The Determinants of Poverty among Agro-Pastoralists Households  
(The Case of Fik District, Ethiopian Somali Regional State)

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Abstract: Extreme poverty remains a daily reality for more than a billion people who survive on less than the basic needed for a day to day survival. Hunger and malnutrition are almost equally pervasive also more than 800 million people have too little to meet their daily energy needs. Therefore, this study was conducted to analyze pastoral households’ poverty status, determinants that could potentially affect the households’ poverty status, and to measure the intensity of poverty in Fik district. The analysis was based on household survey data gathered from 154 randomly selected households in four Kebeles based on probability proportional to size. Descriptive statistics, like mean, standard deviation, percentage and frequency distribution. Univariate analysis such as t-test and Chi-square (X2) test, FGT and binary logit regression were used to achieve the stated objectives. The survey result shows that 55.19% of the sample households live below poverty line with poverty gap and poverty severity index of 0.104 and 0.030 respectively. The binary logit model outputs show that 7 variables were significant determinants of household poverty. These were sex of the household, age of the household head, dependency ratio, family size, education level of the household head, credit and income from milk. The results generally suggest the need to improve agricultural technologies enhancing land productivity and training of farmers on land management. The findings imply that emphasis should be given to the following issues with a view to reduce poverty prevalence in the study area. Accordingly, building basic livelihood assets, improving institutional services (credit provision), and improving the market for the surplus milk, family planning programs and gender equality could provide entry points for policy making and intervention.

Keyword: Poverty, FGT, Logit, pastoral, Fik.

1. INTRODUCTION
1.1 Background
The population of Ethiopia is 104,834,317 as of Saturday, September 16, 2017, based on the latest United Nations estimates, equivalent to 1.39% of the total world population, with rank of number 12 in the list of countries by population. The population density in Ethiopia is 104 per Km2.
And the total land area is 999,541 Km² (385,925 sq. miles). The rural population of the country is 83,170,696 which is a 79.7% of the total population (World Meters, 2017).

Ethiopia is the second most populous country in Africa and is a one-party state with a planned economy. For more than a decade before 2016, Ethiopia grew at a rate between 8% and 11% annually as one of the fastest growing countries among the 188 IMF member countries. This growth was driven by government investment in infrastructure, as well as sustained progress in the agricultural and service sectors (CIA World Fact Book, 2017).

Ethiopia has the lowest level of income-inequality in Africa and one of the lowest in the world, yet despite progress toward eliminating extreme poverty, Ethiopia remains one of the poorest countries in the world, due both to rapid population growth and a low income per capita. Changes in rainfall associated with world-wide weather patterns resulted in the worst drought in 30 years in 2015-16, creating food insecurity for millions of Ethiopians (CIA World Fact Book, 2017).

The government is currently implementing the second phase of its Second Growth and Transformation Plan (GTP II), which will run from 2015/16 to 2019/20, aims to continue improvements in physical infrastructure through public investment projects and transform the country into a manufacturing hub. The overarching goal is to turn Ethiopia into a lower-middle-income country by 2025. Growth targets are comparable to those under the previous plan, with annual average GDP growth of 11%; in line with the manufacturing strategy, the industrial sector is slated to grow by an average of 20% (World Bank, 2017).

The international development community had poverty in focus for more than a decade. In “The Millennium Assembly of the United Nations” Summit (6-8 September 2000), the International Community issued a statement pronouncing the eradication of poverty as a Priority one for the millennium development goals, specifically, it set out to halve severe poverty by the year 2015 (UN, 2017).

Extreme poverty remains a daily reality for more than a billion people who survive on less than the basic needed for a day to day survival. Hunger and malnutrition are almost equally pervasive also more than 800 million people have too little to meet their daily energy needs. In recent years, many countries in Africa have experienced extraordinary recover in economic growth (Eunice Busisa, 2011).

Poverty continues to be the main challenge in developing countries, especially in Sub-Saharan Africa (SSA). Three fourths of the poor in the developing world live in rural areas, and rural poverty remains high and persistent 51 percent in SSA—while the absolute number of poor people has increased since 1993 (World Bank, 2008). In fact, the burden of poverty in SSA is disproportionately borne by rural dwellers and women (UNECA, 2012).

Poverty in pastoral areas is different from the other rural households. The major roots of pastoral poverty stem from shortage of rainfall resulting water scarcity and loss of pasture, loss of land, conflict, and political marginalization (Little, McPeak, Barrett, & Kristjanson, 2008).

Generally, the determining factors of poverty are varied and complex, which needs close analysis at the grass-root level, that is, at the level of the poor pastoral households themselves. If the poor and their problems are to be identified more clearly, then they must be asked what they think and given the opportunity to express their views. Therefore, this study is expected to undertake a thorough analysis of the case among pastoral households of Fik district.

1.2 Statement of the Problem
Poverty situation is a major problem in most of the developing countries, especially in Sub-Saharan Africa. In Ethiopia, poverty have become chronic problems and significantly more widespread in rural areas than in urban (Kader H. Obsiye, 2011).

Ethiopia faced a decades of political instability and economic decline, in the late 1980s and has begun economic reform. The country is still one of the poorest countries in the world, and has an estimated 35 million people who are subjected to abject poverty; this is roughly around 44 percent of the current population. Over 12 million of these people are severely affected by food insecurity, the majority live in rural areas (Rainbow CDA, 2017).

The Somali region is a lowland region and among the poorest regions in Ethiopia that its rural population is dominated by pastoralists. A study carried out by the Ethiopian Pastoralists’ Forum Day
Pastoral livelihoods are characterized by risk and uncertainty due to fluctuating environmental conditions and occasional shocks (Scoones, 1995). Traditionally, the vagaries of the natural environment are overcome through access to and management of communal rangelands, mobility of stock, and institutions for mutual assistance. Moreover, the very features that allow pastoral production systems to work – the communal land tenure and the free mobility are often viewed as impediments to commercialization of land use, social integration, and, in a broad sense, the modernization and civilization of pastoral culture (Scott, 1998; Bonfiglioli, 1992; Baxter, 1985).

All the above mentioned poverty situations and constraints are the true highlights of rural and urban of Ethiopia, but the people in the rural areas particularly the pastoralists are dauntingly exposed to poverty which needs area focused and context specific researches to examine and investigate factors causing poverty at households and grass root level within poverty prone groups. Moreover, in Fik district contextual factors that are believed to explain the magnitudes and determining factors of poverty are not evaluated using the available methods of measurement. So far there is no such type of research conducted by the any other researcher in the study area particularly on poverty status of pastoral households. Accordingly, this study is proposed with the main aims of measuring poverty in agro pastoralist households and examining the relationship between poverty and different socio-economic characteristics of the agro-agro-pastoralist households in order to narrow the existing information gap and enhance the development actions pertaining to the betterment of the agro-pastoralists themselves.

1.3 Research Questions
This study focuses on the following key research questions.
1. What is the poverty status of the pastoral households in the sampled district study area?
2. What is the magnitude of pastoral household poverty in the study area?
3. What are the determinants of household poverty in the study area?

1.4 Objectives of the Study
The general objective of the study is to assess the determinants of poverty status of agro pastoral household of Fik district of the Ethiopian Somali Regional State.

Specific objectives are:
1. To assess agro-pastoral household’s poverty status of poor and non-poor households in the study area.
2. Estimate the magnitude of agro-pastoral household’s poverty in the study area.
3. To identify determinants of agro-pastoral households poverty in the study area.

