Determinants of Poverty in Gebi-Resu Pastoralists Area of Afar Region, Ethiopia

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Abstract

Poverty in pastoral areas is complex, deep-rooted and multi-dimensional that derives from the cumulative effects of human induced and natural calamities. Poverty reduction is a long-term process and is not amenable to significant improvements in a short period of time. One has still to monitor changes over time to assess whether there is a positive direction and gains in poverty reduction. Then, in this case, a continuous systematic analysis of poverty both at national and sub national level is a necessary commitment of poverty reduction process. However, studies of this type in the area are very scanty. Hence, an attempt to fill in the research gap observed in poverty studies at micro level in Ethiopia, the present study was carried out in Gebi-Resu zone of Afar National Regional State with objectives of exploring the determinants of poverty. To achieve the aim of this study, data collection on household characteristics was conducted through interview schedules, checklists, FGD and key informant interviews. A multi-stage sampling technique was employed. In the first stage, two woredas, namely; Gewane and Awash Fentale were selected purposively; in the second stage, 4 pastoral Kebeles were selected randomly and in the third stage 130 pastoral households were selected randomly probability proportional to size. The data collected were analyzed and discussed using logit regression model. The result of logistic regression model revealed that out of 13 variables 8 are found to be significant. Accordingly, age of HH head, age at first marriage of HH head and livestock ownership (at less than 10% level of probability); family size (at less than 5% level of probability); and income from sale of livestock and livestock products, non pastoral income per AE and remittances were found to be significant (at less than 1% level of probability).

Keywords: poverty, logit regression model, Afar

1. Introduction

1.1 Background of the study

This day, the greatest challenge which confronts is how to reverse the unrelieved historical trend of deepening rural poverty both at national or regional level. Despite efforts being made and some signs of change, poverty and ill-being are appalling and staggeringly high (Ferdu, 2008; Devereux and Sharp, 2003) and Ethiopia is still among the poorest in SSA with a HDI of 0.328, which gives the country a rank of 157 out of 169 countries (UNDP, 2010). Poverty is manifested in low per capita income, low literacy rate, low primary school enrollment ratio, limited access to health services, safe water and sanitation facilities, high rate of infant, child and maternal mortality as well as short life expectancy.

Even though Ethiopia is well on the track to achieve universal primary education, adult literacy rate remains very low and is estimated to be 36 percent. Only 62 percent of the population has access to safe water and 88 percent lives under acceptable sanitation conditions. In 2009/10 the under - five mortality and infant mortality rates are 101and 45 out of 1000 live births, respectively. The maternal mortality ratio on the other hand between the years 2003-2008 was 720. Life expectancy has also declined at an alarming rate in to 56.1 years due to HIV/AIDS epidemics. The dependency ratio per 100 people is 86.5. The aforementioned figures were found to be extremely low compared to LDCs (UNDP, 2010; MoFED, 2010).

Pastoral poverty as a set of processes is multi-dimensional, with diverse causes that emanate from the cumulative effects of human induced and natural calamities and its complex challenges constitute the priority development agenda in the country (Taylor and Amdissa, 2007). Herders are poverty stricken with high vulnerability, food insecurity, minimal literacy rates, poor social services and a fragile ecosystem, submitted to unsustainable resource use practices (Pavanello, 2009; Eshetu, 2007). Range and herd yields, the mainstay of local livelihood, are declining, under the pressure of demographic growth, livestock disease and drought. The frequency of drought recurrence is greater than before manifested once every two to three years and, at times, once every year, affecting either big areas or small pockets (Beruk, 2004).

The statistical figures on the state of poverty would confirm what a casual observer would feel about poverty in Ethiopia: it is massive, chronic, deep and severe. Thus, the country is better known for its symbol of abject poverty all over the world (Abebe, 1999). Hence, it is no wonder then that poverty reduction is high on the agenda of the government, donors and non-governmental organizations operating in the country.

Since poverty analysis is a natural point of departure for the country analysis to meet the MDGs, designing a strategy, analysis of the magnitude and investigation of the root causes of poverty are imperative. A number of studies have sought to examine the extent of poverty in rural Ethiopia (Ayalneh, 2011). However, what have so

far been studied in Ethiopia, much if not all, concentrate on and reflect the national picture. But studies and analysis at an aggregate level do not necessarily reflect the situation at grass root level. Dercon and Krishnan (1996) strongly advise that one should be careful about the implications derived from measurement and factors of poverty at national level, because it hides many important differences that exist in different locations, and hence, are likely to be reliable only for particular localities.

Ayalneh (2011) stated that there should be a more disaggregated household survey and studies household level covariates that affect the probability of a rural household to be poor at a particular time. This kind of assessments are very critical in decentralized decision making like Ethiopia as the cause of poverty and its perceptions vary from place to place. Poverty alleviating programs also rely on geographic targeting as a crucial device to guide resource allocation (Ayalneh "*et al.*"., 2005). As such, studies of this nature are valuable to design and evaluate policies aimed at alleviating poverty.

To combat such weakening poverty in view of very scarce resources available to be allocated for the purpose, the poor must be properly identified and an index that takes into account the intensity of poverty suffered by the poor should be constructed (Ayalneh "*et al.*"., 2005). To mitigate the problem, even though it is not always possible to cover all the dimensions of poverty at any level, the study of poverty as a continuous process, needs to be supplemented by qualitative and quantitative measures (Thorbecke, 2005).

