Assessing Vulnerability to Poverty in Wolaita and Dawuro Zones, Ethiopia

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Abstract: *A household's observed poverty level is an ex-post measure of a household's well-being. But poverty is a stochastic phenomenon implying that the current poverty level of a household may not necessarily be a good guide to the household's expected poverty in the future. Hence, in thinking about ex ante poverty prevention interventions, the critical need then is to go beyond a classifying of who is currently poor and who is not, to an assessment of households' vulnerability to poverty.Therefore, this study is primarily intended to examine the extent of poverty and vulnerability in Wolaita and Dawuro zones, in which existing studies neglected it. The data for this research is mainly based on the cross sectional primary data collected from 165 households selected from the two zones using two stage sampling. We use the Foster-Greer-Thorbecke (FGT) poverty measures in order to measure the ex post poverty and we make use of the Chaudhuri (2003) vulnerability measures that uses a three step Feasible Generalized Least Squares (3FGLS) to estimate ex ante poverty. Despite the substantial efforts to reduce poverty over all the country, our study found that considerable proportion of households are found poor (56%) and vulnerable (62%) in both zones but both measures of poverty have been found to vary between different population segments. Moreover, the fraction of the population that faces risk of poverty is considerably greater than the fraction that is observed to be poor implying considerable proportion of currently non poor (62%) will face risk of poverty. And our study shows that majority of the household vulnerability to poverty is sourced from the low endowments of households residing in the two zones.*

Keywords: Poverty, Vulnerability to poverty, Wolaita zone, Dawuro zone

1. Introduction

1.1 Assessing vulnerability to poverty in Wolaita and Dawuro zones

The world today has confronted many socio-economic problems. Poverty among others is a pervasive reality of the world that requires an urgent solution. Poverty the greatest challenges of the world, in the 21st century, is a multi-dimensional reality. In fact out of the total population of the world people, around 1.2 Billion people leads their life obtaining less than $ 1 a day (World Bank, 2000).Africa in general and the sub-Sahara Africa in particular is a region with economic performance worse than those other regions. World Bank report 2000 reported that the greatest majority of Africans live on barely $ 0.65 a day and this number is decreasing persistently. In both real income and access to social services, people in sub Saharan Africa are among the poorest in the world. Although urban poverty is substantial and appears to be growing, the rural poor accounts for 80% of African poverty. Almost half of the populations living in this region, according to UNDP report in 2006, live on less than $ 1 a day.

Ethiopia, being one of the sub Saharan countries, is one of the world's poorest country by any standard. Most of the population lives in extreme poverty. World Bank's report 2006 showed that 23% of the population survives on less than $ 1 a day. The study of poverty in general emphasis on those who are currently poor or were poor in the past because poverty can be measured ex-post. This approach has its own merit by using actual data to measure the effects of past public intervention on the extent of poverty. But it allows us to identify whose poverty needs to be alleviated.

Now a days, governments and policy makers are typically more interested on the second approach that measures those who are expected to be poor ex-ante. Thus, according to Chaudhuri, Jalan and Suryahadi (2002), the crucial need for an appropriate forward looking intervention anti-poverty intervention is an assessment of household's vulnerably to poverty. As Decon (2001), defines it a household is vulnerable to poverty if it is likely to be poor in the future that is ex ante poverty that measures "exposure to poverty rather than the poverty outcome itself".Poverty and vulnerability particularly at zonal and Woreda has been given less attention on research and development agenda of Ethiopia and there exists only few studies conducted in relation to poverty and vulnerability. Moreover, the previous studies conducted at national level and a case of big cities in Ethiopia has given more emphasis on the measures of poverty in an ex post approach. Although, important to have an insight on how poverty is widespread and its consequences, such studies are unable to predict how many individuals or household will be exposed to poverty.

However, between one year and next many people may move in to/out of poverty and there will be a lack of conclusive information to know who will be poor next year since measures of who is poor now are imperfect guides to predict who will be poor next year.Thus, we found that conducting research studies emphasizing on vulnerary to poverty that helps to predict who will be poor next year, most probably that exceed who is poor this year, are very essential that can clear the sense of cause of vulnerability to poverty and to recommend concerted bodies successful policies to help them combat poverty.

As this study provides information on poverty and vulnerability to poverty, it will help policy makers to guide poverty targeted interventions in which ex post studies help poverty alleviation interventions and ex ante studies help poverty prevention interventions.Moreover, this study will mainly benefit not only Wolaita and Dawuro zonal

administrations in implementing their poverty reduction programs but also Wolaita Sodo University in particular and the academics environment in general, and the SNNP regional state.

1.2 Objectives of the study

The general objective of this study is to assess vulnerability to poverty in Wolaita and Dawuro zones. More specifically, the study will:
1) Determine the extent of vulnerability to poverty
2) Examine the effects of drought, measured by rain fall on future poverty
3) Assess the sources of vulnerability to poverty

2. Methods

2.1 Definition of Important Terms

Poverty: for a household, in relation to this study, is defined as a state of having consumption level below a certain standard usually known as the poverty line. In spite of its difficulties in measurement, themeasure of welfare is an income or consumption (Ravallion, 1998) but in practice researchers employ these measures as convenient measure of welfare.

Absolute Poverty line: is anchored in some absolute standard of what households should be able to count on in order to meet their basic needs. For monetary measures, these absolute poverty lines are often based on estimates of the cost of basic food needs, that is, the cost of a nutritional basket considered minimal for the health of a typical family, to which a provision is added for nonfood needs.

Vulnerability to Poverty - Vulnerability as Expected Poverty (VEP): According to the World Bank's definition, vulnerability to poverty is the probability, today, of being in poverty or to fall into deeper poverty in the future. Vulnerability is very different from the standard analysis of poverty because it recalls a forward-looking perspective rather than an ex post assessment, allowing the design of protection policies that can prevent households and individuals from experiencing welfare losses.

Vulnerability Thresholds: are cutoff points separating the non vulnerable, relatively vulnerable and highly vulnerable from each other. The choice of a vulnerability threshold is ultimately quite arbitrary. In this study we use Chaudhuri, Jalan, and Suryahadi (2002) classification. Those who are highly vulnerable, for whom the expected vulnerability is 0.5 or above, those who are relatively vulnerable, for whom their expected vulnerability level is between 0.22 and 0.5; 0.22 inclusive and those who are not vulnerable, for whom their expected vulnerability is less than 0.22. We just adopt this classification because the incidence of poverty in our study area is higher than 0.50 and the incidence of poverty for SNNP for the year 2011 is 0.296 (MoFED, March 2012).

2.2 Sample and Sampling

Like most researches in the empirical world, our study relay on taking sample since the population we are dealing with is large enough in terms of cost and data management. Moreover, as our study deals with population that is distributed across a wide range of geographic region, we find it an expensive affair to take sample from across the whole geographic region. Hence, inorder to reduce the costs, two-stage sampling procedure is used to draw the sample from the population of the Wolaita and Dawuro zones as whole. We first select five cluster Woredas from the 21 Woredastwo zones in S.N.N.P using simple random sampling and we found Araka, Boditi, Humbo, Sodo and Tercha Woredas as first stage units. Then we use simple random sampling procedure to select households from selected cluster Woredas based on proportional allocation and we find the following second stage units (households).

We reach at the total sample of 165 to be taken from the total population of households living in the five Woredas of the two zones using Yamané's (1973) formula. According to Yamané if we use 95 percent confidence level and an estimated population proportion of 0.5, the lowest sample size we need is given by[1]:

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

Where N = the population size and e = tolerable error (precision/error level)

Using this formula and taking the tolerable error to be 0.08, we take a sample of 165 from the total 43,413 household population in the cluster Woredas[2].

Regarding the type and source of the data, this research is based on primary cross sectional data surveyed from five Woredas of Wolaita and Dawuro zones in 2011. A multipurpose pre coded questionnaire has been designed and administered to 165 households to collect data on household consumption expenditure, household demographics, household income, and household assets and other household and community shocks. Besides, secondary data is collected from Central Statistical Agency (CSA) for adjustment purposes (like adjustment in poverty line, adjustment in inflated commodity prices reported by respondents etc.). Moreover, field and office checks for each filled questionnaire are undertaken using manual and SPSS V.17 to keep data consistency.

2.3 Estimating poverty measures

The poverty measure itself is a statistical function that translates the comparison of the indicator of household well-being and the chosen poverty line into one aggregate number for the population as a whole or a population subgroup. In this study we use Foster-Greer-Thorbecke (FGT) indices which are the most commonly used measures.

