International Journal of African and Asian Studies www.iiste.org
ISSN 2409-6938 An International Peer-reviewed Journal
Vol.29, 2017

Determinants of Poverty in Rural Households (The Case of Damot Gale District in Wolaita Zone) A Household Level Analysis

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Abstract
The study was carried out at Damot Gale district of Wolaita Zone in Southern Nation Nationalities Regional State with the main objectives to describe 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 from 235 sample households .The data collected were analyzed and discussed applying FGT measure of poverty i.e. poverty head count index, poverty gap and severity. Using cost of basic needs approach; the study found that total poverty line of the study area was about 3612.151 birr per year per adult equivalent consumption. Using this poverty line as bench mark the study indicated that 56.17 percent of the households were poor. The result of the logistic regression model revealed that out of 18 variables included in the model, 13 explanatory variables were found to be significant at 1%, 5% and 10% level. Accordingly, family size, household head sex, household age, dependency ratio and marital status were found to have positive association with poverty of the household and statistically significant. Meanwhile Age square, cultivated land size, oxen, access to credit, off farm activity, household health, remittance, and market access were found out to have strong negative association with the households poverty status and statistically significant up to less than 10% level of significance
Keywords: Binary Logit, Cost of basic need, Consumption approach, Determinants, Household, Rural poverty.

1. Introduction

1.1 Background of the study

Poverty is a multidimensional and complex phenomenon and is related not only to the income or consumption, considered as monetary dimension of poverty, but also to non-monetary dimensions such as education, health, gender equality, water supply, etc. Poverty is caused by many factors and brings several effects which influence the lives of people considered to be poor. The influence of the factors varies from one place to another, because many countries have different development possibilities. The influential factors of poverty level are not only economical, but also social, political, cultural, geographical, etc (Spaho, 2014).

Extreme poverty, or absolute poverty, is a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. The 2014 release of a new set of purchasing power parity conversion factors (PPPs) for 2011 has prompted a revision of the international poverty line. The new poverty line was chosen so as to preserve the definition and real purchasing power of the earlier $1.25 line (in 2005 PPPs) in poor countries. Using the 2011 PPPs, the new line equals $1.90 per person per day (Francisco H. G. Ferreira, 2015).

With new line world Bank projects that global poverty will have fallen from 902 million people or 12.8 percent of the global population in 2012 to 702 million people or 9.6 percent of the global population (World Bank,2015).

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, 2012).

In Damot Gale district approximately 95% of the households rely on agriculture for their major livelihood strategy, all are smallholder farmers, they face constraints including shortage of land, land degradation and soil in fertility, poor access to market, few off farm employment opportunities, low agricultural productivity and major economic activity is rain fed farming (DGWAO, 2014).

Since poverty is a major constraining factor among farming households, Therefore, this study mainly focused on determinants of rural household's poverty in Damot Gale district by including the most crucial demographic and socio economic variables. Both qualitative and quantitative method of data collection method was employed and consumption per capital used to indicate the standard of living in study area rather than using income as welfare indicator. Cost of basic needs approach was used for setting poverty line .Data analysis was done by using descriptive analysis, FGT and econometric model to capture the influence of explanatory variables on dependent variable.

1.2 Objectives of the Study

The general objective of this study is to examine the profile and determinants of poverty in rural households in the study area. The study is based on the following Specific Objective

- ✓ Identify factors that determine poverty in rural households in the study area.
- ✓ Determine the proportion of households who live below and above the poverty line.
- ✓ Analyzing the magnitude (incidence, depth and severity) of poverty in study area

2. Research Methodology

2.1 Description of the Study Area

Damot Gale is one of 12 districts in Wolayta zone of SNNPR in Ethiopia. It is located at 139 km south west of the Hawassa town which is the capital of Southern Regional State and 365km from Addis Ababa in the southern direction. Geographically, it is located between 6^0 53'- 7^0 6' 30" North latitude and 37^0 46' – 37^0 58' 40" East longitude. It has an altitude ranging from1501- 2950 meters above mean sea level.The study area covers an area of 24285.861 hectare.

