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Poverty Dynamics and Vulnerability: Empirical Evidence from Smallholders in Northern Highlands of Ethiopia

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Poverty Dynamics and Vulnerability: Empirical Evidence from Smallholders in Northern Highlands of Ethiopia

Abstract

This study is primarily intended to examine the dynamics and determinants of rural household poverty and vulnerability in Northern Highlands of Ethiopia. The data for this research is mainly based on the Ethiopian Household Survey (ERHS). Results from disaggregation of the poor indicate that ultra poverty is predominant in the area. Similarly, using a three steps feasible generalized least squares (FGLS) we found that many of the households in the region are vulnerable to poverty. However, the trend has been found to vary across villages for both poverty and vulnerability measures. Besides, poverty decomposition of sample households showed that chronic poverty is dominant while transient poverty is secondary. An implication of this is that programs targeting on poverty should primarily focus on factors causing persistence deprivation without undermining risk factors that drag households in to poverty. Finally, some of the important determining factors of observed poverty appear to impact on vulnerability to poverty differently. Therefore, strategies aimed at reducing poverty should critically consider factors that make households vulnerable to poverty.

Key Words: Poverty Dynamics, Vulnerability, Rural Ethiopia

JEL: I32

1. Introduction

Despite massive progress in reducing poverty in some parts of the world over the past couple of decades – notably in East Asia – there are still about 1.4 billion people living on less than US\$1.25 a day, and close to 1 billion people suffering from hunger. At least 70 percent of the world’s very poor people are rural, and a large proportion of the poor and hungry are children and young people. Neither of these facts is likely to change in the immediate future, despite widespread urbanization and demographic changes in all regions (IFAD, 2011). The two most affected regions in the world are South Asia and Sub-Saharan Africa (SSA). The former is known for having the largest number of poor people while the latter witnesses the highest incidence of poverty in the world. Levels of poverty vary considerably however, not just across regions and countries, but also within countries. In 2005, according to World Bank figures, 38.9% of the populations of Ethiopia lived under national poverty

line, which was a decline from 44.2% in 2000¹. However, this trend could be reversed since 2006 due to macroeconomic imbalances and inflationary pressures fanned by rising global commodity prices of food and fuel (DERCON, HODDINOTT, & WOLDEHANNA, 2011).

Policies targeting the poorest of the poor should be well-informed about the features as well as the factors triggering the outcome. As in most developing countries, poverty reduction strategies and policies are primarily informed by periodic cross-section household survey data that provide estimates of static poverty rates. Interestingly, however, the focus of these policies appears to be chronic or long-term poverty—poverty that is not necessarily reflected in cross-sectional survey data (BHATTA & SHARMA, 2006).

Several studies have been conducted on poverty and food security in Ethiopia based on cross sectional datasets. However, longitudinal data researches have been limited in the country in general and in this particular area of study in particular. In the last couple of decades, a number of studies have been carried out using panel datasets made available by few projects targeted particularly on investigating the trends and dynamics of poverty and food insecurity covering part or whole of the country. Some of the studies in this line include HAGOS & HOLDEN (2003), KEDIR & MCKAY (2003), ISLAM & SHIMELES (2007), BIGSTEN & SHIMELES (2008) & (DERCON et al., 2011). All of these researches are done with panel datasets spanning over different survey rounds, the latest being 2009. This paper uses a rich panel data set made available by Economics Department (AAU) and IFPRI since 1994. Besides, it adds additional survey year of 2010 by tracking same households from the selected peasant associations. Most of the previous empirical studies in the country tried to analyze observed poverty and do not give sufficient attention to vulnerability to poverty. The authors of this paper contend that in countries where there are no regular surveys, longitudinal poverty researches based entirely on observed poverty may not tell the exact picture on the ground. Consequently, policy instruments (interventions) designed solely based on the outcome of observed poverty may not achieve the intended target. Any poverty analysis would be more complete if it combines the outcomes of observed poverty with that of future poverty (likelihood of being poor or non-poor in the future i.e. vulnerability to poverty). This study is, therefore, done with the aim of understanding the dynamics as well as the determinants of observed poverty and vulnerability to poverty in one of the impoverished areas of the country.

The rest of the paper is organized as follows. It starts with a brief description of the data used and the methodological approach applied. It then presents the description and the expected signs of the explanatory variables employed in the regression models followed by descriptive statistics and a study

¹ <http://data.worldbank.org/country/ethiopia>

on the determinants of poverty dynamics in Northern highlands of Ethiopia. Finally, the paper attempts to give an adequate treatment on the other dimension of poverty- vulnerability to poverty- in the study area.

2. Data and Research Methods

2.1 Data

The data for this research is mainly based on the Ethiopian Rural Household Survey (ERHS), a rich panel data set conducted by Addis Ababa University in collaboration with IFPRI and CSAE (University of Oxford) since 1994. Besides, a primary data was collected tracing the panel households of ERHS in two villages of Northern Ethiopia in 2010. This study hence constituted two peasant associations (PAs) in northern highlands of Ethiopia namely Yetmen and Shumsheha. Peasant association has been the smallest unit of administration in the former regime and constitutes of roughly 1000 households. Shumsheha represents the semi-arid, insufficient rainfall, limited arable land, cereal growing and vulnerable parts of the region. On the other hand, Yetmen symbolizes the high rainfall, fertile arable land, grain dominated and relatively rich parts of region. Shumsheha and Yetmen constitute 10 and 8 villages under them respectively. The sample size is 209, in which 61 of them are from Yetmen and 148 from Shumsheha. The attrition rate is only 13.88 % in 16 years panel data, which means 0.93 % attrition rate per year. The sample is not representative of the northern highlands of Ethiopia but it could give a good agro-ecological representation of the northern highlands of the country.

2.2 Research Methods

The research methods used in this article has been treated in to three sections. The first part deals with the measurement of poverty dynamics in the region. Second, we use a three steps FGLS to analyze the vulnerability of rural households to poverty and, finally, fixed effects instrumental variable (FEIV) and multinomial logit models (MNL) are employed for assessing the determining factors for poverty whereas Ordinary Least Squares (OLS) for the determinants of vulnerability to poverty.

2.2.1 Poverty Dynamics

The spells and components approach are the most widely used methods of poverty dynamics and decomposition. In this paper, we use both approaches but emphasize on the latter approach as it has advantage over the former in terms of capturing information about the position of household's consumption expenditure relative to the poverty threshold. We start with a brief description of components approach, which was developed by RODGERS & RODGERS (1993) and used by

JALAN & RAVALLION (2000). Jalan and Ravallion decomposed household poverty in to chronic and transient components using panel data. A household is in chronic poverty when its inter-temporal mean consumption is below the poverty line. The mathematical presentation of the method is presented below.

