

# Determinants of Poverty in Rural Tigray:Ethiopia Evidence from Rural Households of Gulomekeda Wereda

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## Abstract

The study was carried out at Gulomekeda wereda of Tigray National Regional State with the main objectives to describe correlates or determinants of rural poverty in the study area. In order to attain this objective the study made use of cross-sectional household survey data collected by Relief Society of Tigray (REST) from 191 sample households. The data collected were analyzed and discussed applying poverty index, descriptive statistics and logit regression model analyses. To this end, identifying poor and non poor households; examining the incidence, depth and severity of poverty in the community; demographic and socioeconomic characteristics of poor and non poor households and measurement of the dimensions of poverty have been made. Using cost of basic needs approach the study found that total poverty line (food and non food poverty line) of the area is 2094 birr per year per adult equivalent. Using this poverty line as bench mark the study indicated that 51 percent of the households are poor. The result of the logistic regression model revealed that out of 12 variables included in the model, 8 explanatory variables are found to be significant up to less than 10% probability level. Accordingly, total family size & dependency ratio were found to have positive association with poverty of the household and statistically significant. Meanwhile, farm size, total livestock owned (TLU), value of asset, educational status of the household head, access to credit and access to off farm income were found out to have strong negative association with the households poverty status and statistically significant up to less than 10 percent level of significance.

## 1.Introduction

In most of developing countries larger population are living in rural than urban: some 3.1 billion people, or 55 per cent of the total population, live in rural areas out of this about 1.4 billion people live on less than US\$1.25 a day, and close to 1 billion people suffering from hunger. In most of the developing countries, the numbers of people who are poor and hungry are increasing. About 70 per cent of the world's very poor people (around one billion) are rural, and a large proportion of the poor and hungry amongst them are children and youth. Despite massive progress in reducing poverty in developing countries the rural people are suffering from poverty resulted from lack of assets, limited economic opportunities, poor education and capabilities. (IFAD, 2011)

Many rural populations in Ethiopia live around the poverty line, moving in and out of poverty and food insecurity. On average the income of the rural poor is 12.1% far from the poverty line, while it is 10.1% for the urban poor (MoFED, 2006). Poverty in Ethiopia is highly correlated with the size and composition of households, the educational level of household head, the degree and extent of dependency within the household, asset ownership (particularly ownership of oxen in rural areas), the occupation of household heads, rapid population growth, major health problems, lack of infrastructure and extreme environmental degradation. (MoFED, 2002:17). Thus identifying what characteristics are correlated with rural poverty, can yield critical insights for policy makers.

Approximately 83% of Tigray households rely on agriculture for their major livelihood strategy. According to REST, (2011) report, per capita agricultural gross domestic product and per capita grain production has been declining over the past three decades, only marginal improvement in recent years, perpetuating rural poverty as food price rise without a similar rise in rural incomes. Smallholder farmers, accounts for more than 90% of agricultural production in rural Tigray, face constraints including shortage of land, land degradation and soil infertility, poor terms of trade and lack of investment, erratic and unpredictable rainfall patterns, poor access to market, few off farm employment opportunities, low agricultural productivity and chronic illness (REST, 2011))

Out of 4.314 million total population in Tigray region (CSA, 2007), 83 percent of the total population are located in rural areas and majority of these remain chronically food insecure and vulnerable to shocks and potential disasters. Rural poverty rates have declined however half of the population continue to live below the poverty line and have a low per capita income \$139 (world bank: 2007): the decline in rural poverty has been largely attributed to food security and antipoverty rural programs including the productive safety net program. The study area, Gulomekeda wereda, is severely deforested, it suffers from acute and chronic poverty almost every year. (REST, 2011)

There are limited researches conducted on poverty and its correlates in northern Ethiopia. The implication is that the poverty situations of the area were not given attention. Beside this, most research papers

focuses on the national level determinants of poverty than at wereda level. Measuring and analysis of poverty, on wereda rural households becomes sound enough to put an agenda on the poor, targeting of policy makers in intervening on that particular study area.

## 2. Analysis and interpretation

### 2.1 Descriptive Analysis

Extent of poverty in Rural Gulomekeda

From the survey data a poverty line of 2094 birr per adult per year is constructed. The poverty line is constructed by first identifying the poorest 50% as a reference household deemed to be typical of the poor. Next, the researcher identifies the food items commonly consumed by the reference household to constitute the food bundle. In this case, a total of 17 food items are chosen and their quantity is determined in such a way that the bundle supplies predetermined level of minimum calorie requirement – 2200 Kcal. Having selected the bundle of goods, the researcher then valued it using a median price for each food item in the basket based on internal price data. The researcher expressed consumption expenditure in terms of 2010 prices following the approach described in Ravallion and Bidani (1994) to estimate the required non-food share by examining the consumption behavior of the reference household who can just afford the reference food bundle. The non-food share is estimated by regressing the share of total expenditure devoted to food of each household  $i$  on a constant and the log of the ratio of consumption expenditures to the food poverty line as stated above in the literature part.