2.3.1 Incidence of poverty (headcount index)
Poverty incidence refers to the percentage of people living below a minimum threshold as measured by local living standards, that is, the share of the population that cannot afford to buy a basic basket of goods. This is given by:

$$P_o = \frac{q}{n}$$

Where:q is the number of households below poverty line, Z and
n is the total number of sampled hpuseholds

I. Depth of poverty (poverty gap)

This provides information regarding how far off households are from the poverty line. This measure captures the mean aggregate consumption shortfall relative to the poverty line across the whole population. It is obtained by adding up all the shortfalls of the poor (assuming that the non-poor have a shortfall of zero) and dividing the total by the population. In other words, it estimates the total resources needed to bring all the poor to the level of the poverty line (divided by the number of individuals in the population).

$$P_1 = \frac{1}{n}\sum_1^q\left(\frac{Z-C_i}{Z}\right)$$

Where: Z is absolute poverty line, C_i per adult consumption expenditure of household H_i

q is the number of households below poverty line, Z and

n is the total number of sampled hpuseholds

II. Poverty severity (squared poverty gap)

Poverty severity is a measure of relative deprivation among the poor, i.e., it takes into account not only the distance separating the poor from the minimum threshold, but also the inequality among the poor. It places a higher weight on those households further away from the poverty line. Using the poverty line and the data on real annual consumption expenditure per adult equivalent, the three FGT poverty indices have been computed as:

$$P_2 = \frac{1}{n}\sum_1^q\left(\frac{Z-C_i}{Z}\right)^2$$

Where: Z,, C_i, q and nare as defined above.

2.4 Estimating Vulnerability Measures

2.4.1. Basic Approach Adopted

Whatever the precise measure of vulnerability we choose to work with, specification of the data generating process for consumption is first and foremost. This is because that no matter how rich data we have, vulnerability to poverty of household is never observable.From this it naturally follows that the observed consumption expenditures at a point in time (i.e., from a single cross-section survey) should be viewed as the outcome (snapshot) of a dynamic process that is occurring in real time. And this means that vulnerability assessments have to be rooted in explicit models of inter-temporal household behavior.

Once a specification has been chosen, the next step is to estimate the parameters of the process using the household data. In general it will be possible to estimate the key parameters in a fairly flexible way without making too many stringent distributional assumptions. However, in going from estimates of the consumption process to estimates of vulnerability, the problem of estimating the distribution of consumption will need to be faced. In this study we work with a pre specified parametric distribution in contrast to the non-parametric technique.

Generally, we use both descriptive and inferential statistical analysis techniques in this study. Descriptive statistics is used to characterize the variables of interest and to analyze the poverty and vulnerability status of households but inferential statistics is adopted to arrive at the expected consumption and expected variance; then in turn to find vulnerability to poverty and to examine the correlates of

vulnerability to poverty. STATA version 12 was used for both types of analysis.

2.4.2. Model Specification

The probability that a household will find itself poor depends on its expected consumption looking forward, and also on the volatility of its consumption stream, and possibly on higher moments of the consumption.We need to estimate in this study both expected consumption and the variance of its consumption to estimate household's vulnerability to poverty.

Cross-sectional household surveys are much more widely used in cases where longitudinal surveys are not available. These cross-sectional surveys provide the raw data for most of the poverty assessments that are now routinely done for numerous developing economies.

Chaudhuri (2000) provides a detailed description of the assumptions that are needed to interpret the estimates we obtain in terms of vulnerability to poverty. We begin here by assuming that the stochastic process generating the consumption of a household h is given by:

$$LnCh = Xh\beta + \varepsilon h.. \quad \text{……………….. (3.1)}$$

where C_h is per capita consumption expenditure, X_h represents a bundle of observable household characteristics, such as household size, location, educational attainment of the household head, etc., β is a vector of parameters, and ε_h is a mean-zero disturbance term that captures idiosyncratic factors (shocks) that contribute to different per capita consumption levels for households that are otherwise observationally equivalent.

.We do however allow the variance of eh (and hence of lnCh) to depend upon observable household characteristics in some parametric way. This is simply to allow for heteroskedasticity in consumption data generating process. There are a number of ways in which this can be done. The estimates we report are generated assuming the following extremely simple functional form:

$$\delta e, h^2 = Xh\theta \quad \text{………………………… (3.2)}$$

We estimate β and θ using a three-step feasible generalized least squares (FGLS) procedure suggested by Amemiya (1977). Using the estimates $\hat{\beta}$ and $\hat{\theta}$ that we obtain form FGLS, we are able to directly estimate expected log consumption (for detailed procedure see appendix A-A1):

$$E\left(ln\ ^{Ch}/_{Xh} = Xh\hat{\beta}\right)\text{…………………..(3.3)}$$

and the variance of log consumption:

$$\text{Var}\ [lnC_h /X_h] = \sigma^2_{e,h} = X_h\hat{\theta} \quad \text{………(3.4)}$$

For each household h assuming that consumption is log-normally distributed (i.e., that lnC_h is normally distributed), we are then able to use these estimates to form an estimate of the probability that a household with the characteristics, X_h, will be poor, i.e, of the household's vulnerability level. Letting Φ (.) denote the cumulative density of the standard normal, this estimated probability will be given by:

$$\hat{v} = \widehat{Pr}\ (lnC_h<ln\ Z/\ X_h) = \Phi\left(\frac{ln\ Z-X_h\hat{\beta}}{\sqrt{X_h\hat{\theta}}}\right)\text{……(3.5)}$$

The method we have outlined is the standard one used in most vulnerability to poverty assessments that rely on regression methods, but with one important difference compared to poverty assessments[1].

Moreover, we use the simple OLS regression to see the impact of the explanatory variables listed above in equation 3.1 on the vulnerability to poverty.

2.4.3. Variable Specification

Based on theoretical expositions and previous empirical studies, the following explanatory variables are hypothesized to influence the welfare of households as follows. Annual real consumption expenditure per adult equivalent is dependent variable in the FGLS and vulnerability to poverty is dependent variable in the OLS regression.

- *Woreda*: This variable captures geographical differences of our study area
- *Sex of household head*: the gender of household heads is vital in the context of Ethiopia
- *Age and Age Squared of the household head*: Age and age squared (a proxy for experience and old age respectively).
- *Adult Equivalent Scale*: It is expected to affect the dependent variable either ways depending on the demographic composition of the household.
- *Dependency Ratio:* It is a proxy for the average number economically inactive members of households per each household member.
- *Household Marital Status*: The marital status of household heads is also vital in the context of our study area as, in most cases; married households have large number of family size compared to unmarried households.
- *Household Education*: It is a proxy for the educational level of the household head
- *Household Occupation*: It is a proxy for the occupational level of the household head
- *Number of Household Members with Primary Education*: It is a proxy for the educational level of the household members
- *Number of Household Members with Secondary Education*: It is a proxy for the educational level of the household members
- *Number of Household Members with Higher Education*: It is a proxy for the educational level of the household members

- *Number of Household Members with No Occupation*: It is a proxy for the occupational level of the household members
- *Number of Household Members with Paid Work*: It is a proxy for the occupational level of the household members
- *Community and Household Shocks*: The study includes as much as possible community and household shocks in a bid to account for the variance of household consumption.

3. Results

3.1 Descriptive Statistics

Description of the data on variables of interest (Table 4.1.1) shows a big difference in terms of household composition across Woredas as reflected by mean values. Humbo has the highest number of adult equivalent scale, highest dependency ratio and highest number of house hold members with no occupation. This is also evident from its second lower annual consumption per adult equivalent. On the other hand, Tercha has the lowest number of adult equivalent scale; lowest dependency ratio and lowest number of house hold members with no occupation possibly which help the Woreda to have the highest welfare among the surveyed areas as measured by annual consumption per adult equivalent. Based on the number of house hold members with paid work, Sodo town has the highest mean number followed by Boditi. Moreover, Sodo town is found to have the highest number of members with higher education. Despite of these highest levels of education and occupation, the town has the lowest welfare. This may be induced from its highest dependency ratio.

Chart 1 below shows that 46.7 percent of the female headed households and only 6.9 percent of the male headed households have no occupation. While 23.8 percent of the female headed households and 65.3 percent of the male headed households are engaged in paid works. Female headed households are found more participatory in petty trade (23.8 percent) than male headed households (9 percent).
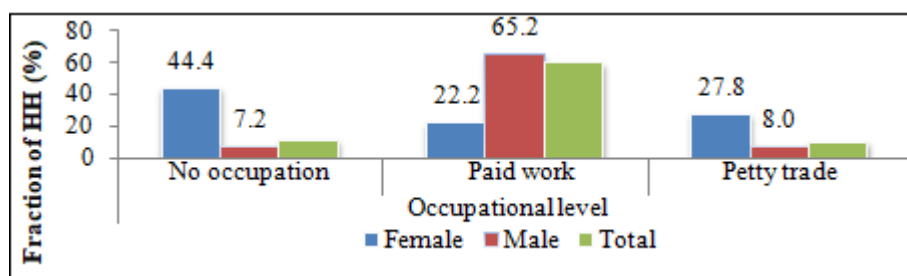
Chart 1: Population Distribution of Occupational Level

