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Dimensions of Poverty in Northeastern Ethiopia: Looking into Multitude Facets of Poverty for Poverty Reduction

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Abstract
Despite efforts being made and some signs of change, poverty in Ethiopia is staggeringly high and thus the country is undoubtedly among the poorest nations in the world in which poverty persists at debilitating levels and hence becomes multifaceted and longstanding problem over periods. The situation of northeastern Ethiopia, one of the poverty stricken areas in the country, does not be different from the above situations. A thorough examination different dimension of poverty and estimating the extent of each dimension are important for policy measures to tackle poverty. This study is, therefore, aims to analyze the economic, social and institutional dimensions of poverty in the northeastern Ethiopia. The study employed rural household survey questionnaire based on income and expenditure dataset of the 400 sample households from four study weredas using a two stage random sampling method proportionate to size. Data on the demographic, socio-economic and institutional characteristics of the sample households are also collected so as to analyze the various poverty dimensions. While the cost of basic needs approach was used to determine the poverty line, FGT family of poverty indices were used to estimate the extent of poverty in monetary terms. In addition, the analysis of multidimensional poverty is also supplemented by additional measures of poverty in terms of the economic, social and institutional aspects using the summary statistics and t-tests. Concerning the monetary measures of poverty, the absolute food and total poverty line are ETB 2866.14 and 3410.71 respectively and the extreme food and total poverty lines are 2149.39.59 and 2557.77 respectively. Based on the above absolute total poverty line, the incidence of poverty in rural northeastern Ethiopia is 39 percent. With regard to the other economic and social dimensions of poverty, households identified as poor in our survey confirms that they are worse off in almost all dimensions than average or better-off households so that poverty in rural northeastern Ethiopia is truly multi-dimensional. As a result, in most cases rural households in the study areas are facing adverse socio-economic composition which in turn increases the likelihood of falling into poverty. Therefore, the identified multitude dimensions and the respective estimated magnitudes of poverty in the study areas are worth considering as a positive knock for policymakers and anyone else who may have a stake on poverty reduction and hence better livelihood of rural households in northeasten Ethiopia in particular and in the country in general.
Keywords: Poverty, dimensions of poverty, households, wollo, zones, northeastern Ethiopia, Ethiopia

1. Introduction

Poverty has prevailed in many Sub-Saharan African countries. For instance, about 290 million people, who constitute about 46 percent of the total population of the region, live on less than a one US dollar per day per adult (World Bank, 2000a). The same source states that Africa enters the 21st century comprising some of the poorest countries in the world.

Ethiopia is undoubtedly among the poorest nations in the world in which poverty persists at debilitating levels and hence becomes multifaceted and longstanding problem over periods. A number of studies have sought to examine the extent of poverty in Ethiopia. For example, the Ethiopian government's 2004/05 Household Income and Consumption Expenditure Survey (HICES) is the most extensive survey available on the extent of poverty. It indicates that the incidence of poverty in rural and urban areas with the poverty head count ratio is being 39.3 and 35.1 percent respectively. In addition, the study conducted by Woldehanna (2004) has shown that about 45% of the rural population and 37% of the urban population is under the national poverty line. In general, despite efforts being made and some signs of change, a number of studies have sought that poverty in Ethiopia is staggeringly high and thus the country is often reported as one of the poorest countries in the world almost by all dimensions of poverty.

The situation of northeastern Ethiopia, specifically south and north Wollo zones, does not be different from the above situations. This area is among the chronically affected areas in Ethiopia which is currently facing daunting challenges of socioeconomic and demographic variables.[2] This study is, therefore, aims to analyze dimensions of poverty in northeastern Ethiopia.

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[2] The summary statistics of important demographic and socio-economic variables are presented on appendix table 8.1.

2. Problem Statement

According to the 1999/2000 Central Statistical Agency (CSA) Survey, The majority of people in Ethiopia are living in rural areas (83%) where poverty is more widespread than in urban areas. About 44% of the population is below the nationally defined poverty line in 1999/2000, while it is 45% for rural population and 37% for urban population. The study conducted by Tassew and Tekie (2002) also brought to light the situation of poverty in Ethiopia by addressing different dimensions of economic activity and livelihood patterns. Accordingly, the national consumption expenditure for the year 1999/2000 was calculated at US$ 139. Higher consumption expenditure was registered for urban areas as compared to that of rural areas. The study established that the proportion of people that are absolutely poor in 1999/2000 was 44.2% on the average (37% in urban areas and 45% in rural areas). However, in 2004/05 the proportion of poor Ethiopians became 38.7 percent, implying that there were 27.5 million people living below the poverty line.

Poverty is also deeper and severer in rural areas than in urban areas. On the average, the income of the rural poor is 12.1% far from the poverty line, while it is 10.1% for the urban poor (MOFED, 2008). The same source also revealed that about 85% of the households in Ethiopia live in low quality houses of which 65% are grass roofed. Thus, the fundamental question that comes in the fore front is not are we really poor, just because we are, but what are the multitude dimensions of poverty in the study areas and what are the extents of each dimension of poverty. This question has been answered through critical analysis of multi dimensional poverty in the study areas.

Understanding the different dimensions of poverty and estimating these dimensions of poverty are important for policy measures to tackle poverty. Motivated by the need to understand the different dimensions of poverty and its extent, this study is conducted in the rural northeastern Ethiopia, one of the poverty stricken area in the region and the country as well. This study is, therefore, aims to analyze the economic and social dimensions of poverty in the northeastern Ethiopia. In this regard, analysis of poverty has been begun by estimating the total and food poverty line and measuring the extent of poverty using expenditure approach. In addition, the extent of poverty is analyzed in terms of economic, social and institutional aspects.

3. Multidimensional Poverty: Literature Review

As far as the nature of poverty is concerned, it ranges from the one-dimensional poverty approach where a given monetary income or expenditure defines the limits between poor and non-poor to multidimensional frameworks, which take into account ownership of assets and provision of social services and food security situations. In the one-dimensional approach, income or expenditure level has been the standard way of assessing whether an individual is above or below the poverty threshold. According to this perspective, an individual is poor if he/she does not have the minimum potential purchasing power to obtain a bundle of attributes yielding a certain level of well-being (Hoffman, 1998).

