POVERTY STATUS AND ITS DETERMINANTS IN RURAL HOUSEHOLDS OF ENDA-MOHONI WOREDA, NORTHERN ETHIOPIA

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A B S T R A C T

This research generates specific, contextualized identification of existing poverty status and poverty causing factors in Enda-mohoni woreda in Tigray Region, Ethiopia. Agroecology based cluster sampling technique was employed to select 154 household heads. Logit model was used to analyze household poverty status and FGT poverty index estimation model for poverty incidence analysis. The poverty analysis found a 30.9% headcount ratio, 4.4% poverty gap ratio, and 1% poverty severity. Furthermore, the result of the logistic regression revealed that among the explanatory variables used in the model, family size and agroecological location of the household head were found to positively influence HHs' poverty status at (P<0.01) and (P<0.05) respectively. Whereas, owning livestock and marital status of the HHH were found to negatively influence HHs' poverty status at (P<0.05) and (P<0.1) respectively. It is with appropriate policies that recognize the importance of poverty features and trends would it be possible for more people to make positive exits from poverty risk.

Introduction

Poverty has been a widespread phenomenon with varying degrees of features that have been existing in the world in general and in developing countries in particular. In Ethiopia, poverty is multifaceted and deep-rooted (Addae-korankye, 2014; Deressa

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& Sharma, 2014). By any standard, the majority of people in Ethiopia are among the poorest in the world (Bogale et al., 2005).

In most developing countries a large proportion of the poor are in rural areas and their poverty is generally far more severe than in urban areas. The causes of rural poverty are complex and multidimensional involving forces of nature, social, political, and environmental aspects. likewise the rural poor are quite diverse in their resource endowments and links to markets, government, and their strategies to deal with poverty vulnerability and risk (Khan, 2000). Poverty in Ethiopia has many underlying causes resulting in multiple deprivations that have been persistently continuing the situation in rural and urban regions of the country. Poverty seems to persist in large sections of the rural society with little hope for a substantial improvement in the living conditions of the rural poor soon (Bogale et al., 2005; Deressa & Sharma, 2014).

Poverty indices do not show a uniform trend at different times conducted by different researchers and organizations. The implication is that, as there are people who could fall into poverty situation and some others escape from poverty. This is because of the dynamic nature of poverty (Goshu, 2013). The incidence and distribution of poverty have also remained in varying degrees of magnitude in the regional states in Ethiopia that might be due to the varied nature of poverty causes both in rural and urban areas. According to ENPC (2017), the poverty headcount index was estimated 27 % Tigray (31.1 % in the rural areas and 14.2 % in urban areas) which is quite greater in rural areas than the national level of poverty headcount index.

According to the Enda-mohoni woreda[5] early warning and food security office annual report of (2018/19), 31,534 productive safety net program users, and 10,506 emergency aid users, 42,040 total beneficiaries which accounted 42.6 % of the total population are currently under the emergency care of government and foreign donor groups support. And no evidence showed how the agricultural and extension workers well perceived at knowing the main factors that affect the rural farm households to remain in food and material aids for a longer period.

Although most of the literature focuses on indicators of deprivation such as income, access to social services, etc., the choice of indicators to measure the level of poverty can often be arbitrary and hence may not reflect the full-scale measurement of unmet basic needs in different social contexts (Bogale, 2011; Demeke et al., 2003; Mesele et al., 2018; Tsehay, 2012). Moreover, current statistical information offers little or no disaggregated data that can be useful at woreda level of government offices for planning and poverty reduction purposes. poverty statistics are generally compiled at national levels, it is still a difficult task to compile poverty profile data in remote rural areas and to ensure that every woreda has its own poverty profile. Besides to this, the World Bank (2018) in its study on poverty reduction strategy paper (PRSP), emphasized that countries, regions, and specific communities are expected to measure

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5   *In the Ethiopian context, woreda is the fourth-level administrative division followed by kebele.*

and analyze the domestic poverty profiles and be able to identify the specific causes of poverty to operationalize actions to reduce poverty. Therefore, this study measures the existing poverty status and its major determinants of poverty in the study area. It is also intended to help local extension/social workers, agricultural experts, administrators, and nongovernmental organizations in their endeavors towards enhancing poverty reduction strategies.