1.5 Significance of the Study
Results and findings of the study have economic and policy implication significance and expected to give detail and clear understanding of the extents and determinants of poverty among the pastoral households in the study area to help policy makers, planners and donors in the formulation of appropriate policies that aims to pastoral development, local as well as international NGOs interested in promoting pastoral development in the study area would benefit from the results and findings of the study.
1.6 Scope/ limitation of the study

It is the nature of any type of research to have some scope and limitations. So, as to the scope of this study it was conducted only in Fik district of Erer Zone in Ethiopian Somali Regional State (ESRS); the study was covered four Kebeles of the district from which a representative number of agro-pastoral households were selected. Moreover, the study has some limitations in terms of time, logistics and budget as well as lack of well-documented record.

2. LITERATURE REVIEW

2.1 Definitions, concepts and types of pastoralism

2.1.1 Definitions and concepts of pastoralism

There has not been a consensus over the definition of pastoralism but the most dominant definition is an economic activity involving the care of herds of domesticated livestock, also notes that pastoralism is “the use of extensive grazing in rangelands for livestock production” which is widely practiced in the dry land areas of the world. Pastoralism is a livelihood strategy and a system of mobile livestock production that makes wide-ranging use of grazing lands in arid and semi-arid environment that doesn’t uphold sustainable crop cultivation (Yohannes Aberra and Mahmud Abdulahi, 2015).

According to Oxfam (2008) defines Pastoralism as “the finely-honed symbolic relationship between the local ecology, domesticated livestock and people in high variable conditions” and represents a form that manages the natural resources and the ecology between pasture, water, livestock and people (WISP, 2006). However, the exact definition of the term pastoralism depends on the nature of the unique pastoral societies being studied.

2.2 Ethiopian Pastoral Policies and Strategies

In the Federal Democratic Republic of Ethiopia (FDRE) pastoralism is one of the fundamental socio-economic classifications in which livestock husbandry in open grazing areas characterizes the key means of survival. Ethiopia’s arid or semi-arid pastoral lands, the majority of pastoralists live in the four regional states of Somali, Afar, Oromia and Southern Nations, pastoralist areas mark Ethiopia’s border with neighboring countries (Yohannes Aberra and Mahmud Abdulahi, 2015).

Ethiopian government considered the area of pastoral as areas of special problems which need special measures appropriate to local conditions (Solomon Desta, 2006). The 1995 constitution is the first in incorporated the issues of pastoralists for the first time in the country. It also formed a department in the Ministry of Federal Affairs which coordinates and facilitates development in pastoral areas and set up Pastoralist Affairs Standing Committee (PASC) in the parliament which oversees pastoral development activities in the country. Regional offices in charge of pastoral development have been established in regions where pastoralism is an important production system. Different from the previous two regimes the current government has attempted to incorporate pastoral development in its national development plans 2000-2004 and 2005-2009 five year plans (Mohammed Yimer, 2015).

The government set a national policy and strategies to direct development efforts in the pastoral areas of Ethiopia. It has made a stride in considering the need to develop the pastoral area and to give some development direction that triggers improvement of the livelihood of pastoralists. It also has made certain shift in the thinking of pastoral development from its predecessors. It looks like it has made a departure from its predecessors in a sense that it is focusing more on the poor livestock holders (i.e., pastoralists) and poverty reduction than the livestock themselves (Solomon Desta, 2006).

The current Ethiopian constitution also provides pastoralists to receive fair prices for their products that would lead to improvement in their conditions of life. These are some of the articles in the constitution which specifically reflect position of the government regarding pastoralist interest. In its short-medium development policy the government admits the importance of investing in pastoralism to improve the food security situation of pastoralists. It also acknowledges the usefulness of the traditional pastoral knowledge to manage pastoral resources, however in its long term policy it advocates for sedentarization of pastoralists based on development of irrigation. There is a need for more and open dialogue among the policy makers, development facilitators, researchers, pastoral advocacy groups and the pastoral households to bring to the surface implications and appropriateness of the government long term policy of pastoral sedentarization. The government has to move and admit unambiguously that
Pastoralism as a viable way of life for the environment it is being practiced as crop cultivation is in the high moisture area (Solomon Desta, 2006).

Nowadays, according to Solomon Desta, (2006) even organizations that have been operating in pastoral areas have begun to question the impact of their development interventions. More studies are revealing that pastoral systems in Ethiopia which have been functioning well for centuries and which have provided livelihood to people are becoming unstable and less reliable to sustain pastoral livelihoods. The pastoral areas are currently being characterized by increasing instability, food insecurity, decreasing income, increasing poverty, a decline in adherence to social mores and environmental degradation. Most alarming of all is the decline in the ratio of livestock to people. The human population is increasing while the livestock population fluctuates as it is periodically affected by drought and feed shortages all these in one way or the other is possibly influence the poverty conditions of the pastoral households in the pastoral communities in general.

2.3 Poverty: Concepts, Causes, Measures and Indicators

Poverty is the inability to attain a minimum level of standard of living (World Bank, 1990). This definition considers income and expenditure per capita to be adequate yardsticks for measuring welfare. The definition is used to determine who fall below or above the minimum standard of living and classify them as poor or non-poor respectively.

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, 2000).

According to the most recent estimates in 2013, there are 767 million people or 10.7 percent of the world populations were estimated to be living below the International Poverty Line (IPL) of $1.90 per person per day. Since 2000 Ethiopia was one of the highest poverty rates in the world, and the country has seen a 33 percent reduction in the share population living in poverty, this progress has been underpinned by strong and sustained economic growth averaging 10.9 percent annually (World Bank, 2014).

There are two broad concepts that have emerged: that of absolute poverty and that of relative poverty:

Absolute poverty refers to the set of resources a person must acquire in order to maintain a "minimum standard of living", whereas relative poverty is concerned with how well-off an individual is with respect to others in the same society. In theory, therefore, while an absolute poverty line is a measure that could, adjusting for price fluxes, remains stable over time, a relative poverty line is one that could be expected to shift with the overall standard of living in a given society (WDR, 2007).

Relative poverty reflects the difference in the level of living between the top and bottom strata of society (ISSER, 1993). According to MEDaC (1999), a relative poverty line is usually set at an arbitrarily selection 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 the two-thirds of the national average expenditure per AE; and varies with the level of average income in the country (MEDaC, 1999; FAO, 2001; Gossaye Assefa, 2008).

According to the World Bank 1990, poverty has many dimensions extending beyond the low level of income. The first dimension is material deprivation (lack of opportunity), which is measured by the concept of income or consumption. The second dimension is low achievement in education and health (low capabilities). The third and the fourth dimensions of poverty are vulnerability (exposure to risk or low level of security) and voicelessness (powerlessness), respectively (World Bank, 2000). Accordingly, the World Bank defines poverty as "the inability to attain a minimal standard of living" and distinguishes it from inequality, which "refers to the relative living standards across the whole society" (World Bank, 1990). Similarly, World Book of Encyclopedia defines poverty as the lack of enough income and resources to live adequately by community standards, and it emphasizes that these standards and definitions of poverty vary according to place and time.
a. Causes of Poverty

According to the World Bank 2001, one route investigating the causes of poverty is to examine dimensions by poor people: lack of income and assets to attain basic necessities (food, shelter, clothing, and acceptable levels of health and education), sense of voicelessness and powerlessness in the institutions of state and society, and vulnerability to adverse shocks (World Development Report, 2001).

- **Lack of income and assets**: to identify with the determinants of poverty in all its dimensions, it helps to think in terms of people’s assets, the returns to productivity of these assets, and the volatility of returns. These assets are of several kinds: Human assets (capacity for basic labor, skills, and good health), Natural assets (land, water), Physical assets (access to infrastructure), financial assets (savings and access to credit), and Social assets (networks of contacts and reciprocal obligations that can be called on in time of need, and political influence over resources).