The contribution of household i to total poverty is defined as:

$$p_i = p(y_{i1}, y_{i2}, \dots, y_{iT})$$

Where y_{it} are the consumption expenditures of household i at time t, and there are T times in which it is measured and p_i is some well-defined poverty measure. We use the familiar Foster-Greer-Thorbecke (FGT) measure because of its additive decomposability property. Thus, total household poverty over the period is measured as the inter-temporal mean of the poverty measure.

$$\bar{p}_i = \frac{1}{T} \sum p_i$$

Where, \bar{p}_i is the mean of the FGT measure of the total poverty and T is the number of years. Hence, chronic poverty is measured by

$$P_i^* = \frac{1}{n} \sum_{i=1}^{m^*} \left(\frac{z - \bar{y}_i}{z} \right)^\alpha \quad \text{if } z > \bar{y}_i; 0 \text{ otherwise.}$$

Where, Z is the poverty line, \bar{y}_i is the mean consumption expenditure of household i, m^* is the number of households below the poverty line and n is the number of households in the sample. α is a positive parameter, which gives more weight for the poor when it increases. The most common values of α are 0, 1 and 2.

Transient poverty (\tilde{p}_i) is the difference of total poverty (\bar{p}_i) and chronic poverty (P_i^*). Hence, once chronic poverty is measured, it would be simple to find transient poverty as:

$$\tilde{p}_i = \bar{p}_i - P_i^*$$

The components approach is complimented by the spells approach for explaining the nature of poverty dynamics in the region. The spell approach involves identifying the poverty status of the household in the different time periods under investigation. A tool used for this type of analysis is the transition matrix. It is constructed by classifying the households' incomes in to different income groups. This matrix provides information on the proportion or number that move from one state of poverty to another. The rows of the matrix add up to unity or 100% (ODURU, AGGGREY-FYNN, BANNI, CROPPENSTEDT, & AGYAPONG, 2003). Transition matrices also give information on transient and chronic poverty based on the households' length or spells in poverty. The transient poor in this

approach is defined as those households that have income or consumption above the designated poverty line in at least one period out of the periods the welfare indicator is measured. The chronic poor have their welfare measure below the poverty line in all the periods (MCCULLOCH & BAULCH, 2002). However, in this paper we define households to be in chronic poverty if they are under poverty line in half or more of the survey rounds following FOSTER (2007). Once the transition matrix is developed, it is easy to note poverty dynamics by using the Shorrocks mobility index. The Shorrocks Mobility Index is presented as follows:

The mobility index, M for a transition matrix P,

$$M(P) = \frac{n - \text{trace } P}{n - 1}$$

Where, trace P is the trace of the transition matrix P, n is the number of states, for example quartiles or deciles. The index is normalized to take a value between 0 and 1 by dividing it by $\frac{n}{n-1}$. The closer the Shorrocks mobility index to 1 implies the existence of higher mobility.

2.2.2 Determinants of Poverty

An analysis of poverty will not be complete without explaining why people are poor and remain poor over time. Hence, an appropriate approach would be to analyze the impacts of household characteristics, village level factors, and policy related variables on the welfare of individuals or households using regression-based models at least at micro level. Two types of models are used for this purpose.

The first model we employed for this purpose is the fixed effects instrumental variable (FE IV). It has advantage over the random effects model as it controls unobserved heterogeneities among households. It is formulated as follows:

$$\ln y_{it} = d'_{it}\sigma + x'_{it}\beta + \tau'_{it}\theta + \alpha_i + u_{it} \dots \quad (1)$$

$$d_{it} = f(x_{it}, z_{it}, \tau_{it}, v_{it}) \dots \quad (2)$$

$$i = 1, 2, \dots, N; t = 1, 2, \dots, T$$

The first equation is original fixed effects model using log of real consumption expenditure per adult equivalent, $\ln y_{it}$, as a dependent variable against a set of identified endogenous variables, d_{it} , exogenous variables, x_{it} , period dummies, τ_{it} , and unobserved household fixed effects, α_i . In equation 2, we regress the endogenous variables against the rest of the variables in the system in

addition to set of instrumental variables, Z_{it} , to estimate their predicted values. The predicted values of the endogenous variable and their lagged values are used as instruments in equation 1. u_{it} and v_{it} are idiosyncratic error terms in the respected equations.

The second model used in this study is the Multinomial Logit model for analyzing the factors affecting the probability that a household is in chronic poverty as opposed to transient poverty or being non-poor. One of the main advantages of such an approach is ease of specification (GLEWWE & HALL, 1995; GROOTAERT & KANBUR, 1995). However, the main drawback is that it imposes the property of Independence of Irrelevant Alternatives (IIA). Once the data fulfill this property then the model will be appropriate to use.

In our model, the regressand takes the values of 0, 1, or 2 depending on whether the household was respectively never poor, poor in one or two of the periods, or poor in all the three. The multinomial logit regression gives the coefficient values for two groups relative to the third omitted group (here the never poor). However, the results are more easily interpreted in terms of the marginal effects and their significance. These show the impact of each explanatory variable on the likelihood of a household being in each one of the three groups.

In this paper, we use household consumption expenditure as a welfare measure for computing poverty. But as in the case of any other welfare indicator, the poverty level computed using consumption expenditure can be contaminated by measurement errors. However, using the ERHS panel data BIGSTEN & SHIMELES (2008) proved that consumption based mobility estimates are not seriously distorted by measurement error.

The dependent variable of the model can take one of three discrete values indicating the poverty status of a household (non-poor, transient poor and chronically poor). The probability (P_{ij}) that a household i is in a particular poverty state j is modeled as a function of explanatory variables X_i as follows:

$$P_{ij} = Prob(Poverty = j) = \frac{e^{X_i' \beta_j}}{1 + \sum_{k=1}^2 e^{X_i' \beta_k}} \quad for \ j = 0,1,2.$$

Where, β_j represents a vector of coefficients, β_0 is set to 0, and j can take the values 0 (non-poor), 1 (transient poor) and 2 (chronically poor). The non-poor state ($j = 0$) is used as the base category in the regressions based on the equation above.