However, so far, analytical works that scrutinize poverty profiles and derive meaningful insight about various poverty-generating factors that determine the persistence of poverty in Ethiopia is at best scanty (Ayalneh *"et al."*, 2005), let alone in the pastoral communities of Afar region. Getaneh (1999) also pointed out that an enhanced effort still needs to be made to understand the complex realities of the Ethiopian poor. These arguments cement the very foundation for the urgency of researching poverty in general and undertaking a closer investigation on the correlates of rural poverty at lower level in particular. This would help in identifying the needs of pastoral communities in the fight against poverty and overall socio-economic development of their areas (PFE, 2006).

In an area like Afar, where life is intrinsically difficult, it will be of paramount importance to investigate the causes and consequences at the grass root level to deepen perspectives on poverty and bring an input in future policy interventions. Hence, this study attempts to fill the gap. Besides, it is anticipated that the results obtained would add to the wealth of information currently available on the determinants of poverty in Ethiopia. The updated estimates on poverty would provide about the nature and extent of poverty as experienced by pastoralists residing in Afar.

2. Rationale of the study

The study addresses the conditions facing pastoralists and on how to overcome the persistent and interlocking problems of poverty in the study area. This research is also significant in creating baseline information that may be extrapolated to other woredas and zones of the region. It is also believed that the results of the research are important in providing valuable information to prepare alternative livelihood development programs in the area. It is anticipated that the output of this study will be useful to the regional BPARD as well as the rural pastoralists in the operational area.

Furthermore, such an understanding of the determinants of poverty can effectively guide governments' efforts to reduce poverty by adopting more location specific and precise policy options. Moreover, the findings of the study will be useful to policy makers, NGOs and to the wide range of civil society's actors in devising follow up actions for the future of the country assessments on poverty. Micro level understanding of the major challenges of poverty has practical implications to help policy makers and planners in the formulation of new poverty policies. NGOs interested in promoting pastoral development in the study area would be benefited from the findings of the study. Furthermore, it paves the way and gives an insight to the researchers who are interested to conduct detailed investigations of the problems in other areas.

3. Research methodology
3.1. Description of the Study Area
3.1.1. Description of Gewane Wereda
Gewane is one of the six woredas of the Gebi-Resu zone. The woreda is bordered on the south by Amibara, on the west by Buremudaytu woreda, on the north-west by administrative zone V, on the north by the administrative zone I, on the east by the Somali Region and on the south-east by the Oromia Region. The Awash River defines parts of the boundary with Administrative Zones III and V.

The woreda consists of 7 kebeles of which two urban and seven rural (five pastoral and two agro-pastoral). It covers a total area of 59,640 ha. Based on the CSA report of 2008, in Gewane woreda 31,313 people reside; of which 5,982 are urban and 25,331 are rural dwellers. Therefore, more than 80% of the population of the wereda lives in rural areas. The woreda is generally semi-arid with a temperature level that falls between 28 and 42^0C, with an average temperature of 35^0C. Seasonal variations reveal that the temperature is moderate in the months between September and November and also in the months of December and January.

The highest temperature is in the months between March and May. It is generally low from June to August. The woreda receives an average annual rainfall of 320milli meter. Most of the rain is concentrated in the months of July and August. The land use pattern shows that out of the total area coverage of the woreda according to information from the livelihood survey result of Farm Africa, 35.0% used for grazing, 6.6% is covered with crops, 15% is arable land, 25.4 % covered with shrubs and the rest 18.36% either, barren or rocky and for settlement (Farm Africa, 2009).

Concerning livestock composition it has a total livestock population (cattle, shoat and camels) of 194,818.2 TLU (Farm Africa, 2009). The woreda has no livestock market place other than small daily village markets for only small ruminants. Gewane Agricultural Technical Vocational Training College is found in this woreda. Furthermore, there are 33 cooperatives currently working in the woreda.

3.1. 2. Description of Awash Fentale Woreda

Awash Fentale is one of the six woredas included in administrative zone-III of the Afar region. It is administratively divided in to six kebeles (kebena, Doho, Sabure, Dudub, Boloyita and Awash 01). It is bordered on the north by Amibara Wereda, on the west by the Awash River which separates it from Dulecha to the south-west then on the north-west by the administrative zone V, on the north by Gewane woreda, and on the east by Oromia region; and administratively, it is structured into 10 PAs.

The livelihood of inhabitants in Awash Fentale woreda is predominantly pastoralism, although agro pastoralism is also practiced. The two kebeles are purely pastoralists, one urban kebele and the rest practice agro-pastoralism. Furthermore, petty-trade and employment in local government and NGOs also constitute the means of living mainly for urban dwellers. In general, the main sources of food in the woreda are own livestock production, and some extent crop production, and also purchase of cereals from the market.

Based on the CSA report of 2008, in Awash Fentale woreda 29,775 people reside; of which 16,844 are urban and 12,931 are rural dwellers. As it was seen from table 2, unlike the low level of urbanization in the Afar region, 56.57% of the population in Awash Fentale is urban dweller.