Materials and methods

The study area is located between $36^0 27' 0''$ - $39^0 59' 30''$ east, $12^0 15' 0''$ - $14^0 50' 20''$ north at about 120 km south direction of Mekele which is the capital city of Tigray, Ethiopia. The woreda has 18 rural kebeles in which they have diverse demographic and topographic compositions. It has three agro-ecological zones mid-land (*weyna-dega*) that ranges from 1637-2300 m.a.s.l, highland (*dega*) which ranges from 2300-3200 m.a.s.l, and moist high land (*wurch*) that ranges greater than the elevation of 3300 m.a.s.l (FAO, 2012). The agroecological composition of the study area accounts for 18.72 % of mid-land, 73.46 % of highland, and 7.82 % of moist high land (Enda-mohoni, BoARD, 2020).

Figure 1. Administrative map of Enda-mohoni woreda
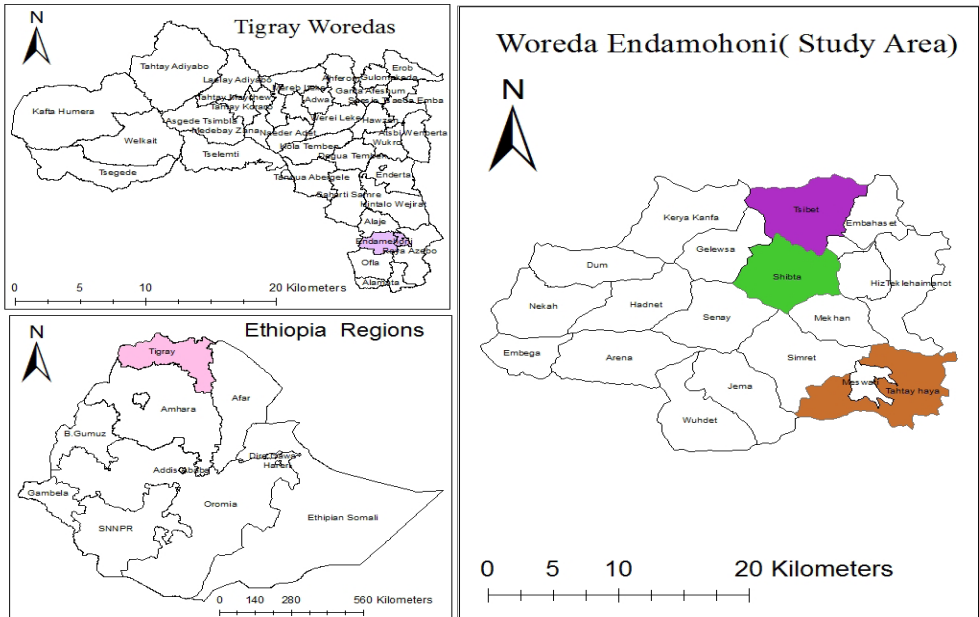
Source: Own map preparation using arc GIS and satellite image (2020)

Data type and source

This research relied on both quantitative and qualitative types of data. The researchers gathered information on the nature of poverty causes; monthly consumption, demographic and socioeconomic data from the sample farm households, households

with their family size list, household list data, from kebele extension worker's office (DAs), main food items list, food security impact assessment report from Enda-mohoni woreda office of agriculture and rural development and woreda food security office, farm size from woreda land administration office. The researcher used structured questionnaire interviews and key informant discussions. Secondary data were also collected from officially published and unpublished materials, reports, statistical bulletins, and other materials used which were believed necessary information sources.

