deyr* rains from October to November. Similarly, the *hagaa*¹ which is the short dry season of the year falls between June and October, with the *jilaal*² stretching from December to March. For the *karan*³ receiving zones, which are Fafan and Siti, follow climate pattern more like that of the highland areas of the country. In this part of the region, the *gu* is received from March to late May and is followed by the *hagaa* which continues to mid-July. The *karan* rains fall from mid-July to late September. The *jilaal* season which is normally the most difficult time of the year and hunger season for both pastoralists and agro-pastoralists, is from October to mid-March (BoFED, 2014).

The vast majority of the population of the region is pastoralists and agro-pastoralists who are dependent on livestock and farming for their survival. The region has 17 rural livelihood

¹ Hagaa season is a dry season which is from June to October.

² Jilaal season is a dry season which is from December to March.

³ Karan season is a rainy season which is from July to September.

zones, generically classified as pastoral, agro-pastoral, riverine and sedentary farming. The major sources of income include livestock and livestock product sales, crop sales, firewood and charcoal sales, petty trade and remittance from western living Diaspora of the region (BoFED, 2014).

Kabribayah district is one of the eight districts in Fafan Zone of Somali Regional State. According to the estimates of Central Statistical Agency (2008), the total population of the Kabribayah district is about 165,422 people (75,778(46%) of the total population were female, and 89,644(54%)) of the total population were male) while the rural and urban population were 150,534 and 14,888 respectively. The average family size for rural and urban areas is 6.4 and 5.2 persons respectively. Kabribayah District is one of the largest in terms of area coverage among the eight districts of the Fafan Zone and has an altitude of 1,500m above sea level. The mean monthly minimum temperature varies from 5.8^oc in November to 14^oc in July to September and mean monthly maximum temperature varies from 25^oc in July to 29^oc in March to April. The area obtains bimodal type of rainfall classified as small (short rain season) and main rain seasons, the short rain season usually occurs from July to September and the main rain season occurs from March to April. Agricultural production of the study area is mainly rain fed where there is unreliable rainfall and drought is more frequent (FZOA, 2015).

In the study area, there are two main seasons: Gu (wet season) and *Jilaal* (dry season). Within the Gu there are three sub seasons: *dira'* (late March-late May), *Hagaaa* (late May-late July), and *Karan* (late July -late September). The *Jilaal* (late September - late March) can be further divided into two sub seasons: *deyr* (late September-late November) and *kalil* (late November-late March). The area is dependent upon the *dira'* rains (mid-March–mid June) and the *Karan* rains (mid July – mid September). The *Karan* rains are normally heavier than the *dira'*. Both sets of rains are equally important for cultivation and maturation of crops, availability of water, and regeneration of pasture for livestock (DPPB, 2012).

3.1.1. Crop Production System

The farming system in the District is characterized by smallholder Agro-pastoral farming system, where mixed farming is well known and practiced by the Agro-pastoralists. The soil found in the area is a black clay soil that is relatively fertile and capable of retaining moisture.

This has a positive contribution to overall agricultural yields. Crops cultivated on Kabribayah plains include cereals (mainly maize). Basically, sorghum and maize are most important agricultural crops in Kabribayah and they are staple food of rural community. Some agro-pastoralists plant 'chat' as cash crop. Some very small numbers of agro-pastoralists also grow some perennial crops like Guava, mango and vegetable crops. Members of the household and relatives mostly are used as labor in the farming system. The low amount and erratic distribution of rainfall, high evaporation-transpiration, limited use or absence of drought tolerant crop varieties, crop pests' devastation and agro-pastoralists' inability to synchronize planting with the onset of the rains have by turns been the major causes of crop failures (DPPB, 2012).

3.1.2. Livestock Production System

Livestock plays a significant role in the agro-pastoral farming system of the study area. Livestock types kept by the agro-pastoralists include: cattle, goats, sheep, donkey, and camel. Oxen are kept to provide draught power, cows to provide farm households with milk, meat and butter for consumption and sale, donkeys for transporting goods and fetching water, while sheep and goats are mainly kept for sale as well as for their meat purposes. The feed sources commonly used for livestock include natural grazing and crop residues. For most of the agro-pastoralists in the district, keeping livestock is not only a source of income, and diversification of farming as a way of life which is very common in the area, but also their prestige which is closely correlated with the size of their herd. They rear livestock as a supplementary to the crop production system. Since arable land is scarce and holding declines as population increases, they enlarge their herd when they have surplus money and convert it to cash when they need money especially in long dry seasons (DPPB, 2012).

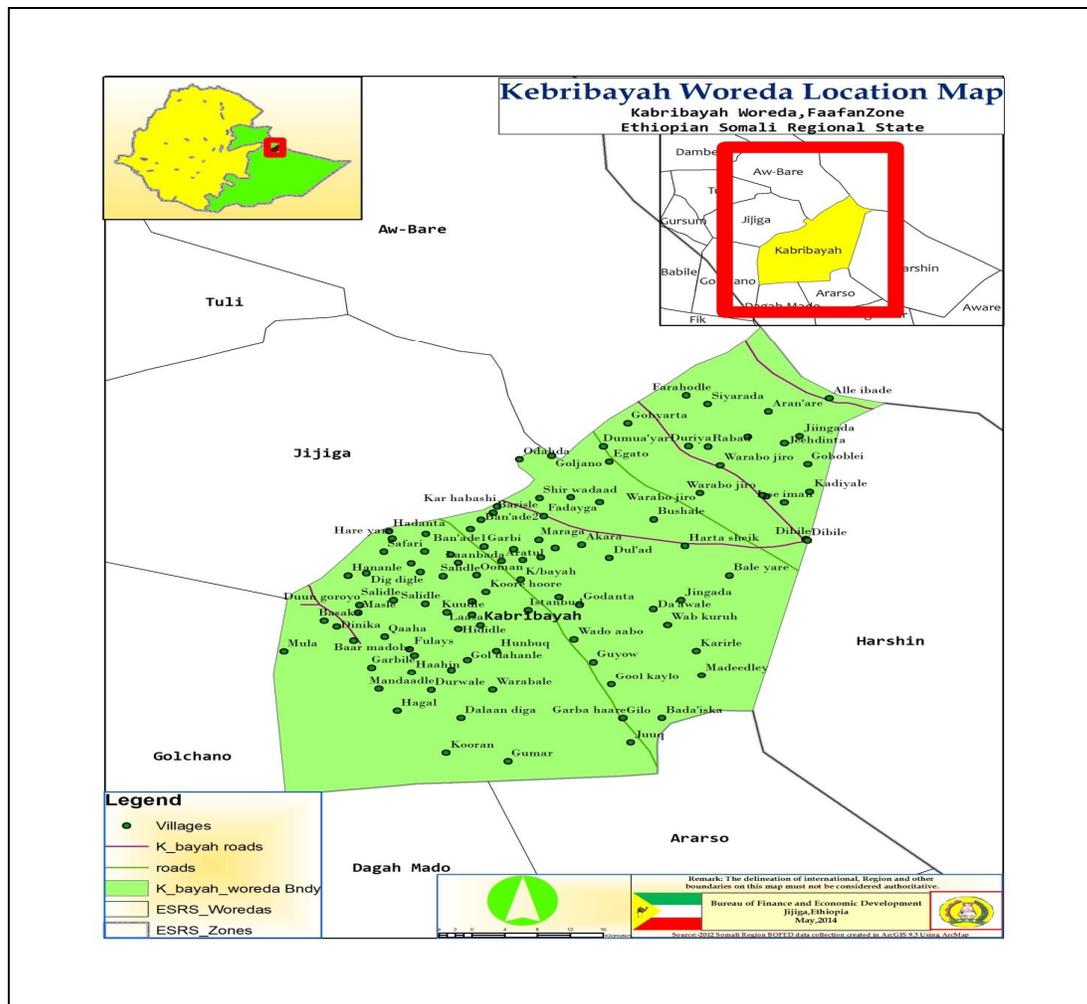


Figure 2: Location of the study area

Source: SRSBOFED, 2014.

3.2. Types, Sources and Methods of Data Collection

The study mainly depended on primary data which were collected in household survey by using structured questionnaire. This structured questionnaire has been used to gather data on household income, expenditure, access to public services and safety nets, non-farm income, and household assets alongside a host of other information related to production and sale of agricultural products. For the data collection, six high school graduate enumerators who speak the local language fluently were recruited and trained from the study area. The whole process of the household survey was supervised by the researcher.

In addition to primary data, relevant secondary data were collected from Kabribayah District Agricultural Office, Administration, Health Office, Water Office, Somali Regional State Line Bureaus, NGOs and Organizations operating in the district. Published and unpublished documents have extensively been reviewed to secure pertinent information.

3.3. Sampling Techniques and Sample Size

Sampling is the process or technique of selecting a suitable sample for the purpose of determining parameters or characteristics of the whole population. To carry out a study, one might bear in mind what size the sample should be, and whether the size is statistically justified and lastly, what method of sampling is to be used. As for all sampling, we need to think about the time and cost for the survey, whether it is small-scale or large-scale.

3.3.1. Sampling Techniques

The survey covered three agro-pastoral kebeles in Kabribayah District of Fafan Zone of Somali Regional State. In the process of selecting the sample, a multi-stage sampling procedure was used. In the first stage, the Kabribayah district has purposively selected to represent the Agro-pastoral society of the Somali regional state. In second stage, three agro-pastoral kebeles were selected randomly from the total twenty four agro pastoral kebeles that exist in the district. In third stage, the determinations of the agro-pastoral sample households were made by using simple random sampling. The agro-pastoral households in the three kebeles of Kabribayah district have been listed and among the list of agro-pastoral households from these three kebeles, a representative sample size was drawn based on Yamane's formula, following probability proportion to size technique.

3.3.2. Sample Size Determination

The existing literature debates the issue of successful selection and meaningful sample-size. Determining sample size varies for various types of research designs and there are several approaches in practice. Sample size determination is an important element in any survey research, although it is a difficult one. A simplified formula for proportions developed by Yamane (1967) was used in this study. Accordingly, the sample size is given by:

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

Where

n is the sample size,

N is the population size, and

e is the level of precision.

According to the estimates of CSA (2008), the total population of the Kabribayah District is about 165,422 people (75,778 (46%) of the total population were female and 89,644 (54%) of the total population were male) while the rural and urban population were 150,534 and 14,888 respectively. The agro-pastoral and pastoral population are 122,412 and 28,122 respectively and the total households in the agro-pastoral areas of the district are 19,127. The average family size for rural and urban areas was 6.4 and 5.2 persons respectively. A 91% confidence level and $e = 0.09$ are inserted into the Equation 1 to obtain.

$$n = \frac{19127}{1 + 19127 (0.09)^2} = 123 \quad (2)$$

Then according to Yamane (1967) formula, the sample size of 123 agro-pastoral households has been selected randomly from the selected three agro-pastoral kebeles. This sample size has enabled the researcher to gather richer data with regard to demographic, socio-economic behaviours, livelihood styles, environmental factors, traditional institutional setup and others. After having the total number of households in each of the three agro-pastoral kebele households' probability proportional to size was employed in selecting the sample households from the three agro-pastoral kebeles. Accordingly, the selected 123 sample households were interviewed by using structured survey questionnaire.

Table 1: Agro-pastoral population and sample distribution of sample kebeles

Kebele	Number of households	Sample size
Danabe	920	32
Garbi	1325	46
Guyow	1307	45
Total	3552	123

Source: Field survey, 2015

3.4. Methods of Data Analysis

3.4.1. Descriptive Statistics

Descriptive statistics like percentages, ratios, mean values, frequencies, and others were used in assessing the status of poverty in the study area based on the socio-economic, institutional and demographic situations. The mean difference of poor and non-poor categories has been compared and contrasted with respect to the desired characteristics using independent sample t-test and Pearson chi-square analysis. Bivariate correlation analysis was used to show the association and direction of poverty and the desired correlates, respectively for further modeling and analysis.

3.4.2. Poverty Index Analytical Method

In the first step, consumption based approach poverty measures was employed. In the second step, in order to determine the poverty status of sampled households, a poverty line, a threshold level below which an individual is considered to be poor was set based on the cost-of-basic-needs method. Therefore, based on the food consumption behaviour and expenditure pattern of the agro-pastoralists in the study area a basket of food items typically consumed by the poor were selected. Accordingly, a food basket of the poorest 50 percent households and the cost of 2200 kcal per day per adult food consumption with an allowance for essential non-food items were used for the purpose of this study.