In relation to marital status of house heads (Chart 2), household with single and divorced house heads consume much higher than households with married and widowed house heads (on average households with single and divorced house heads consume 4.8 times consumption of households with married and widowed house heads).
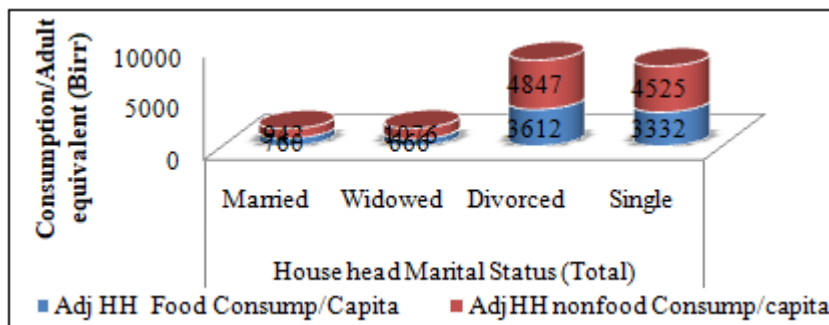
Chart 2: Consumption by House Head Marital Status

In our survey about 55.8 percent of the male heads have secondary and above education while 61.9 percent of the female heads have no education at all (Chart 3) and this implies male heads are found to have better educational background than female heads.
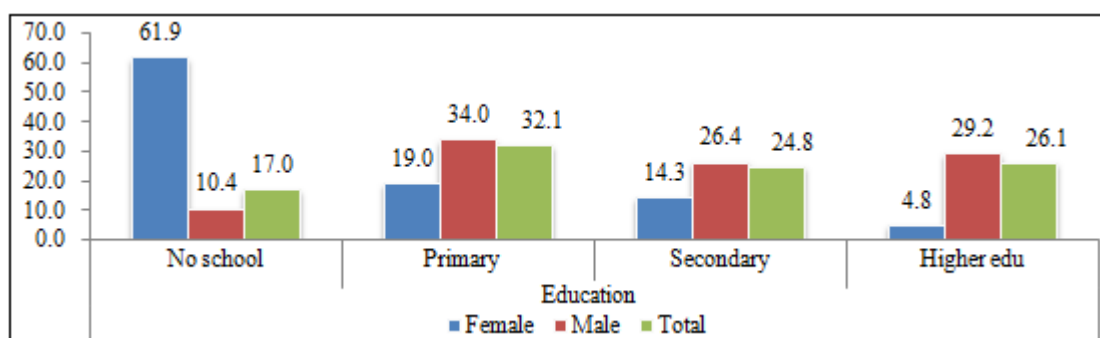

Chart 3: Population Distribution by Education

3.1.2 Aggregate and Geographic Poverty Profile

The analysis of the poverty at aggregate and Woreda levels in Table 4.2.1.1 indicates higher incidence of poverty, poverty gap and severity in all the survey areas. It is found that 56 percent of the sampled households are deemed poor. The poverty gap for the overall study area is 44 percent which reflects the surveyed areas mobilized 44 percent of the poverty line (4037.02 Birr per year) for every adult equivalent individuals and distribute it to the poor in the amount needed, each poor household will move to the poverty line. Table 4.2.1.1 also shows differences in the FGT indices across the Woredas. The proportion of poor (62 percent and 61 percent respectively) in Sodo and Boditi is higher than the proportion of non-poor. While the proportion of poor (44 percent and 40 percent respectively) in Araka and Humbo are lower than the proportion of non-poor. Moreover, Table 4.2.1.1 shows that the number of poor and non-poor is balanced in Tercha. Sodo has the highest contribution (47 percent) to the overall poverty of the study area while Humbo has the lowest contribution (2 percent) to the overall poverty.

3.1.3. Demographic Poverty Profile

A summary of the poverty measures across different demographic groups given in Table 4.2.2.1 shows that poverty incidence of female headed households (72 percent) is much higher than the poverty incidence in the male headed households (54 percent). As a result, to mitigate poverty (keeping other factors constant) female headed households need higher proportion of the poverty line (57 percent) for every individual adult equivalent compared to male headed households (43 percent). Moreover, the severity of poverty among female headed households is higher than that of male headed households and households with married house heads have higher incidence of poverty, poverty gap and severity compared to the households with unmarried heads and the married group contribute 89 percent to the overall poverty.

Results in Table 4.2.2.1 shows households with aged heads (60 years and higher) have lower incidence of poverty (27 percent) compared to the younger house heads (59 percent). Moreover, these households with aged heads have lower poverty gap and poverty severity. This result may be due to the higher number of productive household members (lower dependency ratio of 0.76) that those household groups possess compared to the number of productive members (higher dependency ratio of 0.94) that households with younger heads have. Households with dependency ratio 0.25 and above have poverty incidence of 61 percent which contributes 84 percent to the overall poverty. This group has also higher gap and severity of poverty.

Table 4.2.2.2 ascertains that household heads with higher educational level have the lowest poverty incidence 37 percent which contributes 16 percent to the overall poverty in the study area. Those secondary education completed heads have the second lowest poverty incidence 58 percent but accounts for the 25 percent of the overall poverty higher than the contribution of households with heads with no education (20 percent).

Moreover, Table 4.2.2.2 marked that households with primary school completed heads have the same incidence of poverty compared to households with heads that have no formal education. Surprising result that we observe

regarding the composition is that households with heads who are no more engaged in any job have the lowest incidence of poverty, poverty gap and poverty severity (Table 4.2.2.2) contributing only 8 percent to the overall poverty. This may be due to the case that those households have on average an almost equal household size (4.6) but lower dependency ratio (0.4) compared to rest groups. It is clear from Table 4.2.2.2 that households with heads engaged in unpaid works (like cultivating own land) and in petty trade have almost the same fraction of their people below poverty line (68 and 69 percent respectively). However, the severity of the poverty is higher in households headed by heads who are engaged in unpaid work. Moreover, households with heads engaged in paid works have the second lowest proportion of poor (53 percent) contributing 57 percent to the overall poverty. These groups of households have higher dependency ratio compared to the households with unengaged heads.

3.2 Econometric Results

3.2.1 The Vulnerability Model

Using our survey cross sectional data for the year 2011 derived from Humbo, Araka, Sodo, Boditi and Tercha and the model specified in section 3.4.1, we estimated the models and the results are presented as follows. The FGLS results (Table 4.3.1.1) indicate that expected log consumption per adult equivalent is positively affected by adult equivalent whereas dependency ratio, number of household members with primary education and number of members with paid work have significant negative effect on expected log consumption per adult equivalent. Moreover, there is significance difference between wellbeing of male headed households and female headed households in which male headed households take the advantage over female headed households.

Education of house head has also significant positive effect. From the FGLS results it is also apparent that geographical differences have significant effect on the wellbeing of households in the study area. A surprising result that we should note here is that though crop damage and land shortage have significant negative effect, drought and absence of oxen have positive significant effect on expected log consumption per adult equivalent. This may show that during drought times food aids from government and other sources have significant effect as we do not smooth for such consumption. Moreover, it is known in the study areas that absence of oxen is one of the main selection criteria for food aid.

Similarly, household age and number of workers with paid work have positive significant effect on the variability of the household welfare whereas the number of household members with higher education has significant negative effect while. that dummies household sex, crop damage, land shortage, drought and absence of oxen have significant effect on the variability of the household's welfare. Moreover, differences in marital status of household have also show significance differences in the variability of the log consumption per adult equivalent.

Provided the above results and using assumption specified in section 3.4.1 that consumption is log-normally distributed, we computed the Vulnerability to poverty for each household and found that the mean vulnerability to poverty is 47 percent. This result tells us, on average, there is a probability of 0.47 of falling in to poverty in next period, which is expected head count poverty for the next period.

Simple OLS regression displayed in Table 4.3.1.2 indicated that female headed households are more vulnerable than male headed households in a way that household sex (Male = 1, Female =0) is significantly negatively correlated to vulnerabilityand geographical differences induce significant differences in vulnerability of households. Dependency ratio, number of household members with primary education and number of members with paid work have significant positive effect on vulnerability but adult equivalent and house head education correlate vulnerability negatively. The surprising result that followed from determination of expected log consumption per adult equivalent is that drought and absence of oxen has significant negative effect on vulnerability while crop damage and land shortage increases the vulnerability of households in our study area.