- **Powerlessness and voicelessness**: those significantly depressed feel actually their lack of voice, power and independence. This helplessness subjects them to the rudeness, humiliation, shame, inhumane treatment, and exploitations at the hands of the institutions of state and society. Absence of the rule of law, lack of protection against violence, extortion and intimidation, and lack of civility and predictability in interactions which public officials all these places a large burden on poor people, also international sanctions, War and violence are the primary causes of poverty.

- **Vulnerability to adverse shocks**: vulnerability is a regular companion of human deprivations, given the circumstances of the poor and the near-poor. Poor live and farm on marginal lands with uncertain rainfall. They are at higher risk disease such as malaria and tuberculosis. They are at risk of arbitrary arrest and ill treatment at the hands of local authorities. And they—women in particular—are at risk of being socially excluded and victims of violence and crime.

b. Measurement and determinant of Poverty

There is no a single measure of poverty and all choices have their strengths and weaknesses, the combinations of measures yield relatively more reliable results. The measures of poverty underlie a fundamental concept of the poverty lines.

**Poverty Line:**

The poverty threshold, poverty limit or poverty line is the minimum level of income deemed adequate in a particular country. Poverty lines are the starting point of every point of poor analysis. They are usually based on income and consumption data. The proportion of the population below the poverty line provides a quick indication of the scope of the problem. Poverty line is a tool for measuring acceptable levels known as the poverty line (World Bank, 1992). It is true that there exists certain levels of clearexactly what levels are for any given individual poverty lines. In most communities, what constitutes “poverty” goes beyond the attainment of the absolute minimum needed for survival.

Poverty line is defined individually by the society concerned according to its income distribution. The poverty line is a measure that separates the poor from the non-poor, those whose incomes (consumptions) fall below the line are poor and those above are non-poor. According to the World Bank Group in 2016 the poverty line is estimated using purchasing power parity (PPP) exchange rates which seek to make comparable the purchasing power of US$1.90 in different countries at different times (World Bank, 2016).

Poverty line can be set in relative or absolute terms. Relative poverty refers to the position of an individual or household compared with the average income in the community, society, group or country. That means relative poverty varies with the level of the average income. Absolute poverty refers to the position of an individual or household in relation to a poverty line whose real value is fixed over time. An absolute poverty line is based on the cost of a minimum consumption basket, based on food necessary for a recommended calorie intake. The poverty line is then augmented by an allowance for non-food needs, consistent with the consumption of the poor (World Bank, 2002).

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.

2.4 Poverty Reduction efforts in Ethiopia

Poverty is an outcome of more than economic process. It is an outcome of economic, social, and political processes that interact with and reinforce each other in a way that can worsen or ease the deprivation poor people face every day. To attack poverty requires promoting opportunity, facilitating environment, and enhancing security-with actions at the local, national, and global levels. Making progress on all three fronts can generate the dynamics for sustainable poverty reduction (World Bank, 2001). However, actual priorities and action need to be worked out in each country’s economic, regional, structural, and cultural context—indeed, each community’s and households.

According to the World Bank report in 2015, Ethiopia is making significant gains in eradicating poverty. In the last decade, the country has reduced poverty by 33 percent, and increased life expectancy each year, to 63 years in 2011 (World Bank, 2015). In line with the IMF and World Bank guidelines, the Ethiopian Poverty Reduction Strategy Paper (PRSP) sets out the country’s comprehensive long-term plan to reduce poverty (FDRE, 2000). The preparation of the full PRSP named as Sustainable Development and Poverty Reduction Program (SDPRP) was finalized in August 2002. The program was the guiding document, the core objective of this strategy paper was to reduce poverty and ensure food security through rapid economic growth, which was expected to be achieved via free market economic system. It particularly focused on reducing rural poverty and increasing the income earning capacity of the poor through its highly publicized Agriculture Development Led Industrialization (ADLI) strategy (Tassew, 2004).

PRSP was a government driven national strategy to reduce poverty, developed in consultation with civil society and other stakeholders. More recently, the HIPC (Highly Indebted Poor Countries) initiative has been designed to deal with the debt problem. There are criteria set for a country to be eligible for services that back-up HIPC. The Bretton Woods Institutions give debt relief on condition that the resource relieved from debt is spent on poverty-oriented sectors such as health and education. The condition is in order to check whether the debt relief has been channeling to poverty reduction schemes, thus preparation of PRSP was put as conditionality for qualifying the debt relief (MoFED, 2002).

The Ethiopian PRSP, which is 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. To this effect, the Ethiopian government has been taking various measures aimed at combating poverty. Among others the New Coalition for Food Security, Productive Safety net Program is usually a component or a continuation of the New Coalition. In addition, “Plan for Accelerated and Sustained Development to End Poverty” (PASDEP) spanning the five year period 2005 – 2010 were 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 center of its poverty reduction endeavor, 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).

Ethiopia formally embarked on anti-poverty reduction strategy in 2002 and the government put its objectives and policies in its poverty reduction strategy paper Ethiopia: Sustainable Development and Poverty Reduction Program- which assesses the poverty situation in the country, the sources and constraints to economic growth, and outlines measures to address them (FDRE, 2002). This was followed by a revised policy plan to accelerate and sustainable development to end poverty (PASDEP) (FDRE, 2006).

The revised policy stance recognizes the importance of non-agricultural sector in promoting overall growth and in addressing pressing poverty problems. Ethiopia undertook yet another ambitious economic plan within the framework of poverty reduction strategy. The Growth and Transformation
Plan I (GTP-I) operational for 2010/11 to 2014/15 and envisaged a rapid economic growth and structural transformation with emphasis on industrial development (MoFED, 2010). The core of the strategy was to achieve an average annual real GDP growth rate of 10 to 14 percent per annum with an estimated cost of US$ 57 billion. The country has had no shortage of lofty and unrealistic plans in the past and yet all of them failed to address the fundamental problem of the economy (Abu Girma Moges, 2013). And yet the government has also prepared and get approved the second GTP (GTP II) and started to implement it.

2.5 Review of Empirical Studies on Poverty

As poverty is the worst kind of social and material deprivation alleviating poverty is certainly one of the primary ways of ensuring social justice. Moreover, not only economic growth contributes to poverty alleviation, but also poverty alleviation itself is an important prerequisite for economic efficiency and growth. Economic growth does not necessarily mean poverty reduction, as far as there is unequal distribution of resources and unbalanced growth in the public and private sectors. Design of poverty reduction strategies requires however, an understanding of poverty, identifying who the poor are, the distribution, the dynamics and the causes of poverty. Designing appropriate poverty reduction strategies are important not only from cost-effectiveness considerations but also increasing their efficiency in reducing poverty. The analysis of determinants of poverty can provide meaningful insight about various poverty generating factors and the relevance of various policies, such as the feasibility of using targeting devices (Fitsum, 2003).

Stefan and Pramila Krishnan (1998) a survey in seven villages located in the regions Amhara, Oromiya and the Southern Ethiopian People’s Association. The study collected consumption, asset and income data on about 450 households, 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 reduce fluctuations in poverty across the seasons. The study was used in logit model and also reported that the households with better physical capital, in terms of land and oxen, had lower poverty levels and experienced larger poverty declines.

(Dercon, 1999, 2000; Mekonnen et al., 2002) the survey was conducted in 15 areas of the country with 1477 household showed that household level studies in Ethiopia have identified some of the determinants of poverty; the survey used the logit model and has shown that ownership of assets such as oxen is associated with a lower chance of falling into poverty in rural areas. In rural areas, the type of crops that farmers grow such as coffee, chat, the cereal crop and the type of crop have a lower chance of falling into poverty. In addition, households with large household size and higher dependency ratios and households headed by females are associated with higher incidence of poverty.