2.2.3 Vulnerability to Poverty

The other major inquisition of this article is to supplement the results of poverty incidences with the ex-ante probability of households being poor using three steps feasible generalized least squares. Linking poverty studies with that of vulnerability to poverty serves as a tool for poverty reduction strategies to attain their goals better. The approach is rooted in the pioneer work of CHAUDHURI, JALAN, & SURYAHADI (2002). Assuming consumption expenditure to follow a log-normal distribution and the consumption of household i in period t is determined by a set of variables X_i .

$$\ln c_i = \beta_0 + \beta_1 X_i + e_i \quad (1)$$

And, the variance of the unexplained part of households' consumption e_i is also assumed to be a function of the same explanatory variables used in model 1 as follows:

$$\sigma_{e_i}^2 = \theta_0 + \theta_1 X_i + \eta_i \quad (2)$$

Then, we estimate equations (1) and (2) using three-step feasible generalized least squares (FGLS) suggested by AMEMIYA (1977) cited in (CHAUDHURI et al., 2002). Then, using consistent and asymptotically efficient estimators $\hat{\beta}$ and $\hat{\theta}$, we get:

$$\hat{E}(\ln c_i / X) = \hat{\beta}_0 + \hat{\beta}_1 X_i \quad (3)$$

$$\hat{V}(\ln c_i / X) = \hat{\sigma}_{e_i}^2 = \hat{\theta}_0 + \hat{\theta}_1 X_i \quad (4)$$

Hence, using the estimated expected mean and variance of log consumption in equation (3) and (4) above respectively, the estimated vulnerability to poverty is given as

$$\hat{v}_i = \hat{P}(\ln c_i < \ln z | X, Z) = \Phi \left(\frac{\ln z - \ln \hat{c}_i}{\sqrt{\hat{\sigma}_i^2}} \right) \quad (5)$$

Where $\Phi(\cdot)$ denotes the cumulative density of the standard normal distribution function. Finally, the vulnerability status of households is evaluated using the standard vulnerability threshold.

In addition to this, the determining factors of vulnerability to poverty are assessed using ordinary least squares. The vulnerability indices found from the results of the above model are regressed against household characteristics, village characteristics and policy related variables.

3. Definition and Hypothesis of Variables

Based on theoretical expositions and previous empirical studies, the following explanatory variables are hypothesized to influence the dependent variable as follows. Annual real consumption expenditure per adult equivalent is the dependent variable in the fixed effects instrumental variable regression model while a categorical variable of being chronic poor, transient poor and non-poor in the multinomial logit model.

Age and Age Squared of the household head: Age is expected to positively associate with real consumption expenditure while age squared (a proxy for experience or old ages) to be negatively correlated with real consumption expenditure as aged household heads face decrease in labour supply and decision making capability.

Literacy of the household head: It is a proxy for the education level of the household head and is hypothesized to have a positive impact on the welfare of households as measured by real consumption expenditure per adult equivalent.

Household size: Its impact on welfare of households is mixed as shown in previous empirical literatures. It is expected to affect the dependent variable either ways depending on the demographic composition of the household. Its effect will be positive if larger household size means more working force (hence less dependency ratio) and negative if it implies higher dependency ratio.

Livestock asset: It is an important asset for mixed farming smallholders. It is expected to be positively associated with the welfare of households as it serves as source of power in the predominantly oxen-plough technology, source of income from their products, their dung for cooking and as manure, and as a hedge against risk.

Engagement in off-farm activities: It is one of the dummy regressors and is expected to positively impact the welfare of the households. As the descriptive statistics shows a modest figure of about 58 percent of the households participate in one or more of off-farm activities.

Cultivated land refers to the size of the land the household owns and used it actually for cultivation in hectares. It is the most valuable asset for small holders and hypothesized to impact the welfare of households positively.

Number of plots: It is a proxy for land fragmentation and could influence the dependent variable either ways as witnessed in previous empirical works. In literature, arguments on the impacts of land fragmentation fall into two lines of factors: the demand side factors and supply side factors (BENTLEY, 1987 & SUNDQVIST & ANDERSSON, 2006). The latter merely treats land fragmentation as an exogenous imposition on smallholders hence detrimental on productivity as it

hinders mechanization of agriculture and creates inefficiency in the allocation of labour and capital. The arguments on the demand side factors assert that farmers voluntarily choose beneficial level land fragmentations as it helps them avoid labour bottlenecks, spreads risks of crop failure, allows crop rotation and fallow and promotes use of more fertilizers. Therefore, the ultimate effect of land fragmentation depends on which one outweighs from the two factors mentioned above. If the demand side factor outweighs, the impact on welfare of households will be positive, otherwise negative. Nearly four decades has passed after the first nation-wide land distribution was held in 1974. The most recent land distribution has been carried out in Amhara region (where our sample is drawn from) in 1996 with a primary criterion of household size compromising for fertility of the soil.

Number of crops: This regressor is included as a proxy for crop diversification. It is hypothesized to positively impact households' welfare as it spreads risks of crop failure and creates opportunities to use different soil conditions to their best advantage.

Membership for extension service: It is a dummy that takes 1 if the household is a member of extension service and 0 otherwise. This variable represents agricultural extension services provided by government for promoting agricultural productivity. It is expected to have a positive impact on households' welfare.

Transfers: It takes 1 if the household received transfers in the last 12 months and 0 otherwise. It captures both private transfers (remittances) and government direct transfers in both forms (cash and kind). Empirical evidences show mixed impacts of transfers on the welfare of households (KANBUR, KEEN, & TUOMALA, 1994; QUARTEY, 2006 and MANGIAVACCHI & VERME, 2011). Transfers are advantageous in helping households get out of deprivation in the short run but their long run impacts have been widely questioned. Ample evidences are found that shows the negative impact of transfers by creating dependency syndrome and hence making household decrease labour supply. Thus, our expectation is that the impact of transfers might go either ways.

Credit: It is a dummy variable taking a value of 1 for those that take credit in the last 12 months and 0 otherwise. It is expected to be associated with higher consumption expenditures.

Membership in saving groups 'equb': It is also a dummy variable taking 1 for members of 'equb' and 0 for non-members. Saving helps households to accumulate more money for further investment hence is hypothesized to have positive impact on households' welfare.

Household assets: refers, in this article, to the monetary value of assets used either in the house or in farming excluding livestock, land, house and other major assets of the household. More household asset is expected to associate with lower vulnerability of households to poverty as it serves as coping mechanism in the time of risk.

Days not-in-work: refers to the number of adult days missed by one or more member of the household in the previous major farming season due to illnesses. It is expected to exacerbate the likelihood of households being vulnerable to poverty.

Storing cereals: It is a dummy variable representing if households have stored any amount of cereals in the last twelve months or not. Stored cereals are used as emergency buffer in time of risk to poverty and are hypothesized to reduce the risk of households falling into poverty.

Village dummy: It takes a value of 1 if the household is in Yetmen, 0 otherwise. This regressor is used only in the MNL model and is expected to be associated with transient and persistence poverty negatively.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1 describes the change in household's welfare in terms of selected data on assets, education and participation in development activities. There are improvements in most of these measures, even if some outcomes remain low.

Table 1: Some descriptive statistics on household characteristics: 1994 - 2010

Household Characteristics	Yetmen		Shumsheha	
	1994	2010	1994	2010
Household size (person per household)	4.7	5.2	4.3	4.5
Households owning oxen (%)	5.45	75.5	5.6	45.6
Households who could not get oxen at the right time (%)	36.5	1.85	23.97	18.25
Livestock Asset (Birr)	2423	8607	1038	5547
Literacy of the household head (%)	54	44	34	29
School Enrollment: Boys aged 7-14 enrolled (%)	16.7	65.6	15.9	69.2
Girls aged 7-14 enrolled (%)	28	85.2	7.5	87
Agriculture extension service members (%)	0	13.5	0	51.6
Households who received transfers (%)	0	45	97	33
Households who stored cereals (%)	94	67	83	57

Source: Calculated from ERHS (1994) and primary survey (2010)

Household size has slightly increased in both villages. Oxen is a crucial asset for Ethiopian small holders as they depend on oxen-plough technology and the outcome is a dramatic rise in the percentage of households owning oxen in the 16 years since 1994. Similarly, the lack of access to oxen by households when they are most needed has decreased sharply and the cumulative livestock asset of households has exhibited a large growth.