To attain the first and second objectives which are related to the dimensions of poverty in the agro-pastoral households, the FGT poverty measure introduced by Foster *et al.* (1984) was used. The first step that has been taken was distinguishing the poor and non-poor.

In order to make this classification, demarcation points or line is required to be drawn to have single measuring yardstick in poverty analysis. Poverty line, which is obtained by quantifying the various indicators of wellbeing, was used as the yardstick starting point for poverty analysis in assessing well-being and determining who is poor and who is not. People are counted as poor when their measured standard of living (generally in either income or consumption) is below poverty line, otherwise non-poor (Rath, 1996). Based on this, three

poverty measures that are identified by Foster *et al.* (1984) are employed. These include headcount index; the poverty gap index; and severity index or Foster-Greer-Thorbecke (FGT) index of poverty (FAO, 2001).

Head Count Index (HCI): This reflects the proportion of the poor in total population measuring the incidence of poverty in the whole population. It is insensitive to the depth or severity of poverty and hence, not good to assess the impact of a policy measures. Head Count Index (HCI) is defined as the proportion of the population whose measured standard of living is less than the poverty line. The headcount index does not tell us whether the poor are only slightly below the poverty line or whether their consumption falls substantially short of the poverty line. The head count measure also does not reveal whether all the poor are about equally poor, or whether some are very poor and others just below the poverty line. In other words, this index does not capture differences among the poor. This calls for the second poverty index called Poverty Gap.

Poverty Gap Index (PGI): This estimates the average distance separating the poor from the poverty line. The poverty gap is understood as the amount of income transfer needed to close up the gap. This is sensitive to the depth of poverty but not to its severity. The poverty gap index indicates the depth of poverty, which is, the difference between the poverty line and the mean income of the poor expressed as a percentage of the poverty line. Neither HC nor PG, or any combination of HC and PG adequately capture poverty. Because, some transfer from the poor to the better one but both remaining below the poverty line will not change either HC or PG, and combination of them. If all the poor have exactly the same income, PG indicates the intensity of poverty. Therefore, PG can be used as an indicator of potential for eliminating poverty by targeting transfer to the poor, where the poverty gap yields the minimum possible cost. This as well, has a drawback of being insensitive to the distribution of income among the poor. Besides these, the widely used measure of poverty is severity index.

Severity of poverty: This depicts the severity of poverty by assigning each individual a weight equal to his/her distance from the poverty line. Hence, this takes into account not only the distance separating the poor from the poverty line, but also the inequality among the poor. Therefore, as Sen (1976) stated to make PGI sensitive to the income inequality among the poor, the severity poverty index is specified. This poverty index, FGT gives greater emphasis

to the poorest of the poor by weighting each poor person by the square of his/her proportionate shortfall below the poverty line. FGT is more sensitive to redistribution among the poor in that a dollar gained by the poor would have more effect on poverty than that gained by the moderately poor people. FGT is more comprehensive, because it increases when the number of poor people increases, or the poor get poorer, or poorer get poorest compared with other poor people (Foster *et al.*, 1984; Ravallion and Bidani, 1994).

The mathematical expression of the model is as follows:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha} \quad (3)$$

Where,

P_{α} = Poverty measure

Z = Poverty line

y_i = the income of the poor found below the poverty line

n = sample size

q = number of poor people

α = is the weight attached to the severity of poverty.

The measures are defined for $\alpha=0$, $\alpha=1$ and $\alpha=2$ and α is a measure of the sensitivity of the index to poverty. The parameter α determines the weight given to the severity of poverty. For $\alpha = 0$, $P_0 = F(z)$, the cumulative income distribution at the poverty line z . In other words, for $\alpha = 0$, all poor are given equal weight and P_0 equals the head count ratio. For $\alpha = 1$, each poor person is weighted by his distance to the poverty line, $(z - y_i)$, relative to z . Thus P_1 measures the distance to the poverty line for the average poor person: this reveals the poverty gap. For $\alpha = 2$, the weight given to each of the poor is more than proportional to the shortfall from the poverty line. It is the squared poverty gap index.

3.4.3. Econometric Model

In order to address the third objective of this study, binary logistic regression model was employed to examine the association of each factor with poverty status. The built model was used to approximate the mathematical relationships between explanatory variables and the dependent variable.

The reason why the logistic regression model was used is that when the dependent variable is binary (0, 1), OLS regression technique produces parameter estimates that are inefficient and heteroscedastic error structure. As a result, testing hypothesis and construction of confidence interval becomes inaccurate and misleading (Aldrich and Nelson, 1984).

Similarly, a linear probability model may generate predicted value outside 0 - 1 interval which violates the basic tenets of probability (Gujarati, 1988). It also creates a problem of non-normality, heteroscedasticity of the disturbance term; thereafter leading to lower coefficients of determination (Gujarati, 1988). To alleviate these problems and produce relevant outcomes, the most widely used qualitative response models are the logit and probit models (Amemiya, 1981). There are two primary reasons for choosing the logistic distribution Model. First, from a mathematical point of view, it is an extremely flexible and easily used function, and second, it lends itself to a clinically meaningful interpretation (David, 2000).

The logit and probit models guarantee that the estimated probabilities will lie between logical limit of 0 and 1 (Pindyck and Rubinfeld, 1981). Because of this and other facilities, the logit and the probit models are the most frequently used models when the dependent variable happens to be dichotomous (Liao, 1994; Maddala, 1989; Gujarati, 1988; Pindyck and Rubinfeld, 1981). Accordingly, in this model, the dependent variable takes a value of 1 if the household belongs to below poverty line, i.e. poor with the probability of P_i , otherwise a value of 0, i.e. non-poor with the probability of $1-P_i$.

Even though the logit and probit models are comparable (Liao, 1994) reported that the logit model has the advantage that the predicted probabilities could be arrived at easily. The same source also indicated that when there are many observations at the extremes of the distribution, then the logit model is preferred over the probit model. Therefore, in this study logistic regression model will be used.

Specification of the model is as follows:

$$P_i = \frac{e^{z_i}}{1 + e^{z_i}} \quad (4)$$

Where: p_i is 1 with the probability the household is poor; 0, otherwise.

The probability that the household belongs to non-poor will be $(1-P_i)$. That is,

$$1 - p_i = \frac{1}{1 + e^{z_i}} \quad (5)$$

The odds ratio can be written as:

$$\frac{p_i}{1 - p_i} = e^{z_i} \quad (6)$$

In linear form by taking the natural log of odds ratio:

$$\ln\left(\frac{p_i}{1 - p_i}\right) = \ln(e^{z_i}) = z_i \quad (7)$$

$$z_i = \beta_0 + \sum_{i=1}^n \beta_i X_i + \varepsilon_i \quad \text{Where } i=1, 2, 3, \dots, n \quad (8)$$

n = the number of explanatory variables

β_0 = intercept term

β_i = the coefficient of explanatory variables.

ε_i = disturbance term

X_i = explanatory variables such as age, family size, level of education, sex, land holding size, dependency ratio, livestock assets, etc.

The model was estimated through iterative maximum likelihood procedure with the help of STATA computer software. The coefficients of the logit model present the change in the log of the odds (poverty as a 0 or 1) associated with a unit change in the explanatory variables.

Before estimating the logit model, it is necessary to check if multicollinearity exists among the continuous variables and verify the associations among discrete variables. The reason for this is that the existence of multicollinearity will affect seriously the parameter estimates. If multicollinearity turns out to be significant, the simultaneous presence of the two variables will attenuate or reinforce the individual effects of these variables. Needless to say, omitting significant interaction terms incorrectly will lead to a specification bias. In short, the coefficients of the interaction of the variables indicate whether or not one of the two associated variables should be eliminated from model analysis (Kothari, 1990). Accordingly, Variance Inflation Factor (VIF) technique has been employed to detect the problem of

multicollinearity for explanatory variables (Gujarati, 1995). Each selected continuous variable is regressed on all the other explanatory variables, the coefficient of determination (R_j^2) being constructed in each case. If an approximate linear relationship exists among the explanatory variables then this will result, in a 'large' value for R_j^2 in at least one of the test regressions. A popular measure of multicollinearity associated with the VIF is defined as:

$$VIF_j = \frac{1}{1 - R_j^2} \quad (9)$$

Where VIF_j is the variance inflation factor of variable j . R_j^2 is the coefficient of determination when we regress variable j on the remaining quantitative explanatory variables.

A rise in the value of R_j^2 that is an increase in the degree of multicollinearity, does indeed lead to an increase in the variances and standard errors of the OLS estimates. A VIF value greater than 10 (this will happen if R_j^2 exceeds 0.90) is used as a signal for existence of severe multicollinearity (Gujarati, 2004).

3.5. Definition of Variables and Working Hypothesis

Once the analytical procedure and its requirements are known, it is necessary to identify the potential explanatory variables and describe their measurements. Different variables are expected to affect poverty in the study area. The major variables that are expected to have influence on the household poverty are presented and explained below.

The dependent variable of the model (POVSTAT): The agro-pastoral households poverty status, which is the dependent variable for the logit analysis is a dichotomous variable representing the status of household poverty. Agro-pastoral households whose consumption expenditure per AE are less than the poverty line (5195.20 Birr per AE) were classified as being poor, while those with equal and higher consumption expenditure were classified as non-poor. It was represented in the model as 1 for poor and 0 for non-poor agro-pastoral households or individuals.

The independent variables of the model: The independent variables that are expected (hypothesized) to have association with poverty status used for binary logit regression were selected based on economic theories and the past research findings related to the study. Any exogenous variable having negative coefficient is expected to reduce poverty whereas

explanatory variable found to be positively related to the poverty status will deteriorate the wellbeing of the households by increasing the poverty level of the households. Efforts were made to incorporate demographic, biophysical and socioeconomic factors, which are expected to be relevant in the agro-pastoralists livelihood systems of Kabribayah District in particular.

Consequently, economic theories, past research findings, experts and author's knowledge of the poverty status and situation of the study area have been used to identify the potential determinants of household poverty in the study area. Therefore, by taking the household poverty as the dependent variable, the following variables are hypothesized to examine whether or not they explain households' poverty in the study area.

Family size (FAMSZAE): This is the total number of family members that live under the same household and adjusted to adult equivalent. According to the findings of Tassew and Tekie (2002) family size has positive association with poverty of a household. They justified their finding that as the household size increase the number of individuals sharing the resources available in the household increases and hence positively affected poverty. Hence, it is hypothesized that family size and poverty status are positively related.

Dependency ratio (DEPENDCY): This is the ratio of children under age 15 and old age of above 64 to total family (total dependency ratio) expressed in terms of adult equivalent. The existence of large number of children under age of 15 and old age of 64 and above in the family could affect the poverty status of the household. This is due to the fact that the working age population (active labour force i.e., 15-64 years) supports not only themselves, but also additional dependent persons in the family. Dereje (2008), found that household with large economically non-active family members found to be poorer than those households with small family size, because of high dependency burden. Thus, it is hypothesized that dependency ratio has a positive relation with household poverty status.

Age of the household head (HHage): This refers to the age of the household head measured in years. Hilina (2005) and Olorunsanya and Omotesho (2012), found the higher the age of the household head, the more stable the economy of the farm household. The same studies also reported that older people have relatively richer experience of the social and physical

environments. Therefore, age of the household head and poverty status was hypothesized as negatively related.

Livestock ownership excluding oxen (HHLvst): This is the total number of livestock holding of the household excluding oxen measured in Tropical Livestock Units (TLU). Livestock are the source of livelihood of the rural households in general and households owning more livestock are expected to be non-poor (Shibru *et al.*, 2011). Additionally, the possession of livestock serves as a hedge against food insecurity and poverty, source of cash income, principal form of saving and investment etc. Since households with more number of livestock obtain more milk, milk products and meat for direct consumption, large size livestock owners are expected to be non-poor. Besides, a household with large livestock holding can obtain more cash income from the sale of live animals. Therefore, it is expected that a higher number of TLU will increase the probability of the household to be non-poor. That is, as TLU increases poverty of the household reduces.

Non-farm income (HHnonfincm): This represents the amount received from various income sources (in cash or in kind) by the head of the rural household or any of the household members in the year valuated in monetary terms. In this regard, Dereje (2008) found that, households who are engaged in various activities or receiving incomes from remittances, renting of pack animals and other informal businesses were better endowed with additional income to meet their food and non-food requirements. Hence, such non-farm income sources determine the poverty status of the household. As a result, it is expected to have a negative impact on poverty.