On the other hand, Dercon (1999) found that access to infrastructure, education and land ownership is an important variable explaining the movement of households out of poverty.

The results also indicate that more female household heads and older people stay poor or experienced greater poverty compared to male and younger people. Dercon (2000) also revealed that there were signs of consumption poverty reduction and rapid improvement in primary enrolment rates. The results also suggest improvement in primary health care delivery.

Fitsum (2003) showed that dependency ratio was found to be marginally significant and with the expected negative sign. From the household head specific factors, age of the head was found to be negative 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 have significantly higher consumption expenditures. Oxen holding were also found to be highly significant with a negative sign. As far as the effects of households’ access to services are concerned, none of the coefficients were significantly related with household welfare. Moreover, households who had access to off-farm employment did experience positive changes in welfare and the studies used a logit model.

Tassew and Tekie (2002) conducted a study on national poverty profile of Ethiopia and found that poverty incidence, depth and severity are higher for those engaged in farming than non-farming
activities, and also poverty depth and severity are higher for the illiterate than the literate in both rural and urban areas; also 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 size using the logit model.

In addition, Ayalneh Bogale and Konrad Hagedorn (2002) the study has adopted a stratified random sampling procedure with rural household as an ultimate unit for acquiring first-hand information. Three administrative districts, namely Alemaya, Hitosa, and Merhabe, were selected purposively to represent major farming systems in Ethiopia with a total of 149 households. The survey found that poor households tend to be younger by 2.70 years, have large dependency ratio, less education, have less access to land, and have less number of livestock wealth under their disposal. He specifically used logit model and pointed out that age of household head, dependency ratio, location, education of household head, capita household expenditure, sex of the household head, family size, land holding were the main determinants of rural poverty. Among these, an increase in age, female household, educational levels, land size and oxen are negatively related with rural household poverty.

Similarly, Edilegnaw Wale (1997) demonstrated that the likelihood of poverty in Ghana were determined by education of the household head, residence area, economically active working labor, migration, sex of household head, age of household head, land size and family size, he also used logit model.

Likewise, Twodros Shibru (2013) shown that the likelihood of poverty in pastoral households in Somali region using logit and probit models were determined by age, sex, family size and dependency ratio, education, land size, access to irrigation, livestock ownership, number of oxen owned, non-farm income, distance from market center and diversification of herd. The study found that variables like education, land size; livestock ownership, and number of oxen owned, nonfarm income, and distance from market center and diversification of herd to have significant effect in determining the poor or non-poor of the household.

3. RESEARCH METHODOLOGY

3.1 Description of the research area

3.1.1 Geographical features and population

Fik (Fiq) district is one of the eight districts or districts in the Erer Zone Formerly known as Fik and Nogob Zone respectively, Fik town which is the capital of Erer zone is bordered on the North Babili, Goljano districts of Fafan Zone, North West Mayamulukodistrict, on the South Hamaro, Yohob, Sagagdistricts and East Degahmadodistrict of jarar zone, the district western boundary is Qubbi district and its surrounded by the Erer River of Somali Regional State.

Fik district located in Ethiopia about 200km south of Jigjiga capital city of Somali Region and 676 km East of Addis Ababa, the country's capital city. This town has DMS Coordinates latitude: 8°09’60.00"N and Longitude: 42°19’60.00" E, or DD Coordinates 8.166666 42.333332, the average elevation in this district is 1229 meters above sea level.

According to the last total population projection of the Central Statistical Authority (CSA) in 2017, the total population of the Fik district is 168,890 people while 97,259 (57.59%) of the total population are Male, and 70,844 (41.95%) of the total population are Female while the rural and urban population are153,160 (90.69%) and 15,730 (9.314%) respectively.

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, in this area, there are Four main seasons: Gu’ (wet season), Xagaa, Jilaal (dry season) and Dayr seasons.
3.1.2 Sources of income

The sale of livestock and livestock products are the main source of income for the majority of the population in the Fik district, self-employment, and remittances from relatives residing abroad. The only reliable source of income is largely from limited livestock sale in local markets. The main markets for the pastoralist population in Fik district are Fik Town and Cobosha Kebele in Babili Woreda of Faafan Zone. The people tend to purchase goods in the same market where livestock sales are made. The main grains purchased by pastoralists in Fik district include maize, wheat, and rice.

Predominant animals are sheep largely goats and camels. Main problems in the zone include rainfall failures, market disruptions, clan conflicts/general insecurity and poor road network, (Save the Children UK, December 2009 Report).

3.1.3 Livestock production system

Livestock population in the district is estimated to be around 314,988 heads. Of the total livestock population the share of Cattle, Goats and Sheep are 21,416, 115,658, and 91,530 heads respectively. The remaining 77,572, 8,803 are drought animals (Camel and Donkey) respectively. As it can be seen in the numbers, the great share of livestock population goes to Goats which is 36.7% (Assessment of the socio-economic resources and create GIS database for the Fik Woreda, BoFED, 2013).

Livestock plays a significant role in the Pastoralism households system of the study area. Livestock types kept by the pastoralists include Camel, Cattle, Sheep, Donkey and Goats, Cows & Oxen. Female Camel and cows are kept to provide households with milk, and butter for consumption and sale, Male of Camel and donkeys for transporting goods, 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.

3.2 Sample Size and Sampling Techniques.

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.
3.2.1 Sampling Techniques

Fik district was selected purposively as a representative of the agro-pastoral districts of the ESRS. In the process of selecting the sample, four pastoral kebeles were selected purposively from the fifteen of pastoral kebeles that exist in the district, because it is representativeness of pastoral households in the district as a whole. The survey covered four pastoral kebeles in Fik district of Erer zone of ESRS. The pastoral households in the four kebeles of Fik district were recorded and among the list of these four pastoral household kebeles a representative sample size was drawn based on Yamane’s formula.

3.2.2 Sample size determination

Sample size varies for various types of research designs and there are several approaches in practice to determine sample size. Sample size determination is an important element in any survey research, although it is a difficult one. A Simplified formula developed by Yamane was used in this study. Accordingly, Yamane (1967) provides a simplified formula to calculate sample size.

\[
 n = \frac{N}{1 + Ne^2}
\]

Where

\( n \) is the sample size,

\( N \) is the population size, and

\( e \); is the level of precision.

\[
 n = \frac{11250}{1 + 11250(0.08)^2} = 154
\]

Applying the Yamane (1967) formulate 95% confidence level, the sample size of 154 pastoral households were selected randomly from selected four pastoral kebeles. After having the total number of households in each of the four pastoral kebeles, households’ probability proportional to size was employed to select the sample households from the four pastoral kebeles. Accordingly, the selected 154 sample households (i.e. total sampled 154) were interviewed by using semi-structured survey questionnaires.

3.3 Sources and methods of Data Collection

This study mainly depended on primary data which was collected by using multi-purpose questionnaires. This multi-purpose questionnaire was used to gather data on demographic, socio-economic behaviours, livelihood styles, environmental factors, traditional institutional setup, household income, expenditure, access to public services, and household assets alongside a host of other information related to production and sale of livestock products.

For the data collection, five college enumerators who speak the local language fluently were recruited from the study area and they were trained. During the data collection phase, the researcher was supervised the enumerators.

3.4 Methods of Data Analysis

In order to meet objectives of the study two methods of data analysis was conducted. Following the completion of the data collection phase, the responses was coded and entered into STATA software program for statistical analysis. The two different models were used in the study data analysis are FGT index and econometric model was used.