Nowadays, however, it is largely agreed that poverty is a result of multiple causes and encompasses multiple dimensions. Thus, poverty has multifaceted nature and dimension hence many scholars have been busy finding the tangible nature of poverty. They have agreed that poverty has various interpretations in economic, social, political, institutional, environmental and cultural contexts. The biological approach, for instance, conceptualizes poverty as the lack of entities for survival. It postulates that poverty exists when the necessary minimum requirements for physical efficiency are not fulfilled regardless of additional requirements, which an individual should get. In this regard, most literatures have agreed to express poverty in terms of lack of sufficient food, clothing and housing (Sen, 1981).

In the multiple dimension of poverty broader definitions of poverty has emerged but face natural measurement and data limitations and, as a result, some restrictions have to be made in the number and type of the attributes being analyzed. In line with this, some indexes were created in order to construct a scalar measure, which synthesizes all the relevant human poverty dimensions. For instance, Human Development Index (HDI) is proposed by UNDP in the 1990's. But although HDI represents an attempt to capture poverty aspects that go beyond income levels, it only incorporates educational and life expectancy attributes (UNPD, 2003). Building on HDI, the Generalized Human Development Index (GHDI) is an attempt to expand well-being dimensions by including the contribution of additional attributes such as provision of public goods (Chakravarty, 2003 cited in Gilvan *et al*., 2005).

4. Data and Methods

The study has presented an analysis of poverty in northeastern Ethiopia based on the data obtained from the household survey in 2014. The data employed in this study was derived from our survey questionnaire administered to 400 rural sample households in the four study weredas in the two zones namely Dessie zuriya and Kalu (south Wollo) and Gubalafto and Harbu (north Wollo) in Amhara national regional state (ANRS). Out of the woreda administrations in the two zones two woreda administrations have been selected in each zone purposively to represent different agro-ecological, economic and social diversities within each zone. Finally, a

total of 400 sample households were chosen from the four weredas using a two stage random sampling method. In the first stage, ten study sites also called kebelles were selected randomly from the four weredas.[1] In the second stage 400 sample households are randomly drawn from a complete list of respective selected kebelles in conformity to proportionate to size random sampling procedure. The survey questionnaire data from the sample households was collected through interviewing the selected households.

The survey is based on income and expenditure dataset of the sample households in which household expenditure is considered as an adequate measure of household welfare in developing countries as it is better able to capture household's consumption capabilities (Grootaert, 1986). In addition, data on the demographic, socio-economic and institutional characteristics of the sample households are collected so as to measure the extent of poverty in terms of economic, social and institutional dimensions.

Once the nature of data and method of sampling are identified, the poverty line in the study area is determined using the cost of basic needs (CBN) approach, which has become part of the poverty monitoring standard in most developing countries. Such poverty lines are particularly useful for drawing of poverty profiles, examining the determinants of poverty and guiding policy interventions aimed at poverty reduction. Regarding the measurement issue, the Foster-Greer-Thorbecke (FGT) poverty measure in terms of headcount ratio (HCR), poverty gap/depth index and severity index has been used. The analysis of multidimensional poverty is also supplemented by additional measures of poverty in that the economic, social and institutional aspects of poverty is analyzed using the summary statistics and t-tests.

5. Results and Discussions

5.1 The Poverty Line and Extent of Poverty

In order to set the poverty line using the CBN approach, developed by Ravallion and Bidani (1994), the cost of a food basket[2] enabling households to meet a minimum number of calories required for good health-2200 Kcal per day per adult equivalent - and then an allowance for the consumption of basic non-food items is added. As a result, consumption expenditure reported by the households is used to measure the level of poverty. Regarding the consumption expenditure the adult equivalent consumption expenditure with the help of adult equivalent units calculated by Dercon and Krishnan (1998) using World Health Organisation (WHO) conversion codes has been adopted (See appendix table 8.2).

Table 5.1 Food and total poverty lines per adult per year

Poverty lines	Food poverty line	Total poverty line	Kcal per adult per day
Absolute poverty line	2866.14	3410.71	2200
Extreme poverty line	2149.39	2557.77	1650

Based on these methodological steps of the CBN approach the food poverty line and the absolute poverty line that corresponds to the food items in appendix table 8.3 are ETB 2866.14 and 3410.71 respectively.[3] The extreme food and total poverty lines based on food basket of 1650 Kcal per adult per day are 2149.39.59 and 2557.77 respectively (table 5.1).[4] Compared to the national level poverty lines in 2010/11, the food poverty line in the present study is higher whereas the total poverty line is lower. The national level food and total poverty line set by the Ethiopian government are ETB 1985 and 3781 respectively (MOFED, 2012).

Once the poverty lines have been constructed, we can now choose the measures to express the shortfall and deprivation and then analyse the extent of poverty. As has become standard in poverty research, this study follows Foster, Greer and Thorbecke (1984) by using the most common of the so-called Foster-Greer-Thorbecke (FGT) family of poverty indices.

Accordingly, based on total poverty line, absolute head count index stood at 39 percent indicating that on the

[1] Zone is the main administrative unit next to national regional governments in Ethiopia, which is equivalent to district in the country. While woreda is the next administrative unit and is equivalent to administrative sub-district in the county, kebelle is the smallest administrative unit.

[2] The basic food basket that contains most frequently food items consumed by the poor is presented on appendix table 8.3. In this case, a total of 17 food items are identified and their quantity is determined in such a way that the bundle supplies a predetermined level of minimum calorie requirement (2200 Kcal per day per adult as set by WHO 1985).

[3] At an exchange rate of about 19.60 birr at the time of the date collection, the absolute poverty line for food and for total consumption is about $146.23 and $174.16 per year per adult respectively. Note that this is relatively low poverty line, compared to the standard of 'one dollar per day' suggested by the World Bank. See appendix table 8.4a and table 8.4b for the detailed procedures to determine the food poverty line in case of absolute and extreme poverty respectively.