3.2.3 Aggregate vulnerability profile

The analysis in assessment of vulnerability is to see pattern of overall level of vulnerability and as depicted in Chart 4, using vulnerability threshold ranging from 0 to 1 (measured along the horizontal axis) for the population as a whole as well as by observed poverty status.By construction, as the threshold increases, the incidence of vulnerability declines. Thus, at a threshold of zero, everyone is vulnerable while no one is vulnerable at the threshold of one. For the vulnerability thresholds between 0.1 up to 0.3, the incidence of vulnerability for non-poor is higher than for poor. However, not surprisingly, for any threshold above 0.3, the incidence of vulnerability is higher for the poor than for the population as a whole, which in turn is higher than the incidence of vulnerability amongst the non-poor. More significantly, Chart 4 suggests that for a wide range of thresholds, poverty and vulnerability are significantly different from each other. This implies not all the poor are vulnerable while a significant proportion of the non-poor are vulnerable.
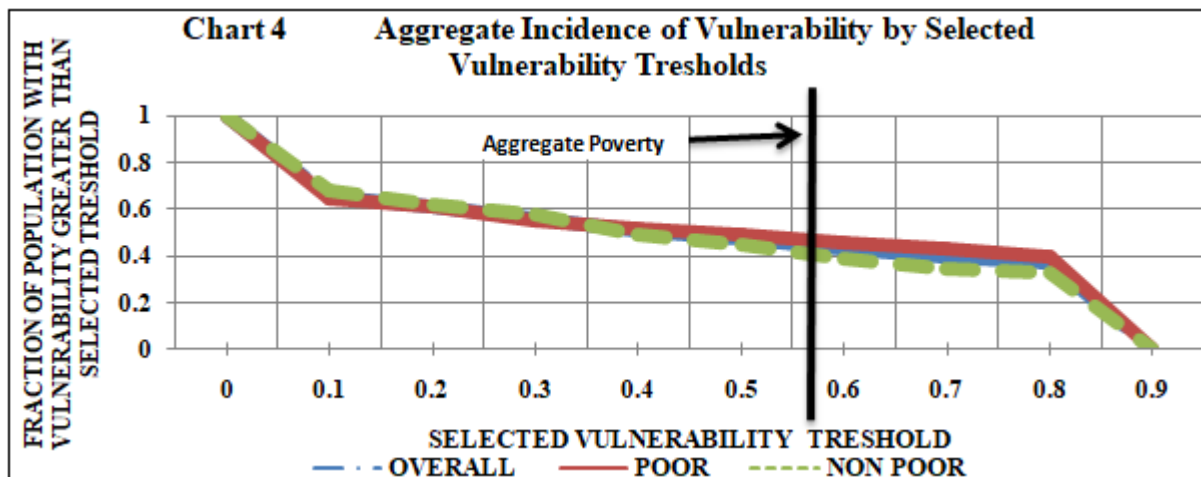
At the aggregate level, while 56 percent of the population is observed to be poor, we estimate that 62 percent of the population is vulnerable to poverty. Hence, there are households who are not currently poor whose vulnerability (ex-ante poverty) is high (above 0.22 percent). In fact, out of currently non poor households that constitute 44 percent of the population, 62 percent are vulnerable and this implies that about 28 percent of the population though not currently poor are vulnerable to poverty. Therefore, it is clear from our result to deduce that the incidence of poverty underestimates the fraction of people that is going to be poor in the next period(s).

On the other hand, it is clear form Table 4.4.1 that there are some households who are classified as poor whose vulnerability level is low enough for them to be categorized as non-vulnerable. Among the overall poor 61 percent are vulnerable implying 39 percent of the observed poor is non-vulnerable. This simply reflects non deterministic nature of the relationship between poverty and vulnerability. Moreover, this is also apparent our results show that 57 percent of the non-vulnerable households and 55 percent of the vulnerable households are poor and amongst the households classified as vulnerable, 77 percent are highly vulnerable. This constitutes 47.4 percent of the population of our study area. And among the highly vulnerable about 58 percent (27.6 percent of the overall population) are currently poor which implies that nearly 20% of the population is highly vulnerable but currently non-poor.

To end up our discussion on the aggregate level of vulnerability, let see the mean vulnerability across poverty and vulnerability status of households. The mean vulnerability for the non-poor (45 percent) and poor (49 percent) is about balanced. And households classified as non-vulnerable have mean probability of only 2 percent to be poor in the near future. Moreover, though mean vulnerability of the households classified as vulnerable is 76 percent, it more certain (88 percent) that high vulnerable households are going to be poor in the near future.

The central message from our discussion on aggregate vulnerability considering policy issues is that though poverty and vulnerability are two related concepts, there remain important distinctions between the two and neither is a subset of the other. Particularly in our study, fraction of the population that faces considerable risk of poverty is higher than the fraction of the observed poor. The second important policy implication that emerges from our discussion is that characteristics of those who are observed to be poor at any given point in time may differ from the characteristics of those who are estimated to be vulnerable to poverty, whether or not they are currently poor. Hence, Interventions and programs that aim to reduce the level of vulnerability in the population may therefore need to be targeted differently from those aimed at poverty alleviation.

4.4.2. Comparing Vulnerability Profiles across Different Population Segments

Tables 4.4.2.1 and 4.4.2.2 reveals the fraction of the population that is observed to be poor ranges from a low of 40 percent in Hunbo to a high of 62 percent in Sodo. Inter-Woreda differences in the estimated incidence of vulnerability are even more pronounced than the Woreda wide disparities in poverty rates. The fraction of the population estimated to be vulnerable ranges from a low of 40 percent in Hunbo to a high of 70 percent Araka. Moreover, the estimated mean vulnerability also shows considerable difference among different regions. Humbo and Tercha on average lie on the relatively vulnerable category whereas the rest Woredas are among the highly vulnerable. It is also easy to recognize from Tables 4.4.2.1that though Araka has the highest incidence of vulnerability, Boditi is number one considering the fraction of highly vulnerable within its population and two important points revealed from our comparison of vulnerability and poverty across geographic composition that indicate differences in distribution of the vulnerability are: First, in each Woreda the estimated incidence of vulnerability is at least as high (Humbo) and in most cases higher, than the observed incidence of poverty. Moreover, there is considerable variation in the vulnerability to poverty ratio. Vulnerability to poverty ratio for Araka is 1.58 showing vulnerability to poverty is dispersed in the population. In contrast, the vulnerability to poverty is much concentrated in the rest of the Woredas with vulnerability to poverty ratio around 1. Secondly, two geographic segments with roughly similar observed poverty rates may have very different incidences of vulnerability. This can be revealed from Humbo and ArakaWoredas. In both Woredas incidence of poverty is almost balanced and the estimated fraction vulnerability in Araka is 70 percent pretty high compared to the incidence of vulnerability in Humbo (40 percent).

Turning our discussion to the comparison of vulnerability across demographic composition of the population, there is difference in the poverty and vulnerability rates for different groups. Female headed households are found to be poorer and more vulnerable than male households (Tables 4.4.2.2). Moreover, all of the vulnerable female headed households are estimated to be highly vulnerable but vulnerability to poverty is much concentrated in male headed households. When we consider the age of the households, households with aged heads (60 years or higher) are less poor and less vulnerable than young age (less than 60 years) headed households. In addition the vulnerability to poverty is much dispersed in the households headed by aged heads as indicated by high vulnerability to poverty ratio (2.25).Similarly households headed by married heads are poorer but less vulnerable than households headed by unmarried heads. Households with high dependency ratios are likely to be poorer and more vulnerable than households with low dependency ratios and vulnerability is concentrated in the households with higher dependency.

In sharp contrast, for the households with in the lowest educational attainment category, which make up 17 percent of the overall population, the incidence of poverty is about same compared to the second lowest educational attainment category but with higher vulnerability incidence (74 percent) compared to the other educational attainment categories. However, vulnerability and poverty declines as educational attainment increase for the rest educational attainment categories (Tables 4.4.2.2). If we divide the sample according to the employment status of the household head (Tables 4.4.2.3) we realized that though households with heads with no occupation have lower incidence of poverty,

they are estimated to have higher vulnerability incidence next to households with salaried heads. Important point to add here is that, households with paid works that constitute 60 percent of the population, on average, lie in the high vulnerable category (mean vulnerability of 0.51) with 52 percent of the group being highly vulnerable but with dispersed vulnerability.