Damot Gale district is divided in to three agro-ecologic zones such as Dega or high altitude (25.3%), Woinadega or mid-altitude (61.2%) and Kola or low altitude (13%) DGWAO (2014).Woinadega dominates the study area which has bimodal distribution of rainfall. Mean annual rainfall ranges between 1001-1400 mm (RFEDB, 2013) as cited in (Tesema, 2015).

Based on the CSA (2011) estimation and districts Finance and Economic Development office report, Damot Gale has a total population of 177,570 out of this male 103,011 and female 74,559. The total households of the district are 30,767 of which male households, 26,417 and female 4,350 and has a total of 31 rural kebels

2.2 Sample Size Determination

The sample size in this study was determined by using the minimum sample size formula of Fowler(2001) and then adjusted for the total population of the study area by Cochran's sample size formula (Cochran, 1977) as shown below

$$n = \frac{Z^2(p)(q)}{d^2} \quad ----------(2.1)$$

The researcher has been decided to take that true margin of error may exceed the acceptable margin of 6% with confidence level 94% and estimated proportion of an attribute that was present in the population p=0.5.

$$n = \frac{1.88^2 * (0.5) * (0.5)}{0.06^2} = 245 \quad ----------(2.2)$$

In order to calculate the final sample size, we have considered the total population of the study area. Therefore, Cochran's (1977) correct formula was used to calculate the final sample size in the study area.

$$no = \frac{n}{1 + \left(\frac{n}{N}\right)} \quad ----------(2.3)$$

The total number of population in 31 kebele was about 177,570 male 103,011and female 74559 and the total household was about 30,767 male 26,417 and female 4,350.Total households in selected four kebeles 3779 (CSA,2011) estimation. Therefore we have

$$\text{no} = \frac{\mathbf{245}}{1 + \frac{245}{3779}} = \frac{\mathbf{245}}{1 + 0.064832} = \frac{\mathbf{245}}{1.064832} = \mathbf{235} \quad ----------(2.4)$$

Table 2.1 Sample Size of the Kebeles

Name of Kebele	Total population	Total household	Sample households
Damot Mokonissa	5215	990	67
Gacheno	3702	718	45
Wandara Gale	6073	1238	75
Shasha Gale	4200	833	48
Total	19190	3779	235

Source: own computed proportion to size

Therefore, the final sample size for the district was 235 which is the sum of four kebels

2.3 Sampling Technique

In the study area, farming households were responsible for making day to day decision on farm activities. Thus, households were the basic sampling units in order to get quantitative and qualitative data on the determinants of rural poverty in the study area. A two-stage sampling technique was employed to get the required primary data. At the first stage, Damot Gale district was selected purposively because it was one of the food insecure districts in wolayta zone. In the second stage, four Kebels were selected by simple random sampling techniques out of

31Kebels in the district. A probability proportion to size (PPS) was employed to determine sample size from each kebele. Accordingly 235 households were selected through systematic random sampling techniques. The first household was selected by lottery method and the rest survey points selected by interval.

2.4 Method of Data Analysis

To achieve the objectives of this study, different methods of data analysis were used descriptive, FGT method and econometric analysis with the help of econometric software i.e. STATA and DAD.