[4] While the poverty line is used as a threshold point between non poor and poor which basis 2200 Kcal of minimum nutritional requirement, the extreme poverty line is used as a threshold point between poor and extremely poor which basis 1650 Kcal of minimum nutritional requirement.

average 39 percent of the rural farm households in northeastern Ethiopia are unable to meet the stipulated minimum level of calorie intake (2200 kcal per day per adult) adjusted for the requirement of non food items expenditure. In other words, this percentage of households is living below total poverty line. The proportion is even lower, 20.4 percent in terms of extreme head count index. The absolute incidence of poverty (39 percent) in rural northeastern Ethiopia in the present study is by far higher compared to the rural national level incidence of poverty (30.4 percent) in 2010/11 (MoFED, 2012). This is because the study areas are much vulnerable to poverty as they are characterized by high risk of environmental shocks which in turn causes drought, famine, ill health, loss of assets, or loss of income.

Table 5.2 Estimated poverty levels in northeastern Ethiopia (n=382)

Type of poverty	Absolute poverty indices			Extreme poverty indices		
	Head count index (P0)	Poverty gap Index (P1)	Squared poverty gap index (P2)	Head count index (P0)	Poverty gap Index (P1)	Squared poverty gap index (P2)
Food poverty	0.576 (0.025)	0.190 (0.012)	0.093 (0.008)	0.319 (0.024)	0.105 (0.010)	0.050 (0.006)
Total poverty	0.390 (0.025)	0.106 (0.009)	0.041 (0.004)	0.204 (0.021)	0.043 (0.006)	0.014 (0.003)

Note: values in brackets are standard errors

The depth of poverty (poverty gap ratio), a measure that captures the mean aggregate consumption shortfall relative to the poverty line across the whole population is found to be 0.106 which means that the percentage of total consumption needed to bring the entire population to the poverty line is 10.6 percent in terms of absolute poverty line and it is found to be 4.3 percent in terms of extreme poverty line. Moreover, the squared poverty gap, a measure that captures the relative deprivation among the poor households, the severity of poverty gives a higher weight to the poorest of the poor and this measure is particularly useful in tracking developments over time and comparing deprivation between regions. In this regard, 4.1 and 1.4 percent of relative deprivation is identified in the study areas in terms of the absolute and extreme poverty lines respectively. This implies that there is sever inequality among the lowest quartile in case of absolute poverty compared to extreme poverty. The national data on rural Ethiopia in terms of absolute poverty severity in 2010/11 is 3.2 percent. Thus, compared to the national data, the absolute poverty severity in this study even after two years from the national survey is higher implying that the study areas have more severity than the national ones. So it can be inferred that, on average people living in the study areas suffer higher levels of deprivation than people living elsewhere in Ethiopia.

When considering the food poverty line the absolute and the extreme head count indices in the rural northeastern Ethiopian in the present study are 57.6 percent and 31.9 percent respectively. This indicates that 57.7 percent (in case of absolute poverty) and 31.5 percent (in case of extreme poverty) of the population are food-poor households that are unable to meet even their food requirements and thus fall below the food poverty line. All these are due to the existence of drought and high vulnerability in the study areas even to minor weather related shocks.

The absolute food poverty head count index in the country is estimated to be 33.6% in 2010/11 while it stood at 34.7% in rural areas and 27.9% in urban areas. This indicates that the absolute head count index rural northeastern Ethiopian in the present study is much higher than the national absolute head count index in rural Ethiopia as a whole in 2010/11. Indeed, achievement of food self-sufficiency is one of the key objectives of the government as articulated in its Growth and Transformation Plan (GTP) and rural development policies and strategies, which is also consistent with the MDG goal of eradicating extreme poverty or hunger. However, this could not be realized in the study areas.

The food poverty gap indicates that the households are 19.0 and 10.5 percent far off from the absolute and extreme food poverty lines respectively. The severity of inequality among the poor is also 9.3 and 5 percent in case of absolute and extreme food poverty lines respectively. Furthermore, as compared to what has been planned in the GTP to reduce the national total and food poverty head count indices to 24.7 and 23.6 percent respectively, as annual targets by 2012/13, both the total and food poverty absolute head count indices in the present study are substantially higher than the national average (MoFED, 2010).

Looking at the other dimensions of poverty, the socio-economic status of the sample rural households tells us the extent of poverty in the northeastern Ethiopia. The socio-economic status of the households has been explained by considering the households income and consumption expenditure, ownership of agricultural and household assets by the households, provision of social services to the households and the food security situation of households.

5.2 Income and Consumption Expenditure

As can be seen from table 5.3, it was possible to learn that the average per adult annual income of households in

northeastern Ethiopia was ETB 2495.38.[1] There is a big disparity between this level of farm households' actual income per adult and the poverty line determined in the later which is calculated as ETB 3410.71.[2] The average household, for instance, needs an additional income of ETB 915.33 to fulfill the minimum food and non-food consumption requirement. Households derive 70.80 percent (ETB 1767.08) of their annual income from the agricultural sector and the remaining 29.20 (ETB 728.30) percent of their income is derived from off farm and non-farm activities.

Table 5.3 Mean income and consumption of the household by poverty status

Income/consumption	Non-poor (n=149)	Poor (n=233)	Total (n=382)	t-value
Farm income per adult	2308.01	921.22	1767.08	-7.25*
Off farm income per adult	823.16	579.96	728.30	-1.99**
Total income per adult	3131.17	1501.18	2495.38	-7.26*
Food consumption per adult	3387.09	1709.23	2732.64	-17.21*
Non-food consumption per adult	1903.64	776.85	1464.13	-11.40*
Total consumption per adult	5290.73	2486.08	4196.77	-19.45*

* Significant at 1%; **Significant at 5%

The share of agricultural income mainly from crop production and livestock keeping to the total income in northeastern Ethiopia goes below the corresponding national average of 72.5 percent (MoFED, 2002b). This is because some of the farm households have access to receive remittance income from relatives living and working elsewhere mainly in abroad countries such as Saudi Arabia, Dubai, Yemen, and Kuwait. Compared to the other sources of off farm income, remittance is significantly important source of income in terms of both number of receivers and the amount transferred. Though it would be risky for poor household to rely on this income source, the diversified income sources including income from remittance help the rural households to minimize risk of loss and partly to avail food staff in family dish during seasons that food becomes short. In this regard, among the rural households covered in the survey more than 61 percent of them have reported to have off farm income source.