Table 2.1: poverty lines at market price

poverty line	Value at market price
<b>Food poverty line</b>	1716 Birr per year
<b>Non food poverty line</b>	378 Birr per year
<b>Total poverty line</b>	2094 Birr per year

Source: own computation REST /2010/ data

This market price poverty line reflects the norm, the culture, the taste and preference of the societies' situation in the study area. This poverty line (2094 birr per adult) is adopted for this study and used to estimate the poverty indices in the study area.

Based on the calculated poverty line out of the total sample households 49 percent were non poor(94 households) and 51 percent were identified to be poor(live on less than 2094 birr real consumption per adult equivalent per year)

Table 2. 2: Category of households in to poor and non poor

Household category	Number of households	Percent
<b>Non poor</b>	94	49
<b>Poor</b>	97	51
<b>Total</b>	191	100

Own computation based on REST /2010/data

### Poverty indices

Given information on welfare measure such as consumption, and poverty line, then the only remaining problem is deciding on an appropriate summary measure of aggregate poverty. There are number of aggregate measures of poverty that can be computed as discussed in literature part in chapter two. There are three widely used poverty indices, the incidence of poverty also called the headcount index ( $p_0$ ), the aggregate poverty gap ( $p_1$ ) and the squared poverty gap ( $p_2$ ): the head count index is the share of population whose consumption is below poverty line, that is the share of population who cannot afford to buy basic basket food items and essential non food items. The poverty gap provides information regarding how far households are from poverty line. This measure captures the mean aggregate consumption short fall relative to the poverty line across the whole population. In other words, it estimates the total resources needed to bring all the poor to the level of poverty line. Poverty severity (squared poverty gap index) takes in to account not only the distance separating the poor from poverty line (poverty gap) but also the inequality among the poor. It places a higher weight on those households further away from the poverty line.

Accordingly, the poverty indices were calculated using the FGT measures and found out to be 0.51, 0.15 and 0.059 for head count, poverty gap and poverty severity, respectively

Table 2.3: poverty indices of sampled household.

Poverty indices	Index number	
	Food poverty	Total poverty
<b>Head count index(<math>\alpha=0</math>)</b>	0.37	0.51
<b>Poverty gap(<math>\alpha=1</math>)</b>	0.087	0.15
<b>Squared poverty gap(<math>\alpha=2</math>)</b>	0.03	0.059

Source: own computation REST /2010/ data

As already discussed above the poverty measure ( $P\alpha$ ) developed by Foster, Greer and Thorbecke (1984) are used to explain the extent of poverty in the study area. The resulting poverty estimates for the study area (Table 4.3) shows that the percentage of poor people measured in absolute head count index ( $\alpha = 0$ ) is about 51%. This figure indicates that this proportion of the sampled households in Gulomekeda wereda live below absolute poverty line. This implies that 51% of the population are unable to get the minimum calorie required (2200 kcal per day per adult) adjusted for the requirement of non food items expenditure. Putting differently, these proportions of sample households are unable to fulfill the minimum amount of income i.e., Birr 2094.00 per adult equivalent per year and live under absolute poverty. The poverty gap index ( $\alpha=1$ ), a measure that captures the mean aggregate consumption shortfall relative to the poverty line across the whole population is found to be 0.15 which means that the percentage of total consumption needed to bring the entire population to the poverty line is 15%. Similarly, the FGT severity index (the squared poverty gap,  $\alpha=2$ ) in consumption expenditure shows that 5.9% fall below the threshold line implying severe inequality. In other words, it means that there is a high degree of inequality among the lowest quartile population.

Food poverty indices calculated above shows, the share of the population whose consumption expenditure below the food poverty line is 37% which is 14% less than the proportion of people who are under absolute poverty. This implies that food poverty contributes more to aggravate total poverty. The food poverty gap indicates poor households are 8.7% far off from the food poverty line. Severity of food poverty of the sample household accounts 3%.

## 2.2. Econometric Analysis

There are 200 households in the data for rural Gulomekeda. However data diagnosis results revealed that out of the total 200 households 9 households were found to have non stated values for total household consumption, so these households were dropped from the analysis. Thus the logit estimation is based on the data for 191 households.