Agro-ecologically the weather condition of the woreda is generally arid with an average temperature of 29.5^0C. The altitude of the woreda ranges between 720 and 1100 meter above sea level. Seasonal variations reveal that the temperature is moderate in the months between September and January while it is the highest in the months between February and May. Temperature is generally low in the months of July and August. The wereda receives an average annual rainfall of 575mm.
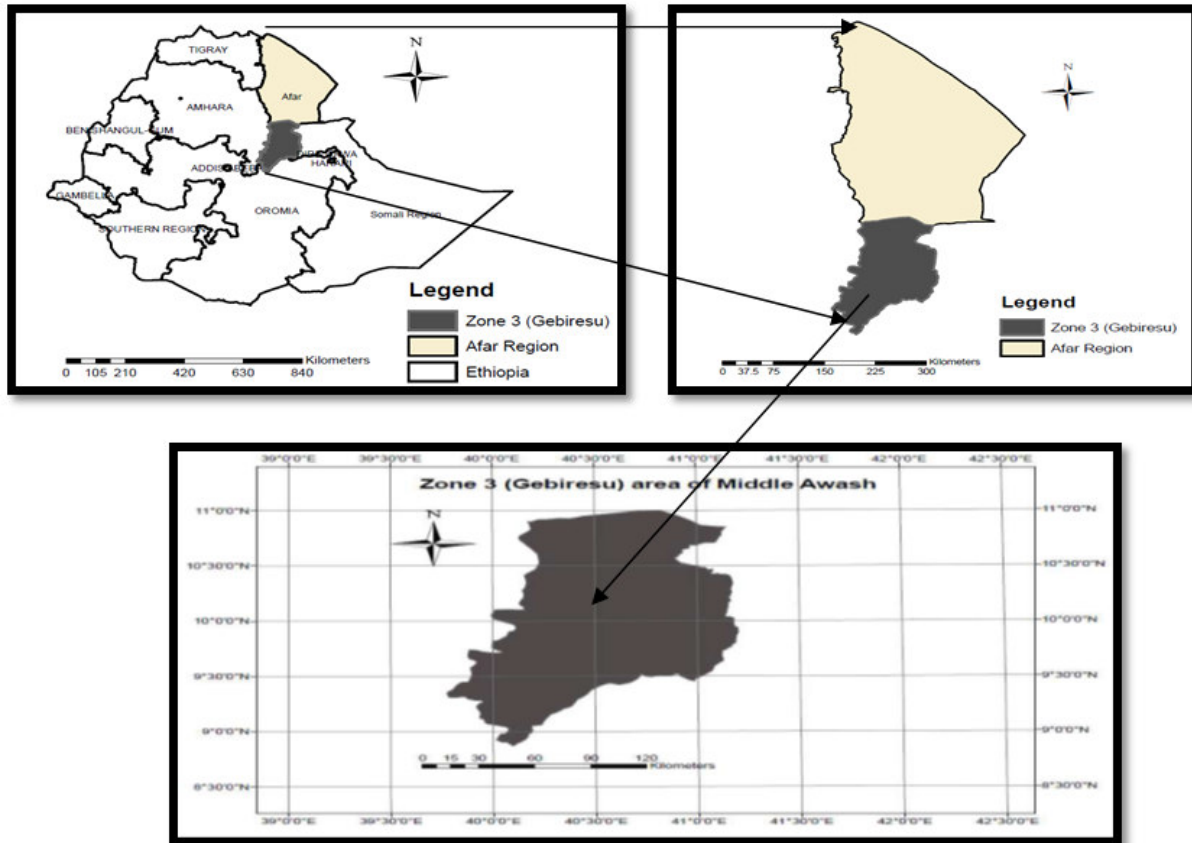

Figure 1. Location Map of the Study Area

3.2 Sources of Data

The research design followed a multi stage sampling method, both systematic and random sampling at woreda, village and household levels, respectively. In the first stage, two woreda namely; Gewane and Awash Fentale were purposively selected in Middle Awash based on frequency of shocks like flood and drought, food relief program and the subsequent death of cattle during drought season as criteria.

According to data obtained from Pastoral and Agro-pastoral Office of the study area, the lists of pastoral villages or PAs in the woredas are 7 and 6 respectively. Among these, two villages for each of Awash Fentale and Gewane woreda respectively were selected using random sampling techniques. Complete lists of household heads of selected four villages were not available at the Administration Office. But, according to the information obtained from clan leaders, the total number of households in Doho, Dudub, Biraforo and Adebaro respectively was found to be 75, 54, 71 and 95. Therefore, from those 4 villages, using random sampling techniques probability proportional to size, ˉ33, 24, 31 and 42 households a total of 130 household were selected as indicated in figure 3.

3.3 Data Collection Methods

Since complex studies of the socio-economic, demographic and institutional effects are labor-intensive, tedious and time-consuming, the study applied an interview schedule, Focus Group Discussions and Key Informant Interviews in targeting local communities for the selected areas. Participatory Rural Appraisal (PRA) technique like Wealth ranking was also applied to identify the wealth status of people using local criterion for measuring wealth. Checklists were also developed and used for collecting information. Finally, secondary data analysis also substantiated the findings of the primary data.