Though the share of agricultural income of the households to their total income goes below the corresponding national average, agriculture is the mainstay of livelihood for virtually all farm households in northeastern Ethiopia. The difference between the poor and the non poor in terms of the per capita farm income, per capita off farm income and per capita total income is clearly observed from table 5.3. To sum up, the mean difference between the poor and the non poor in terms of farm income, off farm income and total income is significantly different at 1%, 5% and 1% respectively.

Regarding the consumption expenditure of the northeastern Ethiopia rural farm household, per adult consumption averaged ETB 4196.77 ($214.12). Food consumption accounted for just 65.11 percent, 2732.64, with the remainder, non food expenditures, averaging ETB 1464.13. Except the food consumption the average per adult non food consumption and the total consumption of the households are lower compared to the national average. When compared to even the 2010/11 national average, per adult non food consumption and total consumption are ETB 3022 and ETB 5659 respectively (MoFED, 2012). The mean per capita consumption of non poor is found to be ETB 5290.73 and that of the poor is ETB 2486.08. The mean difference between per adult consumption of the two groups is significantly different at 1%. The same applies for food and non food consumption.

5.3 Agricultural Assets

The crucial productive resource in the rural farm household is farmland, both 'owned' and cultivated.[3] As can be noticed from table 5.4, the majority of the farm households (93 percent) have their own farmland and thus they own average land size of 2.65 timad (0.66 ha) ranges between 0.25 timad (0.06 ha) and 10 timad (2.5 ha).[4] In the

[1] In order to better reflect the household's living standards, the analysis built on per adult equivalent instead of the total income. Besides, per adult equivalent total income is disaggregated into the agricultural and non-agricultural per adult income. The income per adult is obtained by dividing income by adult equivalent family size adjusted for age and gender of household members. Note that the consumption levels exceed the corresponding income levels. This is because in the consumption expenditure the monetary values of the food and non food items produced and consumed by the household are included but not considered as an income of the household.

[2] ETB represents Ethiopian Birr which is the legal currency of Ethiopia. The exchange rate as of February 2014 was 1USD = 19.6062ETB (CBE, 2014). Note that this is the exchange rate at the time of data collection.

[3] Strictly speaking, the Ethiopian Constitution allows no private ownership of land. Instead, usufruct rights are allocated to households who are recognised as *de facto* owners by their communities. Land ownership is defined here as land to which respondents have legal title recognised by their *kebele*, and on which they pay tax.

[4] Timad is the local unit of measure for farming land. It is the area of land that can be ploughed by one pair of oxen in a day and is approximately equal to one-fourth of a hectare.

study areas by the present study, on average, each sampled farm household cultivated 2.20 timad with a 0.5 and 8 timad as minimum and maximum. Regarding the land for irrigation, the total land size that can be used for irrigation purpose is averaged 0.93 timad of which an average of 0.87 timad is used for irrigation in the last agricultural year. concerning the extension services on average 92 percent of the sample farm households have used improved inputs such as fertilizer (60.88 kg), improved seeds (5.85 kg) and Pesticides/herbicides (0.29 litre) in the last agricultural year. Besides, only 14 percent households reported that they have used modern agricultural tools for their farming activity.

Table 5.4 Summary statistics of agricultural assets related to farming practices

Variable	Obs.[1]	Mean	Std. Deviation	Minimum	Maximum
Own farm land	382	0.93	0.25	0	1
Size of cultivable land (timad)	382	2.65	1.56	0.5	10
Size of cultivated land (timad)	382	2.20	1.32	0.5	8
Size of irrigable land (timad)	176	0.93	0.63	0	3
Size of irrigated land (timad)	176	0.87	0.63	0	3
Use of inputs	382	0.92	0.27	0	1
Fertilizer (kg)	382	60.88	55.87	0	450
Improved Seed (kg)	382	5.85	11.36	0	54
Pesticides/herbicides (litre)	382	0.29	0.69	0	9
Use of modern tools	382	0.14	0.35	0	1

Our survey questionnaire collected information on livestock holdings as another aspect of measuring rural poverty. Drawing on this household-level information, a number of methods were used to derive estimates of the proportion of poor people in the sample, and hence in the study areas. In most cases, livestock ownership would be considered as an indicator of poverty in rural farm households. It, therefore, constitutes an important element in the livelihood of the households in the study areas. Farm animals such as sheep and goats, cattle and pack animals among others are source of draught power, food (milk and meat), cash, animal dung and means of transport.

Table 5.6 Mean Tropical Livestock Unit (TLU) by poverty status, wereda and zone

Wereda/Zone	Obs.	Non poor (n=149)	Poor (n=233)	Total (n=382)	t-value
Dessie zuria	131	3.65	2.97	3.38	-1.65
Kalu	96	2.86	2.31	2.64	-1.13
South Wollo	***227***	***3.32***	***2.69***	***3.08***	***-1.96****
Gubalafto	76	2.34	2.02	2.21	-0.86
Habru	79	3.13	1.85	2.66	-2.56*
North Wollo	***155***	***2.76***	***1.94***	***2.44***	***-2.26****
Both Zones	**382**	**3.09**	**2.39**	**2.82**	**-3.08***

* Significant at 1%; **Significant at 5%

Generally, farm animals in the study areas serve as a measure of wealth and culturally a sign of social status. During drought years, livestock, a major asset that can be easily liquidated, is more important in terms of implying better access to food. Accordingly, livestock has served as buffer against hard times. Households in the study areas who have opportunity to save usually keep their money in the form of livestock. They produce or buy livestock (particularly small ruminants, considered as liquid assets) to sell and buy food grains during years of drought or to fill the gap in food requirements towards the end of the agricultural year when they fall short of food.

Therefore, the size of livestock of an average household could be taken as a proxy to indicate the household's poverty status. The present study showed that out of the 382 sample households 359 own livestock. The mean livestock holding in Tropical Livestock Unit (TLU) for all sample households is 2.82, where the minimum is 0 and the maximum is 11.80 (table 5.6).[2] The mean ownership of the non poor households is found to be 3.09 TLU whereas for the poor the mean TLU ownership was found to be 2.39. It is also evident that the mean difference in livestock holding between the poor and non poor is statistically significant at 1% significant level.

[1] Obs. refers to 'observation'

[2] It is a more comprehensive indicator of 'physical capital', which is calculated by weighting the total livestock number owned by the household in terms of Tropical Livestock Units (TLUs) using the standardized conversion factor. This is an equivalence scale based on the average biomass consumption of each animal species. The storck, et al. (1991) conversion factors were used in our analysis; they range from 0.013 for a chicken to 1.25 for a camel. For details see appendix table 8.5.