3.4.1 Descriptive analysis

The qualitative and quantitative data obtained were analysed using appropriate methods of analysis. Qualitative data was analysed through interpretation and generalization. For quantitative data, both descriptive statistics and econometric model was employed to analyse the relationship between the dependent and explanatory variables. While household characteristics were analysed using descriptive statistics, the econometric model was used to study the relationship between variables empirically. The descriptive analysis was used frequency, percentage, mean, mod, minimum, and maximum values of important variables. Mean tests of variables was used to test the significance of the difference between microfinance beneficiaries and non-beneficiaries.
3.4.2 Poverty index analytical model

To attain the objectives of the study which is the determinants of poverty among pastoral households, the FGT poverty measure that introduced by (Foster, Greer, and Thorbecke, 1984) was used in addition to other descriptive (Mean, Mode and Standard Deviation) and inferential statistics. The first step was distinguished the poor and non-poor. In order to classify into two groups, 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 well-being 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.

Head Count Index (HCI)

Measures the proportion of the population that is poor, it is popular because it is easy to understand and measure. But it does not indicate how poor the poor are. By far the most widely-used measure is the headcount index, which simply measures the proportion of the population that is counted as poor, often denoted by $P_0$. Formally,

$$P_0 = \frac{N_p}{N}$$

Where $N_p$ is the number of poor and $N$ is the total population (or sample). If 60 people are poor in a survey that samples 300 people, then $P_0 = \frac{60}{300} = 0.2 = 20\%$.

For reasons that was cleared below, it is often helpful to rewrite as

Here, $I(\cdot)$ is an indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise? So if expenditure ($y_i$) is less than the poverty line ($z$), then $I(\cdot)$ Equals to 1 and the household would be counted as poor. $N_p$ is the total number of the poor.

Poverty Gap Index (PGI)

This estimates the average distance separating the poor from the poverty line, measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. The sum of these poverty gaps gives the minimum cost of eliminating poverty, if transfers were perfectly targeted. The measure does not reflect changes in inequality among the poor. More specifically, define the poverty gap ($G_i$) as the poverty line ($z$) less actual income ($y_i$) for poor individuals; the gap is considered to be zero for everyone else. Using the index function, we have

$$G_i = (z - y_i)I(y_i < z).$$

Then the poverty gap index ($P_1$) may be written as

$$P_1 = \frac{1}{N} \sum_{i=1}^{N} \frac{G_i}{z}.$$

Squared poverty gap (Severity of poverty) Index

Averages the squares of the poverty gaps relative to the poverty line, it is one of the Foster-Greer-Thorbecke (FGT) class of poverty measures.

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:

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

Where,
- \( p_\alpha \) = Poverty measure
- Z = Poverty line
- \( y_i \) = Income level
- n = sample size
- q = number of poor people
- \( \alpha \) = is the weight attached to the severity of poverty.

In the equation (1), \( z - y_i = 0 \) if \( y_i > z \). The measures are defined for \( \alpha \geq 0 \), and \( \alpha \) is a measure of the sensitivity of the index to poverty. The parameter \( \alpha \) 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

To meet the objectives of this study the binary logistic regression model was employed to examine an association of each factor with poverty. The built model can be used to approximate the mathematical relationships between explanatory variables and the dependent variable.

To mention few points as to why the logistic regression model was used, 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.

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. There is primary reason for choosing the logistic distribution model is a mathematical point of view, and it is an extremely flexible and easily used function.

The logit and probit models guarantee that the estimated probabilities were lie between logical limit of 0 and 1. 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; and Pindyck and Runbinfeld, 1981). Accordingly, in this model, the dependent variable takes a value of 1 if the household (HH) 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 \( 1-p_i \). To estimate this type of relationship, it requires the use of qualitative response models.

The goal of logistic regression is to find the best fitting (yet biologically reasonable) model to describe the relationship between the dichotomous characteristic of interest (dependent variable = response or outcome variable) and a set of independent (predictor or explanatory) variables. Logistic regression generates the coefficients (and its standard errors and significance levels) of a formula to predict a logit transformation of the probability of presence of the characteristic of interest:

\[ \text{logit}(p) = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \ldots + b_k X_k \]
Where \( p \) is the probability of presence of the characteristic of interest. The logit transformation is defined as the logged odds:

\[
\text{odds} = \frac{p}{1-p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}}
\]

And

\[
\logit(p) = \ln\left(\frac{p}{1-p}\right)
\]

Rather than choosing parameters that minimize the sum of squared errors (like in ordinary regression), estimation in logistic regression chooses parameters that maximize the likelihood of observing the sample values 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.

4. RESULTS AND DISCUSSION

In this chapter the results of the descriptive analysis, econometric model and FGT indices are presented.

4.1. Prevalence and Intensity of Poverty

In this section, the estimated poverty line, the prevalence and the intensity of poverty among the sample pastoral households is presented using the approaches specified and discussed in chapter three. The first part of this section deals with estimation of poverty line, a benchmark, beyond which household is poor or non-poor.

4.1.1. Poverty line and prevalence of poverty

The minimum food poverty line is determined using the minimum level of kilocalorie consumption which is to be 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 which is calculated from the surveyed data available and was found to be Birr 2,517.81 per adult per annum shown in Table 1. The food poverty line obtained has to be translated and incorporate the expenditure required to attain basic non-food needs.

The total poverty line was obtained after adjusting for non-food expenditure using the average food share of the poorest half of the sampled pastoral households. The food share of the half of the poorest households was 69.79 percent. Dividing the food poverty line of Birr 2,517.81 by 0.6979 gives a total poverty line of Birr 3,607.69 per adult per year. This is approximately Birr 10.02 per adult per day.
Abrahim, A. M. 2019. The Determinants of Poverty among Agro-Pastoralists Households

### Table 1: Food consumption of the poorest half of the sampled households and value of food poverty line

<table>
<thead>
<tr>
<th>Food items</th>
<th>Mean Kcal/Kg/lt</th>
<th>Gram/ml consumed/day/AE</th>
<th>Kcal/day/AE needed</th>
<th>Mean price Kg/lt (Birr)</th>
<th>Price per Kcal (Br)</th>
<th>Value of food poverty line / yr (Birr)</th>
<th>Expenditure Share %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorghum</td>
<td>3805</td>
<td>96.20</td>
<td>366.04</td>
<td>501.3</td>
<td>10</td>
<td>0.0026</td>
<td>351.1</td>
</tr>
<tr>
<td>Maize</td>
<td>3751</td>
<td>85.98</td>
<td>322.53</td>
<td>441.7</td>
<td>10</td>
<td>0.0027</td>
<td>313.8</td>
</tr>
<tr>
<td>Wheat</td>
<td>3623</td>
<td>87.82</td>
<td>318.16</td>
<td>435.7</td>
<td>12</td>
<td>0.0033</td>
<td>384.6</td>
</tr>
<tr>
<td>Rice</td>
<td>3923</td>
<td>39.67</td>
<td>155.63</td>
<td>213.1</td>
<td>18</td>
<td>0.0046</td>
<td>260.6</td>
</tr>
<tr>
<td>Milk</td>
<td>737</td>
<td>57.06</td>
<td>42.05</td>
<td>57.6</td>
<td>16</td>
<td>0.0217</td>
<td>333.2</td>
</tr>
<tr>
<td>Meat</td>
<td>1148</td>
<td>0.36</td>
<td>0.42</td>
<td>0.6</td>
<td>65</td>
<td>0.0566</td>
<td>8.7</td>
</tr>
<tr>
<td>Oil</td>
<td>8964</td>
<td>18.88</td>
<td>169.25</td>
<td>231.8</td>
<td>40</td>
<td>0.0045</td>
<td>275.7</td>
</tr>
<tr>
<td>Sugar</td>
<td>3850</td>
<td>56.90</td>
<td>219.08</td>
<td>300</td>
<td>25</td>
<td>0.0065</td>
<td>519.3</td>
</tr>
<tr>
<td>Tea leaf</td>
<td>1190</td>
<td>1.68</td>
<td>1.99</td>
<td>2.7</td>
<td>70</td>
<td>0.0588</td>
<td>42.8</td>
</tr>
<tr>
<td>Salt</td>
<td>1780</td>
<td>6.38</td>
<td>11.35</td>
<td>15.5</td>
<td>12</td>
<td>0.0067</td>
<td>27.9</td>
</tr>
<tr>
<td>Total</td>
<td>2200</td>
<td></td>
<td>2517.814</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

In this analysis, based on the total poverty line of ETB 3,607.69, the poverty status of pastoral households revealed that 55.19 percent were poor households while 44.80 percent were non-poor households.