The selection of the explanatory variables was guided by the conceptual framework discussed in methodology section taking in to account poverty profiles used in previous empirical works in Ethiopia and developing countries. A key consideration was given in selecting arguably exogenous variables that are not determined by the current economic system rather possibly determine the current household welfare. The explanatory variables include demographic, socioeconomic and other characteristics of the household. The capital base include both physical and human capital base of the household i.e. the number of adults (age between 15&65) and educational attainment of the household head. The demographic and other characteristics of the household include age of the household head and its squared value in order to capture any possibilities of lifecycle effects, sex of the household head, household size including the number of juniors (under age 15) and number of seniors (age above 65)

Binary logit model was used to identify potential socio economic determinants of poverty status of rural households. Multicollinearity diagnostics test was done to check the presence of high co linearity among and between each independent variable. Different methods were employed to check the presence of multicollinearity for continuous and discrete explanatory variables. Variance inflating factor (VIF) and condition index (CI) were used to check for multicollinearity problem among and between continuous variables. For continuous variables VIF and CI and for discrete variables coefficient of contingency (CC) was computed using STATA software. For this case, based on the results of the diagnostic tests for both discrete and continuous variables, no variable was found to be highly correlated or associated with one or more of other variables.

## 2.3 The Determinants of Poverty Using Logit Model

Finding the factors that contribute to poverty goes beyond the descriptive analysis and requires employing econometric analysis. Multivariate econometric analysis helps us to identify factors influencing the extent of poverty. As it was discussed in the methodology part of this thesis, a logit model is estimated to identify the major determinants of poverty of households. The variables described in the descriptive analysis are used as explanatory variables in logit model. Using the household poverty as a dependent variable where by a value of 1 is given to households being poor and 0, otherwise. Considering the absolute poverty line, the researcher looks through factors that determine the household to fall below the poverty line.

Table 2.3 below regresses the binary response variable, the probability of being poor ( $P(Y=1)$ ). A

glance at the results verifies that most of the explanatory variables in the model have the signs that conform to the researcher's prior expectations. It is also evident that most of the variables are statistically significant at 10% or lower level. Employing both criteria, the results from the data across the study area highlights the importance of household resource endowment in determining poverty. Total farm size, off farm income, access to credit, value of productive asset, dependency ratio, family size, livestock owned and educational status of the household head are both significant in determining the probability of a household to be poor.

Table 2.3: Output of the model.

Variables	Coefficient	p-value	Marginal effect
Hsexd2	-.372	0.542	-.09
Farmsize	-1.959*	0.004	-.49
Disnear	-.002	0.427	-.00
Valueasset	-1.230***	0.081	-.18
age2	-.002	0.154	-.00
Depenratio	.288***	0.057	.72
Hheduc	-.965**	0.029	-.23
Hhhage	.182	0.147	.04
Doyaccr	-1.553*	0.002	-.36
Offincome	-1.417*	0.002	-.34
Famsize	.450*	0.001	.38
Tlu	-.335**	0.017	-.85
Cons	-3.348***	0.080	
Sensitivity	91.75%		
Specificity	93.62%		
Counted R2	92.67%		

Source: model output

Note: \*, \*\* and \*\*\* indicate that the coefficients are statistically significant at 1%, 5% and 10% level

Interpretation of Variables from the Model Output (logistic regression)

**Family size:** In line with expectation, family size was found to have positive relation with poverty status of rural 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 3.8% while other things are held constant. The main cause behind is that, as family size increases there is no access to have more land for cultivation to meet the demand of large family size. The per capita land size falls. It creates more pressure on food consumption with other factors remaining constant. Having more household size aggravates the chance of being falling in to poverty. This finding was consistent with the research result of Ayalneh et.al (2008).

**Dependency Ratio:** This variable is found to be significant at less than 10% level of significance in determining the household poverty. The result shows that the variable is found to have positive impact on the probability of being poor in the study area. In other words, the probability that a household will be poor increases as the household size increases due to an increase in the number of dependents. The marginal effect of 0.72 implies that, ceteris paribus, the probability of being poor increases by 72% 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.

**Off-farm income:** This represents the amount of non-farm income (in cash or in kind) the household or any member of the household has earned in the year. From the traditional experience and existing reality of the rural households and their members, one way to get out of poverty, in part, is largely determined by their ability to get access to non-farm income opportunities. In this regard, households engaged in non-farm activities are better endowed with additional income to get out of poverty. As expected, the contribution of non-farm income 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 34 % as the household earned one more unit of money from non-farm income.