Data collected from farmers in south and north Wollo zone indicate that the mean livestock holding is 3.08 and 2.44 TLU respectively. While the livestock holding in south Wollo is above the sample average of 2.82, the livestock holding in north Wollo is below the sample average. In other words, during the survey year, on average farmers in south Wollo own 0.64 TLU more than what households in north Wollo own so that poverty in terms of livestock holding rising from South Wollo to North Wollo. This mean difference between the poor and the non poor in terms of livestock ownership is statistically significant both in south and north Wollo zones. Data collected from farmers at Wereda level, livestock ownership is better in Dessie zuria wereda followed by Habru, Kalu and Gubalafto Weredas respectively.

Non poor households have better livestock holding than poor households in all weredas. The mean comparison for the two groups (the poor and the non poor) showed that the difference between the groups with regard to livestock holding is found to be statistically significant only in Habru Wereda. Other studies, for instance study conducted by EEA in 2003, indicates a worsening trend in the size of livestock owned by households in south and north Wollo. In conclusion, the present survey result indicates limited condition of livestock ownership by the poor in particular by the sample households in general.

5.4 Household Assets and Basic Social Services

In the poverty study, ownership of physical assets and accessibility of various services has been included as an indicator of poverty. In this study, we call for lessons on how poverty is explained in a range of domains, including household assets, distance and access to facilities, physical housing features and utilities, and other living conditions. Thus the following analysis shows how poverty status is correlated with ownership of assets and access to infrastructural services in northeastern Ethiopia.

The survey data as portrayed in table 5.7 shows that 96 percent of the households have their own house and the remaining 5 percent are living on a rental house. Moreover, quality of households' housing is an important issue to differentiate wealth. This quality of house is in turn considered by the type of materials used in house construction through direct observation by the interviewer. If either roof or walls of the household's home were in good condition (metal roof and non draught wall), this is taken as an indication that the household is not poor; if both roof and walls was in poor condition (thatch roof and draughty walls), the household is considered poor. In this case the households are unable to maintain their house even to provide adequate protection against the weather. In our sample, 62 percent have a house with at least either good roof or wall and the rest 38 percent have a house with poor roof and wall. When we compare the difference between the two zones households having at least either good roof or wall are more in south Wollo (63 percent) than that of households north Wollo (61 percent).

With regard to assets such as television, radio and mobile telephone, mobile telephone is the asset owned by most of the households (59 percent) followed by radio (45 percent) and television (8 percent). By contrasting the two zones, ownership of all the three assets is relatively higher in north Wollo than south Wollo implying that poverty in terms of holding of some household durable assets rising from North Wollo to South Wollo. Much more unequal is ownership of television. This may be due to distribution of electricity between the two zones as more households in north Wollo (45 percent) have access to electricity compare to that of households in south Wollo (33 percent). The number of times the household bought clothes during the past years is an important measure of wealth because of the fact that a minimum level of socio-economic respectability in rural Ethiopia is represented by buying clothes at more times each year. Conversely, inability to buy clothes at least twice a year, at least for their children, indicates poverty or deprivation. In our sample, 78 percent of households are unable to buy more than twice each year in the past years, while only 22 percent of the households purchased clothes more than twice in the same period.

Interestingly, there is adequate access to education as 99 percent households reported that they have such access, at least the primary school, at local/kebelle level. There is also nevertheless an important difference between the south and north Wollo in terms of access to this service. Table 5.7 gives details. The proximity to the nearest school is found to be on average at a distance of 11.39 km. According to the households response on health service there are 98 percent access to health facilities in the study areas. However, the quality of health service provided in the local area is no promising, despite the fact that there is good accessibility of the health institutions in physical term. Only 11 percent of the sample households (12 and 9 percent for south and north Wollo zones respectively) reported that the quality of health service currently provided to the community is good whereas the remaining 89 percent (88 and 91 percent for south and north Wollo zones respectively) households perceive that the service quality is poor, with most facilities lacking drugs and maintenance and also poor manpower situation as well.

Table 5.7 Asset ownership and access to infrastructural services in northeastern Ethiopia

Asset/service	South Wollo (n=227)	North Wollo (n=155)	Total (n=382)
Own house	0.95	0.98	0.96
Good condition of roof and wall	0.63	0.61	0.62
Television	0.07	0.63	0.08
Radio	0.41	0.49	0.45
Mobile telephone	0.57	0.61	0.59
Two or less times cloth purchase	0.80	0.75	0.78
Electricity	0.33	0.45	0.38
School	1.00	0.98	0.99
Distance to nearest school *(km)*	13.62	8.11	11.39
Health facility	0.98	0.99	0.98
Health service quality	0.12	0.09	0.11
Distance to nearest health facility *(km)*	15.07	10.36	13.16
Drinking water	0.74	0.66	0.70
Distance to nearest drinking water *(km)*	1.41	1.40	1.40
All weather road	0.85	0.70	0.79
Distance to all weather road *(km)*	5.47	6.02	5.68
Distance to nearest market *(km)*	5.05	3.77	4.53
Average distance to other services: tele, post and bank *(km)*	22.27	18.6	20.82

Strictly speaking, most of the health institutions in the study areas are existing by name and by the mere presence of physical structures. The required manpower (health personnel), equipment and drugs as well as facilities that make these health institutions functional and operational at least by the standard of the country are not in place. Still worse, in some extreme remote areas some households have no the slightest clue about the existence of such services. As a result, households are subject to additional costs either to search out other better public health facilities by travelling long distance or to get hold of better services from the private clinics working in their nearby local areas. The average distance travelled by the households to get the health facilities like clinic, health centre and hospital is 13.16 km with 15.07 and 10.36 km for households in south and north Wollo zones respectively. Compared to the national average, the result in this study is get worse. On average in rural Ethiopia, the distance to the nearest health facility is about 8 km.