4.1.2. Intensity of poverty

Based on the total poverty line, the poverty absolute head count index indicates that 55.19% of the sample pastoral households are deemed poor. This index indicates the percentage of the population which was unable to meet the minimum amount of cost of basic needs (i.e., Birr 3,607.69 per adult equivalent per year). But head count ratio measure doesn’t tell the depth and severity of poverty. Hence to know how far the poor households are below the poverty line, poverty gap (FGT1) was computed from the survey data. It is a measure that captures the mean aggregate consumption shortfall relative to the poverty line across the whole population and was found to be 0.1046 which means that the percentage of total consumption needed to bring the entire population to the poverty line is 10.46%.

Furthermore, to address the poorest households, severity of poverty (FGT2) was calculated. Severity of poverty (FGT2) is a measure closely related to poverty gap but giving those further away from the subsistence level a higher weight in aggregation than those closer to the subsistence level.

Thus, the survey result demonstrated that the severity of poverty in the study area was 0.030.

### Table 2: Absolute poverty indices of sampled agro-pastoralist households

<table>
<thead>
<tr>
<th>Poverty indices</th>
<th>Index values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head count index (□=0)</td>
<td>0.551</td>
</tr>
<tr>
<td>Poverty gap (□=1)</td>
<td>0.104</td>
</tr>
<tr>
<td>Squared poverty gap (□=2)</td>
<td>0.030</td>
</tr>
</tbody>
</table>

Source: Own computation, 2018

4.2. Description of Variables Affecting Poverty

Based on the literature review on past research findings, experts and authors’ knowledge about poverty situation of the study area, the important determinants of agro-pastoral household poverty...
situation were identified. The identified agro-pastoral households poverty determinants thought to have relationship with poverty were discussed in the following sub-sections.

4.2.1. Demographic and economic characteristics of pastoral households

Variables such as age, sex and level of education of the household head, family size of the household, dependent ratio, food aid accessibility, income from milk, animal disease incidence, market distance, distance from water points, number of livestock owned and access to credit, were taken in to consideration. The results of the analysis made for each variable are presented in comparison between sample poor and non-poor.

Age of the household head: The mean age of household heads in the study area was found to be 47 years with standard deviation of 10.05. The younger age of the household head was 24 whereas the older age is 78 years. According to the survey result, poor households are headed by older persons compared to the non-poor which were led by relatively young aged persons. Besides, the mean age of poor household heads was 51 and that of non-poor was 44 years with standard deviations of 9.72 and 8.51, respectively. It was hypothesized that the age of the household head and poverty status is negatively related in the study area. Therefore, according to the results illustrated in Table 3, there is significant mean difference between poor and non-poor households with regard to age of household heads (t=-5.53, P = 0.000) at less than 1% significance level.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the household head</td>
<td>47.74</td>
<td>51.44</td>
</tr>
<tr>
<td>Family size</td>
<td>5.60</td>
<td>4.44</td>
</tr>
<tr>
<td>Dependent ratio</td>
<td>1.12</td>
<td>0.84</td>
</tr>
<tr>
<td>Livestock holding</td>
<td>22.18</td>
<td>15.82</td>
</tr>
<tr>
<td>Distance to market</td>
<td>16.08</td>
<td>3.87</td>
</tr>
<tr>
<td>Distance to water points</td>
<td>1.92</td>
<td>1.86</td>
</tr>
<tr>
<td>Animal disease</td>
<td>3.92</td>
<td>5.20</td>
</tr>
<tr>
<td>Income from milk</td>
<td>5422</td>
<td>7579.56</td>
</tr>
<tr>
<td>Amount of credit</td>
<td>7365.90</td>
<td>8393.47</td>
</tr>
</tbody>
</table>

Source: Own estimation result.
***, ** and * means significant at the 1%, 5% and 10% probability levels, respectively.

Family Size: The result of the study shows that the mean family size of sampled households was 5.60 in adult equivalent (AE) with standard deviation of 2.26. The minimum and maximum family sizes in AE were found to be 1.15 and 13.1 respectively. The mean family size of non-poor households was found to be less than that of poor households. The mean family size of non-poor and that of poor households was 4.44 and 6.54 respectively with standard deviations of 1.86 and 2.13 respectively. Results in the Table 3, indicates that the family size mean difference between the poor and non-poor households is statistically significant at less than 1% significance level. Based on the survey results the poor households tend to have higher family size. This result is inline with the prior expectation of those larger family size households are likely to be poor.

Dependency Ratio: The age structure of a household determines its dependency ratio. The study has identified age structure by comparing poor versus non-poor. The mean dependency ratio in AE of the sampled households of the study area was found to be 1.12 with standard deviation of 0.89. As indicated in the Table 3, the mean dependency ratio of poor households was 1.38 and that of non-poor was 0.80 with standard deviations of 0.97 and 0.65 respectively. The mean dependency ratio difference of the poor households and non-poor households is statistically significant at less than 1% significance level with t-value of -4.25. This indicates that poor households have larger dependency ratio compared to the non-poor households and are more likely to be immersed into poverty.
Livestock Ownership: Types and herds of livestock owned by the sample households were converted into tropical livestock unit (TLU), so as to facilitate comparison among the pastoral households poverty status. The maximum and minimum livestock holding in the study area were 70.44 and 2.42 respectively. The overall livestock holding mean was 22.18 livestock (TLU), having a standard deviation of 14.97. The mean livestock holding of the poor and non-poor households was 16.86 and 28.74 respectively. Test of mean revealed that there is statistically significant mean difference in livestock holding in TLU between the poor and non-poor at less than 1% significance level with t-value of 5.31(Table 3).

Distance from market center: 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-agro-pastoralists can have access to information, and display their output at fair price with good margin. The average distance to the nearest market for the sample households was 16.08 km. The average distance from the market for poor households was 16.92 km while for non-poor households, the average distance from market was 15.82 km. The mean difference between the poor and non-poor households is not statistically significant in terms distance from market (Table3).

Distance from water point: distance to water points play a vital role in rural communities for they are a source of water for both human and livestock. If the water point is near to the community, people can save time to involve other activities. It can also reduce the weight loss from the livestock during trekking to the water points. The average distance to the nearest water point for the sample households was 1.92 km. The average distance from the water point for poor households was 1.86 km while for non-poor households; the average distance from water point was 1.96 km. The mean difference between the poor and non-poor households is not statistically significant in terms distance from water points (Table3).