2.5 Econometric Model

The logit model is designed to analyze qualitative data reflecting a choice between two alternatives, which in this case are the poor and non-poor. The choice of the logit model is premised on the fact that ordinary least squares assumes a continuous dependant variable while in the case of poverty the response is a binomial process taking the value 1 for poor and 0 for non-poor. The parameters of this model was be estimated by using the maximum likelihood estimation rather than the movement estimation in which OLS regression technique rely on (Gujarati & porter, 2009) Probability of being poor is specified as the value of the cumulative distribution function which is specified as function of the explanatory variables. The equation is of the form:

The probability of being poor (an event occurring) as the form:

$$Pr(y = 1/x) = Pr(Y = 1) = \frac{e^{zi}}{1 + e^{zi}} = \frac{1}{1 + e^{-zi}} - - - - - - - - - - - - - (2.5)$$

$$z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + - - - - + \beta_k x_k + \varepsilon - - - - - - - - - - - - - - - - - - (2.6)$$

For a non-event (non-poor) cumulative logistic distribution, (1-p*i*) become as the form:

$$1 - pr(y = 1/x) = = \frac{e^{-zi}}{1 + e^{-zi}} - (2.7)$$

Therefore, by dividing equation (2.5) by equation (2.7) we result with odds-ratio in binary response, which is as stated below:

$$\frac{pr(y = 1/x)}{[1 - pr(y = 1/x)]} = \frac{P(Y = 1)}{1 - P(Y = 1)} = \frac{\frac{1}{1 + e^{-zi}}}{\frac{e^{-zi}}{1 + e^{-zi}}} = \frac{1}{e^{-zi}} = e^{zi} - - - - - (2.8)$$

Equation (2.8) is simply the odd-ratio in favor of household falling below the poverty line. This is the ratio of the poverty that a household will be poor to the probability that it will not be poor.

When we take the natural logarisim of odd-ratio of equation (2.8) will result in logit model as we can see below

$$Li = ln\left(\frac{P(Y = 1)}{1 - P(Y = 1)}\right) = Zi \quad = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_{18} x_{18} - - - - (2.9)$$

The logit model for probability of being poor or not-poor and determinants of poverty as follows:-

$$Y_i = \beta_0 + \beta_1 \mathrm{Ag} + \beta_2 \mathrm{Ag2} + \beta_3 \mathrm{Sex} + \beta_4 \mathrm{FS} + \beta_5 \mathrm{Dr} + \beta_6 \mathrm{Ms} + \beta_7 \mathrm{Edu} + \beta_8 \mathrm{HE} + \beta_9 \mathrm{LS} + \beta_{10} \mathrm{OX} + \beta_{11} \mathrm{TLU} + \beta_{12} \mathrm{IAgI} + \beta_{13} \mathrm{REM} + \beta_{14} \mathrm{CA} + \beta_{15} \mathrm{OFI} + \beta_{16} \mathrm{Sav} + \beta_{17} \mathrm{crd} + \beta_{18} \mathrm{MAc} + \varepsilon_i - - - - - - - - - - (2.10)$$

Therefore Y*i* = 1 if household is poor and = 0 if household is not poor, $\beta_{\square}$ is regression parameters,$\varepsilon_{\square}$ is the error term and the others are explanatory variables used in this study

Table-2.2: Variables and their Expected Sign

Variable Name	Description of variable	Measurement	Expected sign
Poverty	Probability of being poor	Dummy (1=poor, 0 =non-poor)	**Dependant**
Ag	Age of the household head	Continuous variable measured in years	-
Sex	Sex of the household head	Dummy(1=male,0=female)	-/+
FS	Family size of the households in Adult equivalence	Continuous variable measured in number	+
Dr	Dependency ratio of household	Continuous variable measured in percent	+
MS	Marital status of household	Dummy(1=married,0=unmarried+ divorced + widowed)	+
Edu	Education of household head	Continuous variable measured in years of schooling	-
HE	Health of the household	Dummy(1=if the household has no health problem,0 otherwise)	-
LS	Total size of cultivated land	Continuous variable measured in hectares	-
OX	The number of oxen owned	Continuous variable measured in number	-
TLU	Total livestock except oxen owned by farm household	Continuous variable measured in number	-
IAgI	Improved agricultural input	Dummy(1 if the household use improved seed, 0 otherwise)	-
REM	Household access to remittance	Dummy(1,if HH has access to remittance, 0 ,otherwise)	
CA	Household involvement in community participation	Dummy(1 if the household participate,0 otherwise)	-
OFI	Household off farm activity	Continuous measured in birr	-
Sav	Saving behavior of household	Dummy(1,if the HH has saving behavior,0 otherwise)	-
Crd	Household access to credit	Dummy(1 ,if the household access credit, 0 otherwise)	-
Mac	Household market access	Continuous variable measured in hours	-

3. Results and Discussion

3.1 Computing Poverty Line

Following the steps mentioned in methodology section we established poverty line for the study area in the following form.