The result on access to drinking water shows 70 percent households have access to drinking water. The contrast between the two administrative zones of former Wollo but the recent northeastern Ethiopia is striking. Compared to households from south Wollo, households from north Wollo experience limited access to drinking water. On average, people travelled 1.40 km in order to fetch water. Similarly, they have to travel on average 5.68 and 4.53, km to access all weather roads and nearest market respectively. In addition, the mean distance to use telephone, post service and bank facilities is on average 20.28 km. By and large, the households in the study areas are poorly accessed to services when compared to the national data in almost most aspect of service. For instance, the mean distances to the nearest school, health centres and drinking water at national level for rural Ethiopia is 3.38, 7.98 and 0.41 km respectively.

5.5 Food Security Situation

The food security situation of the sample households has been taken as an indicator of poverty. During the survey of the present study, information was collected from each household about the food security situation of the household in the year prior to the interview period. The data on the response about food security of the sample households across the study areas shows that half of the household are food secure while the remaining half are food insecure. This result is consistent with the absolute food head count index estimated earlier using expenditure approach, which indicated that more than half of the sample households are food-poor households that are unable to meet even their food requirements. Thus, in this study it is pointed out that the growing number of rural households that appeared to be unable to make ends meet, even in good rainfall years.

In connection with this, 52 percent of the food insecure households are reported that drought is the main reason for unable to secure their food and the remaining 48 percent households took other factors such as pest, various diseases and shortage of land as the main reason for being food insecure. This indicates that although poverty in the study area exhibits itself in many forms mainly it is explained in terms of lack of access to sufficient food due to the existence of drought and thus there is high vulnerability even to minor weather related shocks. There is also statistical significance difference between the poor and the non poor in terms of food security, implying that the food insecure households are more likely to be poor than the food secure households. Moreover, two indicators relating to household food security were derived from the household survey. In one hand, number of months of food shortage experienced by the household during the previous

year's worst season and in the other hand number of meals per day eaten by household members during the previous year's worst season.

The first food security indicator is a widely accepted proxy for poverty and food insecurity. The duration of food shortage reported covered the full range of possibilities, from 1 to 12 months, though there were few households at the upper end of the distribution. In our data average households suffered 4.72 months of food shortage, reflecting the fact that 2012/13 was a relatively good year in food security terms. According to the household's response on a month with high food shortage 39 percent households replied that a month with high food shortage is September and the remaining 61 percent households any other month other than September.

Table 5.8 the food security situation of households

Food security situation	Obs.	Non poor	Poor	Total	t-value
Food security	382	0.56	0.43	0.50	-2.46*
Reason for food insecurity	189	0.58	0.45	0.52	-1.77**
Number of months with food shortage	189	4.69	4.76	4.72	0.18
A month with high food shortage	189	0.30	0.49	0.39	2.67*
Three or more months of food shortage	382	0.44	0.49	0.45	0.99
Only one or no meals per day	382	0.44	0.48	0.46	0.83
Food aid	382	0.26	0.25	0.25	0.20

* Significant at 1%; **Significant at 5%

Applying a cut-off of more than three months of food shortage as an indicator of poverty or food insecurity for rural Africa, our data produces 45 percent poor or food insecure households. Regarding the second food security indicator, 46 percent households reported that their household members consumed one or no meals at all per day during the worst month last year where as 54 percent reported that they ate more than one times per day. These data offer an immediate and intuitively credible indicator of poverty or food insecurity: namely, households that consumed less than two meals per day. This result is consistent with the report made by the sample households with regard to their food security situation. To this end, half of the household are food insecure indicating that these proportions of people are unable to meet even their food requirements. With regard to food aid, the percentage of average sampled households who received urgent food aid, in the twelve months before the survey is 25 percent and the associated t-tests showed that there is no statistically significant difference between the poor and the non poor. According to the DPPC office of the Amhara region, for instance, about 1,306,976 people or 35% of the total population of North and South Wollo Zones received food aid every year between 1997 and 2001. Thus, the food security situation in the study areas has not been significantly improved even in recent years.

6. Conclusion and Recommendations

6.1 Conclusion

Based on CBN approach the food poverty line and the absolute poverty line in northeastern Ethiopian are found to be ETB 2866.14 and 3410.71 respectively. The extreme food and total poverty lines based on food basket of 1650 Kcal per adult per day are 2149.39.59 and 2557.77 respectively. Compared to the national level poverty lines in 2010/11, the absolute food poverty line in the present study is higher whereas the total poverty line is lower. The national level food and total poverty line set by the Ethiopian government are ETB 1985 and 3781 respectively (MOFED, 2012). Thereafter, the poverty indices were computed and the resulting poverty estimates for the study area is presented below using FGT indices.

Building the static type of poverty analysis, the level of poverty in northeastern Ethiopia is estimated based on the food poverty line and total poverty line in one side and the absolute and extreme poverty types on the other side. Accordingly, based on total poverty line, absolute head count index stood at 39 percent indicating that on the average 39 percent of the rural farm households in northeastern Ethiopia are unable to meet the stipulated minimum level of calorie intake, which in turn indicates percentage of households living below total poverty line. The proportion is even lower, 20.4 percent in terms of extreme head count index. Extremely poor households have emerged in three out of six poor households. The absolute incidence of poverty (39 percent) in rural northeastern Ethiopia in the present study is by far higher compared to the rural national level incidence of poverty (30.4 percent) in 2010/11 (MoFED, 2012).

The depth of poverty, i.e. how much people on average fall below the poverty line, is found to be 0.106 which means that the percentage of total consumption needed to bring the entire population to the poverty line is 10.6 percent in terms of absolute poverty line and it is found to be 4.3 percent in terms of extreme poverty line. This means that the budget required to raise very poor people to the poverty line level has become gigantic, since a significant number of poor people were more and more concentrated around the poverty line. The levels of the poverty severity index, a measure that captures the relative deprivation among the poor households that gives a higher weight to the poorest of the poor, are 4.1 and 1.4 percent in terms of the absolute and extreme

poverty lines respectively. The national data on rural Ethiopia in terms of absolute poverty severity in 2010/11 is 3.2 percent. Thus, compared to the national data, the absolute poverty severity in this study even after two years from the national survey is higher implying that the study areas have more severity than the national ones. So it can be inferred that, on average people living in the study areas suffer higher levels of deprivation than people living elsewhere in Ethiopia.