**Educational status of household head:** The coefficient on education reflects the prime role that human capital plays in determining poverty. In fact, education is an important dimension of poverty itself, when poverty is broadly defined to include shortage of capabilities and knowledge deprivation. It has important effects on the poor children's chance to escape from poverty in their adult age and plays a catalytic role for those who are most likely to be poor, particularly those households living in rural communities. Education is expected to lead to increased earning potential and to improve occupational and geographic mobility of labor. Therefore, it deserves an important place in formulating poverty reduction strategies.

Educational status of the household head is negatively related with the dependent variable (probability of being poor) and is statistically significant at less than 5% level of significance. Although, educational status of

other income earner household members have great importance, that of head plays a significant role in shaping household members by being exemplary and willing to invest on education. The marginal effect shows, other things remaining constant, probability of being poor decreases by 23% as head of the household becomes literate. It is explained in terms of contribution of education on working efficiency, competency, diversify income, adopting technologies and becoming visionary in creating conducive environment to educate dependants with long term target to ensure better living condition than illiterate ones. Thus, being literate reduces the chance of becoming poor in the sample households. The study is consistent with the finding of Fitsum H. and Holden S. (2003)

**Value of asset owned:** Value of asset owned by the household is significant at less than 10 percent level of significance and related negatively with probability of being poor. This shows that household with broaden asset were able to be above poverty line. Under ceteris paribus condition, the marginal effect depicts probability of being poor decreases by 18% as asset ownership increases by one. Household with valuable assets were expected to use those assets to improve their welfare, both by using the asset to help the household to work more efficiently and therefore increase income, or through the ability to sell off the asset when household experiences shock or crop failure. The finding of this study is supported by coates, Webb and Houser (2003)

**Household access to credit:** The results of the study revealed that the variable under consideration is negatively related and significant at less than 1 percent probability level with the probability of being poor. Holding other things constant, the marginal effect of the variable shows probability of being poor decreases by 36% as a household has access to credit. 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. The result of this study is also consistent with the finding of Ayalneh B. and Alemu S. (2009), Latifee (2003).

**Size of farm Land:** Size of farm land, which is significant at less than 1% probability level, has negative influence on the probability of household's being poor in the study area. It implies that the probability of being poor decreases with large farm size. This agrees with the hypothesis that farmers who have larger farm land holding would be less poor than those with smaller land size, due to the fact that, larger farmers are associated with higher possibility to produce more food. Household with large size of land can have wealth and income which increases availability of capital that could increase the probability of investment in purchase of farm inputs which increases food production and hence ensuring food security of farm households. The marginal effect of 0.49 for the total cultivated farm size implies that other things kept constant, the probability of being poor decreases by 49 % as the total cultivated farm size increases by one hectare.

**Number of livestock in tropical livestock unit (TLU):** One of the determinants for rural household poverty is total livestock held by the household. As hypothesized the livestock owned by the household has significant and negative correlation with the poverty level of the household. The logic behind is that livestock rearing helps the poor in many ways such as income from sale of products, insurance against drought, emergency cash requirements, tenancy for share cropping, household nutrition, fuel for cooking, manure for crops, drought power for farming, store of value e.t.c. Livestock ownership increases the wealth of the rural household and raises the income earning potential. The finding is supported by Upton M, and J.Otte(2004) research project.

### 3. Consumption Inequality

Measuring inequality focuses on the entire population rather than only on poor households. Out of the possible measurements of inequality the simplest way to measure inequality among individual households is by dividing the whole population from the poorest to the richest and show the percentage of consumption expenditure attributed to each quintile of the population. This answers questions such as how much percent of the total expenditure is made by the poorest 20 % (or the poorest 10%) or the richest 20 % (or the richest 10%)

Table 2.4: Summary of adult consumption expenditure in each quintile

Quintile group	Mean	%mean expenditure	Frequency
First quintile	4585.758	9.32	39
Second quintile	7519.372	15.28	38
Third quintile	9308.313	18.92	38
Fourth quintile	11864.64	24.11	38
Fifth quintile	15917.05	32.35	38
<b>Total</b>	<b>49195.133</b>	<b>100</b>	<b>191</b>

Source: own computation REST /2010/ data

From table above, one can understand that the poorest quintile (i.e. the poorest 20%) consumes only 9.32% of the mean expenditures per year per adult, while the share of the richest quintile (i.e., the richest 20%) is 32.35%. Furthermore, the mean expenditure of the first two quintiles (i.e. the poorest 40%) is 24.6% still lower than the share of the richest 20% that is 32.35%. This distribution indicates there is a gap in welfare among the



population. The most widely used single measure of inequality is the Gini-coefficient. As the researcher estimated using DASP software the Gini-coefficient is 0.30. If we express it in percent Gini index is 30%. That is total inequality of the population accounts for 0.30 or 30%. This shows that there is low inequality among population.