Before the actual data collection, several preparatory activities have done; group discussion with a few elders was conducted (both from Gewane and Awash Fentale). The discussion was important for re-designing the interview schedule and build trust in the research process. In many villages the head of the village is the most influential person and the first person to contact. This helped to ensure that the interview schedule received the greatest support throughout the village. Before conducting the field survey, five enumerators with practical knowledge of the area and well conversant with the culture and language were recruited. Three of the enumerators were diploma holders. But, a detail discussion was held with the enumerators about the interview schedule and trained about understanding the questions, interpretation and translation of concepts. It might build confidences of the enumerators and to make amendment in the interview schedule accordingly. The enumerators collected the required data under a close supervision of the researcher. The filled in interview schedule were thoroughly checked every day on the spot for the completeness and for re-interview if problem happened.

3.4 The Analytical Model

Once the HH level of consumption is determined and thus identified the poor and non- poor, the next step would be to identify the demographic, socio economic and other variables that correlate with the level of poverty. Then, relevant HH characteristics which potentially threaten the level of HH well being were identified. It is hypothesized that pastoralists household's poverty status is determined by a wide variety of factors such as; age of HH head, age at first marriage of HH head, remittances, family size, education level of the HH head, livestock ownership, income from livestock, income from livestock products, non-pastoral income, access to extension services, access to credit, access to human health services, distance to livestock market etc. In this study, some 13 independent variables hypothesized to affect household poverty were analyzed statistically. For this study a logistic regression model is used to assess the determinants of poverty. The analysis of logistic regression model shows that changing an independent variable alters the probability that a given HH becomes poor, and will help to produce the probability of being non poor HHs.

A variety of statistical models can be used to establish the relationship between HH characters and poverty. Models which include a 'yes' or 'no' type dependant variables are called dichotomous or dummy variable regression models. Such models approximate the mathematical relationship between explanatory variables and the dependant variables that is always assigned qualitative response variables (Guajarati, 1988). This includes the linear probability function (logit) and logistic distribution function (probit). The major point that distinguish these functions is binary or dichotomous (Hosmer and Lemeshow, 1989). When the dependant variable is binary (0, 1), the OLS regression technique produce parameter estimate that are inefficient and hetrosedasticity error structure.

As a result, hypothesis testing and construction of confidence intervals become 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 (Guajarati, 1988). It also creates a problem of non normality, hetrosedasticity of the disturbance term, therefore leading to lower coefficient of determination (Guajarati, 1988). To alleviate these problems and problem outcomes, the most widely used qualitative response models are the logit and probit models (Amemiya, 1981).

In the studies involving qualitative factors usually a choice is made between the two models. Because the

statistical similarities between the two models make the choice very difficult as Amemiya (1981) said. According to Hosmer and Lemeshow (1989), the logit and probit formulations are also comparable. They also indicated that logit has advantages over the others in the analysis of dichotomous outcome variables in that it is an extremely flexible and easy model from mathematical point of view and meaningful interpretations. For this study a logistic regression model is used to assess the determinants of poverty since it is easy to work with. The analysis of logistic regression model shows that changing an independent variable alters the probability that a given HH becomes poor, and will help to produce the probability of being non poor HHs and is mathematically specified as follows:

$$P_i = E\left(Y = \frac{1}{X}\right) = \frac{1}{1+e^{-(\beta_1+\beta_2 x_1)}}$$

Where; e – is the base of the natural logarithm which is approximately equal to 2.718

x_i - The ith explanatory variable

P_i – is the probability that an individual will make a certain choice gives Xi

α and $\boldsymbol{\beta_i}$ – are regression parameters to be estimated

The probability that a HH belongs to the non poor will be (1 - P_i).

$$1 - P_i = \frac{1}{1+e^{Z_i}}$$

Hosmer and Lemeshow (1989) indicated that a logit model can be written in terms of the odds, which enable one to understand the interpretations of the coefficients. The odds ratio is simply   the ratio of the probabilities of being poor (P_i) to the probability that it would be non - poor   (1- P_i). The odd ratio is specified as;

$$\frac{P_i}{1-P_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}}$$

Where; $z_i = \alpha + \beta_i x_i$

Therefore to get linearity both in variable and in parameters the natural log of the odd ratio should be taken. As p goes from 0 to 1, the logit goes from – α to α. That is, although the probabilities lie between 0 and 1, the logit Z are not so bounded (Guajarati, 1988). The model can be estimated through iterative maximum likelihood procedure with the help of SPSS software. The coefficient of the logit model represents the change in the log of the odds (poverty as 0 or 1) associated with a unit change in explanatory variable

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots + \beta_n X_n + U_i$$

Where; Z_i - poverty status of households

$X_1, X_2 \ldots\ldots\ldots\ldots X_n$ - are the explanatory variables

β_0 - intercept terms

$\beta_1, \beta_2, \ldots\ldots\ldots \beta_n$ - are the partial regression coefficients of parameters

 i - The ith observation; and

U_i - is the stochastic disturbance or the error term.

If the disturbance term is taken in to account, the logit model becomes

$$Z_i = \alpha + \sum \beta_i X_i + U_i$$

Referring multicollinearity as a situation where two or more explanatory variables can be highly linearly related, it is statistically desirable to sort out problem of multicollinearity among the continuous variables and check the association among discrete variables before estimating a model. If multicollinearity is perfect, the regression coefficients of the X variables are indeterminate and their standard errors are infinite. If multicollinearity is less than perfect, the regression coefficients, although determinate, possess large standard errors (in relation to the coefficients themselves), which means the coefficients cannot be estimated with great precision or accuracy (Gujarati, 2004).