Animal disease incidence:While existence of the animal health services are crucial for the agro-pastoralist community like Fikdistrict, who depend significantly on livestock for their living, institutional veterinary centers that provide services to the animals of these agro-pastoralist communities are not well established and functional. The overall mean of disease incidence was 3.92 livestock in TLU per household, having a standard deviation of 4.98. The mean of animals lost due to disease for the poor and non-poor households was 2.87 and 5.20 with standard deviation of 3.25 and 6.30 respectively. The result sows that poor households had lesser number of animals dead due to animal disease incidence when compared to their counter parts which is opposite to the prior expectation of that the poor households have more animal disease incidence. This may be due to that having large livestock may increase the probability of having large animal death due to diseases. Test of mean revealed that there is a statistically significant mean difference in disease incidence between the two groups of households at less than 1 percent significance level.

Income from Milk:The amount of household income obtained from milk is one of the important factors determining poverty status. Having milk income can help to cover some of the food expenses incurred by the household. In view of the contribution of milk income sources to the livelihood of the sample households, it was attempted to see if measurable difference exists between the poor and the non-poor households. The fundamental assumption made in this regard was that, households who have the excess milk to sell are more likely to be non-poor than those who do not.

Data on milk income shows that the average annual milk income of the sampled pastoral households was Birr 5,422.46 with standard deviation of 6,790.24. The non-poor households’ annual mean of milk income was Birr 7,579.56 per household and that of poor households was Birr 3,671.41. The non-poor households’ annual mean of milk income was higher than that of poor households by Birr 3,908.15. The mean difference was significant at less than 1% probability level between the two poverty categories.
Sex of the household head: Sex of the household head was one of the demographic characteristics hypothesized to influence poverty status. It was found that among the total sample household heads 84% of them were male headed while 16% were female headed households. However, the chi-square test of sex distribution between the two groups was run and the difference was found to be not statistically significant.

Education level of the household head: Education plays a key role for household poverty status in the study area. It creates awareness and helps for better innovation and invention. The distribution of total sample respondents in terms of literacy level has shown that, 75.33% were illiterate at least they cannot read and write while the remaining 24.67% were literate, they could at least read and write. The study shows that 90.58% of the poor and 56.52% of the non-poor were found to be illiterate, while 9.42% of the poor household heads and 19.48% of the non-poor could read and write. Similarly, in this study the chi square test shows that there exists significant relationship/association between education level of the household head and poverty status at less than 1% level of significance. This indicates that educated household heads had chance to escape from poverty trap by using their education.

It was hypothesized that the households who received food aid were more likely to escape the risk of food insecurity. However, food aid was seen as unproductive in the long term perspective when it was not accompanied by development program that contributes to the development of the endogenous capacity. Survey result indicated that 52.59% of the sample household heads (54.11% of the poor and 50.72% of the non-poor households) were not receiving food aid while 47.41% of the sampled households (45.88% of the poor households and 49.27% of the non-poor) were reported that they were receiving food aid. The result also showed that there was no significant association/relationship between poverty status of the household and food aid.

4.3. Determinants of Poverty

Prior to the estimation of the model parameters, it is crucial to look into the problem of multicollinearity or association among the potential candidate variables. To this end, the variance inflation factor (VIF) was used to test the degree of multicollinearity among the continuous variables and contingency coefficients were also computed to check for the degree of association among the discrete variables.

Table 4: proportion difference test of dummy variables between poor and non-poor households

<table>
<thead>
<tr>
<th>Variable</th>
<th>Proportion</th>
<th></th>
<th>X²-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>categories</td>
<td>All samples</td>
<td>Non-poor</td>
</tr>
<tr>
<td>Sex of household head</td>
<td>male</td>
<td>129(83.76)</td>
<td>60(86.96)</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>25(16.24)</td>
<td>9(13.04)</td>
</tr>
<tr>
<td>Education Level of the HH head</td>
<td>illiterate</td>
<td>116(75.33)</td>
<td>39(56.52)</td>
</tr>
<tr>
<td></td>
<td>read and writes</td>
<td>38(24.67)</td>
<td>30(19.48)</td>
</tr>
<tr>
<td>Food Aid</td>
<td>Yes</td>
<td>73(47.41)</td>
<td>34(49.27)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>81(52.59)</td>
<td>35(50.72)</td>
</tr>
</tbody>
</table>

Note: *** significant at 1 percent probability level.
The values of VIF for continuous variables were found to be small (i.e. VIF values less than 10). To avoid serious problem of multicollinearity, it is quite essential to omit the variable with value 10 and more from the model analysis. Based on the VIF result, the data have no serious problem of multicollinearity. As a result, all the 8 continuous variables were retained and entered into the binary logistic regression analysis.

Similarly, the contingency coefficients, which measure the association between various discrete variables based on the chi-square, were computed in order to check the degree of association among the discrete variables. The values of contingency coefficient ranges between 0 and 1, zero indicating no association between the variables and values close to 1 indicating a high degree of association. Accordingly, the results of the computation reveal that there was no serious problem of association among discrete explanatory variables. The contingency coefficients did not exceed 0.75, which is often taken as a cut-off point. Hence, all the 53 discrete variables were entered into the analysis.

The sign, magnitude and level of significance of the estimated parameters are presented in Table 5. Likewise, the overall goodness of fit of the model, which indicates the overall prediction ability of the model and other pertinent statistics, are provided.

The maximum likelihood estimates of the binary logit model result shows that the household poverty status is determined by the interaction of several potential factors. To check measure of goodness of fit in logistic regression analysis, the likelihood ratio test (LR) that follows chi-square distribution with degree of freedom equal to number of explanatory variables included in the model was used. Accordingly, the chi-square computed shows that, the model was significant at less than 1% significance level. This indicates that the null hypothesis stating the coefficients of explanatory variables less the intercept are equal to zero was rejected and the alternative hypothesis of non-zero slope was accepted.

In linear regression, the R-square statistic measures the proportion of the variation in the response that is explained by the model. However, in logistic regression models, the R-square statistic cannot be exactly computed, so the pseudo R-square statistics for approximation of the goodness of fit is computed, instead. Larger pseudo R-square statistics indicates that more of the variation is explained by the model. In this study the pseudo R-square was calculated to be 0.54, which indicate that, 54 percent of the variation in the dependent variable was explained by the independent variables included in the model.

Out of the total twelve explanatory variables, seven variables were found to be significantly creating variation on the probability of households’ poverty status or determine the probability of being poor in the study area. Variables found to be significant include: Sex of the household head, age of the household head, family size, dependent ratio, education level of the household head, income from milk and amount of credit received.
Table 5: Maximum likelihood estimates of binary logit model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Robust Std. Err</th>
<th>Marginal effect</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMSIZE</td>
<td>.7122361***</td>
<td>.1671602</td>
<td>.1679542***</td>
<td>0.000</td>
</tr>
<tr>
<td>AGE</td>
<td>.0664406**</td>
<td>.032212</td>
<td>.0156675**</td>
<td>0.037</td>
</tr>
<tr>
<td>SEX</td>
<td>-1.519954**</td>
<td>.7538303</td>
<td>-.2936077***</td>
<td>0.009</td>
</tr>
<tr>
<td>DEPRATIO</td>
<td>1.512406***</td>
<td>.4573817</td>
<td>.3566444***</td>
<td>0.001</td>
</tr>
<tr>
<td>EDULEVEL</td>
<td>-2.743579***</td>
<td>.7286879</td>
<td>-.5911545***</td>
<td>0.000</td>
</tr>
<tr>
<td>TLU</td>
<td>-.0469409*</td>
<td>.0276634</td>
<td>-.0110693</td>
<td>0.102</td>
</tr>
<tr>
<td>DISTWATER</td>
<td>.491433</td>
<td>.4098601</td>
<td>.1158861</td>
<td>0.228</td>
</tr>
<tr>
<td>ANDISEASE</td>
<td>.0059127</td>
<td>.0820676</td>
<td>.0013943</td>
<td>0.943</td>
</tr>
<tr>
<td>MARKTDIS</td>
<td>.0774517</td>
<td>.052467</td>
<td>.0182641</td>
<td>0.139</td>
</tr>
<tr>
<td>MILKINCOME</td>
<td>-.0001375***</td>
<td>.0000464</td>
<td>-.0000324***</td>
<td>0.003</td>
</tr>
<tr>
<td>FAID</td>
<td>-.6921638</td>
<td>.5629829</td>
<td>-.1625441</td>
<td>0.214</td>
</tr>
<tr>
<td>CREDIT</td>
<td>-.0000779**</td>
<td>.0000367</td>
<td>-.0000184**</td>
<td>0.034</td>
</tr>
<tr>
<td>Constant</td>
<td>5.956073***</td>
<td>2.237383</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR chi2 (14)</td>
<td></td>
<td></td>
<td>115.69***</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td></td>
<td></td>
<td>-48.06</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td></td>
<td></td>
<td>0.54</td>
<td></td>
</tr>
</tbody>
</table>