4.4.3. Geographic Targeting Using Vulnerability Estimates

With the increasing number of fiscal decentralization initiatives like in Ethiopia, under which funds and expenditure authority are being devolved down to local governments, a better understanding of the geographic aspects of poverty has become even more crucial. If the severity of poverty in a region is to be included in the criteria for determining the allocation of central funds, information on the geographic distribution of poverty is obviously essential. The method we proposed here (an assessment of the geographic distribution of vulnerability to poverty) supports the effective allocation of available resources to poverty concerned programs. But doing so raises the question of whether funds for poverty alleviation efforts should be allocated on the basis of the incidence of poverty or the incidence of vulnerability to poverty. If the rankings of geographic units in terms of vulnerability and poverty are largely overlapped, the question could obviously be sidestepped. However, Chart 5 below, which plots the estimated incidence of vulnerability against the observed incidence of poverty for each Woredas, shows differences in poverty and vulnerability incidences across Woredas.
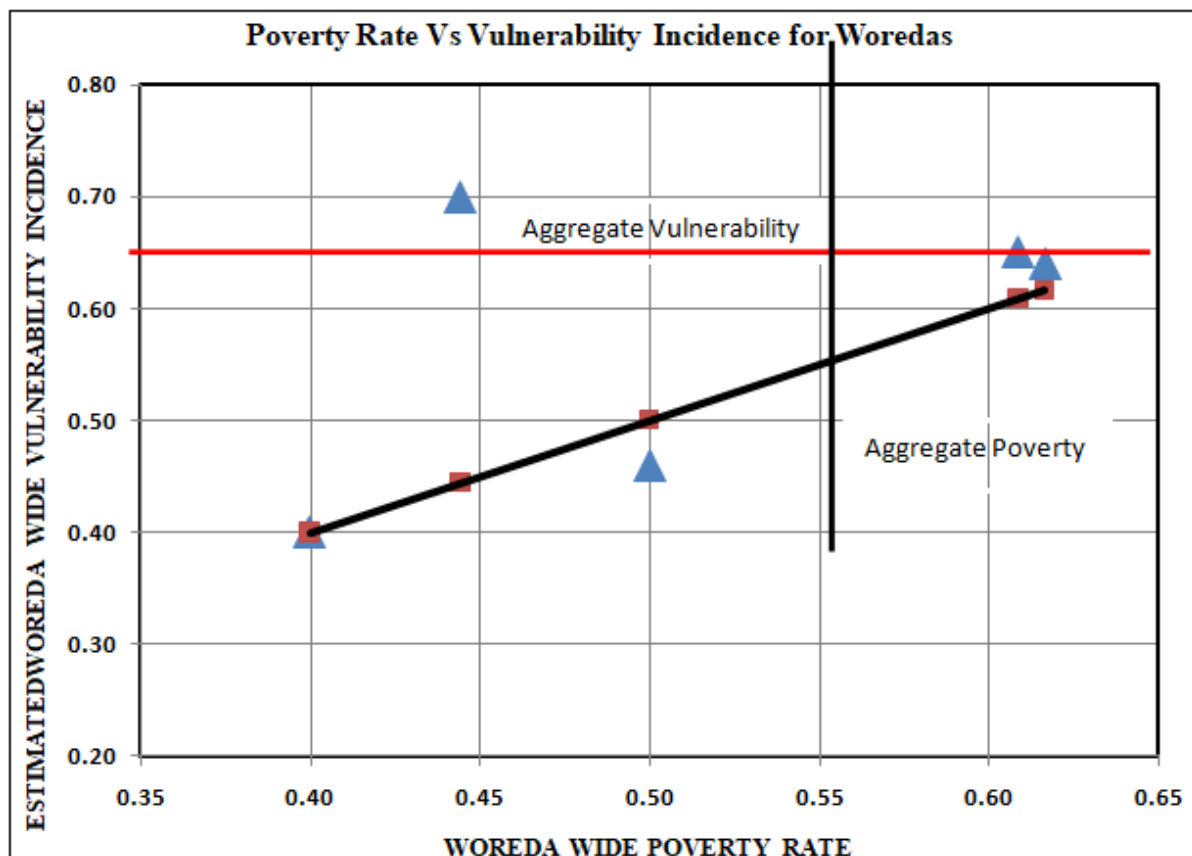

Chart 5

For most Woredas, the estimated incidence of vulnerability is higher than the observed incidence of poverty. This can be seen from the fact that three of the Woreda lie above the 45-degree line (Chart5). The remarkable note here is that geographic targeting based on incidence of poverty ranking drives as to different action compared to geographic targeting based on incidence of vulnerability. If we consider geographic targeting based on incidence of poverty, Woredas to the left aggregate poverty line (Araka, Humbo and Tercha) will not be included in the program. But if we consider geographic targeting based on vulnerability, Woredas above the aggregate vulnerability line and to the left of aggregate poverty line (Araka) along with Woredas to the right of aggregate poverty and above the aggregate vulnerability line (Sodo and Boditi) will be included to the program.

The key to resolving this apparent dilemma lies in distinguishing ex-ante poverty prevention interventions from ex-post poverty alleviation interventions. The incidence of poverty should determine the allocation of funds for ex-post poverty alleviation programs. In case of Ethiopia this may constitute programs like food for work, distribution of subsidized food items, use of cobblestone road construction and housing construction for urban job creation, housing construction (condominium) for low income households etc. However, the allocation of funds for preventive interventions (ex-ante interventions aimed at poverty prevention) should be guided by the incidence of vulnerability to poverty. Ex-ante poverty prevention interventions may include infrastructural development, vocational training schemes, agricultural extension programs, investment funds to major irrigation projects and etc.

4.4.4. Exploring the Proximate Sources of Vulnerability
Chart 6 shows our estimates of the mean and standard deviation of consumption for households with selected levels of vulnerability thereby constructing, empirically, a number of iso-vulnerability curves. Considering the cluster of points associated with a vulnerability level of 0.25, which is slightly above the threshold level of vulnerability (0.22) above which we consider households to be vulnerable. All the households represented in this cluster have estimated levels of vulnerability in the range 0.2405 and 0.262. Yet the normalized mean consumption levels estimated for these households (the ratio of estimated mean consumption to the poverty line) ranges from a low of about 1.06 (with correspondingly lower levels of normalized volatility) to a high of about 1.2. Within this group, therefore, some households are vulnerable because they have low levels of mean consumption whereas others are vulnerable because their consumptions are more volatile (positively slopped iso-vulnerability curve). However, mean and standard deviation of consumption need not be monotonically related across households. For instance, amongst households with an estimated vulnerability level of 0.35, a household with highest estimated standard deviation of consumption has a lower estimated mean level of consumption than several of the households with lower estimated levels of vulnerability (steeper positively slopped iso-vulnerability curve). This implies then, estimated variance of consumption to always be higher for households with higher estimated mean consumptions. Hence, the effect of consumption volatility on vulnerability to poverty declines for higher estimated levels of vulnerability with lower mean consumption.

However, when mean consumption is below the poverty line, an increase in the variability of consumption (holding mean consumption fixed) may reduce the level of vulnerability because it increases the likelihood of consumption levels above the poverty line (Whom he was certainly poor in the future with vulnerability 1 become above poverty line hence less vulnerable). So, for a low enough initial level of consumption variability, an increase in variability would have to be offset by a reduction in mean consumption to maintain the same level of vulnerability. And this would imply that when mean consumption is below the poverty line segments of the iso-vulnerability curves would be negatively sloped.

Estimated Standard deviation (SD) Vs Mean Consumption for selected Vulnerability levels
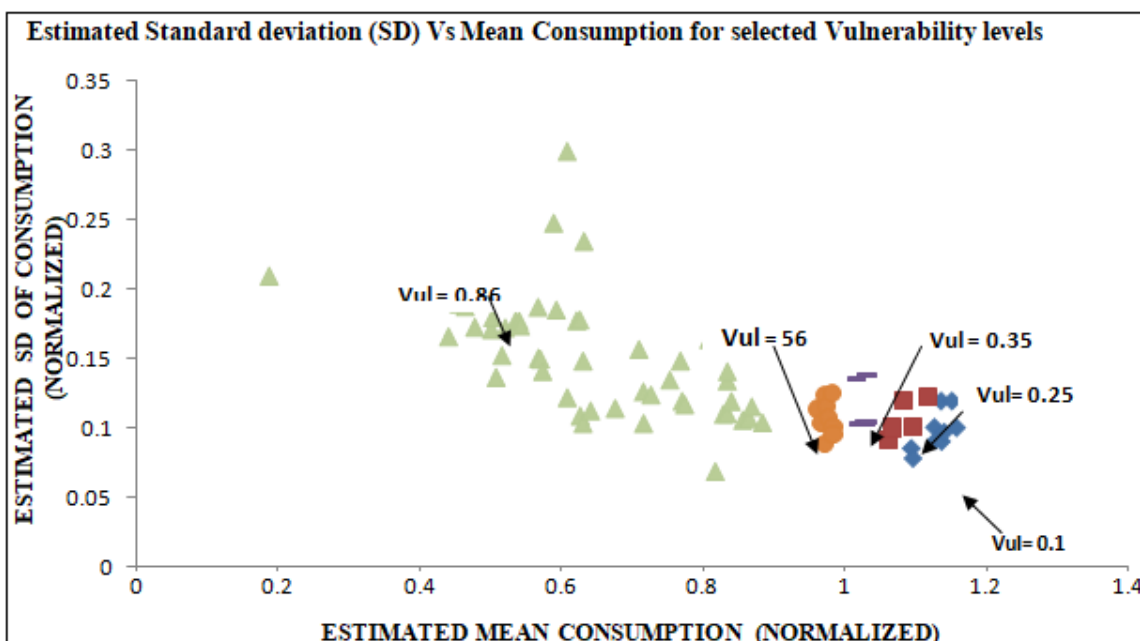
To facilitate the discussion of the sources of vulnerability we adopt a three-way classification of households. The first group is non-vulnerable group with an estimated vulnerability level below the threshold level of 0.22 and has estimated levels of mean consumption well above the poverty line. The second group, whom we label the high volatility (HV) vulnerable, is those with an estimated vulnerability level above the threshold, but estimated mean consumption above the poverty line. These households are vulnerable because their consumptions are volatile; were we to eliminate the variability in their consumptions, these households, because their mean consumptions lie above the poverty line, would no longer be vulnerable to poverty. The third group is low-mean (LM) vulnerable group which consists of those households with mean levels of consumption below the poverty line and households have vulnerability levels above 0.5.