Results of previous empirical studies show that education of a household head is positively correlated to the household's welfare. In our sample, the percentage of literate household heads declined while school enrollment for boys and girls increased remarkably in both villages implying that efforts of providing education access to adults remained low while the future seems promising if school dropouts are taken care of.

Though agricultural extension service started in Ethiopia in the mid of the 20th century, they were far from being stable and successful in transforming the livelihood of small holders due to numerous impeding factors². The incumbent government launched a new extension system in 1995 after a brief period of discontinuity since the fall of the Derg regime in 1991. This system was able to attract some farmers in both villages since then but its significance is noticeable in Shumsheha than Yetmen.

Household receiving transfers increased from nil to 45% in Yetmen compared to Shumsheha, which exhibited a decline in 2010. However, Shumsheha have a predominant position on the average compared to Yetmen. The main reason is that Shumsheha is one of the areas severely hit by the 1985 famine in Ethiopia and has been considered vulnerable village since then. As a result it has been a beneficiary of safety net programs by the government and aid by other non-governmental organizations particularly in the aftermath of the famine to rehabilitate hard hit households. Finally, the percentage of households that store cereals has declined in 2010 in both villages.

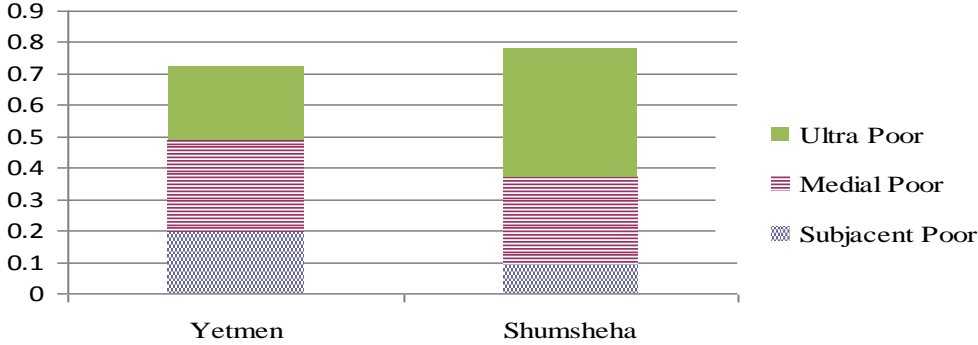
4.2 Ultra, Medial and Subjacent Poor

Previous poverty studies have been most focused on the use of the standard classifications of poor and non-poor. However, closer analysis on the behavior of the poorest of the poor has become influential for policy analysis. Even though the Millennium Development Goals (MDGs) characterize the extremely poor are those living on less than a dollar a day, a recent study by AHMED, HILL, & WIESMANN (2009) disaggregated them into three groups according to their location below a dollar-a-day poverty line: subjacent poor (living on between 75 cents and a dollar a day), medial poor (living

² It would be advisable to read a paper by GEBREMEDHIN, HOEKSTRA, & TEGEGNE (2006) on the evolution of extension system in Ethiopia.

on between 50 cents and 75 cents a day), and ultra poor (living on less than 50 cents a day). We have classified the poverty status of households using real consumption expenditure per adult equivalent based on 2010 prices. Accordingly, the disaggregation of poor households under ultra, medial and subjacent poor below confirms the prevalence of ultra poverty in the region.

Figure1: Disaggregation of Pooers in the Villages (2010)



Source: Calculated from primary survey (2010)

On the other hand, using transition matrices, as reported in table 2, the trend has been similar for the two villages over the panel period (1994-2010). About half of the households moved to lower consumption groups (from non-poor to subjacent, medial and ultra poor) while a quarter of them moved to higher income groups in each village except that both figures have been slightly higher for Shumsheha. Over all, both villages had exhibited higher mobility as shown by the Shorrock’s mobility index though it is a bit higher for Yetmen.

Table 2: Movement of households across the disaggregated groups: 1994 - 2010

		2010	
		Yetmen	Shumsheha
1994	Movements		
	Moved Down	49%	49.5%
	Moved Up	24.5%	27.1%
Shorrock’s Mobility Index		79.17%	77.36%

Source: Calculated from ERHS (1994) and primary survey (2010)

4.3 The Foster-Greer-Thorbecke Indices

The Foster-Greer-Thorbecke (FGT) indices are the most widely used poverty indices that comprises of three measures: the incidence of poverty, also called the headcount index; the aggregate poverty gap (poverty depth); and the squared poverty gap (poverty severity). Poverty incidence refers to the percentage of people living below a minimum threshold as measured by local living standards. The

poverty gap captures the mean aggregate consumption shortfall relative to the poverty line across the whole population. In other words, it estimates the total resources needed to bring all the poor to the level of the poverty line. 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.

This paper uses the international poverty line of 1 USD per adult equivalent using the 2010 village-average constant prices³. Using this poverty line and the data on real per adult equivalent consumption, the three FGT poverty indices have been computed for Shumsheha and Yetmen for four years in five years interval since 1994, except the last one in six years.

Table 3: Foster-Greer-Thorbecke (FGT) Indices and Other Descriptive Statistics in 2010 Prices

FGT Indices (Percentage)		1994	1999	2004	2010
Head Count Index (HCI):	Yetmen	57.38	70.49	35.19	74.00
	Shumsheha	68.24	54.17	43.97	74.49
Poverty Gap:	Yetmen	24.33	31.31	13.21	29.00
	Shumsheha	30.05	18.56	14.82	38.50
Squared Poverty Gap:	Yetmen	13.80	17.16	6.36	13.99
	Shumsheha	16.38	8.13	6.63	21.95
Mean annual consumption expenditure per adult:	Yetmen	6588.54	4310.31	7392.20	4441.13
	Shumsheha	6066.12	6744.47	8295.19	5862.35
Median consumption expenditure per adult:	Yetmen	4929.92	3445.19	7106.78	3730.18
	Shumsheha	4137.64	5167.87	5814.80	3135.44
Gini Coefficient of Inequality:	Yetmen	0.39	0.33	0.30	0.29
	Shumsheha	0.42	0.35	0.39	0.55

Source: Calculated from ERHS (1994, 1999 and 2004) and primary survey (2010)