Distance from market center (Dstmrkt): This refers to the proximity of the household village to the nearest district market measured in kilometres. Some studies like (Shibru *et al.*, 2009) confirmed that access to market to their agricultural product and other public infrastructures create opportunities of more income by providing non-farm employment and easy access to inputs and transportation. Proximity to market centres creates access to additional income by providing opportunities of engaging in employment as well as selling different agricultural products, better chance to reduce household's poverty. Hence, distance to market centre is expected to be positively related to poverty status.

Education status of household head (HHedu): This stands for educational level of the agro-pastoral household head by categorizing into literate and illiterate. This is a dummy independent variable that takes 1 for illiterate and zero otherwise. The agro-pastoral household head is highly influential in decision making process in the family. Education equips individuals with the necessary knowledge of how to make a living. Literate individuals are very keen to get information and use it. Education promotes awareness about the possible advantages of modern agriculture and the use of technological inputs and diversifying household income sources. The findings of Tassew and Tekie (2002) also agreed in this justification. As a result, the educational status of the head of the household was expected to have negative impact on poverty.

Sex of household head (HHsex): This refers to the role played by the male or female of the household head in generating income from different sources. It takes a value of 1 if the household head is female and zero otherwise. Akerele and Adewuyi (2011) found out that male headed households' are in a better position to pull more labour force together than the female headed ones. Moreover, with regard to farming experience, males are in a better position than the female headed ones. Hence, it was hypothesized as male headed households have more chance to be non-poor and signaled negative impact on poverty.

Farm land holding size of the household (HHFrmsize): This refers to the total area of land in hectares cultivated by the household. Farm land is one of the livelihood assets that are used for the production of food for consumption and for ensuring household entitlement to food. Dercon (1999) found that, households with larger farm land can have better options to diversify and increase production. Consequently, it was hypothesized that the larger the endowment of cultivated land, the less be the chance to be poor.

Oxen ownership (Oxenhld): This represents the major source of draught power for the majority of rural households using the traditional cultivation. Fitsum (2003) found that, Oxen holding were highly significant and negative sign with poverty. Hence, ownership of oxen was anticipated to have negative effect on household's poverty, holding other things constant.

Expenditure on use of improved seeds per hectare (IMSEED): The use of high yielding varieties can remarkably improve farm output and thereby increase food supply and income of the household. It is an important source of increased productivity that makes a difference

in the poverty status of farm households. According to Etim and Solomon (2010) those households who use productivity enhancing seeds are found to be non-poor. Therefore, the use of improved seeds was hypothesized to negatively influence poverty.

Expenditure made on veterinary medicines and services (DSDTLUAE): This variable is continuous and represents the total veterinary medicines and services expenditures on the number of livestock units (TLU) per adult equivalent per year as a consequence of disease occurrences. Almost in all areas of agro-pastoralists inhabited localities it is thought that there is high prevalence of animal diseases. Veterinary services and facilities are very limited. As a result, it is expected that existence of animal disease incidences will decrease the livelihood of the agro-pastoralists and it will have positive impact in aggravating poverty and higher the expenditure on veterinary medicines and services will improve the production and productivity of livestock which reduces the poverty level of the households (Perry and Grace, 2009). Therefore, expenditure made on veterinary medicines and services was expected to have negative effect on poverty status of households in the study area.

On-farm income (FARIN_AE): The on-farm income refers to total annual earnings of the family from sales of agricultural produce per adult equivalent. It was measured by the amount of Birr obtained from sales of crop produce, livestock and livestock products. This is expected to be used to purchase consumable goods (like cloth, sugar, and others), some agricultural inputs, and also to fulfill social financial obligations. Thus, generating higher farm income per adult equivalent might reduce the probability of being poor (Indiris, 2012). Therefore, it was hypothesized that on-farm income will have negative effect on poverty status of households in the study area.

4. RESULTS AND DISCUSSION

This chapter presents the findings of the study, discussions on the dimensions of poverty among agro-pastoral households, poverty indices, descriptive statistical analysis, and econometric model results and findings.

4.1. Poverty Status, Dimensions and Poverty Line Determination

4.1.1. Poverty Line Determination

The minimum food poverty line is determined using the minimum level of kilocalorie consumption which is 2,200 kilo calories per adult per day, taking into account the typical food diet of poorest half of the sample households in the study area. Accordingly, the estimated food poverty line provides the minimum food requirement calculated from the surveyed data is found to be Birr 3117.64 per adult per annum (Table 2). The food poverty line obtained is translated and incorporate the expenditure required to attain basic non-food needs.

Table 2: Food consumption and diet of the poorest half of the sampled households and value of food poverty line

Food type	Mean ⁴ k cal per kg/lt	Gram/MI consumed per day per adult	K cal per day per Adult	K cal share (%)	Mean price per kg/lt (Birr)	Value of food poverty line/year	Expenditure share (%)
Cereal	3470	497.57	1726.57	78.48	6.27	1138.71	36.52
Milk	860	359.5	309.17	14.05	9.5	1246.57	39.98
Meat	1970	1.54	3.03	0.14	125	70.26	2.25
Sugar & salt	1780	67.18	119.58	5.44	15	367.81	11.80
Edible oil	8120	3.4	27.61	1.26	45	55.85	2.48
Fruits and vegetables	445	11.1	4.94	0.22	17.5	70.90	2.27
Tea leaf	1190	7.65	9.10	0.41	60	167.54	5.37
Total			2200.00	100.00		3,117.64	100.00

Source: Own computational results, 2015

⁴ Standards adopted from the MoFED (2002)

The total poverty line was obtained after adjusting for non-food expenditure using the average food share of the poorest half of the sampled agro-pastoral households. The food share of the half of the poorest households was 60.01⁵ percent. Dividing the food poverty line of Birr 3117.64 by 0.6001 gives a total poverty line of Birr 5195.20 per adult per year (which is around US\$ 220.60⁶). This is approximately Birr 14.23⁷ per adult per day. The currency exchange rate used is one dollar equivalent of Birr 23.55, which shows the closer figure of half a dollar a day is attained.

4.1.2. Poverty Status and Dimensions

Based on the poverty line, the poverty indices were calculated using the FGT measures and found out to be 0.52, 0.1456 and 0.0462 for poverty head count index, poverty gap index and poverty severity index respectively. Applying the three most common indices, namely: the incidence of poverty (head count ratio (FGT₀)), the poverty gap (FGT₁) and poverty severity index (FGT₂), the incidences of poverty across the kebeles via total poverty line and cost of basic needs criteria is indicated in Table 3. The poverty absolute head count index indicates that 52% of the sample agro-pastoral households are deemed poor. This index indicates the percentage of the population which was unable to meet the minimum amount of consumption expenditure required to fulfill the minimum calorie for healthy life (i.e., Birr 5,195.20 per adult equivalent per year). The comparison of poverty incidences across the Kebeles shows the proportion of agro-pastoral households living in poverty being markedly highest in Garbi and Guyow respectively.

Table 3: Poverty dimensions using cost of basic needs method

Name of Kebele	Head count index(P ₀)	Poverty gab index (P ₁)	Poverty severity index (P ₂)
Danabe	0.34	0.1364	0.0342
Garbi	0.67	0.1543	0.0592
Guyow	0.49	0.1457	0.0458
Overall	0.52	0.1456	0.0462

Source: Own calculation, 2015

⁵ After adding the food share of the poorest 50% households, divide the sum by the number of the poorest 50%. or regress the food share (s) of each household *i* on a constant and the log of the ratio of consumption expenditures to the food poverty line.

⁶ During the survey time (August 2015), 1 S\$ = 23.55 birr

⁷ Total poverty line divided by the number of days per year

Poverty Head Count

The absolute poverty headcount index, simply measures the proportion of the sample population that is counted as poor and it does not indicate how poor the poor are, and hence does not change if people below the poverty line become poorer.

Poverty Gap

Poverty gap index (depth of poverty) estimates the total resources needed to bring all the poor to the level of the poverty line and also cover the extent to which individual expenditure falls below poverty line. According to the household survey results, the depth of poverty is higher in Garbi, followed by Guyow and Danabe kebeles, implying that more resource is required to bring the poor households out of poverty in Garbi than Guyow and Danabe. The overall poverty depth of 0.1456 means that if resources are mobilized equal to 14.56% of the poverty line (Birr 756.42) from non-poor individuals and transferred to the poor is the amount needed so as to bring each individual up to the poverty line, then at least in principle, poverty could be eliminated.

Poverty Severity

Likewise, poverty severity index of 4.62% fall below the threshold line implies severe inequality among the poorest households of the sample. Thus, it can be inferred that there is a high degree of inequality among the poorest agro-pastoralist population. All these indices are consistent to the already available poverty profile reports of MoFED (2010/11), which showed a head count index of 0.328, poverty gap index of 0.099, poverty severity index of 0.038, and food and total poverty line of Birr 1985 and 3781 respectively, in 2010/11 for Somali region rural.

Table 4: Distribution of poor and non-poor sample households by study kebeles (2014/15)

Category		Study area			
		Danabe	Garbi	Guyow	
Poor	Count	11	31	22	64
	Percentage within the kebele/s	34%	67%	49%	52%
	Percentage of total sample	8.94%	25.20%	17.88%	52%
Non-Poor	Count	21	15	23	59
	Percentage within the kebele/s	66%	33%	23%	48%
	Percentage of total sample	17.07%	12.19%	18.69%	48%
Total	Count	32	46	45	123
	Percentage within the kebele/s	100%	100%	100%	100%
	Percentage of total sample	26%	37.4%	36.6%	100%

Source: Own computation, 2015.

4.1.3. Households' Perception on Poverty

According to the summary of the focus group discussions collected from the survey of the study area, poor households are those who either have no land or have minimum space of cultivated land; those have no oxen and even family and other sources of labour for cultivation; those who feed most dependents and also eat only one times a day for their normal meal; those earn the minimum amount of income for their farm production and mostly produce an amount that is not sufficient to feed the family members; those have minimum livestock such as camel, cattle, shoats etc. knowing that, for the holdings of these livestock let them cover for the periods of food shortage and other financial deficit; those either have no or have minimum other nonfarm income to cover the family needs. In other hand, non-poor households are those exhibit enough amount of land for cultivation and produce a sufficient food to feed their family members and additional amount for sale; significant number of livestock and use their livestock products for their family needs and supply additional surpluses for the market; have enough oxen holdings to cultivate their land; those that earn most farm and non-farm income and consume a standard diet almost three times a day for their normal meal.

In relation to this, farm size and overall production perspectives, there was also a group discussion on sufficiency of own farm production as well as wealth ranking conditions with

important key informants and elders. Out of the total key informants and elders about 59.8 percent indicated that their current year farm production could only last utmost for 5-6 months in feeding their respective households. On the other hand, almost 37.2 percent have reported that their current year farm production only lasts up to four to three months and only about 3 percent of the key informants and elders households reported that their farm production could take them at least up to 8 months. In addition, about 62 percent of the key informants and elder households reported that their living standard turned for the worse, 25 percent experienced better and improving living conditions and about 13 percent had not come across any change (constant) in their living conditions over the surveyed period. With regard to the livestock products, mainly milk is sold in the local markets on daily basis to fill the gap (use to buy the household' basic needs and in covering other social related aspects).

4.1.4. Consumption Expenditure of the Agro-pastoral Households Per Annum

The majority of the agro-pastoral households in Kabribayah District depend mainly on livestock-crop farming to earn their livelihoods. Most of the agro-pastoral households' annual income and consumption expenditure is basically derived from sales of livestock and livestock by-product, which is the most important source of income. Shoats are the most frequently sold for cash or exchanged for food items as deemed necessary. Most of the Shoats are usually sold in the dry season for family consumption requirement purposes. Cattle and rarely camel are usually sold during the dry season if the households do not have shoats to sell. This is because in the dry season there would be more purchase of cereals for home consumption. In the study area almost all of Agro-pastoral households' own crop productions are very rare and mainly used for subsistence home consumption which is not enough to sustain the lives of family throughout the year unless they purchase additional food items.