Keeping this classification in mind, we estimate that 54 percent of the population is vulnerable due to their low endowments while 7 percent of the population is vulnerable because of high consumption volatility (Table 4.4.4.1). Thus, of the 62 percent of the population that estimated to be vulnerable, only 11.5 percent are so due to the high volatility of their consumption. Low mean income is also the main source of vulnerability for those currently poor. Of the 61 percent of the poor whom we estimate to be vulnerable, almost all are vulnerable because they have low endowments (Table 4.4.4.1). To put it in another way, no currently poor household will be out of poverty even if they stabilize their consumption streams in the near future. However, we could not sidestep the effect of consumption volatility on the future poverty of the currently non-poor households. Out of the 62 percent of the currently non poor vulnerable households, 23.3 percent are high volatile income vulnerable which means about 23.3 percent of the non-poor households will not be poor in the near future if they stabilize their consumption in the near future. Important point that should be noted is also that low mean vulnerability is somewhat concentrated among vulnerable households (with LM vulnerability to poverty ratio of 1.6)

Now let's see differences in the sources of vulnerability across Woredas (Table 4.4.4.2). Sodo town compared to the other Woredas has higher fraction of low mean vulnerable households in which amongst the vulnerable households living in Sodo almost all are low income vulnerable. Even though Humbo has the lowest proportion of vulnerable households, almost all of its vulnerable households are low income vulnerable like Sodo town. However, 21 percent of the vulnerable households living in Arak and 26.7 percent of the vulnerable households living in Boditi will not be poor in the near future if they smooth their consumption. Moreover,

low mean vulnerability is concentrated in Araka compared to other Woredas (LM vulnerability to poverty ratio of 1.25)

From Table 4.4.4.3 it is also clear to recognize differences in the sources of vulnerability in different demographic segments of the population. Though households with unmarried heads have higher incidence of vulnerability (80 percent) compared to households headed by unmarried heads (59 percent), most vulnerable married headed households are low mean vulnerable and 20 percent of the vulnerable unmarried headed households are volatile income vulnerable. Depending on the dependency ratio of the households, the proportion low dependency households that could be prevented from being poor in the near future by smoothing their consumption (19 percent) is higher than that of the higher dependency households (3 percent). However, male and female headed households have same proportion of their vulnerable households that could be prevented from being poor in the future if their consumption is stabilized (around 11 percent of the vulnerable). Moreover, low mean vulnerability to poverty if much more concentrated amongst the households headed by old aged (60 years and higher) heads compared to the households headed by young heads (less than 60 years)

A similar clear pattern emerges in differences in the sources of vulnerability across educational attainment and occupation categories (Table 4.4.4.4). As seen from the educational attainment prospective of heads, educational attainment, though not much, bring differences in the sources of vulnerability. Of the primary school completed vulnerable household and higher education completed vulnerable household, 11.1 percent each are found to be high volatile consumption vulnerable. But the number of low income vulnerable for secondary education completed headed households is comparatively lower (with 22.7 percent high volatile consumption vulnerable) than the rest educational attainment categories. Moreover, households with heads that do not engaged in any work have higher number of vulnerable that may be prevent from being poor in the near future by smoothing consumption compared to the other occupational levels.

To wind up our discussion in sources of vulnerability, majority of the vulnerable (88.5 percent of the overall vulnerable) of our study area is low income vulnerable (Chart 7). This suggests that call for ex-ante interventions that reduce the risks faced by households is not preferable policy measure rather transfer programs like distribution of subsidized food items to the urban poor should be done intensively.
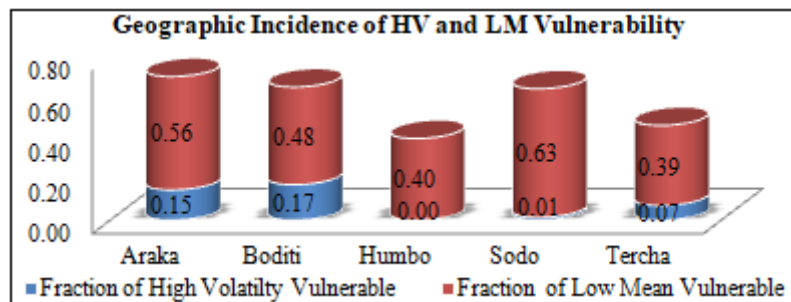
Chart 7: Discussion and Importance to Thematic Area

4. Conclusion and Recommendations

Based on our survey, poverty is quite high in Wolaita and Dawuro zones. It is found that 56 percent of the sampled households are deemed poor. Moreover, there is high gap of households from the poverty line (with poverty gap of 44 percent) and higher relative deficiency among the poor (with poverty severity of 37 percent).This implies that still poverty and vulnerability to poverty are the big risk faced by households living in Wolaita and Dawuro zones, hence, the regional government in general and the zonal administrations in particular should work hard to continue implementing the well-known poverty targeted programs launched by the Government of Ethiopia.

Moreover, Extent of Poverty differs across different geographic and demographic segments of the population. Poverty, as measured by FGT indices, is worst in Sodo and Boditi compared to other sampled Woredas. Sex, marital status and age of house heads also matters the level of household poverty. Male headed households are less poor than female headed households and households with unmarried heads are less poor than with married heads. A little bit surprising is that, households with aged heads are less poor than households with young heads. Moreover, poverty declines as education of house heads increases but households with no occupation are less poor. This also informs the Wolaita zonal administration to give due attention to Sodo and Boditi towns in implementing poverty alleviation programs. Moreover, when zonal administrations undertake transfer programs, female headed households, Households with married heads, households with less educated heads and households headed by young heads (at most 60 years old) should be give higher priority while we consider headship sex, marital status, education and age respectively.

Our study have estimated the vulnerability to poverty of households using 2011 cross sectional data drawn from five Woredas of Wolaita and Dawuro zones and found that on average there is 0.47 probability of entering into poverty a period ahead. The vulnerability of a household is positively significantly correlated with Dependency ratio, number of household members with primary education and number of members with paid work. Factors like household sex (Male =1, Female =0), adult equivalent and house head education found negatively correlated with the household's vulnerability to poverty. It is also consent that geographical differences induce significant differences in vulnerability of households. From this we can imply that Humbo and TerchaWoredas can be given less priority when both zonal

administrations are dealing with ex-ante poverty prevention interventions. Moreover, when zonal administrations undertake ex-ante poverty prevention interventions, female headed households, Households with unmarried heads, households with less educated heads, households with paid works and households headed by young heads (at most 60 years old) should be give higher priority while we consider headship sex, marital status, education, occupation and age respectively

In Wolaita and Dawuro zones, the fraction of the population that faces a non-negligible risk of poverty (62 percent) is considerably greater than the fraction that is observed to be poor (56 percent). This signifies significant proportion of non-poor (62 percent of the non-poor) is vulnerable to poverty. Our findings also suggest that for a wide range of vulnerability thresholds, poverty and vulnerability are significantly different from each other and this implies that not all the poor are vulnerable. Hence, our study argued that while we are thinking appropriate anti-poverty policy interventions in these zones, we should look at not only just who is poor today, but also who is likely to be poor in the future.

In thinking appropriate anti-poverty policy interventions in these zones, the key point lies in distinguishing ex-ante poverty prevention interventions from ex-post poverty alleviation interventions. The incidence of poverty should determine the allocation of funds for ex-post poverty alleviation programs. In case of Ethiopia this may constitute programs like food for work, distribution of subsidized food items, use of cobblestone road construction and housing construction for urban job creation, housing construction (condominium) for low income households etc. However, the allocation of funds for preventive interventions (ex-ante interventions aimed at poverty prevention)should be guided by the incidence of vulnerability to poverty. Ex-ante poverty prevention interventions may include infrastructural development, vocational training schemes, agricultural extension programs, investment funds to major irrigation projects and etc.

The last But not the least that we should note here is that majority of the vulnerable (88.5 percent of the overall vulnerable) of our study area is low income vulnerable. Moreover, there is no striking difference in sources of vulnerability to poverty across different population segments in which low endowments are the main source of vulnerability to poverty in all segments. This suggests that while we are looking for forward looking anti-poverty

interventions, we should focus on those that boast endowments of households in the prior period.

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Table 4.1.1- Summary Statistics

Variable		Woreda					
		Araka	Boditi	Humbo	Sodo	Tercha	Total
House head Age	Mean	34.8	37.4	38.3	41.8	39.0	39.2
	SD	9.0	9.2	3.1	11.9	11.7	11.0
HH size	Mean	4.6	5.4	7.0	5.9	3.1	5.1
	SD	1.7	3.0	2.8	2.0	1.6	2.3
House hold adult equivalent scale	Mean	3.4	3.8	4.7	4.2	2.5	3.7
	SD	1.2	1.8	1.5	1.4	1.1	1.5
Dependency Ratio	Mean	0.9	1.0	1.2	1.1	0.4	0.9
	SD	0.7	1.0	1.2	0.9	0.5	0.9
HH size with Primary education	Mean	2.2	2.2	3.5	2.4	1.5	2.2
	SD	1.8	2.2	2.2	1.5	1.3	1.7
HH size with secondary education	Mean	1.0	1.5	2.2	1.3	1.1	1.3
	SD	1.0	1.5	0.8	1.5	1.0	1.3
HH size with Higher education	Mean	0.5	0.5	0.7	0.9	0.3	0.7
	SD	0.8	1.1	1.2	1.4	0.7	1.2
HH size with no occupation	Mean	3.0	3.3	5.7	3.8	1.8	3.3
	SD	1.7	2.9	2.4	1.7	1.4	2.0
HH size with Paid work	Mean	0.8	0.9	0.5	1.4	0.6	1.1
	SD	0.8	0.9	0.5	1.1	0.8	1.0
Consumption per Adult Equivalent (Annual)	Mean	2155.6	2428.1	1656.0	1234.7	3611.9	2000.0
	SD	1994.1	3698.8	1433.1	1285.5	4632.2	2783.5
Sample Size		31	24	6	76	28	165