The results indicate higher incidence of poverty in both villages with comparable figures on the average. Over the panel, Shumsheha has shown a consistent decline in poverty incidence until 2004 but it increased dramatically in 2010. The trend for Yetmen has been fluctuating throughout. The other two indices had a similar trend with the performance of poverty incidence except that they were relatively lower for Shumsheha than Yetmen in 2004 as opposed to the figures observed in HCI for the same year suggesting that we need relatively lesser resources to uplift more households out of poverty

³ 1 US dollar per adult/day is preferred in this article as poverty threshold since all local poverty lines used in Ethiopia are far below the new revised international poverty line of 1.25 USD per adult/day.

in the former than the latter. Both mean and consumption expenditure per adult equivalent fluctuated for Yetmen across the panel years. Similarly, both measures have been rising in the middle two rounds before it gets all rounds low in 2010 for Shumsheha. Both PAs have also different experience when it comes to the Gini coefficient of inequality: a consistent decline for Yetmen but fluctuating across the panel rounds for Shumsheha. In general, the uniform rise in all the poverty indices for both PAs over the 16 years could be partly associated with the rise in food prices in the country since 2006 and partly due to the collection of the 2010 data after six months of the 2009 harvest and appears to be supported by Dercon et al (2011). They found a fall in median and mean consumption between 2004 and 2009 using the ERHS data for 15 villages in rural Ethiopia.

4.4 Decomposition of poverty

In empirical work, decomposing inter-temporal poverty has been recognized as an important input for policies targeting on poverty. The respective policy responses for chronically poor section of the society should differ from that of the transient one. Following the components approach, we found that there is higher proportion of chronic poverty in terms of headcount but smaller in terms of poverty depth and severity as compared to transient poverty similarly in both villages. Yetmen had slightly higher figures of chronic poverty than Shumsheha in all the three indices. The reverse is true for transient poverty consistently in all the three FGT measures.

Table 4: Poverty Decomposition in Yetmen and Shumsheha (1994-2010)

Poverty Type (percentages)	Head Count (P0)		Poverty Gap (P1)		Squared Poverty Gap(P2)	
	Yetmen	Shumsheha	Yetmen	Shumsheha	Yetmen	Shumsheha
Chronic Poor	0.49	0.47	0.10	0.09	0.04	0.03
Transient Poor	0.10	0.14	0.14	0.16	0.09	0.10
Total Poor	0.59	0.61	0.24	0.25	0.13	0.13
Chronic/Total	0.83	0.77	0.42	0.36	0.31	0.23

Source: Calculated from ERHS (1994, 1999 and 2004) and primary survey (2010)

This dominance of chronic poverty is a great deal comparable with 49 percent chronic poverty for rural Ethiopia during 1994-2009 by DERCON et al. (2011). On the other hand, based on Foster (2007), which considers households that are poor half or more of the times as chronic poor, we found that most households in both villages are under chronic poverty while transient poor and non-poor households are marginal. More than 62 percent of households in Yetmen and over 61 percent in Shumsheha have been persistently poor comparable to a 70 percent of chronic poverty in an earlier study by AWEL (2007) using 1997-2003 panel data in northern Ethiopia. The figures for non-poor are under 10 percent for both Yetmen and Shumsheha whereas transient poverty is well above a

quarter of the households in both PAs. The table below provides us good information about the movement of households over the panel years vis-à-vis to the poverty threshold, which is 1 USD per adult/day in 2010 prices in our case.

Table 5: Poverty episodes 1994 to 2010 (Based on 4 rounds)

Poverty Status	Yetmen (% of households)	Shumsheha (% of households)
Never Poor	9.8	6.93
Poor once	27.45	31.68
Poor in 2 out of 4 rounds	35.29	30.69
Poor 3 out of 4 rounds	19.61	24.75
Poor in all rounds	7.84	5.94
Total	100.00	100.00

Source: Calculated from ERHS (1994, 1999 and 2004) and primary survey (2010)

4.5 Determinants of poverty dynamics

A thorough analysis of poverty requires a satisfactory study on the causes of poverty beyond a routine description of poverty profiles if we are able to tackle the root causes of poverty. Hence, this part of the paper attempts to address the question of what causes poverty. Both fixed effects IV and Multinomial Logit model (MLM) are employed for this purpose. The fixed effects model has been carried out using the log of real annual consumption expenditure per adult equivalent as a dependent variable and covering the whole panel data. The Hausman's specification test rejected the null hypothesis that coefficients of the regressors are not stastically different and hence ruling out the use of random effects model. The time dummy relevancy test was carried out and their use is supported. However, Hausman-Wu test revealed the presence of endogeneity problem in some of the regressors. Size of cultivated land and transfers are found to be endogenous in Yetmen while only the former variable in Shumsheha. Hence, the Fixed Effects Instrumental Variable (FEIV) regression model is applied. We predicted the endogenous variables by regressing them against the exogenous variables in the system and used their predicted and lagged values as instruments. Sargan statistic confirmed the validity of the instruments (see Appendix Table A).

Table 6: A Fixed Effects IV model for analyzing the determinants of poverty (1994-2010)

Dependent: Log real Consumption per adult equivalent	Yetmen	Shumsha
Sex of household head	0.04855 (0.174842)	0.651851 (0.2685707)**
Age of household head	-0.01113 (0.031881)	-0.08722 (0.0517032)*
Age-square of household head	0.00018 (0.000325)	0.000858 (0.0004969)*
Literacy of the household head	-0.07074 (0.132967)	-0.05127 (0.2079258)
Household size	-0.1128 (0.041964)***	-0.00912 (0.0719006)
Size of Cultivated land (ha)	0.235687 (0.088988)***	0.697768 (0.3250237)**
Saving's Group	0.059357 (0.222429)	0.39421 (0.2131756)*
Credit (Dummy: 1 if credit taken)	0.456418 (0.128035)***	-0.02372 (0.1734524)
Remittance recieved(Dummy: 1 Yes)	-0.05139 (0.457218)	-0.03793 (0.1805889)
Value of Livestock asset (Birr)	0.0000907 (0.0000145)	0.000019 (0.0000179)
Off-farm revenue (Birr)	-0.00023 (0.000145)	0.000287 (0.0003187)
Number of Crops harvested	-0.00029 (0.0446813)	0.068188 (0.0475162)
Number of plots owned	0.162859 (0.0521177)***	-0.26435 (0.1402857)*
Extension membership	-0.01393 (0.2289022)	0.433479 (0.1948766)**
Time Dummies (Base Year = 1999)		
Y2004 (Time Dummy 2004)	-0.53972 (0.4277305)	-4.21407 (1.803615)**
Y2010 (Time Dummy 2010)	-0.78436 (0.407565)*	-5.50482 (1.875858)***
Constant	8.616849 (0.8403754)***	14.33967 (2.346312)***
Observations	156	183
F(16, N)	6.61	6.84
Prob > F	0.0000	0.0000

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 (Source: Calculated from ERHS (1994, 1999 and 2004) and primary survey in 2010)