The result of the survey indicates that the overall mean consumption expenditure per year for the sample agro-pastoral households is Birr 18, 948.89. The mean consumption expenditure for the poor and non-poor groups is Birr 12,117.5 and 26, 359.22, respectively with the significant mean difference ($t = 15.26$, $p=0.000$) across poverty categories at less than 1% significance level. The minimum and maximum consumption expenditure per annum of agro-pastoralists was Birr 5,962 and 42,000 Birr, respectively. The statistical correlation analysis between consumption expenditure per annum and poverty status illustrates that there is

negative and high significant relationship ($r = -0.81$) (Table 4). This affirms that agro-pastoralists who have small consumption expenditure per annum were poorer than their counterparts in the study area.

4.1.5. Consumption Expenditure per AE per Annum

According to the results illustrated in Table 5, there is significant mean difference between poor and non-poor households with regard to consumption expenditure per AE/year ($t = 9.60$, $p=0.000$). The average consumption expenditure per AE/year for the sample households was 3503.37 Birr with standard deviation of 1795.42. The average consumption expenditure per AE/year of poor groups was 2401.52 Birr while that of non-poor was 4698.59 Birr. With regard to the direction of relationship, the correlation result substantiate the existence of negative and highly significant relationship ($r = -0.64$) between consumption expenditure per AE/year and poverty status at less than 1% significance level. This indicates a strong ground to study sample agro-pastoral households poverty in terms of this variable rather than per capita consumption.

4.1.6. Per capita Food and Non-food Consumption Expenditure per Annum

In this study, the average per capita food and per capita non-food consumption expenditure of the sample households were Birr 2079.66 and 693.22 respectively. The minimum and maximum per capita food consumption expenditures of agro-pastoralists were Birr 279.47 and 5340 respectively. Similarly, the minimum and maximum per capita non-food consumption expenditures were Birr 93.16 and 1780, likewise. As the results shown in Table 5, on average poor households had lower per capita food and non-food consumption expenditure as compared to non-poor households. Statistical analysis of mean difference had also indicated significant mean difference in the food and non-food per capita consumption parameters ($t= 10.21$ at $p=0.000$) between non-poor and poor groups.

The correlation statistical analysis was also conducted to see the strength and direction of relationship between these two variables and poverty. Accordingly, the food and non-food per capita consumption expenditures were negatively and significantly related with poverty status at 5% level ($r= -0.6805$ and $r= -0.5102$, respectively) (Table 5).

Table 5: Relationship between household consumption expenditure and poverty status

Variable name	Poverty categories		Total	t-value	p-value	r	
	Non poor n=(59)	Poor n=(64)					
Consumption Expenditure Annum	Mean	26,359.22	12,117.5	18,948.89	15.26***	0.00	-0.81
Per AE	St. Dev	6767.81	3029.69	8806.42			
Consumption expenditure per annum	Mean	4698.59	2401.52	3503.37	9.21***	0.00	-0.64
per AE	St. Dev	1647.89	1082.19	1795.41			
Total Per capita (food and non-food) consumption expenditure per annum	Mean	3746.99	1874.85	2772.87	10.21***	0.00	-0.60
Per capita food consumption expenditure per annum	St. Dev	1214.97	788.39	1380.11			
Per capita food consumption expenditure per annum	Mean	2810.25	1406.14	2079.66	8.90***	0.00	-0.68
per AE	St. Dev	911.23	591.29	1035.08			
Per capita non-food consumption expenditure per annum	Mean	936.75	468.71	693.23	7.60***	0.00	-0.51
per AE	St. Dev	303.74	197.09	345.03			

Source: Own computation, 2015, ***, significant at less than 1% probability level

4.2. Descriptive Statistical Analysis of Variables Affecting Poverty

Among the 123 sampled agro-pastoralists, 64 (52.03%) were poor while 59 (47.97%) were non-poor. Based on the literature review, experts and authors' knowledge about poverty situation of the study area, the important determinants of agro-pastoral household poverty status were identified. The identified agro-pastoral households poverty determinants thought to have relationship with poverty were grouped as household demographic variables, household socio-economic variables and institutional variables.

4.2.1. Demographic Characteristics of Agro-pastoral Households

The demographic variables of agro-pastoral households are crucial and important in analysis of the poverty status determination and these demographic variables directly or indirectly affect the household characteristics in terms of income, consumption expenditure, and asset

as well as wealth status. Indicators of household size and structure are important in that they show a possible correlation between the level of poverty and household composition. Household composition, in terms of household size and characteristics of its members (such as age and sex) has different economic and social effects for poor and non-poor households. These variables are presented as follows:

4.2.1.1. Sex of the household head

Sex of the household head was one of the demographic characteristics hypothesized to influence poverty in such a way that female-headed households were expected to be more likely poor and male headed households are less likely to be poor. The proportions of female headed households were lower within the non-poor group (10.17%) than within poor groups (26.56%). On the other word, out of the total female respondents the majority (73.92%) were poor. With regarding to its relationship with poverty, correlation test using Pearson chi-square pointed out significant relationship ($\chi^2 = 5.70$, $df=1$, $\Phi = -0.46$, $P = 0.002$) (Table 6).

Table 6: Relationship between sex, education of the household head and the poverty status

Variable name	Poverty categories (sample HH groups)		Total	χ^2 -value	p-value	Phi	
	Non poor n=(59)	Poor n=(64)					
Sex	Male	53	47	100	5.70***	0.002	-0.46
	Female	6	17				
Educational status	Literate	23	13	36	10.29***	0.003	-0.68
	Illiterate	36	51				

Source: Own computation, 2015, *** significant at less than 1% probability level.

4.2.1.2. Educational status of the household head

Various literatures have indicated that educational status being one of the potential explanatory variables that affect poverty by improving information processing capability of agro-pastoral community. In this study formal education were hypothesized to influence the poverty status. As depicted in Table 6, among the total respondents illiterate household heads

are 70.73% of the sampled households while the rest 29.27% were literate. The proportions of literate household heads were high within the non-poor households (38.98%) than within poor households (20.31%). On the other hand, out of the poor respondents (79.6%) were illiterate. Moreover, the result of chi-square test revealed significant differences between poor and non-poor in terms of education ($\chi^2 = 10.29$, $p = 0.003$, $\Phi = -0.68$) (Table 6).

4.2.1.3. Age of the household head

The mean age of agro-pastoralist household heads in the study area was found to be 40.60 years with standard deviation of 7.93. The younger age of the household head was 25 whereas the older age is 75 years. According to the survey result, poorer households are headed by younger persons compared to the non-poor ones which were led by relatively elder aged persons. Besides, the mean age of poor households was 35.03 and that of non-poor was 49.64 years with standard deviations of 11.03 and 6.14, respectively. Negative relation between age of the household head and poverty status was hypothesized. According to the results illustrated in Table 7, there is significant mean difference between poor and non-poor with regard to age of household heads ($t = 11.9$, $P = 0.001$ and $r = -0.73$) between the sample groups at 1% significance level.

4.2.1.4. Family size in adult equivalent

It was hypothesized that an agro-pastoral household with large family size in terms of AE will have positive association with poverty status that will have greater depth of poverty because of an imbalance between production and consumption in the household. The minimum and maximum family size in terms of AE was 2.95 and 13.5, respectively. According to the results shown in Table 7, the average mean family size (AE) of the sample households was 5.91 with standard deviations of 2.12. The average family size (AE) of poor households was 6.23 while that of non-poor households was 5.12 explaining significant mean difference ($t = -3.00$, $p = 0.005$) between the poverty categories. With regard to the direction and association, the correlation result showed that family size in terms of adult equivalent had positive and highly significant relationship ($r = 0.91$) with poverty status.

4.2.1.5. Dependency ratio

The average dependency ratio for sample household was 0.496 with standard deviation of 0.12. The mean dependency ratio of poor group was 0.52, which is higher than the non-poor of 0.32 by about 0.2. The mean difference ($t = -4.24$, $P = 0.000$) was significant at 1% significance level between poverty categories. As shown in Table 7, bivariate correlation analysis was also analyzed to find the strength and direction of relationship between dependency ratio and poverty. Accordingly, it was positively and significantly related ($r = 0.39$) with poverty status and intensity of poverty.

Table 7: Relationship between age of household head, family size in adult equivalent, household dependency ratio and the poverty status

Variable name		Poverty categories		Total	t-value	p-value	r
		Non poor n=(59)	Poor n=(64)				
Age of household head	Mean	49.64	35.03	40.60	11.9***	0.001	-0.73
	St. Dev.	6.14	11.03	7.93			
Family size adult equivalent	Mean	5.12	6.23	5.91	-3.002***	0.005	0.91
	St. Dev.	1.97	2.17	2.12			
Household dependency ratio	Mean	0.32	0.52	0.49	-4.24***	0.000	0.39
	St. Dev.	0.11	0.14	0.119			

Source: Own computation, 2015, *** significant at less than 1 % probability level

4.2.2. Socio-economic Characteristics of Agro-pastoral Households

Apart from income or consumption – which are typically used to define whether a household is poor or not – there are many other economic characteristics that correlate with poverty, most notably household employment and the property and other assets owned by the household. There are also several social indicators that are correlated with poverty by measuring the household living standards. The most widely used are measures of health, education and shelter.

The livelihoods of majority of agro-pastoralists in Kabribayah District are more diversified livelihood system than pastoralism. The average agro-pastoral household pursues three

livelihood activities – rearing livestock (especially cattle, sheep and goats, but also camels, especially in the drier eastern and southern parts of the district), crop farming, as well as a minor income-earning activity like charcoal burning, petty trading and drinking tea making shop, or collecting firewood or construction materials for sale.

4.2.2.1. Possession of household assets and sources of livelihood

Ownership of assets is one of the indicators of economic wellbeing of the households. The loss or acquisition of these assets could be a manifestation of either deteriorating or improving conditions in the households' economy. Based on data and information collected from sample households the major assets are land holdings and other assets such as livestock, agricultural implements (farming equipment), and other household durable items. The major income sources for the households in the study area include livestock and their byproducts crop production and some non-farm activities. It was observed from the survey results of the study that livestock and some crop production is the most important source of income followed by non-farm activities and other sources, i.e., about 90.25%, 8.5% and 1.25% percent respectively.

4.2.2.2. Land holding

Land size is considered as a crucial production factor that determines the type of crops grown and the amount of crops harvested per season/year. Moreover, the availability of grazing land is an important factor for livestock rearing. Therefore, under subsistence agriculture, land holding size is expected to play a significant role in influencing agro-pastoral households' living standard. Accordingly, the land holding of the sampled households ranged from 0.71 to 14.12 hectares with an average of 3.72 hectares with standard deviations of 2.17. The average farm size of poor groups was 2.42 while that of non-poor groups was 5.13 explaining significant mean difference ($t= 8.84$, $p = 0.003$) between the poverty categories. With regard to the direction and association, the correlation result showed that farm size in terms of hectare had negative and highly significant relationship ($r = -0.63$) with poverty status. In addition, the landholding sizes also show some variation between sampled Kebeles. Relatively the scarcity of land and variation in holding size is observed in Garbi areas of the study sites due to their population density.

4.2.2.3. Livestock owned per adult equivalent

The livestock ownership is an indicator of household's wealth and social status in agro-pastoral community. Besides, it is the main source of food, income, draft power, live asset, social security and means of livelihood diversification (coping mechanism during drought and hardship seasons) for agro-pastoralists. Based on the aforementioned premises, livestock ownership was hypothesized to have negative and significant relationship with poverty status.

The data on livestock ownership measured using TLU per AE shows the average TLU per AE for sample agro-pastoral households of 6.52 with standard deviation of 5.80. The mean TLU per AE of non-poor group was 10.83 and the mean TLU per AE of poor group was 3.54 which are lower than the non-poor group by 7.29. The mean difference was highly significant at 1% probability level between poverty categories ($t = 8.51$, $p = 0.000$). The strength and direction of relationship between livestock ownership and poverty was negative and significant ($r = -0.61$) (Table 8).

4.2.2.4. Oxen ownership

Number of Oxen possession helps to undertake farm activities easily, on time and also allow in managing other farm activities. Besides, well ploughed farm could produce better and secures family food requirement. Ownership of oxen has been anticipated to have negative effect on household's poverty status, holding other things constant. The data from field survey (Table 8) illustrates that the average number of oxen holding of the sampled 1.84 with standard deviation of 0.89. The average number of non-poor household was 1.33 while the poor household was 0.86. The mean difference was highly significant at 1% probability level between poverty categories ($t = 18.13$, $p = 0.0004$). In other hand, the correlation of the poverty with the households number of oxen holding shows the existence of significant and negative relationship ($r = -0.55$).