Concerning the food poverty line the absolute head count, poverty gap and poverty gap squared stood at 57.6, 19.0 and 9.3 percent respectively. These poverty levels stood at 31.9, 10.5 and 5.0 percent for extreme head count, poverty gap and poverty gap squared respectively. In sum, as compared to what has been planned in the GTP to reduce the national total and food poverty head count indices to 24.7 and 23.6 percent respectively, as annual targets by 2012/13, both the total and food poverty absolute head count indices in the present study are substantially higher than the national average (MoFED, 2010). Thus, this study has shown that poverty is a real, significant and deepening phenomenon in rural northeastern Ethiopia.

With reference to the socio-economic status of the households, the average per adult annual income of households in northeastern Ethiopia was ETB 2495.38. There is a big disparity between this level of farm households' actual income per adult and the poverty line calculated as ETB 3410.71. The average household, for instance, needs an additional income of ETB 915.33 to fulfill the minimum food and non-food consumption requirement. Regarding the consumption expenditure, per adult consumption averaged ETB 4196.77 ($214.12). Food consumption accounted for just 65.11 percent, 2732.64, with the remainder, non food expenditures, averaging ETB 1464.13. Except the food consumption the average per adult non food consumption and the total consumption of the households are lower compared to the national average per adult non food consumption and total consumption of ETB 3022 and ETB 5659 respectively (MoFED, 2012).

In terms of agricultural resources, the majority of the farm households (93 percent) have their own farmland and thus they own average land size of 2.65 timad (0.66 ha) and each sampled farm household, on average, cultivated only 2.20 timad. The mean livestock holding in Tropical Livestock Unit (TLU) for all sample households is 2.82. The mean ownership of the non poor households is found to be 3.09 TLU whereas for the poor the mean TLU ownership was found to be 2.39 and the mean difference between the poor and non poor is statistically significant. Data collected from farmers at Wereda level, livestock ownership is better in Dessie zuria wereda followed by Habru, Kalu and Gubalafto Weredas respectively. Non poor households have better livestock holding than poor households in all weredas. Moreover, sample households own less quality house with poor roof and wall lacks household durable assets such as television, radio and mobile telephone, and some are landless.

Access to social services like education and health is at its good performance, however, the quality of health service provided in the local area is no promising. Strictly speaking, most of the health institutions in the study areas are existing by name and by the mere presence of physical structures. While the proximity to the nearest school is found to be on average at a distance of 11.39 km, the average distance travelled by the households to get the health facilities like clinic, health centre and hospital is 13.16 km. The result on access to drinking water shows 70 percent households have access to drinking water. But the average, people travelled 1.40 km in order to fetch water. Similarly, they have to travel on average 5.68 and 4.53, km to access all weather roads and nearest market respectively. The households in the study areas are poorly accessed to services when compared to the national data in almost most aspect of service. For instance, the mean distances to the nearest school, health centres and drinking water at national level for rural Ethiopia is 3.38, 7.98 and 0.41 km respectively.

In relation to the sample household's food security situation, half of the household are food secure while the remaining halves are food insecure. Thus, in this study it is pointed out that the growing number of rural households that appeared to be unable to make ends meet, even in good rainfall years. There is also statistical significance difference between the poor and the non poor in terms of food security, implying that the food insecure households are more likely to be poor than the food secure households. As reported by the majority of food insecure households, drought is the main reason for unable to secure their food and the some households took other factors such as pest, various diseases and shortage of land as the main reason for being food insecure. This indicates that although poverty in the study area exhibits itself in many forms mainly it is explained in terms of lack of access to sufficient food due to the existence of drought and thus there is high vulnerability even to minor weather related shocks. In conclusion, households identified as poor in our survey confirms that they are worse off in almost all dimensions than average or better-off households so that poverty in rural northeastern Ethiopia is truly multi-dimensional. As a result, in most cases rural households in the study areas are facing adverse socio-economic composition which in turn increases the likelihood of falling into poverty.

6.2 Recommendations

The overall magnitude of poverty in northeastern Ethiopian is quite high and worthy of serious attention. In light of this, concrete action oriented programmes and plans are needed to improve the poverty condition of the

households in the study areas. This would be realized by an integrated effort among concerned bodies including government, NGOs as well as concerned civil societies.

Importantly, households are more likely to be extremely poor than absolutely poor. Thus, the fact that most poverty in the region is hard core poverty suggests the importance of making an effort on adoption and implementation of long-term intervention programs in the study areas rather than relying on relief oriented emergency system. The public welfare programs are therefore designed and implemented on the way to achieve the shift the average income of the extremely poor rural households through improving the assets of the poor.

Indeed agricultural income remains a major income source and hence helps to improve poverty for the rural households. Therefore, agricultural activities should be promoted among rural households in northeastern Ethiopia. Besides agricultural income, direct targeting of the poor households for income transfer through promoting off-farm activities should be considered to help reduce the high level poverty and inequality. Since the off-farm sector have an equalizing effect on the income distribution there is need to remove entry barriers faced by disadvantaged households in participating in higher-paying off-farm activities. Provision of physical infrastructure such as good roads, water and electricity would increase overall employment opportunities in the off-farm sector. Similarly, off-farm activities like involving in petty trading activities and participating in public welfare programs should be expanded in rural areas so as to raise the household's off-farm income level.

Considering the multidimensional poverty, a clear prioritisation of multitude measures for interventions is needed to address poverty in the northeastern Ethiopia. Thus, policies should be designed – in the way to address specific constraints with priority and hence improve the overall poverty situation of the households by enhancing ownership of or access to household and agricultural assets as well as social services and economic infrastructures for the very poorest households and communities.

Moreover, since some characteristics associated with the poor are shared by large numbers of non-poor households as well, we need to take care in taking these characteristics for targeting purpose so as to attack poverty. For example, 25 percent of poor households have received food aid, and also the percentage of non poor households who have received food aid is 26 percent. As a result, locally specific judgement that considers the existing reality in the specific area should put into effect before making use of these characteristics as proxy indicators for targeting purpose.