Multicollinearity is essentially a sample (regression) phenomenon in the sense that even if the X variables are not linearly related in the population (i.e., population regression function), they can be so related in particular sample. In postulating the population regression function (PRF), it is believed that all X variables included in the model have a separate or independent effect on the dependent variable Y. But it can happen that in any given sample that is used to estimate the Population Regression Function some or all X variables are so highly collinear that we cannot isolate their individual influences on Y (Gujarati, 2004).

Variance inflation factor (VFI) technique is used to detect the problem of multicollinearity for continuous explanatory variables (Guajarati, 1995). VIF shows how the variance of an estimator is inflated by the presence of multicollinearity (Gujarati, 2004). Each selected continuous variable is regressed on the other continuous explanatory variable, the coefficient of determination (R^2) being constructed in each case. If an approximate linear relationship exists among explanatory variables, it will result in a 'large' value for R_j^2 in at least one of the test represents. A variable is said to be highly collinear, if R^2 exceeds 0.9 or VIF exceeds 10 (Gujarati, 1995). With regard to variance inflation factor, each selected explanatory variable X_i was regressed on all other explanatory variables, the coefficient of determination R^2 constructed in each case was evaluated to detect whether multicollinearity is a serious problem. VIF is expressed as;

$$VIF = \frac{1}{1 - R^2}$$

Where; VIF is variable inflation factor and R^2 is coefficient of determination. The higher R^2 would be the higher multicollinearity, variances and standard errors of the OLS estimates. A VIF value greater than 10 is used as a signal for existence of sever multicollinearity (Guajarati, 1995). 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. Similarly, there may also be an interaction between discrete variables, which can lead to the problem of multicollinearity or strong association. To detect this problem, coefficients of contingency were computed from

the survey data. The contingency coefficients are calculated as follows $C = \sqrt{\frac{x^2}{x^2 + N}}$

Where; C is the contingency,

x^2 is chi-square test and

N = total sample size.

The values of contingency coefficient range between 0 and 1, zero indicating no association between the variable and values close to 1 indicating a high degree of association, which means high degree of multicollinearity.

3.5 Variables and Working Hypothesis

Different variables are expected to affect poverty status in the study area. The major explanatory variables expected to have influence on the households to be poor or not are explained below. Review of literature, past research findings, experts and authors' knowledge of the food insecurity situation of the study area were used to identify the potential determinants of poverty. Therefore, the following variables were selected to analyze whether they explain poverty or not. Any exogenous variables having negative coefficients are expected to reduce poverty, whereas variables positively related with household poverty will deteriorate the well being of households. Therefore, demographic, biophysical and socio economic factors, which are expected to be relevant in pastoral livelihood systems in the study area are incorporated.

The dichotomous dependent variable used in the analysis is household poverty status, with an expected value of 1 indicating the probability of being poor and, 0 otherwise. In this case, a total of 13 explanatory variables, 9 continuous and 4 dummy, were included in the logistic regression analysis. These variables were selected on the basis of theoretical explanations and the results of various empirical studies. To identify explanatory variables considered as good predictors of the dependent variable, the logistic regression were estimated using the method of Maximum Likelihood Estimation. In this method the following independent variables assumed to explain the dependent variable were entered in the model; age of HH head, age at first marriage of HH head, family size, livestock holding, remittances, access to credit, access to extension services, income from sale of livestock and livestock products, non pastoral income, livestock disease incidence, distance to livestock market and access to human health facility. As a result, 8 explanatory variables significantly predicting the dependent variable are selected for the model analysis.

4. Results from Regression Econometric Model

The poverty status of a pastoral household generally is determined by wide ranges of factors. When speaking to the determining factors affecting household poverty, appreciably different factors can be observed. The poverty analysis was estimated using the binary logit model. The study has tried to address the objective and give empirical analysis. A binary logit analysis was carried out using software called Statistical Package for Social Sciences (SPSS) version 16.0.

As it is already discussed, Logit Model is selected to identify the determinants of poverty in the study area. Before running the model, however, the independent variables were checked for exhibiting multicollinearity effect using variance inflation factor (VIF) and Contingency Coefficients (C). Accordingly, for the computed values of VIF, all by far below 10, all the hypothesized continuous independent variables are included in the model for estimation of parameters. Similarly contingency coefficients were calculated for the discrete variables. Contingency coefficient ranges between 0 and 1. The computed values of contingency coefficients for all discrete independent variables reveal that they are not correlated and so multicollinearity effect is not observed. Therefore, nothing has been excluded from the model for exhibiting multicollinearity effect. Consequently, all explanatory variables are used to estimate the model as the contingency coefficients did not exceed 0.75, which is often taken as a cut-off point.

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dependent variable were entered in the model; age of HH head, age at first marriage of HH head, family size, dependency ratio, livestock holding, remittances, access to credit, access to extension services, income from sale of livestock and livestock products, non pastoral income, access to veterinary services, distance to livestock market and access to human health facility. As a result, 8 explanatory variables significantly predicting the dependent variable are selected for the model analysis.