Data analysis procedure

Econometric techniques were applied, to estimate the relationship between the dependent variable poverty status and a combination of independent variables like demographic and socioeconomic variables. Such models approximated the mathematical relationships between explanatory variables and the dependent variable that is always assigned qualitative response variables. In this study, the binary logit model was used to analyze the determinants of poverty (Gujarati, 1995) because it can quantify the marginal effects of the independent variables over the dependent variable poverty and was widely used in many poverty empirical research works. Also, the Foster-Greer and Thorbecke (1984) poverty indices model was used to determine poverty indices as this model has the quality and consistency of additivity behavior towards total poverty.

Specification of the binary logit model

A Logistic model is a univariate binary model. For dependent variable Y_i there are only two values, 1 and 0, and independent variables X_i that is:

$$Prob(Y = 1) = (F(X_{ib})) \tag{1}$$

Here, b is a parameter that needs to be estimated and F is logistic cumulative distribution function(CDF). The logit model was preferable due to its lower computation cost, its flexibility, easy computation, and wide use in many empirical works as compared to other techniques of such type by Green (2003). The functional form of the cumulative logit model is specified as follows:

$$Prob(event) = p_i = E(Y = 1/X_i)) = \frac{1}{1+e-(\beta_0+\beta_i X_i)} \tag{2}$$

Where;

β_0, intercept, and β_i coefficients to be estimated from the data; X_i is the independent variable, e is the base of the natural logarithm for more than one independent variable. Then the empirical model is specified and written as:

$$Prob(poor) = P_i = \frac{1}{1+e^{-Z}} = \frac{e^Z}{1+e^Z} \tag{3}$$

Equivalently, $Prob(non\ poor) = 1 - P_i = \frac{1}{1+e^Z}$ (4)

Where: z is the linear combination of a vector of independent variables

Again in order to estimate the logit model, the dependent variable was transformed by taking the natural log of Equation 4 as follows:

$$L_i = \left(ln\frac{P_i}{1-P_i}\right) = Z_i = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n \quad (5)$$

Where: L_i is the log of the odds ratio, linear not only in the explanatory variables but also in the parameters. L is the logit, and hence it is the logit probability model. It is, thus, noted that the logistic model defined in Equation 5, is based on the logit of Z_i which is the stimulus index. This verifies that as Z_i ranges from $-\infty$ to $\infty +$, P_i ranges between 0 and 1.

Measuring poverty

Foster, Greer, and Thorbecke (1984) have proposed a class of poverty measures built on this idea that have found their way into much of the poverty analysis published by the World Bank. Income or expenditure is the primary deciding factor to measure absolute poverty. The two measures of poverty are absolute and relative poverties. But absolute poverty was used for this study. Because of absolute poverty measures based on predetermined (subsistence) level of per capita consumption expenditure of the population. It portrayed a lack of access to basic needs(minimum) amenities like food, clothing, and shelter. Households that lie below this poverty line were considered as poor and above the poverty line nonpoor. The main poverty measures(indices) used for this study are presneted below:

The FGT model is be given by:

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left[\left(\frac{Z-Y_i}{Z}\right)\right]^\alpha \quad (6)$$

Where Z is the poverty line, Y_i is the expenditure of the ith poor household, N is the total number of households and q is the total number of poor households.

If $\alpha=0$, index P_α becomes: $p_{0=\frac{q}{N}}$, which is the *head-count index.*

If $\alpha = 1$, the poverty index P_α becomes:

$$P_1 = \frac{1}{N}\sum_{i=1}^{q}\left[\left(\frac{Z-Y_i}{Z}\right)\right] \quad (7)$$

,which is the poverty gap index.

If α=2, the poverty index p_α becomes:

$$P_2 = \frac{1}{N} \sum_{i=1}^{q} \left[\left(\frac{Z - Y_i}{Z} \right) \right]^2 \tag{8}$$

,which is the poverty severity index or squared poverty gap index.