Food poverty Line:

- Total Adult equivalent food Expenditure = 2,637,882Birr
- 25% Adult equivalent population food share = 48063.5Birr
- Percentage share of the lowest 25% population = 0.018220489
- Food poverty line =2332.177 Birr

Non-food poverty line:

To obtain this line we have divided the food poverty line by the food share of lowest 25 percent of expenditure distribution.

- Non food poverty= 2332.177/1.8220489= 1279.9749Birr.

Therefore, Poverty line in the study area = food poverty line plus Non-food poverty line

= 2332.177Birr + 1279.974 Birr **=3612.151Birr**

3.2 FGT Method Analysis

Headcount Index (P 0)

This is the share of the population whose consumption is below the poverty line in the study area, i.e $P_0 = \frac{N_p}{N} = \frac{132}{235} = 0.5617 = 56.17\ percent - - - - - - - - - (3.1)$

It shows that 56.17 percent of the sampled households in the woreda were below the poverty line.

Poverty Gap Index (P1)

Poverty gap index measures individuals on average fall below the poverty line; and it is a percentage of the

poverty line. More specifically, define the poverty gap (G*i*) as the poverty line (z) less actual consumption (yi) for poor individuals; the gap is considered to be zero for everyone else. Using the index function, we have

$$P_1 = \frac{1}{N}\sum_{i=1}^{N}\frac{Gi}{Z} \quad (3.2)$$

$$P_1 = \frac{1}{135}\sum_{i=1}^{135}\frac{Gi}{3612.151} = \frac{1}{235}(52.20007) = 0.2221 \quad (3.3)$$

The result from the survey shows the poverty gap (consumption shortfall) of poor to reach poverty line in is 22.21 percent. In other words, it estimates the total resources needed to bring all the poor to the level of the poverty line consumption or the woreda needs to mobilizes resources equal to 22.21 percent of the poverty line for every adult equivalent individuals and distributes these resources to the poor in the amount needed so as to move them to poverty line.

Poverty severity or squared poverty gap (P2)

$$P_2 = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{G_i}{z}\right)^2 (\alpha \geq 0) \quad (3.4)$$

$$P2 = \frac{1}{235}(25.8312) == 0.109 = 10.9\ percent \quad (3.5)$$

The poverty severity index measures variation in the poverty level of individual households. The result indicates that 10.9 percent variation among poor households in the study area.

Table-3.1 FGT measure of Poverty status of four surveyed Kebles

Keble	Poor	Non-poor	OBS	%Share of poor	P0	P1	P2
D/Mokonissa	**36**	**31**	**67**	**27.27**	**0.1532**	**0.057**	**0.027**
W/Gale	**44**	**31**	**75**	**33.33**	**0.1872**	**0.072**	**0.0348**
Gacheno	**28**	**17**	**45**	**21.21**	**0.1191**	**0.0585**	**0.0304**
Shasha Gale	**24**	**24**	**48**	**18.19**	**0.1021**	**0.0335**	**0.0168**
Total	**132**	**103**	**235**	**100**	**0.5617**	**0.221**	**0.109**

Source: Own computed from survey data

3 Descriptive Analysis

3.1 Poverty and Family Size

Table 3.2 Family Size and Poverty

Family Size	Poor	Noon poor	Total	% Share of poor
1-5	43	87	130	33
6-11	89	16	105	67
Total	132	103	235	100

Source: Own computed from survey data

In above table we can see high poverty incidence in households whose family size greater than the average family size and relatively lower in families with family size less than the mean. Therefore, it indicates family size and poverty have positive relation.