#### **4. Conclusion and Recommendation**

##### **4.1. Conclusion**

The study uses the level of households adult equivalent consumption expenditure to categorize the population as the poor and non poor. This way of welfare measure is based on the literature that household's expenditure inversely varies with the level of poverty. The overall objective of this study is to describe determinants and dimensions of poverty in Gulomekeda wereda rural kebeles to this end, 191 household head were randomly selected in order to show the magnitude of poverty. FGT index is applied and the same time Ravallion and Bidane(1994) method is used to set poverty line. The total poverty line calculated is 2094 birr per year per adult equivalent. Accordingly Percentage of the poor is 51 percent. The poverty gap in the study area is 15 percent of the poverty line 2094 birr i.e. 15 percent of the poverty line is required to make all poor above poverty line or to escape from poverty. The estimate of the poverty gap square is 5.9 percent.

In order to examine the parametric relationships and to identify key covariates of poverty an Econometric method of estimation is used. That is logit method is used to identify correlates of the consumption based household's welfare. The result of the binary logistic regression model from STATA revealed that that out of 12 independent variables included in the model, 8 of the explanatory variables are found to be significant up to less than 10 percent probability level. Accordingly, total family size & dependency ratio are found to have positive association with poverty of the household and statistically significant. Meanwhile, farm size, total livestock owned(TLU), value of asset, educational status of the household head, access to credit and access to off farm income are found out to have strong negative association with the households poverty status.

Outcome pertinent to Welfare inequality reveals that there is great variation in consumption expenditure of the households. The poorest 20 % of the population has mean yearly consumption expenditure of Birr 4585.75, where as the mean yearly consumption expenditure of the richest 20% is birr 15917.05. the researcher estimates Gini coefficient and the result is found to be 0.30. That is total inequality of the population accounts for 0.30 or 30%.

Keeping the above finding in mind and considering the results, the study concludes households with less endowments of physical and social capital are prone to poverty. There is strong evidence that education status of household head, access to credit and non farm income varies inversely with consumption based poverty status. Apart from this, family size and dependency ratio positively affect poverty. Citrus paribus, households with large family are usually poor.

##### **4.2 Recommendations**

It has been observed that the dimensions and causes of poverty are vast and complex. Poverty affects people of different characteristics in different ways, because they play different roles, have different needs and face different constraints and opportunities. It is most likely that communities or households in extreme poverty differ from the average and non-poor communities/households in several distinct ways such as in accessibility of social services, demographic characteristics, and other socio-economic conditions. Proper understanding of these characteristics and conditions constitutes 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 at macro and micro levels.

One of the millennium development goals is reduction of poverty and hunger. Currently, poverty situation is global agenda. Thus, this research has tried to explore the covariates of rural poverty using a sample of 191 representative households taken from the rural kebeles of the wereda. Based on this, the following recommendation was made.

Large family size and dependency ratio are found to be some of the key factors that contribute for sever poverty. 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 in to effect. To this end, a focus on family planning and integrated health service and education provisions must catch the attention of decision-making bodies.

Most poor households did not have access to credit and off farm income which has great potential to assist them to graduate from poverty. It is recommended that credit delivery mechanism should continue targeting the poor which helps them to purchase agricultural inputs and the provision should be accompanied by continuous follow up and technical support. Besides households with off farm income are better endowed with better and additional income thus, government should encourage and create nonfarm jobs for rural households.

Livestock is considered as asset which is liquid a security against crop failure. They help to plough

fields and provide means of transportation. So in order to strengthen their benefit for the poor, technical advice and training how to use livestock should offer to make them above poverty line.

Based on the logit model output, educational level directly varies with the level of household welfare. Thus, it is recommended that both formal and informal educations which broaden thinking capacity of the poor should be flourished. Adult education should be given attention.

The livelihood of many households in the wereda was and is seriously affected by the repeated and recurrent drought. Thus, food assistance may not be a long-term solution to the underlining causes of household poverty, it seems imperative to continue the relief handout for some time to keep alive those who have no access either to produce or buy food. But, the link with the employment generating schemes would help both in reducing dependency syndrome and contributing to local development.

Lastly, this study has attempted to come up with the result of the analysis with defined scope however a lot remained to be unanswered.

- To provide basic information on the patterns and determinants of rural poverty, the social, political and environmental dimensions, descriptive data on purchasing patterns of poor households, specific characteristics that make rural poor more vulnerable to poverty and their coping mechanisms demands future researchers' attention.
- The study exploits one time survey and no one be able to address the kind of poverty prevalence in the area. Additional household survey becomes crucial to make a consistent welfare assessment.

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