Turning into the results, households headed by male appears to be associated with higher level of real consumption expenditure in Shumsheha at 5 percent level of significance reflecting the low empowerment as well as entitlement of females to valuable assets (such as land) in rural Ethiopia in general and in Shumsheha in particular. Again in Shumsheha, households having young heads face declining consumption expenditure in real terms while a rising trend for aged heads. This result is against our expectation and what most empirical literatures witness. However, they are less important

in influencing welfare of households due to small coefficients and significance limited to 10 percent. These results appear to reflect the often ignored reality in this part of the country that younger adults (usually new couples in the context of rural Ethiopian) face challenges of having limited command on vital resources of farming such as land, oxen and other social assets, which would reduce their capability of earning more income. On the other hand, besides the small size of households headed by the aged, due to the presence of strong bond among extended families in rural Ethiopia parents receive all rounded and unreserved cooperation from the families of their independent children hence that could positively affect the welfare of households with aged household heads. As Yetmen has a fertile and convenient topography for farming, size of cultivated land is positively and significantly correlated to consumption expenditure of households at 1 percent compared to only at 5 percent in Shumsheha, which has relatively less fertile land and difficult agro-ecology for farming.

From the results of the regression, household size is found to have a negative impact with 1 per cent level of significance in Yetmen. This is in line with previous studies in Ethiopia by RAMAKRISHNA & DEMEKE (2002) and in Kenya by NYARIKI, WIGGINS, & IMUNGI (2002), which reported a negative association between household size and food security. On the other hand, the positive impact of household size on household income and food security has been found by ALENE & MANYONG (2006) in Nigeria, TOULMIN (1986) in Mali and DEMEKE, KEIL, & ZELLER (2011) in Ethiopia. However, the rationale behind these two opposing results lies on the demographic composition of households. In a household having more dependents, large household size would mean more pressure on the income generating members of the household and hence impacting on the household's poverty status. Credit access significantly contributes to improvement of households' welfare limited to Yetmen while membership in local savings groups is positively correlated to the dependent variable in Shumsheha but only limited to 10 percent level of significance. Though formal financial institutions are scant in rural Ethiopia in general and in the sampled peasant associations in particular, we can clearly see the positive role played by social linkages and local savings and credit associations in the study area.

Land fragmentation as measured by number of plots of land appears to be significant in both PAs though in different directions. For Yetmen, land fragmentation is strongly beneficial at 1 percent level of significance while it has adverse impact in Shumsheha except its level of significance is limited only to 10 percent. Extension membership is found to have significantly associated with the dependent variable only in Shumsheha, which indicates the superior implementation of extension services in this specific locality supporting the descriptive results in Table 1. And, our field observation witnessed that extension agents in shumsheha have workable organizational framework as well as time frame for implementing their activities while disorganization and less zeal to work on the side of the Yetmens. Due to the use of lagged instruments, 1999 is used as base year and the time dummies show a

significant decline in the average welfare of households in 2010 similarly for both PAs. The decline in the average real consumption expenditure in 2004 as compared to the base year 1999 was only significant in Shumsheha. Finally, most of the empirical results reported here correspond to the outcomes of the foregoing descriptive statistics.

Table 7: Fixed Effects IV regression and Multinomial Logit model for analyzing the determinants of poverty for the whole sample

Variables	Fixed Effects IV	Transient poverty	Chronic Poverty
	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)
Sex of household head (Dummy: 1 for male)	0.160138 (0.152641)	0.702826 (0.735402)	1.179154 (0.876738)
Age of household head	-0.04298 (0.027107)	0.030723 (0.127913)	-0.21554 (0.141052)
Age square of household head	0.000393 (0.000266)	-0.00037 (0.001296)	0.001868 (0.001422)
Literacy of the household head (Dummy: 1 Yes)	-0.05555 (0.124314)	-5.62636 (2.213258)**	-8.34865 (2.442792)***
Household size	-0.02261 (0.038088)	3.971976 (1.955469)**	6.267173 (2.076945)***
Cultivated land (ha)	0.392677 (0.0887315)***	-5.36557 (2.256837)**	-7.95517 (2.495351)***
Transfers	0.292122 (0.1107063)***	-16.5827 (7.975776)**	-27.6695 (9.152486)***
Saving's Group (Dummy: 1 for Member)	0.209266 (0.1262798)*	-1.38069 (1.128328)	-1.96161 (1.260813)
Credit (Dummy: 1 for Member)	0.120687 (0.100707)	-0.15699 (0.789307)	0.35046 (1.031266)
Monetary value of livestock (Birr)	0.0000143 (0.000011)	-0.0005 (0.0002629)*	-0.00069 (0.0002907)**
Off-farm Revenue (Birr)	-0.000062 (0.000157)	-0.00856 (0.002435)***	-0.00873 (0.0028559)***
Extension Service	0.1909 (0.12377)		
Village Dummy (1 if Yetmen, 0 otherwise)		-2.01202 (1.478673)	-5.279 (1.634079)***
Time Dummy (Base: 1999)			
Year 2004	-0.76254 (0.4511962)*		
Year 2009	-1.50075 (0.4694452)***		
Constant	9.844051 (0.7303818)***	4.386867 (4.003344)	12.22737 (4.972125)**
F(14, N)	12.16	LR chi2 (24)	44.04
Prob > F	0.0000	Prob > chi2	0.0075
N	277	N	134

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 (Source: Calculated from ERHS (1994, 1999 and 2004) and primary survey in 2010)

The MNL uses a categorical variable of being chronically poor, transient poor and non-poor (base category) as a dependent variable against the different household characteristics of the base year (1994 in this case) and a village dummy. Results are shown in the last two columns of table 7. MNL is based on a strong assumption of Independence of Irrelevant Alternatives (IIA). Hence, we employed the Hausman IIA test, which indicates that the assumption is not violated and thus use of MNL is appropriate. The explanatory variables included in the model are jointly significant at 1 percent and the McFadden's pseudo R² value associated with the models is 0.2, which indicates that the fitness of the model is pretty satisfactory. In addition to the MNL, we use the Fixed Effects IV model for the whole sample with the same set of explanatory variables and accounting for the endogeneity of size of cultivated land using the same procedures and tests outlined for the FEIV regressions in Table 6.

Turning into the results, households headed by male are less likely to remain in a state of chronic and transient poverty in the region with 1 and 5 percent level of significance respectively. This is in line with the less empowerment of women as well as their limited access to assets in Ethiopia especially in rural areas.