Table 1. Variables and their expected signs

S/no	Variable name	Variable description	Measurement	Expected sign
1	Poverty	Probability of being poor	Dummy (1=poor, 0 =non-poor)	dependent
2	HHHSex	Sex of the household head	Dummy(male=0,=female=1)	-/+
3	FSize	Family size of the households in Adult equivalence	Continuous variable measured in number	+
4	HHHAge	Age of the household head	Continuous variable measured in years	-/+
5	Dratio	Dependency ratio of household	Continuous variable measured in percent	+
6	HHHmrst	Marital status of household	Dummy(divorced=1, married=2, single=3, , widowed=4)	+/-
7	Levedu	Education of household head	Dummy(literate=1, illiterate=0)	-
8	LSize	Total size of cultivated land	Continuous variable measured in hectare	-
9	TLU	Total livestock owned by sample households	Continuous variable measured in TLU	-
10	foodwr	Household involvement in labor participation	Dummy(1 if the household participate,0, Otherwise)	-
11	offfarmuse	Household off-farm activity	Dummy (off farm income, yes=1, no= 0)	-
12	Hsave	Saving behavior of household	Continuous variable measured in Birr if the household has monthly saving	-
13	accmktig	Household access to market	Dummy(if the household access to market, Yes=1, No=0)	-
14	accexten	Household access to extension services	Dummy(if the household has access to extension service, Yes = 1, otherwise=0)	-
15	irruse	Household irrigation use	Dummy(household irrigation use, yes=1, no=0)	-
16	Agro	Household living in different Agroecology	Dummy(if the household live in, dega=1, weynadega=2, Wurch=3)	-/+
17	AssetV	Household current Assets	Continuous variable measured in Birr	-

Results and Discussion

Incidence of Poverty in the study area

Setting the poverty line

The Cost of Basic Needs (CBN) approach is employed based on the procedures by Ravallion (1995) and Wodon (1997) to determine the poverty line. To avoid biases in consumption of households, the survey was conducted in February 2020, assuming that as the optimum period for food and non-food consumption of households and were collected the monthly average food consumption to consider for poverty line estimation. Having such a rationale for the CBN, the following steps were employed to obtain the poverty line:

1. Identify and select the food items commonly consumed by the majority of the lower quartile of the poorest and 17 food items (Annex 1) were identified from the survey.

2. Each bundle of the food items is weighted with the appropriate unit of measurement like kilograms, liters according to the nature of food items.

3. Each unit of food items consumed by a household in a month is divided into the corresponding AEU of the HHs to get the number of kilograms each adult individual gets in a month.

4. Sum all food per adult units consumed in a month to get the monthly requirement and divided by 30 days to compute the daily requirements of food for each adult equivalent unit in the HHs.

5. Assuming 2200kcal as the minimum calorie required per adult equivalent per day in Ethiopia, we estimated the cost of meeting this food energy requirement.

Thus, the food poverty line is approximately estimated ETB 517.4 per month per adult equivalent or ETB 6209 per year which is much greater than the national food poverty line of ETB 3772 set by (NPC, 2015/16) by 64.6%, with average increment rate of 12.9%, inflation per year was treated. Once the food poverty line was being computed, the total poverty line was derived by taking the average food share of the first lower (first quartile) proportion of the population (Maru, 2004) which resulted in a total poverty line (PL) of ETB 708.33 per month or ETB 8500 per year per adult equivalent. This computed total PL is greater than the national PL, found in (NPC, 2015/16) by 18.32%, with an annual increment rate of 3.7% (see Table 2). This computed value of the food PL in the study area might be the result of the continuous food and non-food price increments at the local and national levels of market price changes.

Table 2. Poverty lines at market price

S.No	Poverty line	Value in Ethiopian birr at market price
1.	Food poverty line	6209
	Nonfood poverty line	2291
	Total poverty line	8500
	Source: Own household survey computation, 2020	

This market price poverty line reflects the norm, the culture, the taste and preference of the society's' situation in the study area. This poverty line[6] (ETB 8500/adult/year) was adopted for this study and used to estimate the poverty indices in the study area. The process of poverty line calculation was exhaustively demonstrated in Annex 1.