Table 1. Definition of Explanatory Variables Used in the Model

Codes	Definitions of variables	Types	Expected signs
AGE.HH	Age of household head	Continuous	+
AGE.FM	Age at first marriage of household head	Continuous	−
FAM.SIZ	Family size in terms of AE	Continuous	+
DEP.RAT	Dependency ratio	Continuous	+
LS.OWN	Livestock ownership in terms of TLU	Continuous	−
REMITT	Remittances	Continuous	−
CRDT.ACS	Access to credit	Dummy	−
LSP.INCAE	Income from livestock and livestock products per AE	Continuous	−
NP.INCAE	Non-pastoral income per AE	Continuous	−
EXT.ACS	Access to extension services	Dummy	−
HHLTH.ACS	Access to human health services	Dummy	−
VET.ACS	Access to veterinary services	Dummy	+
DIST.LSMTK	Distance to livestock market in number of hours	Continuous	+

Table 2. Maximum likelihood estimates of the binary logit model

Variables	Coefficient	Odd ratio	Wald stat.	Significance
AG.HH	0.120	0.065	3.358	0.067*
AGE.1SM	- 0.194	0.101	3.645	0.056*
FAM.SIZ	-1.022	0.457	4.993	0.025**
DEP.RAT	2.718	2.207	1.517	0.218
CRDT.ACS	0.724	1.276	0.322	0.570
REMITT	-0.008	0.003	7.661	0.006***
LS.OWN	-0.181	0.093	3.747	0.053*
LSP.INCAE	-0.002	0.001	7.509	0.006***
NP.INCAE	-0.004	0.001	9.476	0.002***
EXT.ACS	-0.409	2.450	0.028	0.867
HHLTH.ACS	-0.261	1.169	0.050	0.823
VET.ACS	-2.670	1.625	2.702	0.100
DIS.LSMKT	1.233	0.442	7.796	0.005***
-2 Log likelihood	37.046			
Model chi- square	139.539(0.000) ***			
Sensitivity (percent correctly predicted poor groups)	94.5			
Specificity (percent correctly predicted non poor groups)	91.1			
Percent correctly predicted (count R^2)	93.0			
Sample size	130			

Source: Model output, 2011

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

Table 2 presented that out of those13 explanatory variables; only 8 variables are found to be significantly affecting pastoralists' household poverty status. Those variables which are important determinants of pastoralist as per the analysis result were; a) age of the household head (AGE.HH), b) age at first marriage of the household head (AGE.1STM), c) family size (FAM.SIZ), d) livestock ownership (LS.OWN), e) livestock income per AE (LS.INCAE), f) non pastoral income per AE (NP.INCAE), g) access to extension services (EXT.ACS) and h) distance to livestock market (DIS.LSMKT) are statistically significant at different probability levels; whereas, the coefficient of the remaining explanatory variables are not statistically different from zero at the conventional levels of significance. Out of the 9 continuous and 4 dummy variables, 7 and 1 respectively were found to be significant in affecting poverty.

The model results depicted on table 2 shows that the binary logit model correctly predicted 93.0% (130) of the total sample pastoralists, 94.5% poor and 91.1% non poor groups. However, it doesn't mean that the variables included are exhaustive. It implies that about 94.5% (123 HHs) of sampled respondents in the study area were

correctly predicted. The model Chi-Square statistic has been run to evaluate the performance of the model. Accordingly, the Chi-Square value was found to be 139.530 and the -2loglikilihood value of the model was 37.055 significant at l% probability level. This implies that the model fits the data very well; at least one of the parameters of the determinants of poverty in logistic regression equation is significant, indicating a relatively high explanatory power or goodness of fit of the model. Therefore, the null hypothesis stating all the coefficients of explanatory variables are zero is rejected. The coefficients of factors determining the state of pastoralist poverty in Gebi-Resu area of Afar region in the logit model result of this study indicates that most of the outcomes of the model analysis are quite relevant and indicative of the existing reality. Discussions on the statistically significant independent variables are here explained.

Age of Household Head (AGE.HH)
The study confirmed the hypothesis that as the head of the household gets older, the probability of the household to be poor increases significantly at less than 10% level of probability. That is, a household headed by old ages tend to be poor than youngsters. When the age of head of a pastoral household increases by a unit, the odds ratio favors poverty increment by a factor of 0.065. This direct relationship between age of household and poverty is a common finding in many empirical studies (Kefelegne, 2007; Muyanga "*et al.*" , 2006; Hilina, 2005; Ferdu, 2008; Tilman, 2001; Hanna, 2004; Marit and Andinet, 2008[1]), who explained relationships between age of HH head and poverty situation but inconsistent with the findings of Ayalneh "*et al.*" (2005) and Amao "*et al.*" (2009) as probability of a household being poor tends to diminish as age of the household head increases using per capita household calorie consumption. In pastoral areas, older people will have higher social benefit and less probable to be poor. However, it does not work for ordinary elders. It is true only for the clan leaders. The reason why households with younger heads are less probable to be poor might be the absence of polygamy and in turn as projected during group discussion, less payment of dowry for two or more wives. This would lead to less resource depletion. Besides, FGD revealed that in the infant stage of marriage for younger households, obviously, small size of family added to the great wedding gifts in the form of livestock from their parents, relatives and even from their clan members, makes them less probable to be poor. On the other hand, the reason why the older household heads are highly susceptible for poverty might be explained by their less motivation, energy and performance of engagement in other income generating activities. Furthermore, older herders have less capacity for mobility in search of graze and water so as to improve their livestock productivity as supposed necessary.