Source: Authors' Calculation

Table 4.2.1.1: Aggregate and Geographic Poverty Profile

Measures of Poverty	Araka	Boditi	Humbo	Sodo	Tercha	Overall
Number of Non poor	15	9	3	28	14	69
Number of Poor	12	14	2	45	14	87
Head Count Index	0.44	0.61	0.40	0.62	0.50	0.56
Poverty Gap	0.31	0.50	0.33	0.51	0.37	0.44
Poverty Severity	0.28	0.42	0.27	0.43	0.30	0.37
Population Share	0.17	0.15	0.03	0.47	0.18	1.00
Share of overall poor	0.14	0.16	0.02	0.52	0.16	1.00

Source: Authors' Calculation

Table 4.2.2.1: Demographic Poverty profile

Measures of Poverty	House head Sex		House head Age		House head Marital Status		HH Dependency Ratio	
	Female	Male	>= 60 Years	<60 Years	Married	Unmarried	< 0.25	>= 0.25
Household size	5.6	5.1	6	5.1	5.3	4.2	3.3	5.6
Dependency Ratio	0.9	0.9	0.76	0.94	1	1.2	0.02	1.2
No of Non poor	5	64	11	58	59	10	22	47
Number of Poor	13	74	4	83	77	10	14	73
Head Count Index	0.72	0.54	0.27	0.59	0.57	0.50	0.39	0.61
Poverty Gap	0.57	0.43	0.23	0.47	0.46	0.35	0.24	0.50
Poverty Severity	0.46	0.36	0.20	0.39	0.38	0.34	0.21	0.42
Population Share	0.12	0.88	0.10	0.90	0.87	0.13	0.23	0.77
Share of overall poor	0.15	0.85	0.05	0.95	0.89	0.11	0.16	0.84

Source: Authors' Calculation

Table 4.2.2.2 - House head Education and Occupational level

Measures of Poverty	Educational level of House head				Occupation of House head			
	No school	Premary School	Secondary School	Higher Education	No occupation	Unpaid work	Paid work	Petty trade
Household size	5.5	4.8	4.7	5.7	4.6	5.5	5.2	5.1
Dependency Ratio	0.8	0.9	1.1	0.9	0.4	0.9	1.0	1.0
No of Non poor	10	19	16	24	11	9	44	5
Number of Poor	17	34	22	14	7	19	50	11
Head Count Index	0.63	0.64	0.58	0.37	0.39	0.68	0.53	0.69
Poverty Gap	0.52	0.50	0.46	0.29	0.24	0.57	0.43	0.55
Poverty Severity	0.43	0.44	0.37	0.23	0.25	0.51	0.35	0.44
Population Share	0.17	0.34	0.24	0.24	0.12	0.18	0.60	0.10
Share of overall poor	0.20	0.39	0.25	0.16	0.08	0.22	0.57	0.13

Source: Authors' Calculation

Table 4.3.1.1: FGLS Regression Results

Explanatory Variables	Dependent Variable - log consumption Expenditure per adult equivalent	
	E [ln (C / X)]	Var [ln(C / X)]
	Coefficient (SD)	Coefficient (SD)
Woreda	0.1606161 (0.08)*	-0.01385 (0.02276)
House head Sex	3.096069 (0.5577)*	-0.17833 (0.08823)*
House head Age	-0.0236491 (0.0141)	0.00675 (0.00276)*
House head Age square	Dropped (Multicollinearity)	Dropped (Multicollinearity)
Adult equivalent Scale	0.4703982 (0.1683)*	-0.06072 (0.03281)
Dependency Ratio	-0.2965106 (0.1465)*	-0.01041 (0.05513)
House head Marital Status	0.2493314 (0.2145)	0.13314 (0.06435)*
House head Education	0.3312109 (0.1578)*	Dropped (Insignificant Unexpected sign)
No of HH members with Primary Education	-0.2164046 (0.1016)*	0.02476 (0.03524)
No of HH members with Secondary Education	-0.1220665 (0.1855)	-0.00756 (0.03038)
No of HH members with Higher Education	0.2914044 (0.2081)	-0.07347 (0.03466)*
No members HH with paid work	-0.785366 (0.1679)*	0.11692 (0.03233)*
Food Shortage Reason-Drought	3.024162 (0.7426)*	-0.44377 (0.11002)*
Food shortage reason - Absence of oxen	3.743265 (0.6093)*	-0.28454 (0.10508)*
Food shortage reason -Crop Damage	-2.753184 (0.6262)*	0.54303 (0.12841)*
Food shortage reason-Land Shortage	-3.71528 (0.6468)*	0.45442 (0.09199)*
Food shortage reason-Excess Rainfall	-0.2592026 (0.6174)	-0.07826 (0.12282)
Constant	4.142342 (0.5587)*	0.37176 (0.43266)
Number of observations	**156**	**165**
F(K-1, N-K)=	**177.47**	**20.12**
Prob. > F=	**0**	**0**
R-squared=	**0.9255**	**0.6695**
Level of significance=	**0.05**	**0.05**

Source: Authors' Regression   * Significant at 0.05 confidence level

Table 4.3.1.2: OLS Regression Results

Explanatory Variables	Dependent Variable Mean Vulnerability to Poverty Coefficient (SD)
Woreda	-0.0558261 (0.0138)*
House head Sex	-0.6473515 (0.0662)*
House head Age	0.0131996 (0.0105)
House head Age square	-0.0000426 (0.0001)
Adult equivalent Scale	-0.1594353 (0.0333)*
Dependency Ratio	0.0801245 (0.0317)*
House head Marital Status	0.0429605 (0.0244)
House head Education	-0.0584177 (0.0266)*
House head Occupation	-0.0302294 (0.0261)
No of HH members with Primary Education	0.0409519 (0.0189)*
No of HH members with Secondary Education	0.0398928 (0.0249)
No of HH members with Higher Education	-0.0624205 (0.0331)
No members HH with no occupation	0.0238284 (0.0203)
No members HH with paid work	0.2656843 (0.0252)*
Food Shortage Reason-Drought	-0.4119416 (0.0964)*
Food shortage reason - Absence of oxen	-0.617465 (0.0983)*
Food shortage reason -Crop Damage	0.6957637 (0.073)*
Food shortage reason-Land Shortage	0.585724 (0.0692)*
Food shortage reason-Excess Rainfall	-0.0415209 (0.0837)
Constant	0.9261409 (0.2344)*
Number of Observations	**156**
F(K-1, N-K)=	**21.94**
Prob> F=	**0**
R-squared=	**0.754**

Source: Authors' Regression

* Significant at 0.05 confidence level

Table 4.4.1: Aggregate Vulnerability Profile

Vulnerability Measures	Overall	Among Non Poor	Among Poor	Among Non Vulnerable	Among Vulnerable	Among Relatively Vulnerable	Among High Vulnerable
Mean Consumption/Capita	2,057.22	3,608.51	826.88	2,188.88	1,974.93	1,851.11	2,011.74
Mean Vulnerability	0.47	0.45	0.49	0.02	0.76	0.33	0.88
Number of HH in Group	156	69	87	60	96	22	74
Population Share	1.00	0.44	0.56	0.38	0.62	0.14	0.47
Number of Poor	87	0	87	34	53	10	43
Number of Vulnerable	96	43	53	0	96	22	74
No of Relatively Vulnerable	22	12	10	0	22	22	0
No of Highly Vulnerable	74	31	43	0	74	0	74
Fraction of Poor	0.56	0.00	1.00	0.57	0.55	0.45	0.58
Fraction of Vulnerable	0.62	0.62	0.61	0.00	1.00	1.00	1.00
Fraction of Relatively Vulnerable	0.14	0.17	0.11	0.00	0.23	1.00	0.00
Fraction of Highly Vulnerable	0.47	0.45	0.49	0.00	0.77	0.00	1.00
Vulnerability to Poverty Ratio	1.10		0.61	0.00	1.81	2.20	1.72

Source: Authors' Calculation

Table 4.4.2.1: Spatial Distribution of Vulnerability

Vulnerability Measures	Araka	Boditi	Humbo	Sodo	Tercha
Mean Consumption/Capita	2,287.51	2,521.32	1,849.81	1,243.68	3,611.94
Mean Vulnerability	0.50	0.56	0.33	0.52	0.30
Number in Group	27	23	5	73	28
Population Share	0.17	0.15	0.03	0.47	0.18
Number of Poor	12	14	2	45	14
Number of Vulnerable	19	15	2	47	13
Number of Relatively Vulnerable	5	1	0	10	6
Number of Highly Vulnerable	14	14	2	37	7
Fraction of Poor	0.44	0.61	0.40	0.62	0.50
Fraction of Vulnerable	0.70	0.65	0.40	0.64	0.46
Fraction of Relatively Vulnerable	0.19	0.04	0.00	0.14	0.21
Fraction of Highly Vulnerable	0.52	0.61	0.40	0.51	0.25
Share of overall poor	0.14	0.16	0.02	0.52	0.16
Share of overall Vulnerable	0.18	0.17	0.02	0.51	0.11