Table 8: Relationship between livestock holding, land holding, farm income, non-farm income and poverty status

Variable name		Poverty categories		Total	t-value	p-value	r
		Non poor n=(59)	Poor n=(64)				
Tropical livestock unit	Mean	10.83	3.54	6.52	8.51***	0.000	-0.61
	St.dev	6.92	3.34	5.80			
Land holding	Mean	5.13	2.42	3.72	8.84***	0.003	-0.63
	St.dev	2.43	1.31	2.17			
Oxen ownership	Mean	1.33	0.86	1.84	18.13***	0.004	-0.56
	St.dev	0.98	0.72	0.89			
Farm income	Mean	1649.82	470.55	1036.22	11.94***	0.001	-0.74
	St.dev	716.03	320.73	804.24			
Non-farm income	Mean	270.39	141.24	255.22	4.68***	0.006	-0.6
	St.dev	186.59	165.62	130.65			

Source: own computation, 2015, *** significant at less than 1% probability level

4.2.2.5. Farm income per adult equivalent

In this study, livestock and its products, maize production is the major source of income. The average annual farm income per AE of the sample respondents was 1036.22 Birr with standard deviation of 804.24. The minimum and maximum farm income per AE of the same was birr 122.71 and birr 3428.57, respectively. Households whose income is very small did not sell farm products rather use it for home consumption. Additionally, on average non-poor group had higher farm income per AE (1649.82 Birr) as compared to poor group (470.55 Birr). Analysis of mean comparison has confirmed the existence of significant mean difference between non-poor and poor sample respondents in their farm income per AE ($t=11.94$, $p=0.001$) at less than 1% probability level. In the other hand, the result of correlation analysis shows the negative and significant relation between farm income per AE and poverty ($r=-0.74$) at 1% probability level (Table 8).

4.2.2.6. Non-farm income per adult equivalent

Non-farm income per AE was expected to affect poverty negatively. In the study area, livestock trading, gift and charcoal making and some very small salary employment were found to be the major non-farm activities that sample respondents engaged in. In Table 8, the average non-farm income per AE for the sample households was 255.22 Birr with standard deviation of 130.65. The minimum and maximum non-farm income was found to be 0 and 1297.29Birr.

Mean comparison, on average non-poor households (270.39) had better non-farm income per AE than poor households (141.24). The figures in Table 8 has revealed that there was significant mean difference between non-poor and poor ($t= 4.68$, $p= 0.006$) throughout the poverty categories at 1% probability level (Table 8). With regards to the correlation analysis it shows negative and significant relation between non-farm income per AE and poverty ($r = -0.6$) at 1% probability level (Table 8).

4.2.2.7. Expenditure on use of improved seed

In crop cultivation, high levels of yield are achieved by agricultural technologies such as use of new and improved seeds; fertilizers and irrigation water. The use of high yielding varieties can remarkably improve farm output and thereby increase food supply and income of the household. It was hypothesized that the use of improved seeds will negatively influence poverty status that means the higher the expenditure on use of improved seed in turn increases production and productivity.

According to the data of the survey, the average expenditure use on improved seed per year was Birr 3.24 with standard deviation of Birr 2.68. The minimum and maximum expenditure was birr 0 and birr 17.58, respectively. On average non-poor households had higher expenditure on use of improved seed per year of Birr 4.96 as compared to poor households Birr 1.65. Analysis of mean comparison has confirmed the existence of significant mean difference between non-poor and poor sample respondents in their expenditure on improved seed per year per AE ($t= 8.68$, $p = 0.000$) at less than 1% probability level. In other hand, the

result of correlation analysis shows negative and significant relation between expenditure on improved seed per hectare per AE and poverty ($r = -0.62$) at 1% probability level (Table 9).

4.2.2.8. Expenditure made on veterinary medicines and services

Despite the importance of livestock to the larger sector of the population and the economy of the agro-pastoralist society, the sub-sector has remained untapped and productivities are extremely low. Prevalence of livestock diseases, shortage of feed and their interaction constitute important constraints to livestock production of the agro-pastoralists. There are some common livestock diseases in Kabribayah district that directly or indirectly affects the production and productivity of the livestock.

These common livestock diseases are categorized based on causes of the diseases into viral, bacterial, fungi and parasites etc. the public veterinary service facility available to the community has been very poor both in terms of coverage and quantity/quality. It was hypothesized that existence of animal disease incidences will decrease the well-being of livelihood of the agro-pastoralists and it will have positive impact in aggravating poverty and higher the expenditure on veterinary medicines and services will improve the production and productivity of livestock which reduces the poverty level of the households.

The field survey data indicates that the average expenditure made on veterinary medicines and services per TLU of sampled agro-pastoralists was Birr 19.63 with the standard deviation of Birr 15.55. The minimum and maximum used expenditure was birr 1.35 and birr 83.04, respectively. Relatively speaking, on average non-poor group had higher expenditure made on veterinary medicines and services per TLU Birr 37.08 as compared to poor group Birr 3.55. Analysis of mean comparison has confirmed the existence of significant mean difference between non-poor and poor sample respondents in their expenditure made on veterinary medicines and services per TLU ($t = 9.63$, $p = 0.002$) at less than 1% probability level. The result of correlation analysis shows negative and significant relation between expenditure use made on veterinary medicines and services per TLU and poverty ($r = -0.66$) at less than 1% probability level (Table 9).

Table 9: Relationship between expenditure on improved seed, veterinary medicines and services and poverty status

Variable name		Poverty categories		Total	t-value	p-value	r
		Non poor n=(59)	Poor n=(64)				
Expenditure on improved seed_AE	Mean	4.96	1.66	3.24	8.68***	0.000	-0.62
	St.dev	2.96	0.69	2.68			
Expenditure on veterinary medicines and services and _AE	Mean	37.08	3.55	19.63	9.63***	0.002	-0.66
	St.dev	27.82	1.79	15.55			

Source: own computation, 2015, *** significant at less than 1% probability level respectively

4.2.2.9. Access to education services

This is a basic social service where by human capital could be developed, which is a necessary resource for livelihood improvement and poverty reduction. The district has educational services which range from elementary (including ABE) schools to high school. The access to these services was measured against proximity and utilization. The findings indicate that 55.5% of the sample households have sent their school age children to schools while 44.5% did not sent due to various socio-economic problems of their respective households. The households' survey indicated that majority of the households' children are at school which in the long-run could contribute to poverty reduction.

Access to school services between poor and non-poor was seen in terms of the average distance travelled to the nearest school. Proximity to school within the standard of ministry of education was considered as a measurement to access. Accordingly, it was found out that the mean distance travelled to the nearest school is only 5.5 Km. On averages the poor travel 7.65 Km while the non-poor travel 4.3 Km. The maximum distance travelled is 6 Km which can be seen accessible by national standards except some remote area resided households.

4.2.2.10. Access to health services

The district is providing a range of health services ranging from primary health care to health center level health services. According to the MoH village level services are provided through health posts and district level through health centers. The majority of these services in the study area are provided through these facilities. To analyze the contribution of health services towards poverty reduction they are seen from accessibility to the health facilities, and mortality cases faced by households. Access to health services in the study area, which is seen from distance traveled to the nearest health facility indicates that the mean distance traveled is 11.25 Km. The longest distance traveled is 25 Km which is for Danabe and Guyow. The mean distance travelled to get these services indicate that the poor travel at an average 12.89 Km while it is 10.45 Km for the non-poor.

The occurrence of disease incidence indicates that the incidence of sick person was 54.9% of the poor and 36.63% of the non-poor. The mean number of person per household who were sick during the study period was also found higher in poor families. Mortality cases among the poor indicate that the poor have lost higher number of family members than the non-poor, the mean being 0.30 and 0.21 respectively which is a statistically significant result at 1% probability level.

4.2.2.11. Access to water and sanitation services

Potable pure water coverage of the district is very low that the access to it is determined by coverage. Quantity of water fetched and proximity to these services was analyzed. The average water usage by the households is 58.95 liters per day which is not sufficient for household use. Moreover, the mean distance traveled to water sources is 10.51 Km. The sources of water are traditional well, reservoirs (*birka*), hand dug wells and ponds.

Access to clean water and the average daily consumption is also crucial for health, sanitation, productivity and hence come out of poverty. It is found out that the poor travel at an average 12.8 Km to the nearest protected water sources while it is 9.9 Km for non-poor. Both groups have not access to water sources at national standard. However, the daily average water consumption per AE is higher for the non-poor. The mean difference which is statistically

significant at 1% level indicates the poor households consume less which is 10.82 liters/day while it is 14.45 liters for the non-poor. The poor and non-poor households are found to consume below national standards which is 15 liters/day/Adult equivalents.

4.2.2.12. Access to communication services

Kabribayah District has no a well-developed rural infrastructure that interlinks and connects different kebeles of the district or that creates communication access to the neighboring and adjoining zones and /districts. One of the means of communication available in the district is the road that passes through the district main from Jigjiga to Gode Zone. But this means of transport is inaccessible to most of the agro-pastoral communities for the reasons that agro-pastoralists are residing at the remote areas far from urban center, where there is farm and grazing land as well as water for their livestock is available. All weather roads coverage is as low as 22 km which goes from Harar to Jigjiga and from Jigjiga to Gode through Garbi kebele. These roads are serving as the routes to the main market outlets allowing to connect the district to the Jigjiga town, the capital city of the region, but not accessible for the majority of the agro-pastoralists. Except the above mentioned outlets there is no other means of transportation that permits movement and communication to facilitate market integration. As a result, people and animal trek long distances to reach social service centers and markets.

However, all Kebeles have telecommunication services and telephone services through mobile antennas. People have to travel up to 25.5 km on average in order to get fixed telephone services. In the agro- pastoralist community, the postal service is totally missing and absent in agro-pastoral community of the district.

4.2.3. Institutional Characteristics

The main function of an economic institution is to provide signals that will guide self-interested economic agents/entities to act in the interest of the larger community. The main task of any nation-state is to create institutional arrangements that provide the needed signals to individual economic entities. Markets provide such signals efficiently, so long as they operate with low transaction costs. Non-market mechanisms, such as government agencies and non-governmental organizations, can also provide such signals.

In general, institutions and organizations are important aids to development. They may affect agricultural and rural development in many different ways, including provision of production inputs and services, reduction of transaction costs, enhancement of bargaining power of agro-pastoralist vis-à-vis those to whom they sell their produce and from whom they buy production inputs and services, influencing investments and savings that expected to reduce the extent of poverty level in the society.

4.2.3.1. Extension contacts

For an agrarian and developing economy like the one in the study area, extension service is expected to play vital role in promoting agricultural production and productivity. The most important source of extension service and information in the study area was provided by government through Development Agents (DAs). Accordingly, extension contact was hypothesized to decrease the probability of being poor. As the survey result, the proportion of sample agro-pastoralists who have contact with DAs were 42.75% but the remaining 57.25% did not have contact. From the total sample households who have been visited by DAs, 65.5% were found to be non-poor while the remaining 34.5% were poor.

4.2.3.2. Distance to market place

Markets play a vital role in rural communities for they are a source for inputs and a place for sale of outputs. If the input-output market is closer, agro-pastoralists can have access to information, reduce cost of production and transaction, can easily purchase improved agricultural inputs, and display their output at fair price with good margin. The district has many small livestock markets at some kebele level and one common (large) livestock market at Kabribayah town.

In the study area, agro-pastoralists used to go a minimum and a maximum of 15 km and 26km from their residence to reach the nearest market center, respectively. On average they have to travel 10 km to reach the nearest market center to sell their products and/or buy others basic needs. Non-poor and poor groups travelled on average 14.89 km and 23.62 km,

respectively. Similarly, the mean time required to reach the nearest market center was found to be 175.03 minutes.

4.3. Econometric Model Results

As specified in the methodology part of this research, the analysis of the determinants of poverty status was made using binary logistic regression model. In this section, this model was used to see the influence of household demographic, socio-economic, and institutional variables on poverty status. Identification of the descriptive and inference statistics alone is not enough to stimulate policy actions unless the influence of each factor is known for priority based intervention. Before discussing about the econometric model results, the model specification and data fitting has to be made.

4.3.1. Diagnostics of the Econometric Model

Before running the model, the data was checked for multicollinearity and heteroscedasticity problems using different diagnostic methods. In this case, Variance Inflation Factor (VIF) was used to check for multicollinearity for all explanatory variables. To overcome the heteroscedasticity problems white's general test of heteroscedasticity technique was applied.