Poverty and Cultivated Land Size

Table-3.3 Cultivated Land Size to Poverty Distribution

Size of land	Below poverty line	Above poverty line	Total
Less than 0.75 hectare	**108 (73%)**	**41 (27%)**	**149**
Above 0.75 hectare	**24 (28%)**	**62 (72%)**	**86**
Total	**132**	**103**	**235**

Source: own computed from survey data, 2016.

The mean land holding in the study area was 0.75 hectare. To sum up the influence of land holding on poverty we divided land holding in to two i.e. above mean and below mean land owners. Therefore, when land holding is less than the mean 73% poor and only 27% non-poor. Whereas land holding greater than average, poor 28% and non-poor 72%.

3.4 Econometric Analysis

Marginal Effect for Logit Regression

Since the logit model we employed for regression analysis is not linear, the marginal effect of each independent variable on the dependant variable is not constant but it depends on the value of the independent variables. Thus, marginal effects can be a means for summarizing how change in a response is related to change in a covariate. For categorical variables, the effects of discrete changes are computed, i.e., the marginal effects for categorical variables show how P(Y = 1) is predicted to change as Xk changes from 0 to 1 holding all other Xs equal. Whereas for continuous independent variables, the marginal effect measures the instantaneous rate of change (Greene, 1993).

Table-4.8 Marginal effect for logit regression

. mfx

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
*Household Sex**	.5483766	.1829	3.00	0.003	.1899	.906853	.808511
Household age	.0737968	.03464	2.13	0.033	005896	.141698	46.3957
Family size	.2202904	.06344	3.47	0.001	.09595	.344631	5.4766
Dependency ratio	.2905396	.1205	2.41	0.016	.054356	.526723	1.26716
*Marital status**	.294708	.14488	2.03	0.042	.578662	.010754	.744681
Head Educ	-.0224327	.02997	-0.75	0.454	-.081167	.036302	5.53617
*Family Health**	-.4896436	.21113	-2.32	0.020	-.903457	-.07583	.323404
Cultivated land size	-.878107	.23081	-3.80	0.000	-1.33048	-.425729	1.32234
Off farm income	-.0001777	.0001	-1.72	0.085	-.00038	.000025	1310.04
Oxen	-.1109641	.05544	-2.00	0.045	-.219631	-.002297	2.72766
TLU	-.1153757	.13249	-0.87	0.384	-.375043	.144292	1.2093
*Community Associ**	-.1225184	.24359	-0.50	0.615	-.599954	.354917	.408511
*Remittance**	-.4487378	.21103	-2.13	0.033	-.86235	-.035126	.425532
*AgrInput use**	-.3445273	.28523	-1.21	0.227	-.903569	.214514	.434043
Market Access	-.0148517	.00453	-3.28	0.001	-.023722	-.005981	42.166
*Credit use**	-.4452802	.19383	-2.30	0.022	- .065386	- .825175	.395745
*Saving Behaviour**	-.1007391	.16773	-0.60	0.548	-.429489	.228011	.53617
Age squire	-.0007394	.00037	-1.98	0.047	-.00147	-9.1e-06	2352.63

(*) dy/dx is for discrete change of dummy variable from 0 to 1, y = Pr (prpoor) (predict) = .62868601

Source: Own computed using Stata.

Household Size and Poverty

The size of house hold was positively related and the coefficient is statistically different from zero at 1 percent significance level. Holding all other variables, as family size increase by one adult equivalent individual, the probability of a household to be poor increase by about 22.0%.This is due to the fact that the average number of children age less than 15 is 2.625) and old aged greater than 64 is 0.503 were larger in poor households than non-poor households with age less than 15 family members average size 1.0288 and age greater than 64 members 0.076.With existing high rate of fertility in rural area, less employment opportunity, weak off farm income participation, member of the family become unemployed and coupled with low rate of payment.