Identifying the poor

In terms of poverty status, 113(73.38%) of the sampled HHs were found to be non-poor and 41(26.62%) were poor HHs. Further, in terms of the gender composition of the sample HHs, 55(35.71%) are female-headed and 99(64.29) were male-headed. In terms of gender and poverty status, 44(80%) of the female-headed were found to be nonpoor and 11(20%) were poor. Of the male-headed HHs, 69(69.70) were non-poor and 30(30.3%) were poor. Implying that, the highest number of the poor heads were from male households which were greater by 19(46.34%).

Table 3. Poverty decomposition of the sampled households by gender and sex

Poverty status	Gender of HHHs			
	Female	Male	Total	%
Poor	11	30	41	26.6
Non-poor	44	69	113	73.4
Total	55	99	154	100
Source: Own household survey computation, 2020				

The level of poverty that measured using the Head Count Index (P_0), Poverty Gap Index (P_1), and Poverty Severity Index (P_2) (Foster, Greer, and Thorbecke, 1984)) poverty indices class family are presented in Table 4. Incidence of poverty was analyzed, first, using the total PL (ETB 8500 per adult equivalent expenditure per year) and then the food PL of ETB 6209 per adult equivalent expenditure per year. Accordingly, 30.87% of the respondents were living below the poverty line (ETB 8500) with the poverty gap index of 4.4 % and poverty severity index of 1 %.

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6    $PL = \left(\dfrac{\frac{FPL}{ASB}}{TexpLow} \right) = \left(517.4 \Big/ \dfrac{572670.65}{784050.73} \right) = \dfrac{517.4}{0.7304} = 8500$

Where: PL is the total poverty line

        FPl : is food poverty line

        ASB: is average food share of the bottom 30%

        TexpLow: is total expenditure of the bottom 30%

According to MoFED (2012), the incidence of rural poverty in Tigray, the head count index, was 57.9 % in 1995/6 rose to 61.6 % in 1999/2000 and declined by yearly decrement rate of 3.34 % till 2004/05. Further, it was reduced by 5.69 % per year until 2010/11. Moreover, a recent study conducted in Ethiopia in 2015/2016 by national planning commission (NPC, 2017), showed that the incidence of poverty in rural and urban stood at 23.5%, 25.6%, and 14.8 % respectively. Further, the poverty headcount index was estimated 27 % in Tigray (31.1 % in the rural areas and 14.2 % in urban areas) which is quite greater in rural areas than the national level of poverty headcount index. The headcount ratio (30.90%) in the rural study area again is slightly less by 0.23 % compared to the regional rural poverty and greater by 4.27% compared to the national rural poverty level (see Table 4).

Table 4. FGT poverty indices of sample households

Poverty indices	Index number	
	Food poverty	**Total poverty**
Head count(P_o)	0.28(0.04)	0.31(0.04)
Poverty gap(P_1)	0.05(0.01)	0.04 (0.01)
Squared poverty gap(P_2)	0.01(0.01)	0.01 (0.01)
Source: Own household survey computation, 2020		

Poverty decomposition by population groups

Estimating the total poverty index was the first step in the study of poverty. However, decomposing poverty indices by subpopulation groups help the poverty analysis to detect the main sources of poverty and to indicate policymakers to make efficient policies to reduce poverty. Thus, population group decomposition makes it possible to identify subgroups with greater poverty and can be useful to design and target cost-effective antipoverty interventions. Further, this decomposition can be used to evaluate each subgroup in relative and absolute contribution to total poverty.Accordingly, Kebele wise poverty findings of this study indicated that the highest incidence of poverty was observed in *Tahtay-haya* with headcount index of 0.416, with a poverty gap index of 0.061 and poverty severity rate of 0.014, and the lowest level of poverty was recorded in *Tsibet* with headcount index of 0.191 and poverty gap index of 2.1 % and poverty severity index rate of 0.6 %. The second-lowest incidence of poverty was in *Shibta* with headcount index of 27.88 %, and far by 4.2 % from the PL with a squared poverty index level of 1.03 % (see Table 5) .