Age at First Marriage of Household Head (AGE1ST.M)
As a demographic factor which significantly affects pastoral household poverty at less than 10% level of probability, it is the age at which the household heads gets married at their first wedding. The result indicates a negative significant association with a household poverty status implying that if a household head gets married at the younger age, the probability of a household being poor increases. The odds ratio also signifies that, the probability of being poor increases by a factor of 0.101 as one gets married one year earlier before adolescence. The result is consistent with the findings of Hilina (2005). This shows that early marriage may lead to poverty since it paves the way for bearing large number of children and incapability to manage household resources at hand in short of experience. Moreover, getting married before being well organized physically, mentally and economically exposes the household to vulnerability.

Family Size (FAM.SIZ)
The estimated parameters with regard to size of the family as a demographic factor indicate an opposite relationship with the earlier proposition. This variable is significant at 5% probability level and has negative association with the household poverty. The odds ratio in favor of pastoral household poverty decreases by a factor of 0.457 as household size increases by one. The possible justification for this occurrence is the existence of large number of economically active than non active members of the community[2]. This result is consistent with the findings of Mulu (2008). It was explained in the descriptive analysis part that the dependency ratio for the non poor is lower than the poor ones[3], implying more labor input contributed from more number of family members; as poverty

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[1] As mean age in the household increases, the risk of falling into poverty also increases. This implies that as age composition increases in the household, productivity and productive capacity declines and hence income declines leading to persistent poverty.

[2] It was concluded by Hanna (2004) that large households are more probable to be poor, but size effect is most negative for households with many children, while large retired households are in lower danger.

[3] On average, in comparison to the non-poor, poor households tend to be younger by 2.70 years, have larger dependent ratio (27.50%) in three rural villages of Ethiopia (Ayalneh "*et al. *," 2005). Ayalneh (2011) also added that family size may have an ambiguous role in poverty status of rural households depending on the relative strength of size economies in consumption as against the diminishing return to scale.

status is a function of labor force. A chance of households with low dependency ratio to be non poor is high as can be confirmed by findings of Muyanga *"et al."* (2006) and Hilina (2005). The overall low ratio of dependency in the study area is the result of high child mortality rates. In this case, 22.3% of the respondents experience death the last two years in malaria and frequent outbreak of Atet (formerly cholera). Besides, the opposite association reflects the fact that in pastoral areas children at early age contribute to the household labor force. Looking after livestock is among the major activity of boys. Size of household in adult equivalent as a covariate that is negatively correlated with the probability of being poor is inconsistent with the findings of (Ferdu, 2008).

Remittances (REMITT)
It is an important continuous explanatory variable that can be gauged as one of the indicators of measuring poverty in Afar region. Remittances from other sources of finances are found to affect pastoral household poverty significantly at less than 1% level of probability. As can hypothesize earlier the coefficient is found to be negative, implying that the more households get remittance, the higher will be the tendency to be non poor. Interpretation of the odds ratio also indicated that the probability of pastoral household in being poor decreases by a factor of 0.003 as households obtain one more unit of income. The possible justification here is, remittance is done as part of their indigenous culture of helping each other deeds as pastoral community has a strong social cohesion. Thus, having relative economic support from abroad and within the country has positive impact in reducing the poverty status of households.

Total Livestock ownership in TLU (LS.OWN)
As hypothesized and expected, total herd size exerts a negative impact on the status of poverty for the pastoral household significantly at less than 10% level probability. The odds ratio of 0.093 means, a unit increases in the number of herd size in TLU decreases by the probability of being poor with a factor of 0.093. The implication is that, livestock possession can be used as a form of financial capital (savings and exchange for cash or food) and social capital (the basis for complex social support systems, based on loans and gifts of livestock and livestock products), apart from such contributions as prestige, transportation, stock replacement, reproduction, manure etc. Therefore, pastoralists who owned more livestock are able to assume more better off and little or no livestock as destitute ones. The negative significant coefficient for livestock ownership confirms findings in literature that argue that livestock assets are important means of escaping poverty (Hilina, 2005; Kefelegne, 2007; Mariara, 2002).

Income from Sale of Livestock and Livestock Products per AE (LSP. INCM)
This variable is found to affect negatively and significantly at 1% probability level influence the probability of being poor. The result of this study shows the sale of livestock and its products are a major source of income for the pastoralist communities and have a negative impact on the households' poverty status. The possible explanation is that as livestock resources are the main stay of the local economy, in the study area, pastoralist households who are engaged in earning more cash income from the sale of livestock and its products are better-off. Thus, such households would have a very high probability to get out of poverty compared to those who do not. In other words, larger annual income from livestock and its products per AE would affect the probability of being poor by providing a continuous source of cash flow to buffer the risk associated with adverse climatic conditions and other hazards. The result is consistent with the findings of Hilina (2005) and Kefelegne (2007). The interpretation of the odds ratio implies that the probability of being poor decreases by a factor of 0.001 as the pastoralist generates one more unit of income.