4.3.2. Multicollinearity Test

Multicollinearity refers to the case in which two or more explanatory variables in the regression model are highly correlated, making it difficult or impossible to isolate their individual effects on the dependent variable. With multicollinearity, the estimated OLS coefficients may be statistically insignificant (and even have the wrong sign) even though R^2 may be "high." The presence of the multicollinearity among explanatory variables was tested using VIF (Variance Inflation Factor) for all variables as shown in the (Table 10).

Table 10: Multicollinearity test using VIF test

VARIABLE NAME	VARIABLE CODE	VIF	1/VIF
Age of the household head	HHAGE	1.89	0.53
Family size	HHFAMSIZ_AE	2.01	0.50
Household livestock ownership excluding oxen	HHTLU_AE	2.13	0.47
Oxen ownership	HHOXENHOLD	2.26	0.44
Cultivated land holding size of the household	HHFARMSIZE_AE	3.22	0.31
Household farm income	HHFARMICOME_AE	2.64	0.38
Dependency ratio	HHDR	1.17	0.85
Household non-farm income	HHNONFARMINC~AE	1.69	0.59
Expenditure on use of improved seeds per hectare	HHEXP_IMPRSEED_AE	3.26	0.31
Distance from market center	HHMKTDIS	1.28	0.78
Expenditure made on veterinary medicines and services	HHEXP_VET_TLU_AE	1.97	0.51
Sex of household head	HHHSEX	2.30	0.44
Education level of household head	HHHEDUCATION	2.55	0.39
	Mean VIF	2.18	

Source: own computational result, 2015

As a rule of thumb, if the VIF of a variable exceeds 10, which will happen if R^2 exceeds 0.90, that variable is said to be highly collinear (Gujarati, 2004). However, in the current study as can be seen from Table 10 none of the variables have VIF value of 10 and above which is an indication that there is no problem of multicollinearity among the all explanatory variables of this study.

4.3.3. Heteroscedasticity Test

Heteroscedasticity refers to the case in which the variance of the error term is not constant for all values of the independent variables. With Heteroscedasticity, the OLS parameter estimates are still unbiased and consistent, but they are inefficient (i.e., they have larger than minimum variances). Furthermore, the estimated variances of the parameters are biased, leading to incorrect statistical tests for the parameters and biased confidence intervals. H_0 = variance of

residuals is constant (Homoscedasticity); H_a = unrestricted Heteroscedasticity. Using the STATA command: *estat imtest, white*, if the statistical test is insignificant verifies that there is no heteroscedasticity of presence by accepting H_0 ; otherwise, it indicates the existence of heteroscedasticity by rejecting H_0 . In the process, the chi-square with degree of freedom (df) 100 was 119.27 and the p-value of obtaining such value was 2.92. This suggests the statistical insignificance of the test; that is, null hypothesis is accepted which means the variance of the residuals is constant (Homoscedasticity).

4.3.4. Determinants of Agro-pastoral Household Poverty

This section presents and discusses empirical findings of econometric model analysis. Estimates of the parameters of the variables expected to determine the agro-pastoral poverty status are displayed in Table 11. The goodness-of-fit was tested by the Log likelihood ratio (LR) test. The result shows the chi-square of 140.67 with 13 df and p-value of zero. This means that it is statistically significant and the model displays a good fit. The Pseudo R^2 of the model is also 83%. This verifies that the model has a good fit to the data and explained significant non-zero variations in factors influencing poverty.

Among the total thirteen explanatory variables included in the model, eleven variables were found to be statistically significant in influencing poverty status while the remaining two explanatory variables were statistically insignificant on the poverty status of agro-pastoralists in the study area at the conventional level of significance (*i.e.* $0.01 < P < 0.1$). Among factors which had significant influence on poverty family size, dependency ratio, farm holding size, livestock ownership, oxen holding, sex of household head and farm income were statistically significant at 1% probability level; expenditure made on improved seed and veterinary medicine and services were statistically significant at 5% probability level; non-farm income and distance from the market were significant at 10% probability level.

Table 11: Maximum likelihood estimates of binary logistic model

Variables	Coefficients	Marginal effect	Standard. Error	z-value	P>z
Family size	1.72	0.78 ***	0.04	2.94	0.001
Education	-1.14	-0.09	0.84	1.08	0.234
Sex	-0.43	-0.28***	0.07	4.05	0.001
Dependency ratio	1.69	0.54***	0.90	3.56	0.002
Livestock owned	-0.89	-0.16 ***	0.07	3.05	0.002
Age	-0.19	-0.05	0.12	1.62	0.250
Farm size	-1.28	-0.39***	0.09	2.95	0.003
Expenditure on improved seed	-.023	-.011**	0.01	2.75	0.015
Oxen holding	-1.81	-0.13***	0.86	2.36	0.003
Farm income	-0.091	-0.02***	0.10	2.68	0.003
Non-farm income	-0.015	-0.02*	0.003	2.45	0.054
Market distance	0.17	0.01*	0.09	1.94	0.052
Expenditure on veterinary medicine and services	-0.62	-0.02**	0.13	2.10	0.017
Constant	0.35	-	2.56	0.09	0.843
Number of observation				123	
LR chi2(13)				140.67	
Prob > chi2				0.0000	
Log likelihood				-24.38	
Pseudo R ²				0.83	

Source: Econometric regression model output, 2015. Note: ***, ** and * significant at 1%, 5% and 10%, respectively.

Family size (in AE): Family size is the demographic variable that has strong explanatory power with regards to poverty status analysis at household level. It has affected agro-pastoralists poverty status positively at 1% probability level. The marginal effect of family size indicated that as the number of family members increase by one AE, the probability of being poor increases by 0.78. This could be because of the pressure that large family size has on consumption than production which leads to resource sharing and depletion at household

level. This is consistent with the findings of Abdikadir (2013) and Semere (2008) the higher the family size the more higher the probability of being poor over a period of time.

Number of livestock owned (HHTLU_AE): The region has potentials for livestock development. Owning livestock was negatively and significantly associated with poverty at 1% probability level. According to the model result as one TLU_AE increase in livestock holding, decreases the probability of being poor by 0.16. This is obvious that livestock ownership means a backbone for agro-pastoralists livelihood. They are source of food, means of income, social security, means of coping mechanism, means of purchasing power, draft power, etc. More importantly, shock-absorbing ability of agro-pastoralists depends on livestock ownership. Thus, those who own more livestock might be non-poor than otherwise. This is consistent with the findings of Hilina (2005) and Semere (2008) the more the livestock the lower poverty levels and are more likely to become better off over a period of time.

Oxen holding (HHoxen): As prior expected, this variable was found to have negative and significant effect on the dependent variable at 1% probability level. The marginal effect of oxen ownership is -0.13 showing that oxen ownership decreases the probability of being poor by 0.13 (increase in one ox ownership leads to decrease of the probability falling into poverty by 0.13). This implies that relative to households that have oxen, the level of poverty will be high for those who have no oxen. Since agro-pastoralists in the study area were not accustomed to manage crops properly; proper land preparation could reduce the yield loss due to weed and by pass it enables to perform land preparation on time and to produce enough food for the family. Having oxen will easily facilitate the well preparation and ploughing of the land which increases the land production and productivity per cultivated plot of land. This is consistent with the findings of Abdikadir (2013) and Semere (2008) the more the oxen holding the lower poverty levels and are more likely to become better off over a period of time.

Sex of household head (HHHSEX): Sex of the household head is found to have significant negative effect at 1% probability on poverty status of the household. This implies that male headed households are less likely to be poor than female headed households for the sake that male headed households are in better position of escaping out of poverty than the female

headed ones. The marginal effect of 0.28 indicates that other factors being constant, the probability of poverty status decreases for male headed households by a factor of 0.28. The possible explanation is that with regard to farming experience males were in a better position than the female farmers. This is consistent with the findings of Abdikadir (2013) the female headed households are more likely to be poor their counterparts.

Non-Farm Income (HHNON_FARMINC~AE): It was hypothesized that this variable has a significant contribution to household income hence negatively associated with poverty. The finding indicates that the variable, as expected is negatively and significantly related to poverty. The significant negative direction of influence with the coefficient -0.02 is significant at 10%. Households with non-farm income sources have a better chance of escaping out of poverty and an additional one birr income from these sources reduces the probability of household falling into poverty by a factor of 0.02. This is consistent with the findings of Abdikadir (2013) and Semere (2008) the more the non-farm income households earning the lower poverty levels and are more likely to become better off over a period of time.

Dependency Ratio (HHDR): This variable is found to be significant at less than 1% probability level in determining the household poverty. The result shows that the variable is found to have positive impact on the probability of being poor in the study area. This means, the probability that a household being poor increases as the household size increases due to an increase in the number of dependents. The marginal effect of DR 0.54 implies that, *ceteris paribus*, the probability of a household falling into poverty increases by a factor of 0.54 as dependency ratio increases by one unit. The possible explanation can be that those households with many dependent family members could be poor because of high dependency burden. This shows that those agro-pastoralist households with large economically non-active members tend to be poorer than those households with economically active household members. Most of the dependency ratio is explained by a large number of children under the age of 15; and due to low life expectancy, the relative number of people over the age of 65 is small. This is consistent with the findings of Hilina (2005) and Semere (2008) the more the dependency ratio the households active are required to feed inactive members and increase the resource burden that the increases the poverty levels and are more likely to become being poor over a period of time.

Size of Cultivated Land (HHFrmsize): Size of cultivated land came out to be significant at 1% probability level, has negative influence on the probability of agro-pastoralist household's poverty level. It implies that the probability of being non-poor increases with cultivated farm size. This agrees with the hypothesis that agro-pastoralist who have larger farm land holding would be non-poor than those with smaller land size, due to the fact that, larger agro-pastoralists are associated with higher possibility to produce more food. With greater wealth and income which increases availability of capital that could increase the probability of investment in purchase of farm inputs which increases food production and hence ensuring better living status of agro-pastoralist households. The marginal effect of -0.39 for the total cultivated farm size implies that other things kept constant, the marginal effect in favor of being poor decreases by a factor of 0.39 as the total cultivated farm size increases by one hectare. This is consistent with the findings of Abdikadir (2013) and Semere (2008) the more the cultivated land of the households lowers the extent of poverty levels and are more likely to become being poor over a period of time.

Expenditure on use of improved seeds (EXP_IMSEED): The use of high yielding varieties can remarkably improve farm output and thereby increase food supply and income of the household. It is an important source of increased productivity that makes a difference in the poverty status of farm households. Those households who use productivity enhancing seeds are less likely to be poor. Therefore, as it was hypothesized that the use of improved seeds has negatively influence poverty status, other things being constant. One Birr expenditure increase in use of improved seed decreases the probability of being poor by 0.01. This implies that more expenditure on improved seed leads eventually increased production and productivity from the same plot of land which is expected to enhance the income and earnings of agro-pastoralist by reducing the poverty level.

Expenditure made on veterinary medicines and services (EXP_VET_TLUAE): This variable was continuous and represents the total expenditure on total number of livestock units (TLU) per adult equivalent per year as a consequence of disease occurrences. Almost in all areas of agro-pastoralists inhabited localities it is thought that there is high prevalence of animal diseases with Veterinary services and facilities are very limited. The existence of animal disease incidences decreases number of livestock units' agro-pastoralists and it aggravates being poor. To control this catastrophic event, the agro-pastoralists spend on veterinary medicines. Those agro-pastoralists who spent more on vaccinating, treating and

taking cares of their livestock are expected to become wealthier through increase number of livestock, income, production and food. As expected the model result shows negative effect on being poor. One Birr spent on veterinary medicines and services decreases the probability of being poor by 0.02.

Farm income (FARIN_AE): The farm income refers to total annual earnings of the family from sale of agricultural produce per adult equivalent. This is total annual farm income earnings from sale of crops and their byproducts, livestock and their by-products. This can be used to purchase consumable goods (like cloth, sugar, and others), some agricultural inputs, and also to fulfill social financial obligations. Thus, generating higher farm income per adult equivalent might reduce the probability of being poor. It was measured by the amount of Birr obtained from sale of crop produce, livestock and livestock products. As expected, the model result shows (significant at 1% of probability) negative relation with being poor of a households. One Birr increase in farm income reduces the probability of falling into poverty by 0.02. This is consistent with the findings of Abdikadir (2013) and Semere (2008) the more the farm income households earning the lower poverty levels and are more likely to become better off over a period of time.