Table 5. Incidence of poverty by Kebeles(agro-ecologies)

Kebele(Agro ecology)	Po	P1	P2	Poverty Line
Tsibet (Wurch)	0.19(0.07)	0.02(0.01)	0.01(0.01)	8500
Shibta (Dega)	0.28(0.07)	0.04(0.02)	0.01(0.01)	8500
T.haya(Weyna-dega)	0.42(0.07)	0.06(0.01)	0.01(0.01)	8500
Population	0.31(0.04)	0.04(0.01)	0.01(0.01)	8500

Source: Model output from the household survey, 2020

Note: Values in brackets are standard deviations

Absolute poverty contribution is the share of one kebele's poverty towards the total poverty whereas the relative poverty contribution is the share of one kebele's poverty out of a hundred. The relative and absolute contribution of the three kebeles towards the total poverty incidence, poverty gap, and poverty severity gap was different. Accordingly, Table 6 presents the poverty contribution of each kebeles by agroecology.

Table 6. Absolute and Relative poverty contributions by kebeles

Kebele	P_0	Population share	Absolute contribution	Relative contribution
Tsibet	0.19 (0.07)	0.28(0.04)	0.05(0.02)	0.17(0.06)
Shibta	0.28(0.07)	0.33(0.04)	0.09(0.03)	0.3(0.08)
Tahtay-haya	042(0.07)	0.39(0.04)	0.16(0.03)	0.53(0.08)
Population	**0.31(0.04)**	**1.00(0.00)**	**0.31(0.04)**	**1.00(0.00)**
	P_1			
Tsibet	0.02(0.01)	0.28(0.04)	0.01(0.04)	0.13(0.08)
Shibta	0.04(0.02)	0.33(0.04)	0.01(0.01)	0.32(012)
Tahtay-haya	0.06(0.01)	0.39(0.04)	0.02(0.01)	0.55(0.11)
Population	**0.04(0.01)**	**1.00(0.00)**	**0.04(0.01)**	**1.00(0.00)**
	P_2			
Tsibet	0.02(0.01)	0.28(0.04)	0.01(0.01)	0.13(0.09)
Shibta	0.04(0.02)	0.33(0.04)	0.01(0.01)	0.32(0.11)
Tahtay-haya	0.061(0.01)	0.393(0.04)	0.024(0.01)	0.545(0.11)
Population	**0.04(0.01)**	**1.00(0.00)**	**0.04(0.01)**	**1.00(0.00)**

Source: Model output, 2020
Note: Values in brackets are standard deviations

The absolute and relative contribution to the total poverty show that *Tsibet* has the lowest absolute contribution of 5.3 % with the relative contribution of 17.04% followed by *Shibta* with 9.23% absolute contribution and 29.91% relative contribution.The largest absolute contributor to the total poverty was *Tahtay-haya* having an absolute contribution of 16.38% and a relative contribution of 53.04% recorded in the headcount ratio (see Table 6). According to the theoretical and practical point of view, moisture is a determinant factor for crop and livestock productivity (FAO, 2018). As expected, the highest elevation with relatively better moisture content has been found in *Tsibet*, followed by *Shibta* and the lowest elevation with moisture stress is in *Tahtay-haya*. Thus, the poverty incidence was much lower in *Tsibet* than *Shibta* and the highest poverty incidence was recorded in *Tahtay-hay*a kebele that was most likely limited by moisture and/or rainfall stress.

Econometric analysis: *Determinants of poverty using binary logit model*

A binary logit model was used to identify the major determinants of poverty of households. Using HHs poverty status as a dependent variable whereby a value of 1 has given to households being poor and 0, otherwise. Considering the absolute poverty line, we looked through factors that determine HHs poverty to fall below the poverty line.

Interpretation of variables from the logistic output model

Family Size: In line with our prior expectation, the family size was found to have a positive relationship with the poverty status of rural HHs and is statistically significant at $P < 0.01$. The marginal effect shows as family size increases by one member, the probability of being poor will increase by 7% ceteris paribus. This could be as family size increases the demand for basic needs increases like access to cultivable land, educational and health facilities with no possibility to get, consequently, the household consumption per adult equivalent and the per capita land size start to fall. Having more household size aggravates the chance of being falling into poverty. This was consistent with the findings of (Bogale et al., 2009).