Share of Highly Vulnerable	0.17	0.15	0.03	0.48	0.16
Vulnerability to Poverty Ratio	1.58	1.07	1.00	1.04	0.93

Source: Authors' Calculation

Table 4.4.2.2: Vulnerability across Different Demographic Composition

	House head Sex		Househead Age		Househead Marital Status		HH Dependency Ratio	
	Female	Male	>= 60 Years	< 60 Years	Married	Unmarried	< 0.25	>=0.25
Mean Consumption per Capita	2,319	2,023	1,422	2,124	1,717	5,293	4,213	1,410
Mean Vulnerably	0.92	0.42	0.48	0.47	0.46	0.70	0.79	0.74
Number in Group	18	138	15	141	136	16	36	120
Population Share	0.12	0.88	0.10	0.90	0.87	0.13	0.23	0.77
Number of Poor	13	74	4	83	77	10	14	73
Number of Vulnerable	17	79	9	87	80	16	22	74
Number of Relatively Vulnerable	0	22	2	20	17	5	5	17
Number of Highly Vulnerable	17	79	9	87	63	11	22	74
Fraction of Poor	0.72	0.54	0.27	0.59	0.57	0.50	0.39	0.61
Fraction of Vulnerable	0.94	0.57	0.60	0.62	0.59	0.80	0.61	0.62
Fraction of Relatively Vulnerable	0.00	0.16	0.13	0.14	0.13	0.25	0.14	0.14
Fraction of Highly Vulnerable	0.94	0.41	0.47	0.48	0.46	0.55	0.47	0.48
Share of overall poor	0.15	0.85	0.05	0.95	0.89	0.11	0.16	0.84
Share of overall Vulnerable	0.22	0.78	0.10	0.90	0.84	0.55	0.50	0.47
Share of Highly Vulnerable	0.13	0.86	0.10	0.90	0.87	0.13	0.24	0.76
Vulnerability to Poverty Ratio	1.31	1.07	2.25	1.05	1.04	1.60	1.57	1.01

Source: Authors' Calculation

Tables 4.4.2.3: Vulnerability Profiles for Different Educational and Occupational Levels

	Educational level of House head				Occupational level of House head			
	No school	Primary School	Secondary School	Higher Education	No occupation	Unpaid work	Paid work	Petty trade
Mean Consumption/Capita	1,322.59	1,835.55	2,613.64	2,331.93	3,873.31	1,068.65	1,967.17	2,273.12
Mean Vulnerability	0.66	0.53	0.42	0.31	0.54	0.33	0.51	0.43
Number in Group	27	53	38	38	18	28	94	16
Population Share	0.17	0.34	0.24	0.24	0.12	0.18	0.60	0.10
Number of Poor	17	34	22	14	7	19	50	11
Number of Vulnerable	20	36	22	18	11	12	64	9
Number of High Volatility Vulnerable	0.00	4.00	5.00	2.00	3.00	0.00	7.00	1
Number of Low Mean Vulnerable	20	32	17	16	8	12	57	8
Fraction of Poor	0.63	0.64	0.58	0.37	0.39	0.68	0.53	0.69
Fraction of Vulnerable	0.74	0.68	0.58	0.47	0.61	0.43	0.68	0.56
Fraction of High Volatility Vulnerable	0.00	0.08	0.13	0.05	0.17	0.00	0.07	0.06
Fraction of Low Mean Vulnerable	0.74	0.60	0.45	0.42	0.44	0.43	0.61	0.50
Share of overall poor	0.20	0.39	0.25	0.16	0.08	0.22	0.57	0.13
Share of overall Vulnerable	0.24	0.38	0.22	0.16	0.13	0.13	0.65	0.09
Share of High Volatility Vulnerable	0.00	0.36	0.24	0.22	0.11	0.00	0.60	0.13
Share of Low Mean Vulnerable	0.20	0.35	0.22	0.20	0.14	0.18	0.59	0.10
Low Mean Vulnerable to Poverty Ratio	1.18	0.94	0.77	1.14	1.14	0.63	1.14	0.73

Source: Authors' Calculation

Table 4.4.4.1: Sources of Vulnerability (Aggregate)

	Overall	Among Non-Poor	Among Poor	Among Non-Vulnerable	Among Vulnerable	Among High Volatilty Vulnerable	Among Low Mean Vulnerable
Mean Consumption/Capita	2,057.22	3,608.51	826.88	2,188.88	1,974.93	7,961.97	1,200.13
Mean Vulnerability	0.47	0.45	0.49	0.02	0.76	0.79149335	0.75125712
Number in Group	156	69	87	60	96	11	85
Population Share	1.00	0.44	0.56	0.38	0.62	0.07	0.54
Number of Poor	87	0	87	34	53	1	52
No of Vulnerable	96	43	53	0	96	11	85
No of High Volatility Vulnerable	11	10	1	0	11	11	0
No of Low Mean Vulnerable	85	33	52	0	85	0	85
Fraction of Poor	0.56	0.00	1.00	0.57	0.55	0.09	0.61
Fraction of Vulnerable	0.62	0.62	0.61	0.00	1.00	1.00	1.00
Fraction of High Volatility Vulnerable	0.07	0.14	0.01	0.00	0.11	1.00	0.00
Fraction of Low Mean Vulnerable	0.54	0.48	0.60	0.00	0.89	0.00	1.00

Low Mean Vulnerable to Poverty Ratio	0.98		0.60	0.00	1.60	0.00	1.63

Source: Authors' Calculation

Table 4.4.4.2- Sources of Vulnerability (Spatial Differences)

	Araka	Boditi	Humbo	Sodo	Tercha
Mean Consumption/Capita	2,287.51	2,521.32	1,849.81	1,243.68	3,611.94
Mean Vulnerability	0.50	0.56	0.33	0.52	0.30
Number in Group	27	23	5	73	28
Population Share	0.17	0.15	0.03	0.47	0.18
Number of Poor	12	14	2	45	14
Number of Vulnerable	19	15	2	47	13
Number of High Volatility Vulnerable	4	4	0	1	2
Number of Low Mean Vulnerable	15	11	2	46	11
Fraction of Poor	0.44	0.61	0.40	0.62	0.50
Fraction of Vulnerable	0.70	0.65	0.40	0.64	0.46
Fraction of High Volatility Vulnerable	0.15	0.17	0.00	0.01	0.07
Fraction of Low Mean Vulnerable	0.56	0.48	0.40	0.63	0.39
Share of overall poor	0.14	0.16	0.02	0.52	0.16
Share of overall Vulnerable	0.18	0.17	0.02	0.51	0.11
Share of High Volatility Vulnerable	0.17	0.16	0.00	0.59	0.13
Share of Low Mean Vulnerable	0.16	0.16	0.04	0.49	0.14
Low Mean Vulnerable to Poverty Ratio	1.25	0.79	1.00	1.02	0.79

Source: Authors' Calculation

Table 4.4.4.3: Sources of Vulnerability (Demographic Differences)

	House head Sex		House head Age		House head Marital Status		HH Dependency	
	Female	Male	>= 60 Yrs	< 60 Yrs	Married	Unmarried	< 0.25	>=0.25
Mean Consumption/Capita	2319.4203	2,023.02	1,422.55	2,124.73	1,717.53	5,293.81	4,213.95	1,410.20
Mean Vulnerability	0.92	0.42	0.48	0.47	0.46	0.70	0.79	0.74
Number in Group	18	138	15	141	136	16	36	120
Population Share	0.12	0.88	0.10	0.90	0.87	0.13	0.23	0.77
Number of Poor	13	74	4	83	77	10	14	73
Number of Vulnerable	17	79	9	87	80	16	22	74
Number of High Volatility Vulnerable	2	9	0	11	7	4	7	4
Number of Low Mean Vulnerable	15	70	9	76	73	12	15	70
Fraction of Poor	0.72	0.54	0.27	0.59	0.57	0.50	0.39	0.61
Fraction of Vulnerable	0.94	0.57	0.60	0.62	0.59	0.80	0.61	0.62
Fraction of High Volatility Vulnerable	0.11	0.07	0.00	0.08	0.05	0.20	0.19	0.03
Fraction of Low Mean Vulnerable	0.83	0.51	0.60	0.54	0.54	0.60	0.42	0.58
Share of overall poor	0.15	0.85	0.05	0.95	0.89	0.11	0.16	0.84
Share of overall Vulnerable	0.22	0.78	0.10	0.90	0.84	0.55	0.50	0.47
Share of High Volatility Vulnerable	0.14	0.84	0.00	0.90	0.92	0.01	0.01	0.02
Share of Low Mean Vulnerable	0.15	0.83	0.10	0.90	0.88	0.12	0.25	0.77
Low Mean Vulnerable to Poverty Ratio	1.15	0.95	2.25	0.92	0.95	1.20	1.07	0.96

Source: Authors' Calculation