The regression results reflect a positive association between household size and the tendency of households being in transient and chronic poverty. The implication of this result is that more members of the households are inactive and are dependent on the productive adult members and hence increasing the risk of household to fall (be trapped) under the poverty line. The two models appear to coincide only in two explanatory variables. That is, more size of cultivated and access to transfers reduce the likelihood of households being under transient or persistent poverty at 5 and 10 percent level of significance consistently in both models. From the MNL results, livestock asset and involvement in off-farm activities tend to significantly reduce the probability of smallholders falling in to transient and persistent poverty. Besides, households in Yetmen are less likely to be trapped by chronic poverty as shown by the significance of the village dummy. On the other hand, the Fixed Effects IV model tells us that membership in saving groups increases welfare of households even if the level of significance is limited to 10 percent. And, households in the study area experienced an average decline in their welfares in both 2004 and 2010 compared to the base year 1999. Finally, the results showed that the MNL model appears to be more valid than that of the fixed Effects IV regression model.

4.6 Vulnerability to Poverty

Vulnerability has long been ignored as valuable and necessary component to poverty in poverty literatures. It has gained momentum in recent times as a result of its crucial contribution to policy making. Poverty assessment studies have been immensely used for policy purposes. However, such kind of studies provide only an-expost measure of household's wellbeing (or lack thereof) as an input for poverty reduction strategies. However, they do not provide us a tool for a priori prevention of

poverty incidences as a result of unforeseen risks. Hence, vulnerability studies complement poverty studies by providing an ex ante measure of wellbeing.

Previous studies attach closely related but different definitions to vulnerability to poverty. For this paper the working definition of vulnerability to poverty is the risk of an individual or a household to fall below the poverty line or, for those already below the poverty line, to remain in or to fall further into Poverty.⁴ We use 0.5 as our vulnerability threshold and the results of the three steps FGLS model are reported in table below.

Figure 2: Vulnerability to Poverty for both Peasant Associations (1994-2010)

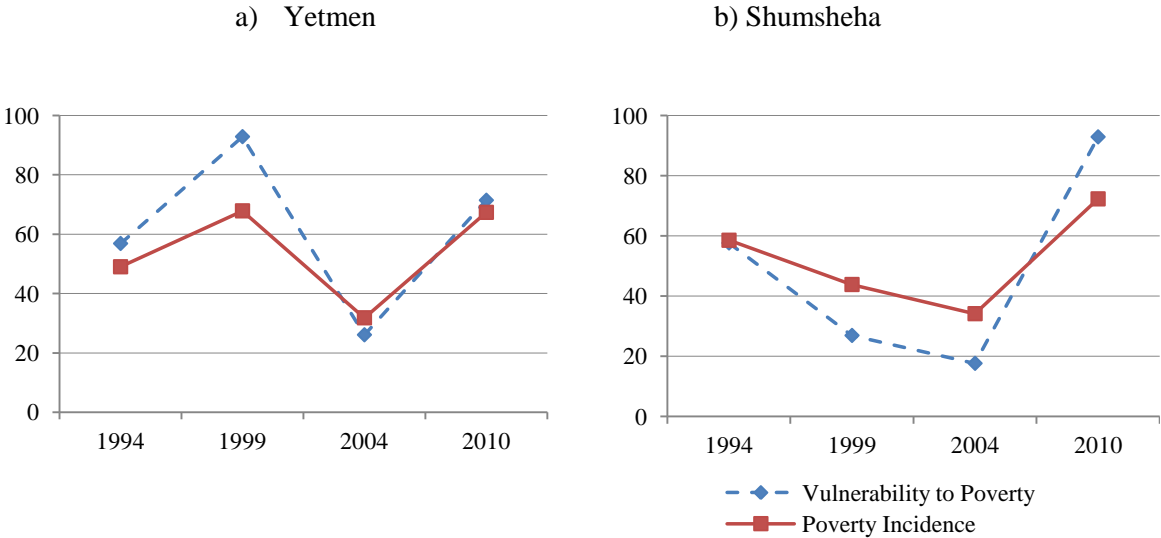


Table 8: Proportion of households common to poverty incidence and Vulnerability to Poverty

PA	1994	1999	2004	2010	All Years Average
Yetmen (%)	37.25	67.86	15.91	51.02	43.01
Shumsheha (%)	41.44	20.00	12.19	71.43	36.27

Source: Calculated from ERHS (1994, 1999 and 2004) and primary survey (2010)

The proportion of households observed to be poor and vulnerable to poverty followed similar trends over the panel years in both PAs. However, the comparison has been different between the two PAs. Households in Shumsheha have enjoyed a consistent decline in both head count and vulnerability to poverty measures except for a sharp rise in 2010 whereas the trend has been greatly fluctuating for Yetmen in both measures. Moreover, the proportion of households common to both poverty incidence and vulnerability to poverty also follows a similar trend as each of these measures in both PAs. However, the average figure for the proportion of households is low in both PAs reflecting higher

⁴ Adopted from JHA, DANG, & SHARMA (2009)

mobility of households in and out of the poverty line as shown by Shorrocks' mobility index in section 4.2.

Beyond the trends of vulnerability to poverty in the two PAs, it is important to investigate the causes behind the disparity in vulnerability of households to poverty between the two PAs and over the sixteen years span of time. We applied two models for this purpose: Instrumental variable regression model and Least Squares approach. Using Hausman-Wu test, all together we found that transfers, membership in savings group, household size and off-farm are endogenous limited to 10 percent level of significance in all cases. However, comparison of the results between instrumental variable and OLS method shows that OLS has better performance in terms of individual significance of variables and overall goodness-of-fit of the model. According to Baum (2009), IV estimators are innate biased, and their fine-sample properties are often problematic. He asserts that the precision of IV estimates is usually lower than that of OLS estimates in small samples. Though ordinary least squares method falls short of capturing the problems of endogeneity in the regressors, the smallness of our sample size per PA in each survey round coupled with weak instruments makes OLS more robust than the IV regression approach. Therefore, only the results of ordinary least squares are reported in Table 9 below. Dummies for transfers and stored cereals are dropped in the results of Yetmen (1994) regression since all respondents give a 'No' for the former and a 'Yes' for the later one unanimously. Again, membership in extension service is not here included as a regressor since there was discontinuity of extension service in 1994 and hence will not be comparable to that of 2010.