Non pastoral income per AE (NP.INCAE)
It refers an involvement of pastoralist in such alternative income generating activities as petty trade, land rent and handicraft. Non pastoral activities provide a substantial additional source of income. According to the result of the analysis, non pastoral income significantly affects pastoralist poverty at less than 1% level of probability. As expected, non pastoral income found to affect poverty figuratively and negatively. The odds ratio imply that, as the household earned one more unit of money from non-farm income generating activities per equivalent adults, the probability of the household to get out of poverty increases by a factor of 0.001. The reasonable justification here is the more households involve themselves in alternative income generating tasks, the higher is the tendency to be out of poverty as they are financially strong to resist or absorb shocks. These results are consistent with literature that argues that source of non-farm incomes enable households to escape poverty (Hilina 2005; Mariara, 2002; Kefelegne, 2007; Ayalneh, 2011; Aikaeli, 2010).

Distance to livestock market (DIS.LSMKT)
It was hypothesized that access to modern livestock marketing center is a necessary condition for an increase in pastoral household income and is expected to influence pastoral household poverty status negatively. The outcome confirms that this socioeconomic variable affects the household poverty status at a probability of less than 1%

level of significance. The odds ratio of 0.442 has an implication of a decrease in the distance of livestock market by a kilometer; the probability of a pastoral household to be poor diminishes by a factor of 0.442. This is because; when pastoralists travel for long distances across region especially for cattle and camel; they are highly susceptible on the way to lose animals through hunger and theft by the rival Issa clan. Since all the roads are covered with Prosopis Juliflora, Finally, the remaining animals reach the market thin and weightless and this adversely lowers the prices[4]. However, sheep and goats are sold at the small daily village markets losing the advantages of multiple buyers and thereby lacking bargaining powers. In all cases they are disadvantaged.

5. Conclusions and Recommendations

Many studies have been done to examine the determinants of poverty in rural Ethiopia. However, the multidimensional nature on causation of poverty allows us to examine their diverse factors contributing to pastoralist poverty. The complexities of their life situations call for multifaceted view of support. Since no single factor drives pastoralists into poverty, concrete action are needed to change their lives. This study also analyzed determinants of household poverty in pastoralist area.

The demographic and socio-economic characteristics of the herders such as age of household head, age at first marriage of household head, family size, livestock ownership in TLU, income from sale of livestock and its products per AE, non pastoral income per AE, access to extension services and distance to livestock market were found to be important correlates of pastoral poverty.

Since the majority of the population in the study area practices pastoralism, keeping livestock safeguard households from drought and other shocks, raise the ability of households to meet social obligations and enhance cultural identity. Livestock for herders is financial asset; as a source of food and storage of wealth; social asset; basis of social relationships through gifts, exchanges, fines etc, and capital asset; with careful tending, can drive households out of poverty.

Efforts should be made to improve the production and productivity of the sector so as to benefit much. Productivity can be improved through the use of improved breeds, introduction of alternative feed sources other than the natural grazing pasture, modern livestock production techniques (strategic feeding, feed storage, housing and etc.); and better management of communal grazing resources and risk management. Herders will also be assisted in provisions of adequate veterinary services and regular vaccination. Prevention of curable animal disease is expected to minimize livestock mortality and increase weight gains thus improving their income potential. Herders should also be supported in gaining access to drugs through the use of community animal health workers.

Apart from remittance, the contribution of livestock and livestock products to the household's income is high. And access to livestock marketing is a major precondition for livestock development. Even though livestock is the major investment of pastoralists, lack of access to market added to terms of trade shock, using local breeds and poor feed supplement aggravates the poverty situation of people in the study area. Pastoralists have less bargaining and purchasing power. Herders need to improve their access to markets through construction of access roads, provision of water along stock routes and improved security along market routes. Pastoralists are keen to see more markets open, a reduction in price fluctuations and the removal of barriers to access. Local community, NGOs and the local government has to work on improving market and road networking within the pastoral area and between pastoral and highlanders on top of everything plays crucial role to facilitate commercialization in the area. If there is good market integration, herders need a few animals to live more than their subsistent needs.

Identifying alternative livelihoods and diversification is a strategy aimed at generating additional sources of income that are less prone to seasonal or weather disturbances such as drought and flooding. Non pastoral livelihood will avert continued emergencies. To reduce dependence on the very volatile pastoral income, such income generating activities as small ruminant fattening, charcoal making, petty trade, production of handicrafts and feed processing from Prosopis Juliflora pods should be considered. Provision of working capital and grant funds are therefore necessary so that people will have some initial capital requirements. Mechanism for grant fund needs to be designed to make sure that the funds are able to rotate or used by other groups or individuals and make the operations self-sustaining.

In pastoral areas, veterinary, human health, water (for humans and livestock) and infrastructure services are inadequate and less accessible. But, the recent attention of the government to health and education is encouraging poverty alleviation. As a result of lack of rainfall in the area, many traditional hand-dug wells, and temporary rivers and ponds have dried up leading to water shortages for both human and livestock consumption and shortage of pasture. Concentration of livestock around limited number of watering points also favors rapid spread of disease. Besides, credit institutions are inexistent and only a few pastoralists have the knowledge of saving. Moreover, the service of extension is weak, though pastoralists are keen to adopt technologies like improved breeds which can foster production.

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[4] The inefficiency of livestock marketing in pastoral regions contributed to pastoral food insecurity (Eshetu, 2007).

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