Distance from Market: This variable is found to be significant at 10% probability level in determining the household poverty. The result shows that the variable is found to have positive impact on the probability of being poor in the study area. This means, the probability a household being poor increase as the household is far from the market centers. This may be due to the long distance movement and trekking challenging sale of livestock and livestock by-products. Since access to market has great impact on livelihood of pastoral community, as the household gets far from the market centers, the probability of being poor increases by 0.01. This is consistent with the findings of Abdikadir (2013) and Semere (2008) the more the distance from the market centres the households increases the probability and extent of poverty and are more likely to become worse off over a period of time.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary and Conclusions

Poverty being the primary concern of developing nations and hence Ethiopia, it has got attention both by governments, humanitarian organizations and international agencies. As a multidimensional phenomenon, it requires a holistic and through understanding of its multidimensional facet. The research study was conducted in three Kebeles (Garbi, Guyow and Danabe) of Kabribayah District of Somali Regional State. It focused on agro-pastoral households who are overwhelmingly exposed to multidimensional poverty. The objectives of the study were to determine prevalence, severity and status of poverty among agro-pastoral households, and to identify the determinants of poverty at household level.

Two-stage sampling procedure was used to take the required number of sample households. The study was initiated purposively in one of the poverty prone district of Somali Region, Kabribayah District; in Jijjiga Zone (Fafan Zone). First, three kebeles were selected randomly from the total number of twenty four agro-pastoral kebeles of the district. Secondly, random samples of 123 agro-pastoralists were drawn from the kebeles based on probability proportionate to size. Probability proportionate to size technique was employed to determine the number of households to be considered from each kebele. Household demographic factors, socio-economic and institutional related factors were the main driving forces for vulnerability of agro-pastoralists to poverty. The results of econometric model indicated that most of the hypothesized variables being significantly related with poverty of agro pastoralists.

In measuring poverty, consumption expenditure approach was used. After setting the poverty line by using cost of basic needs method, factors associated with poverty status were analyzed using descriptive statistics and then econometric model. In the analysis of the data, the FGT poverty index (index developed by Foster, Greer, and Thorbecke) was used which is related to poverty status estimation of agro-pastoral poverty. To identify determinants of poverty in the study area Logistic binary model was employed.

Accordingly, out of the total sampled agro-pastoral households 52 percent were poor and the remaining 48 percent were non-poor. The food poverty line was 3,117.64 Birr and the total poverty line was 5,196.20 Birr per adult person per year. The three common poverty indices were found to be 0.52, 0.1456 and 0.0462 for head count, poverty gap and poverty severity, respectively.

Moreover, the results of descriptive statistics showed that sex and educational status of the household head were significantly related to poverty status of the households indicating that being female headed and illiterate is positively correlated with poverty. Besides, poor households have large family size (in AE), and high dependency ratio than non-poor households. With regard to the household socio-economic variables, poor households have relatively small number of livestock (in TLU/AE), small size of land holding, most of them did not have oxen, and have less farm and non-farm income per AE. In addition, the poor households has limited access to education, health, water and sanitation, communication services as compare to better off households of the study area.

Concerning to institutional factors, extension contact with DAs was found to have significant and negative relation with poverty. In contrary, distance to market centers was found to have a positive and significant relationship with poverty. This confirms that most poor households not having contact with DAs and resides far from market centers.

On the other hand, results of the econometric model indicated the influence of different variables on household poverty. A total of thirteen explanatory variables were included in the model out of which eleven variables had shown significant relationship with poverty. Accordingly, number of livestock (TLU/AE), sex of the household head, oxen ownership, farm size per AE, non-farm income per AE, farm income per AE, expenditure on improved seed, and expenditure on veterinary services were found to have negative and significant influence on poverty. On the contrary, family size (in AE), distance from market center and dependency ratio had significant and positive relation with poverty status.

5.2. Recommendations

Since the poverty prevalence is a major problem in the study area, agro-pastoralists in the district are living in abject poverty which is difficult for them to escape from poverty trap. This requires policy measures that target long term poverty reduction strategies specifically a poverty reduction strategy that target to trickle problems of specific groups within the society such as the poorest of the poor agro-pastoralists. Based on the findings of the study, the following interventions might mitigate the problem of poverty in the district.

Family size and poverty were strongly and positively related. To improve the situation and minimize the effect, due attention is required to limit the growing population in the Kabribayah district. The situation can be handled by strengthen and building positive health seeking behaviors through integrated family planning health education and reproductive health program .

The livestock holding shows significant influence on poverty level. Therefore, as the livelihood of agro-pastoralist is linked with livestock holding, improving productivity and production of livestock through provision of veterinary services, avoiding invasive plant species from rangelands, constructing watering points near rangelands, developing irrigable rangelands and linkage to an improved marketing system can contribute towards poverty reduction. On the other hand, preventing the loss of productive assets due to diseases and rebuilding assets of the poor and the very poor households should be considered to revitalize the path of livelihood improvement through investing on critical public services such as establishing adequate livestock health infrastructures, training the required manpower, giving more emphasis to forage research and extension.

Size of land of the household and poverty is negatively related indicating large farm size improves the well-being of farm households. Even though land size is one of the determinant factors of poverty status, because of its limitedness of that there is no room for area expansion in most parts of the study area. Improved agricultural technologies that enhance the productivity of land per unit area should be developed and training of farmers on land management should be given a due emphasis.

Women headed household had positive impact on poverty. Results show that female headed households are more likely to be poor than male headed households. Therefore, capacity building for female headed households should be given more priority. In addition, interventions intended to help agro-pastoralists have to give priority to female headed households.

Policy support from the government is required to strengthen infrastructures particularly rural road and networks. This will enable inputs/products to be transported from/to market places more efficiently and at lower transportation costs. In addition, development of subsidiary market places at appropriate sites in the rural villages should be considered along with other developmental activities such as promoting the relevance of cooperatives.

Lastly, as result indicated, non-farm income generating activities also play an important supplementary role to enhance self-provisioning of agro-pastoral households. In this regard, interventions like capacity building, agricultural research, agricultural marketing and credit as well as infrastructures that enhance non-farm activities in sustainable manner need to be designed.

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7. APPENDICES

7.1. Tables in Appendix

1. Appendix Table 1. Conversion Factors Used to Estimate Adult Equivalent

Age	Male	Female
<10	0.6	0.6
10 to 13	0.9	0.8
14 to 16	1	0.75
17 to 50	1	0.75
> 50	1	0.75

Source: Storck, *et al.*, 1991.

2. Appendix Table 2. Conversion Factors Used to Estimate Tropical Livestock Unit (TLU)

Animal Category	Tropical livestock unit (TLU)
Calf	0.25
Donkey (young)	0.35
Weaned calf	0.34
Camel	1.25
Heifer	0.75
Shoat (adult)	0.13
Cow and Ox	1
Shoat (young)	0.06
Horse	1.1
Donkey (adult)	0.7
Chicken	0.013

Source: Storck, *et al.*, 1991.

3. Appendix Table 3. List of Selected Kebeles & Number of Sample Households

District	Kebele	Livelihood	Sampled households
Kabribayah	Danabe	Agro-pastoral	32
	Garbi	Agro-pastoral	46
	Guyow	Agro-pastoral	45
Total			123

Source: Field Survey, 2015.

7.2. Survey Questionnaire

Part I: General Information

1. Name of kebele /Agro-pastoralist: _____
2. Household code: _____
3. Name of household head _____
4. Date of interview _____
5. Name of enumerator _____ signature _____
6. Supervisor's name _____ signature _____

Part II: Household characteristics

7. Household demographic characteristics

s/n o	Name of Household Members	Sex	Age	Relationship to Household Head	Marital status	Education al level	Reason for Illiteracy	Age at 1 st marriage	Religion	Ethnic
01	02	03	04	05	06	07	08	09	010	011
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										
13.										
14.										
15.										

Note:

Codes for 05: 1.head 2.wife/husband 3. Son/daughter 4. Parent 5. Grand child 6. Brother/sister 7. Other relatives 8. Not related

Codes for 06: 1.Single 2.Married 3.Divorced 4.Widowed 5.Widower S

Codes for 07: 0. Literate 1. Illiterate

Codes for 08: Reasons for illiteracy and/or if there are people currently stopped attendance; 1. No access to school 2.Lack of money
3.Do not want/ no interest 4.To help family herding animals/Crop 5. Old age 6.Others (specify) _____

Codes for 010: 1. Muslim 2. Christian 3.pagan 4. Others (specify) _____

Codes for 011: 1. Somali 2. Amhara 3.Oromo 4. Others (specify) _____

8. Is there any one of these members who has been away from this household for more than a month during the past 12 months? _____ 1. Yes 2. No

9. If yes to Q.8 above, fill the following table:

s/no	Name of member/s left the household	Sex	Age	Number of months left the household	Reasons
1.					
2.					
3.					
4.					
5.					

10. Is any one of these members joined this household during the past 12 months? _____ 1. Yes 2. No

11. If yes to Q.10 above, fill the following table:

s/no	Name member/s joined	Sex	Age	Number of months passed since joined till the end of the study period
1.				
2.				
3.				
4.				
5.				

12. _____ Labor force status
(for those whose age is between 15 years and 65 years): Have you engaged in productive work during most of the last 12 months? __1. Yes 2. No

13. _____ If no to Q.12,
what are the reasons? 1. Disabled 2. Scarcity of agricultural land 2. Did not want it. 5. Sick 6. No job/no employment 6.Old Age 7.Others
(specify)_____

14. How long have you been in Agro-pastoral mode of life (in years)? _____.

15. Are you a member of any organization? 1. Yes 2. No

16. If yes, mention the type of organization 1. Cooperatives 2. Farmers Group 3. Idir (Afoosha). 4. Iqub (hagbad) 5. Others (specify)_____.

17. If yes, what is your status in the kebele? 1. Kebele Cadre member 2. Kebele clan Elder 3. Religious leader 4. Kebele member 5. If other, specify? _____

18. Farming experience since started farming (years) _____

Part III. Farm Characteristics

19. Do you own a land? 1. Yes 2.No

20. If yes to question No.19, what is the total size of your land holding (in *Qodi*⁸)? _____

⁸ Traditional and Local land holding measurement unit in Somali language.

21. Land holding ownership and land use in 2014/15, fill the following table

		Area under different ownership in <i>Qodi</i>					Output produced in quintals/ <i>Qodi</i>	Value of Produced/quintal in Birr
		Owned	Shared in	Shared out	Leased in	Leased out		
Cultivated	Annual Cropping							
	Perennial crops							
Fallowed/Grazing land								
Others								

22. Why did you rent in land? _____

23. Why did you rent out land? _____

24. Why did you engage in share cropping? _____

25. If you did not have irrigable land, who is the owner of the land in your locality 1. Clan leaders 2. Government 3. Community

Part IV: Socio-Economic factors

A. Livestock ownership

26. Do you own livestock? _____ 1.Yes 2.No

27. If yes, indicate the types and number of livestock owned _____

S/no	Types of livestock	Number owned	Current market Price per head
1.	Camel		
2.	Cattle	Calf	
		weaned calf	
		Heifer	
		Cow	
3.	Shoats	Young shoats	
		Adult shoats	
4.	Oxen		
5.	Donkey	Young Donkey	
		Adult Donkey	
6.	Horse		
7.	Others		

28. Do you use oxen for your farm operation? _____ 1.Yes 2.No

29. If yes, are your oxen enough for your farm operation? _____ 1.Yes 2.No

30. If you do not have enough oxen, how do you get additional oxen you need?

1. Pulling oxen to form a pair 2. Borrow from friends and relatives 3. Oxen obtained for labor exchange 4. Oxen obtained with sharecropping 5. Manually 6. With other livestock 7. Hire from someone/renting in 8. Others (specify) _____

31. Do you have hens? _____ 1. yes 2.No

32. If yes, what is their numbers _____

5.	Donkey			
6.	Horse			
7.	others (specify)_____			

75. Income generated from the sale of livestock by-products in last year, please fill the following table:

s/no	Types of livestock by-products (Items)	Unit of measurement	Unit price (birr)	Total amount of income
1.	Milk	Litre		
2.	Butter	Kg		
3.	Hides and skins	No		
4.	Manures	Kg		
5.	Meat	Kg		
6.	Wool	Kg		
7.	Eggs	No		
8.	others (specify)_____			

76. Did any member of your family engage in **non-farm** activities? 1. Yes 2. No

77. If no, why? Because:

1. I do not have extra time for non-farm activities
2. Non-farm income is less attractive
3. There is no employment opportunity
4. I lack the skills required
5. No starting capital
6. Other reasons, specify_____

78. If yes to Q.76, mention the non-farm activities and estimated income obtained from the respective activities in last cropping season?

s/no	Types of non-farm activity (jobs) (including any remittances, Donations and Aid)	Total income received (in month)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Note: If in kind, (donations, Gifts, Remittances and Aid), covert it to birr at market prices prevailing at the time of transfer.