Table 9: Covariates of Vulnerability to Poverty Using Least Squares Approach

Vulnerability Index	Yetmen - 1994	Shumsheha - 1994	Yetmen - 2010	Shumsheha - 2010
Sex of the household head	-0.1866 (0.1371992)	0.038871 (0.0828821)	-0.15993 (0.1137763)	0.068848 (0.0448)
Age of the household head	0.009653 (0.00355)**	0.010449 (0.0023549)***	-0.00282 (0.0033715)	-0.00246 (0.0017187)
Household size	0.093575 (0.0149442)***	0.097534 (0.0193716)***	0.123599 (0.0255681)***	0.040094 (0.0128635)***
Literacy of head (Dummy: Yes=1)	-0.00541 (0.0984517)	-0.05122 (0.0677252)	-0.17825 (0.0885128)*	-0.06025 (0.0565955)
Credit (Dummy: Yes=1)	0.013905 (0.0800022)	-0.03806 (0.0589126)	-0.14465 (0.0857228)	-0.07555 (0.0432981)*
Membership in Local Savings Group(Dummy)	-0.25718 (0.1765205)	0.245944 (0.0864907)***	-0.33442 (0.2246226)	-0.03126 (0.048274)
Cultivated Land (ha)	-0.000071 (0.0014381)	0.000413 (0.0008862)	-0.00145 (0.0026177)	-0.00039 (0.0006614)
Value of Livestock owned (Birr)	-0.000084 (0.000017)***	-0.000074 (0.0000204)***	0.00000834 (0.00000894)	0.00000634 (0.00000518)
Household Assets (Birr)	-0.00009 (0.0000661)	-0.00025 (0.0001612)	-0.000019 (0.0000257)	0.0000064 (0.0000132)
Engagement off-farm activities (Dummy)	-0.000058 (0.0000182)***	0.0000461 (0.0001163)	0.000128 (0.000083)	-0.000018 (0.00000847)**
Number of crops grown in the year	-0.14202 (0.0313128)***	-0.03665 (0.0215888)*	-0.17945 (0.0453624)***	-0.09086 (0.0350431)**
Number of plots	0.1016 (0.0349619)***	0.004035 (0.0206974)	-0.02426 (0.049235)	0.042223 (0.0213084)**
Remittance received (Dummy: Yes=1)		0.19153 (0.1535258)	-0.21046 (0.1615333)	-0.05954 (0.0529191)
If households stored cereals (Dummy)		-0.48701 (0.1594422)***	-0.14612 (0.1427341)	-0.17108 (0.0429644)***
Number of days not in work due to illness	-0.00195 (0.0034047)	0.002224 (0.0028034)	-0.0039 (0.004738)	0.000641 (0.0012139)
Constant	0.303253 (0.2226665)	0.053862 (0.2525172)	1.132578 (0.2473113)***	1.02982 (0.1229741)***
Observations	43	89	49	112
R-squared	0.77	0.64	0.64	0.391

Source: Calculated from ERHS (1994) and primary survey (2010)

The result showed that the causes of vulnerability to poverty have indeed been different across time and PA. All of the significant variables had the expected signs except for membership in savings group in Shumsheha in 1994. This variable impacted vulnerability to poverty positively. This could probably be due to the fact that households join local saving groups (also called 'equb') primarily as a risk coping strategy; however, the contributions made by the members are too meager to help them avoid possible future calamities. In Ethiopia in general and in rural Ethiopia in particular local saving groups are differentiated based on the amount of contributions made by contributors, which are usually happen to be from similar standards of living. Hence, local saving groups formed by the poorest section of the society might not be big enough to help them cope up in times of poverty risks. All the rest significant variables have the expected signs and support the foregoing results on the determinants of poverty. Household size and crop diversification have consistent and considerable associations with households' vulnerability to poverty in both PAs and panel rounds but in different directions as hypothesized. Age of the household head has positive and significant impact in both PAs but limited to 1994. Literacy of the household head and access to credit helps to reduce vulnerability to poverty in Yetmen and Shumsheha respectively but only limited to 2010. Livestock asset also significantly reduces vulnerability to poverty in both PAs in 1994. On the other hand, engagement in off-farm activities is negatively related to households' vulnerability to poverty in Yetmen and Shumsheha in 1994 and 2010 respectively. Similar story holds true for land fragmentation except it has positive association with the dependent variable in this case. Finally, households storing cereals from previous harvest are found to have less vulnerability to poverty in Shumsheha in both panel rounds.

5 Concluding Remarks

In this article, an attempt is made to analyze poverty dynamics using Foster-Greer-Thorbecke measures, components and spell approaches. Using Fixed Effects IV and Multinomial Logit models, the determining factors of poverty have been investigated. On the other hand, vulnerability to poverty and its determinants are examined using three step Feasible Generalized Least Square and Ordinary Least Square models respectively.

In general, ultra poverty is predominant in the area. Similarly, many of the households in both villages were poor and vulnerable to poverty using 1 USD and 0.5 as poverty and vulnerability threshold respectively. However, both measures have shown consistent decline for Shumsha until 2004 but increased dramatically in 2010 while the trend has been fluctuating for Yetmen over the entire panel years.

Decomposition of poverty into chronic and transient components using the components approach (FGT) revealed that chronic poverty is dominant in the study area as compared to transient poor. This

results was also supported by the results of the Spells approach following the method by FOSTER (2007) indicating that programs targeting on poverty should primarily focus on factors causing persistence deprivation. This essentially requires supporting households to accumulate assets by investing on projects that create employment and enhance their livelihoods besides improving their access to services such credit, training, inputs and better technologies.

Comparable to the figures on observed poverty, vulnerability to poverty is paramount in the area despite the differences in the trends over the panel years in each PA. Similarly, the trends of vulnerability to poverty have been similar to observed poverty in each PA. However, some of the important determining factors of observed poverty appear to impact on vulnerability to poverty differently. Therefore, strategies aimed at reducing poverty should critically consider factors that make households vulnerable to poverty.

One of the key policy variables for smallholders in Ethiopia is agricultural extension services provided by government's extension agents. Its importance is only limited to Shumsheha and no meaningful relationship with smallholders' welfare in Yetmen. This indicates the need for strengthening incentive and monitoring mechanisms so that this decisive policy tool might serve the target it is intended for.

Smallholders' access to saving, credit and off-farm activities is very limited in rural Ethiopia. Except few local (informal) credit and savings institutions and self created off-farm activities, formal institutions for such services are almost non-existent. The insignificance of these variables in many of the foregoing regression results reveals this reality. Hence, increasing access of smallholders for such services is required by supporting local saving and credit institutions besides enhancing poverty oriented formal provision of such services and opportunities in these areas. As traditional saving and credit institutions tend to include the poorest, they need to be supported to accommodate a wider range of services, including insurance, that enable poor households to invest in and protect their assets, particularly from higher incidence events (such as common health risks) and covariate shocks such as extreme weathers.

Most of the important determining factors for households' vulnerability to poverty appear to change across Peasant associations and Panel years. For a meaningful intervention, poverty oriented programs should take in to account such differences and act accordingly. Otherwise, adopting successful poverty reduction programs may not help without considering the impacts of such important factors across time and space. Finally, a piecemeal approach to solving individual problems is by no means sufficient to overall poverty alleviations. A comprehensive package of strategies that creates good governance, establishes functional infrastructure, builds schools and health centers, fosters innovations and technologies and so on is needed to move rural households out of poverty trap and sustain pro-poor growth.

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Appendix

Table A: Sargan tests of overidentification for the Fixed Effects IV regressions

Sample	Chi-square	P-value
Yetmen	1.279	0.2580
Shumsheha	0.898	0.3434
Both Pooled	0.377	0.5391

Note: The null hypothesis is that instruments are not correlated with error terms. The null is accepted in all equations and that all instruments in the respective equations are found to be valid.