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8. Appendices

Table 8.1 Summary statistics of important variables

Variable	Obs.	Mean	Std. Deviation	Minimum	Maximum
Sex of household head (male)	382	0.81	0.39	0	1
Age of household head	382	46.71	12.65	21	90
Mean age of household	382	25.94	9.08	11.5	62.50
Education of household head	382	2.88	3.26	0	12
Mean education of household	382	3.70	1.99	0	10.50
Marital status of household head (married)	382	0.87	0.33	0	1
Religion of household head (orthodox)	382	0.35	0.48	0	1
Illness of household head (ill)	382	0.49	0.51	0	1
Household size	382	5.28	1.77	2	11
Adult equivalent household size	382	4.60	1.60	1.52	8.82
Dependency ratio	382	0.78	0.68	0	4
Female male ratio	382	1.10	0.95	0	8
Income of household	382	10180.88	7985.68	1000	52000
Per capita income	382	2175.60	2015.42	143	16640
Expenditure of household	382	17949.28	7910.61	3035	54900
Expenditure per adult equivalent	382	4196.77	1939.27	923.44	12516.95
Size of land	382	2.65	1.56	0.25	10
Land per capita	382	0.57	0.43	0.04	2.5
Distance from the centre (km)	382	22.88	12.98	1	61
Climatic condition (woina dega)	382	0.63	0.60	0	1
District (south Wollo)	382	0.59	0.49	0	1
Tropical livestock unit (TLU)	382	2.82	2.21	0	11.79
TLU per adult equivalent	382	0.67	0.64	0	5.29
Access to modern tools (yes)	382	0.14	0.35	0	1
Use of inputs (yes)	382	0.92	0.27	0	1

Table 8.2 Adult equivalence scales

Years of age	Men	Women
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.80
30-60	1.00	0.82
60 plus	0.84	0.74

Source: Dercon and Krishnan, 1998

Table 8.3 Quantity of food used for poverty lines per month per person

Food items	Kcal/100 gram*	Consumption per adult per month in Kg/lt
Wheat	357.4	1.427
Barely	372.3	1.754
Teff	355.1	2.958
Sorghum	359.2	6.387
Maize	375	1.413
Beans	351.4	1.609
Peas	355.3	0.262
Onion	71.3	0.785
Tomatoes	30.7	0.393
Potatoes	89.7	0.719
Cabbage	23.7	0.262
Pepper	360.1	0.353
Coffee	110.3	0.236
Sugar	385	0.353
Salt	178	0.393
Oil	896.4	0.419
Milk	73.7	0.419

*The Kcal/100g for each food item is obtained from EHNRI, 2007

Source: Own household survey

Table 8.4a Food poverty line based on food basket of 2200 Kcal per adult per day

Food item	Kcal/ 100 gram	Kcal per adult per day	Consumption per adult per day in Kg/lt	Kcal per adult per day needed to get 2200Kcal	Mean price per Kg/lt	Cost per day (Birr)	Food pov. Line per year (Birr)
Wheat	357.4	129.856	0.048	169.951	9	0.428	156.209
Barely	372.3	166.294	0.058	217.641	8.5	0.497	181.367
Teff	355.1	267.509	0.099	350.108	14.5	1.429	521.809
Sorghum	359.2	584.299	0.213	764.714	10	2.129	777.062
Maize	375	135.000	0.047	176.684	9.45	0.445	162.514
Beans	351.4	144.074	0.054	188.560	10	0.537	195.858
Peas	355.3	23.687	0.009	31.001	10.25	0.089	32.643
Onion	71.3	14.260	0.026	18.663	11	0.288	105.094
Tomatoes	30.7	3.070	0.013	4.018	7.65	0.100	36.544
Potatoes	89.7	16.445	0.024	21.523	6.5	0.156	56.926
Cabbage	23.7	1.580	0.009	2.068	6	0.052	19.108
Pepper	360.1	32.409	0.012	42.416	36.5	0.429	156.925
Coffee	110.3	6.618	0.008	8.661	68.65	0.539	196.765
Sugar	385	34.650	0.012	45.349	15.25	0.179	65.565
Salt	178	17.800	0.013	23.296	4.9	0.064	23.407
Oil	896.4	95.616	0.014	125.139	25	0.349	127.387
Milk	73.7	7.861	0.014	10.289	10	0.139	50.956
Total				**2200.081**			**2866.139**

Source: Own computation based on the household survey and EHNRI, 2007

Table 8.4b Food poverty line based on food basket of 1650 Kcal per adult per day

Food item	Kcal/ 100 gram	Kcal per adult per day	Consumption per adult per day in Kg/lt	Kcal per adult per day needed to get 1650Kcal	Mean price per Kg/lt	Cost per day (Birr)	Food pov. Line per year (Birr)
Wheat	357.4	129.855	0.036	127.451	9	0.321	117.145
Barely	372.3	166.294	0.044	163.214	8.5	0.373	136.012
Teff	355.1	267.509	0.074	262.555	14.5	1.072	391.318
Sorghum	359.2	584.299	0.159	573.478	10	1.597	582.738
Maize	375	135.000	0.035	132.500	9.45	0.334	121.874
Beans	351.4	144.074	0.040	141.406	10	0.402	146.879
Peas	355.3	23.687	0.007	23.248	10.25	0.067	24.479
Onion	71.3	14.260	0.019	13.996	11	0.216	78.813
Tomatoes	30.7	3.070	0.009	3.013	7.65	0.075	27.405
Potatoes	89.7	16.445	0.018	16.140	6.5	0.117	42.690
Cabbage	23.7	1.580	0.007	1.551	6	0.039	14.329
Pepper	360.1	32.409	0.009	31.809	36.5	0.322	117.682
Coffee	110.3	6.618	0.006	6.495	68.65	0.404	147.559
Sugar	385	34.650	0.009	34.008	15.25	0.135	49.169
Salt	178	17.800	0.009	17.470	4.9	0.048	17.554
Oil	896.4	95.616	0.010	93.846	25	0.262	95.532
Milk	73.7	7.861	0.010	7.717	10	0.105	38.213
Total				**1649.897**			**2149.391**

Source: Own computation based on the household survey and EHNRI, 2007

Table 8.5 Conversion factors used to estimate tropical livestock unit

Animal Category	Tropical Livestock Unit (TLU)
Cow	1
Ox	1
Bulls	1
Heifers	0.75
Calve	0.25
Sheep	0.13
Goat	0.13
Camel	1.25
Horse	1.10
Mule	1.10
Donkey	0.70
Chicken	0.013

Source: Storck, *et al.,* 1991

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