Dependency Ratio

Dependency ratio and probability of being poor positively related and the coefficient is different from zero at 5% significance level .Holding all other variables constant on their mean values, as the dependency ratio of household's increases by one dependent individual, the probability of a household to be poor increases by 29.05%. The possible explanation for it is that as dependency ratio increases, households saving will be low which limits the chance of consumption smoothening during bad agricultural production season.

Cultivated Land Size

Land holding is negatively correlated with rural poverty and statistically significant at 1% level. As land holding increase by a unit (1 hectare) the probability of household to be poor decrease by about 87.8%. The possible reason is income and consumption may go up for a rural household as land holding is increased .This indicates that a household's ability to generate sufficient economic livelihood depends on the environment in which the land exists for agricultural use.

Ownership of Oxen

Ownership of oxen was negatively correlated with the probability of a household being poor and the coefficient is significantly different from 0 at10% significance level.AS owner ship of oxen increases by a unit (one ox increase), probability of the household being poor decrease by about 11.09%.The possible reason is households who own more oxen have better chance to not be in poverty because the possession of oxen allows effective utilization of the agricultural land and labor resources of the household

Credit access

Credit access was negatively related to the probability of being poor and the coefficient is significantly different from zero at 10% level. Holding other variables of the model at their mean values, a discrete change in credit access from 0 to 1 (**no access** to **access**), probability of being poor decrease at about 44.52 percent.

4. Conclusion and Policy Implications

4.1. CONCLUSION

The study was conducted to identify determinants of rural poverty in households in Damot Gale woreda. Data was collected from 235 sample households from four kebeles.The study used cost of basic needs method to compute the poverty line of the study area by using consumption as an indicator of welfare or standard of living. Based on the information on welfare indicator i.e. adult equivalent consumption we computed poverty line, which is the combination of food and non food poverty expenditure, Birr 3612.151. The poverty headcount index shows that 56.17% of the households were poor and 43.83% were not poor, poverty gap result implies 22% consumption shortfall from the poverty line and severity result indicate 10.9% variation among poor households. The binary logit model regression revealed that family size, household age, age square, marital status, household health, total cultivated land size, off farm income, oxen owned, head sex, market access, access to credit, remittance and dependency ratio affects poverty status of rural farm households of the study area significant at 1%, 5% and 10%.

4.2. POLICY IMPLICATION

Following the results from descriptive and econometric analysis, the following policy implications are forwarded as alternatives for the effective poverty reduction.

- Implementation of family planning and related measures should be taken to limit household family size.
- Land size owned by households was found affecting significantly households' poverty; as cultivable land size is limited it is important to reduce number of households depending on farm income by introducing agro industries and other nonfarm job opportunities into rural areas.
- Access to credit is also negatively correlated with poverty in the study area. It helps the poor households to improve their productivity, create jobs, smooth consumption flows but with a prior saving used as pre requisite to qualify for credit in the form of group lending hinders credit access to the poor in the area. However, poor farmers find group lending inconvenient to access credit from MFI since they are rejected from the group by better offs on one hand and pre requisite saving requirement on the other. Therefore, accommodative credit policy should be employed; meaning that MFIs and other development agencies need to introduce credit policies targeting poorest of the poor.
- Market access improves household's income and reduces probability of becoming poor; hence efforts should intensify to create some sort of market in the vicinities of households and improve road and other infrastructure facilities to established markets.
- Negative correlation between poverty and off farm income observed indicates that when off farm income increases poverty decreases, hence we recommend creation of job and business opportunities that can generate off-farm income for the households.

Poverty reduction strategies should target specific locations and specific households as most of the time poverty by its nature is individual centered rather than aggregate. Therefore schemes that can improve incomes of individual households and certain localities should be employed selectively.

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