Source: Model output from the survey data
Note: *, **, *** significant at 10, 5 and 1 percent probability level respectively.

**Family size:** The measure of the relationship between household size and poverty was also considered. In line with expectation, family size was found to have positive relation with poverty status of pastoral households and is statistically significant at 1% level of significance. The marginal effect shows as family size increases by one member, the probability of being poor increases by 16.79% while other things are held constant. The main cause behind is that, an increase in family size increases demand of food items, which, has its own impacts on poverty status of households. Thus an increase in family size is related positively with poverty status of households. Having more household size aggravates the chance of being falling in to poverty.

**Age of the household head:** This variable was found to have positive relationship and significant (at 5 percent probability level) influence on the probability of being poor. The interpretation of the marginal effect implies that, if other factors are held constant, the probability of being poor increases by 1.56% as the age of the household head increases by one year. The possible explanation for this would be the more the household head is older, the less labour force the household has to carry out livestock production and other income generating activities causing vulnerability to poverty.

**Dependency ratio:** This variable was found to be significant at less than 1% level of significance in determining the household poverty. The result shows that the variable was found to have positive relationship the probability of being poor in the study area. In other words, the probability thata household will be poor increases as the household size increases due to an increase in the number of dependents. The marginal effect of 0.35 implies that, keeping other variables constant, the probability of being poor increases by 35% as dependent adult equivalent increases by one. 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 households with large economically non-active members tend to be poorer than those with small family size.

**Level of Education of the household head:** Economic growth is driven by change in people’s capabilities or their human capital, as affected particularly by their education. Educated people can more easily contribute to the generation of new technologies and more readily utilize those technologies. Moreover educated peoples manage their livestock properly and then this activity results
have pushes to get good production and productivity of the livestock and other activities. The study result indicates that the level of education acquired by head of the household is one of the key determinants of the probability of the poverty status of the household and highly significant at less than 1% level of significance. The marginal effect shows, other things remaining constant, probability of being poor decreases by 59.11% as head of the household becomes literate.

**Income from milk sale:** This represents the amount of income the household has earned from sale of milk in the year. From the traditional experience and existing reality of the pastoral households, one way to get out of poverty, in part, is largely determined by their sale of milk from their animals. In this regard, households engaged in sale of milk are better endowed with additional income to get out of poverty. As expected, the contribution of income from milk is negatively and significantly (1% probability level) associated with household poverty. The marginal effect indicates that, other things being constant, the probability of the household to be poor decreases by 0.0032% as the household earned one more birr from sale of milk.

**Amount of credit received:** Credit is an important source of income. Those households who received the credit they wanted have better possibility to spend on activities they want. They purchase livestock for resale after they fattened them. The results of the study revealed that the variable under consideration is negatively related and significant at less than 5 percent probability level with the probability of being poor, holding other things constant, and the marginal effect of the variable shows that probability of being poor decreases by 0.0018% as the household credit increases by one birr. The possible explanation is that credit gives the household an opportunity to be involved in income generating activities so that derived revenue increases financial capacity and purchasing power of the household to escape from risk of food insecurity. Access to credit also smoothen consumption when household faces with hard time.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Understanding the factors (both socioeconomic and institutional) influencing the households’ poverty status is useful for future policy designs. This study attempts to identify and analyze the determinants of pastoral household’s poverty and its intensity in Fik district with four sample kebeles. To this end, random samples of 154 agro-pastoralist households were drawn from the selected kebeles based on probability proportional to size. Household demographic factors, socioeconomic and institutional related factors were the main driving forces for vulnerability of agro-pastoralists to poverty. The results of descriptive statistics and econometric model indicated that most of the hypothesized variables to influence agro-pastoralists’ poverty were significantly related with poverty.

In measuring poverty, cost of basic needs approach was used. After setting the poverty line by using cost of basic needs method, the FGT poverty index was used to estimate the intensity of pastoral poverty. Accordingly, out of the total sampled pastoral households 55.19% were poor; the remaining 44.80% were non-poor. The poverty line was Birr 3,607.69 per adult per year. The three common poverty indices were found to be 0.551, 0.104 and 0.030 for head count, poverty gap and poverty severity, respectively.

The mean differences of variables like age of the household head, family size of the household, dependency ratio, income from milk, animal disease incidence, market distance, number of livestock owned were significant at 1% level between poor and non-poor households. Again the mean differences of the amount of credit received were significant at 10% probability level for the two groups. Among the discrete variables only education level of the household has association/relationship with the poverty status of the household at less than 1% probability level. According to the result, the remaining hypothesized variables were not found statistically significant mean difference between the two groups or statistically significant association with poverty.

The result of the logit regression model revealed that out of 12 variables included in the model, 7 explanatory variables were found to be significantly affecting the poverty status of the households.
Accordingly, age of the household, total family size & dependency ratio were found to have positive association with probability of being poor of the household and statistically significant. Meanwhile, sex of the household head, education level of the household head, income from milk and amount of credit received were found out to have strong negative association with the probability of being poor.

5.2. Recommendations

Proper understanding of the characteristics and conditions that affect pastoral household’s poverty is an essential starting point and is a key to the formulation of policies, designing appropriate strategies and practical steps that the government can take in order to reduce poverty and promote sustainable growth.

Large family size and dependency ratio were found to be some of the key factors that contribute for the probability of being poor. Hence, the government and NGOs, particularly operating at the local levels should design sound implementation programs to put the already endorsed and existing population policy into effect. To this end, a focus on family planning and integrated health service and education provisions must catch the attention of decision-making bodies.

Accordingly, female headed households could not escape from poverty. This may be due to lack of technical assistance which decreases women’s workload and burden. So, empowering women and improving livestock production need special consideration. That is, planned interventions have to be implemented with clear strategies and indicators of socio-economic and political empowerment, for instance, increase their role in resource ownership and control.

The income from milk activities have become a supportive income source and able to determine household poverty status at 1% probability level. This indicates that a households could secure the income for selling their. Factors that can increase livestock productivity should be implemented such as the introduction of improved forage. Markets should be created the surplus milk produced by agro-pastoralists through encouraging the investment in modern milk plants.

Credit access need to be encouraged to the rural community for the very reason that its involvement in providing income generation. They use credits for livestock trading and selling after fattening. Therefore, integrating credit facility for agro-pastoralists in the study area has paramount importance for improving household income level.

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