Owning Livestock (TLU): As hypothesized the livestock owned by the HHs has a significant and negative relationship with the poverty level of the HHs. The marginal effect 0.039, implies that, ceteris paribus, the probability of being poor decreases by 3.9% as the household increases by a unit of TLU and is statistically significant at < 0.05, ceteris paribus. Livestock rearing helps the poor in many ways. The finding is supported by (Upton & Otte, 2004).

Marital status of Household Head: as expected, marital status determines the status of household poverty that married, single, and widowed households have a negative relation with poverty status of sample households given reference variable divorced households and were statistically significant at $P < 0.1$ and $P < 0.01$ respectively. Being the household head is married, the probability of falling into poverty decreases by 28.2% at $P < 0.1$ as compared to a divorced household head, ceteris paribus. Furthermore, as the household head is single, the probability of falling into poverty decreases by 28.1% at less than a significance level of 10% as compared to a divorced household head, ceteris paribus. And as the HHH is widowed, the probability of falling into poverty decreases by 41.7% at $P < 0.01$ as compared to divorced HHH given other factors constant. The research finding indicated that the highest poverty incidence was observed in divorced households. The reason might be, as some scholars argue that as one is married the probability of falling into poverty decreases, as there will be more labor forces in the household (Maru, 2004; Metalign, 2005; Araya et al, 2011).

Agroecology: Households living in *Weyna-dega* have got a higher poverty incidence and a positive relationship with poverty and an inverse relation to *Wurch* agroecology (Keith, 2006). Further, a household living in *Weyna-dega* has a probability of falling into poverty by 21.5% and is significant at $P < 0.05$ as compared to *Dega* agroecology given other factors remaining constant. This might be due to differences in the quality of land, the amount and distribution of rainfall and population densities that influence between highlands and midlands. For example, climatologically lowland areas are warmer than high land areas. Thus, in this study *Weyna-dega* agroecology might be subject to moisture stress that could limit the productivity of crop, livestock, and other

allied livelihood activities than the *Dega* and *Wurch* agro-ecologies. This is similar to the findings of Wolde (2017).

Variables		Coefficient	Marginal effects	p-value
Table 7. Output of the binary Logistic regression model				
HHHSex (male=0)		0.594	0.086	0.429
FSize		0.465	0.070	0.001***
HHHAge		0.038	0.006	0.147
Dratio		0.653	0.098	0.623
HHHmrst				
	(married=2)	-1.621	-0.282	0.061*
	(single=3)	-1.615	-0.281	0.068*
	(widowed=4)	-2.834	-0.417	0.001***
Levedu (literate=1)		0.569	0.084	0.295
LSize		-0.864	0.130	0.297
TLU		-0.258	0.039	0.013**
Foodwr		-0.446	-0.069	0.437
Offfarmuse (yes=1)		-0.301	-0.044	0.565
Hsave		-0.000	-0.000	0.788
Accmktig (yes=1)		0.221	0.034	0.779
Accexten (yes=1)		-0.649	-0.103	0.385
Irruse (yes=1)		-0.086	-0.013	0.900
Agro-ecological				
	(*Woina-dega*=2)	1.307	0.215	0.021**
	(*Wurch*=3)	-0.929	-0.105	0.181
AssetV		0.000	$-9.38e^{-07}$	0.257
Constant		-3.034	-	0.064*
Sensitivity 31.71%		Specificity 91.15%	Counted R2 75.32%	

Source: model output

Note: *, ** and *** refer to 10%, 5% and 1% Significant levels respectively

Conclusion and Recommendations

This study found that 30.9% poverty incidence, 4.4% poverty gap, and 1% poverty severity gap were observed in the study area. For univariate analysis, simple descriptive statistics, such as mean, frequency distribution, and standard deviation, mode, the median was calculated. Furthermore, the result of the binary logistic regression model revealed that among the explanatory variables in the model, family size ($P < 0.01$ and agroecological location of the household head ($P < 0.05$) were found to be significant, and positively influence HHs" poverty status. Whereas, owning livestock unit ($P < 0.05$), and marital status of the HH head($P < 0.1$), were found to be significant and negatively influence HHs' poverty status.