Part V: Institutional factors

A. Utilization of credits

79. Is there credit service in your area? 1. Yes 2. No

80. Did you take credit during the last cropping season? 1. Yes 2. No

81. If yes, on what basis did you take credit? 1. Kind 2. Cash 3. Both

Part VI: Use of Modern Agricultural Input

93. Do you use chemical fertilizers? ___ 1.Yes 2.No

94. If no state your reasons:

1. Not necessary for cultivated crops
2. Too expensive
3. Not available
4. Harmful to soil
5. Other (specify)_____

95. If yes for how many years have you been using fertilizers? _____

96. Have you been using fertilizers? _____ 1.Yes 2.No

98. If no, Q.96. Why?

1. No regular supply
2. Shortage of income
3. Lack of credit
4. Others (specify)

97. If yes, how much? _____kg per (*Qodi*) and what is price per kg_____ Birr.

98. If yes, indicates the amount of fertilizers used in the year 2014/15.

s/no	Types of fertilizer used	Unit	Quantity	Area used (in <i>Qodi</i>)	Price per unit	Total cost
1.	Urea	Kg				
2.	DAP	Kg				
3.	Others (specify)_____	Kg				

99. Do you use improved seed on your farm? _____ 1.Yes 2.No

100. If yes how much? _____kg per (*Qodi*) and what is price per kg_____ Birr.

101. Total expenditure on improved seed per (*Qodi*) per season_____ Birr.

102. Please indicate the expenditure on Improved seed per *Qodi* by filling the following table

s/no	Type of improved seed used	Unit	Quantity	Area used (in <i>Qodi</i>)	Price per unit	Total cost
1.		Kg				
2.		Kg				
3.		Kg				
4.		Kg				
5.		Kg				
6.		Kg				

103. If no, why?

1. Not heard about it
2. No supply
3. Too expensive
4. No knowledge about its importance
5. Others (specify)

104. Do you apply herbicide and insecticide on your crops? ___ 1.yes 2. No

105. If no why, why? 1. Does not help 2. No problem of weed/ pest 3. Too expensive
4. Not available 5. Not heard about it 6. Other (specify)_____

Part VII: Consumption Expenditure.

106. Would you please tell us the consumption of each of the food items in your family during this month?

Food type	Mostly consumed type food	Total Consumed		Source							
				Own produced		Purchased				Gift/loan/wage in kind	
		Unit	Quantity	Unit	Quantity	Unit	Quantity	Price/unit	Total expenditure	Quantity	Source
A. Staple foods											
1.Sorghum											
2.Maize											
3.Rice											
4.Teff											
5. Wheat											
6.Lentils											
7.Beans dry											
8. others (specify) _____											
B. Meat & Other animal products											
1.Cow milk											
2.Camel milk											
3. Goat milk											
4.Cattle meat											
5.Camel meat											
6.Goat meat											
7.Sheep meat											
8.Butter											
9. others (specify) _____											

Note: Units: 1. gram 2. Kg 3.ml 4. lt 5. Bunch 6.serving 7.others (specify) _____

Food type	Mostly consumed type	Total Consumed		Source							
				Own produced		Purchased				Gift/loan/wage in kind	
		Unit	Quantity	Unit	Quantity	Unit	Quantity	Price/unit	Total expenditure	Quantity	Source
C. Beverages & drinks											
1.Coffee/Tea											
2.Drinking water											
3.Beverage											
4.others (specify)_____											
D. Fats, oils, sweeteners, snacks and others											
1.Edible oil											
2.Sugar											
3.Salt											
4.Pasta											
5.Macaroni											
6. others (specify)_____											
E. Vegetables											
1.Potato											
2.Onions											
3.Pepper											
4.Garlic											
5.others (specify)_____											

Note: Units: 1. gram 2. Kg 3.ml 4. lt 5. Bunch 6.serving 7.others (specify) _____

107. How many times did you eat per day in most of the year's time?
1. Once 2. Twice 3. Three times 4. More than three 5. As obtained
108. What is your families' average consumption of milk per day?
1. one liter 3. Three liters 5. Five liters
2. Two liters 4. Four liters 6. Six liters and above
109. Is your production enough to feed your family? 1. Yes 2. No
110. If no, for how long could it support you? _____ Month(s).
111. In which month(s) did you face food shortage?
_____Month(s)
112. What was the major cause(s) of food shortage (deficit)? _____
113. Are you flexible in your consumption during the time of food shortage? 1. Yes 2. No
114. If yes, how you became flexible in your consumption?

115. How did you cover (cope) the deficit? (Rank according to their importance)
- _____ Purchased food on cash _____ Received gifts or remittance
_____ Animal sale _____ Eating wild food
_____ Relief food aid _____ Migration to other areas
_____ Borrow from friends/relatives _____ Others (specify) _____
_____ Income from non-farm work in the locality
116. If relief food aid is a means, what were the **type** and **quantity** of food items you received? _____
117. Indicate expenditures for your family on various non-food items during the year 2014/15?

s/no	Types of Non-food Items	Unit	Price per Unit	Annual Expenditure (Birr)
1.	clothes and footwear			
2.	utensils/kitchen equipments			
3.	linens(sheets, towels blankets)			
4.	lamp/torch			
5.	transport			
6.	ceremonial expenses			
7.	cosmetics (hair oil, butter, perfume)			
8.	chats, cigarettes, tobacco etc			
9.	school fees and other educational expenses(including exercise books, pen etc)			

10.	medical treatments and medicines			
11.	donation to Mosque, charity, social obligations etc			

118. Have you used your income to cover the expenses of non-food items? 1. Yes 2.

No

119. If no, how did you cover the gap? _____

Part VIII. Human Health, Water and Sanitation

120. Is there any human health facility in your locality? 1. Yes 2. No

121. If yes, how far is the nearest health facility from your residence? _____ in km and minute _____. Please fill the following table

s/no	Type of Accessed human health Facilities	Place	How far from your location (Km/min.)	Remark
1.	Hospital			
2.	Health center			
3.	Clinic			
4.	Health post			
5.	Others (specify) _____			

122. What kinds of health facilities are available in your community?

1. Hospital 2. Health center 3. Clinic 4. Health post

123. How did you travel to health facilities in cases of emergency or when you need medical service? 1. On foot 2. By animals 3. By car 4. Other, specify _____

124. Has anyone in your home been seriously sick in the last one year? 1. Yes 2. No

125. If yes, how many of your family members were got sick? _____

126. Which diseases mostly affected your family?

127. How did you treat the sick person?

1. Did nothing 2. Took to health facility 3. Bought drugs from the shop
4. Took to traditional healer 5. Others (specify) _____

128. Is anyone died/mortality from your family members during the last one year? 1.

Yes 2. No

129. Do you have any sanitation facilities? 1. Yes 2. No

130. What is your permanent source of drinking water?

1. Traditional well (*ceel*) 4. Deep wells / bore holes (motorized)
2. Reservoirs (*birka*) 5. Ponds 7. Tapped water
3. Hand dug wells 6. Springs 8. River

131. How far did you travel to fetch water? _____ Km and _____ Minutes.
132. If it was far, what was the mode of transportation? 1. Donkey 2. Camel 3. Human back 4. Other means (specify) _____
133. How much litres of water your household consumes per day _____.
134. Is the water source for human and livestock different? 1. Yes 2. No
135. If yes, what are the sources for livestock? _____

Part IX: Human House, and Asset ownership (Durable Asset)

136. Do you have your own house? 1. Yes 2. No
137. If yes, what type of house?
1. Thatched roofed 4. Iron sheet roofed house
2. Plastic roofed hut 5. *Gambis* (Traditional Somali house)
3. Soil roofed house 6. Others (specify) _____
138. Is your house permanent? 1. Yes 2. No
139. Do your house and household equipped with any of the following items?

S.no	Utensil/Equipment	Owned Quantity	price if sold in their current status
1.	Valuable Assets		
	Jeweller/Gold (<i>dahab</i>)		
	Wrist watches (<i>sacada Guriga</i>)		
	Others (specify) _____		
2.	Household Goods		
3.	Bed(wooden/Metal)(<i>sariir</i>)		
	Table and chairs (<i>Mis iyo kuras</i>)		
	Radio/Tape Recorder (<i>Raadiye</i>)		
	Gas stove (<i>shawlad</i>)		
	Cellphone (mobile)		
	Other utensils (<i>alabaha kale ee Guriga</i>)		
	Others (specify) _____		
4.	Agricultural Implements		
	Grain storage (<i>bohol</i>)		
	Hoe and Digger (<i>yanbo ama xagaaf</i>)		
	Share and Colter (<i>marashi iyo Milaq</i>)		
	Ox-Yoke and Ox-bow (Harqod)		
	Axe (<i>fas ama guduun</i>)		
	Sickle (Manjo)		
	Others (specify) _____		

140. Do you use housing for livestock? 1. Yes 2. No

141. If Yes, What type of housing you used for livestock (camel, cattle, goat, and sheep)? _____

142. Have you sold any of the above items in the last 12 months?__ 1.Yes 2.No

143. If yes to Q.141 above, fill the following table:

s/no	Type of sold Item	Number sold	Unit price	Total income	Reason for sale
1.					
2.					
3.					
4.					

PART X. Access to Service

144. Do you get veterinary services for your animals? 1. Yes 2. No 3. Sometimes

145. If yes, what animal health facilities are found in your locality? Please fill the following table

s/no	Type of Accessed animal health Facilities	Place	How far from your location (Km/min.)	Remark
6.	Vaccination			
7.	Treatment			
8.	Others (specify)_____			

146. If no, where do you take sick animals for treatment?

1. Traditional healer 3. Buy vet drugs from where it is available 5. Slaughter and eat

2. Give medicinal plants 4. Nowhere & pray for it 6. Others

(specify)_____

147. Which services are provided by the veterinary facilities in your area?

1. Vaccination 2. Treatment 3. Both 4. Nothing

148. Did you vaccinate your livestock in the last 12 months? 1. Yes 2. No

149. If yes, who conducted the vaccination? _____

150. Indicate the cost of treatments in your livestock for the last year

s/no	Types of livestock treated	Number/times of treatment per year	per unit cost per head	Total cost of treatment
1.	Camel			
2.	Cattle			
3.	Oxen			
4.	Shoats			
5.	Donkey			
6.	Others (specify)_____			

151. If no, how long has it been since vaccination campaign was conducted?

1. One year 3. Three years 5. Never been vaccinated
2. Two year 4. Above Three years 6. Do not remember

152. Have you lost livestock as a result of diseases last year? Please indicate in the table.

s/no	Types of Animals	Number of Died	Type of Disease	Remark
1.	Camel			
2.	Cattle			
3.	Oxen			
4.	Shoats			
5.	Donkey			
6.	Others (specify)_____			

153. Which type of animal diseases are the major and common in your locality (rank according to their prevalence)? _____

154. Who is your partner for animal health care?

1. BoARD/District ADO 2. NGOs 3. None 4. Others, specify_____

155. Do you have any coping mechanisms for an outbreak of animal disease? 1. Yes 2.n No

156. If yes, mention the methods _____, _____,

157. How far do you travel to reach the nearest school in your vicinity? _____ Km

158. Do send your school age children to the school 1. Yes 2. No

159. If not to Q158, why _____, _____, _____

160. How far do you travel to get grain mill? _____ km

161. How far do you travel to reach all road services?_____ km

162. How far do you travel to get telephone service? _____ km

163. How far do you travel to postal service? _____ km

164. Does your location have access electricity service? 1. Yes 2. No

165. Would you please, indicate that you would like to have but that you do not have?

166. In general, from your experience, what should be done in order to improve the livelihood of the agro-pastoralist?

1. _____
2. _____
3. _____

Thank you/Waad mahadsantihiiin