Rural farm household poverty causes are highly diverse and multifaceted. Only with more appropriate policies that recognize understanding the importance of poverty features and trends would be possible for more people to make positive exits from

poverty risk through appropriate intervention design and strategy setting. We would like to recommend:

- Even though the headcount ratio, depth, and severity of poverty have shown variations based on the criteria employed, all confirm that poverty is a problem of major concern. Thus, the study showed that it is important to differentiate among the poor that attention needs to be paid to the poverty gap and poverty severity.

- Any attempt to intervene in the community needs to target specific geographic locations such that as lowlanders, Midlanders, or the highlanders, which could enhance and poverty intervention selection criterion. Thus, as the poverty incidence was higher in lowlanders, attention needs to be given for lowlanders in poverty reduction resource allocation and poverty intervention selection.

- Livestock's contribution to the household food requirement and total income is significant. Hence, the provision of adequate veterinary services, improved fodder supplies, the introduction of new livestock packages to the poor households on credit, introducing effective forage development program, provision of training for the livestock holders on how to improve their production and productivity, optimizing stocking and destocking of livestock could significantly reduce poverty.

We used monetary poverty indicator consumption as wellbeing measurement at a given point in time and is a static measure. Broadly speaking, while static measures are useful for giving a headline indicator of the current level of poverty and how they vary across the place, time, and groups, dynamic measures(panel data) are more useful in helping policymakers design intervention to tackle poverty effectively.

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Conflict of interests

The authors declare no conflict of interest.

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Annex 1. Food items selected to calculate poverty lines

s/n	Food items	Kcal/100 gram[1]	Consumption per adult per month in Kg/lt	Consumption per adult per day in Kg//lt	Kcal per adult per day	Kcal per adult per day needed to get 2200kcal	Mean price per kg/lt	Cost per day(Birr)	Food pov. Line per year(Birr)
1	wheat	357.4	3.827	0.128	364.173	455.923	18	2.304	840.96
2	barley	372.3	2.754	0.092	272.99	341.771	16.5	1.518	554.07
3	Teff	355.1	1.556	0.052	155.10	194.179	35	1.82	664.3
4	Sorghum	359.2	2.89	0.096	276.39	346.03	16.22	1.56	568.35
5	maize	375	1.453	0.048	145.07	181.625	10.71	0.51	187.64
6	beans	351.4	1.709	0.057	159.89	200.18	22.18	1.26	461.45
7	pea	355.3	1.202	0.04	113.71	142.357	29.89	1.19	436.394
8	tomato	71.3	1.875	0.063	35.59	44.563	13.94	0.878	320.55
9	onion	30.7	0.743	0.0248	6.07	7.6	18.6	0.46	168.37
10	potatoes	89.7	0.359	0.012	8.57	10.734	33.56	0.40	146.99
11	cabbege	23.7	0.532	0.018	3.36	4.203	8.75	0.16	57.49
12	pepper	360.1	0.553	0.0184	53.02	66.378	38.125	0.70	256.05
13	coffee	110.3	0.436	0.015	12.80	16.03	128.75	1.93	704.91
14	suger	385	0.253	0.01	25.93	32.468	45	0.45	164.25
15	salt	178	0.393	0.013	18.63	23.318	15	0.195	71.18
16	oil	896.4	0.418	0.014	99.76	124.894	95	1.33	485.45
17	milk	73.7	0.319	0.011	6.256	7.837	30	0.33	120.45
					1757.309	2200.09		17.01	6208.84

Source: Model output, 2020

7   *Note:* The kcal/ 100 gm value for each food item is obtained from (EHNRI, 2007)