The Analysis of Poverty in Urban Ethiopia: The Case of North Wollo Zone of Amhara Regional State

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Abstract

This study examined the factors that contribute to urban poverty in Amhara regional state's north Wollo zone. To address the objectives, Using the costs of basic needs approach, qualitative and quantitative data from primary and secondary sources is collected from 397 sampled households, and the poverty line of the study area is determined to be 2278.4 birrs. The FGT poverty index (Foster, Greer, and Thorbecke) is employed, and the headcount index, poverty gap, and severity indexes are estimated to be 19.39%, 9.17%, and 5.96%, respectively. The probit model is used to analyze the main determinants of poverty, and the estimation result of this model shows that being a house owner, having access to credit, being a participant in urban agriculture, and having premises are associated with a high probability of being non-poor, and years of education, family size, and dependency ratio positively contribute to poverty alleviation. Education has the power to alleviate poverty in society. So not only the government but also all the concerned bodies will participate in investments in any education sector to motivate individuals to join the school in mass, in contrast to migrating to Arab countries, and again, households must advise their children not to drop out of school.

Keywords: Cost of basic needs, FGT approach, poverty, probit model.

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Background and Rational of the Study

Ethiopia is one of the poorest nations in the world. The country has a long history of famine, hunger, and poverty, which are frequently managed by international humanitarian organizations. The government of the Federal Democratic Republic of Ethiopia has been spending a large amount of money to alleviate poverty, especially since 1991. Despite strong progress in poverty reduction, millions of poor people still live in the country. In other words, poverty remains a significant feature of the country.

According to MoFEC (2012), by the year 2010/11 around 29.2% and 28.2% of the population are living below the income and food poverty line, respectively. Specifically looking, the annual urban population growth is 4.64% which is higher than sub-Saharan Africa's average annual urban population growth of 4 %. But Compared to many developing countries, including Sub- Saharan African countries, the country is predominantly rural and categorized as one of the lowest urban residences (Efrem, 2017). For example, in 2017, the total urban population count 39.54% of the total population in Sub Sharan Africa, while in Ethiopia total urban population count 20.31% of the total population (World Bank, 2018). The high rural-urban population migration and economic growth have been resulting increases in urbanization in Ethiopia. Factors like land shortages in rural areas and the perception that food, health services, and jobs will be more easily available in urban centers have contributed to this migration to the urban area (Klder, 2005).

As World Bank's Development Report, 1990 states Poverty is a multi-dimensional event manifested by pronounced deprivation of well-being related to lack of material income or consumption, low levels of education and health, vulnerability, and exposure to risk and weakness. UNHCR (2004), also define poverty as a human condition characterized by sustained and chronic deprivation of resource, capabilities, choices, securities, and power necessary for an adequate standard of living and other civil, cultural, economic, political as well as social rights. "Poverty has various manifestations, including lack of income and productive resources sufficient to ensure sustainable livelihoods; hunger and malnutrition; ill health limited or lack of access to education and other basic services; increased morbidity and mortality from illness; inadequate housing; unsafe environments; and social discrimination and exclusion. It is also characterized by a lack of participation in decision-making, and social and cultural life (United Nations, 1995). Many

theories have been tried to look at the reason for poverty theoretically. Neoclassical economist in the Individualistic Theory of Poverty advocates poverty as result due to acquired Traits like character and actions of individuals. Cultural Theory of Poverty theory advocates that poverty is caused by the spread over generations of a set of skills, values, and beliefs that are socially created but individually held (Lewis, 1959). The geographical theory of poverty suggests that poverty is more severe in certain areas than in other due to the fact that individuals, cultures, and institutions in some areas are deficient in objective resources that are essential to generate income and sustain well-being (Morrill and Wohlenberg, 1971). This implies that it is the breakdown of the structures, social, political, and economic systems, which causes poverty in society (Bradshaw, 2007).

Ethiopia has registered remarkable economic growth and millions of people are escaped from poverty. For example, the 2015/16 HICE survey and poverty report show that between 2010/11 and 2015/16 about 5.3 million people have been lifted out of poverty. But still, 21.4 million are poor. Besides its recent decline, poverty continues to be a problem in Ethiopia's urban areas (Mohammed, 2017). The recent House Hold Income Consumption and expenditure survey of the central statistical authority revealed the proportion of the urban population below the total poverty line in Ethiopia is 14.85% whereas the poverty depth (poverty gap index) and poverty severity index are found 3.6% and 1.4% respectively. In addition, the food poverty headcount index is 15.2% in urban areas (NPC, 2017). The level of urban poverty is unevenly distributed among the regions of Ethiopia.

Debeli et al (2019) studied the determinants of urban poverty in Debre-Markos town and the findings of the study showed that the proportion of poor people is estimated to be 46.8% indicating that almost half of the people in the study area were unable to meet the monthly per adult equivalent consumption expenditure of 315 ETB.

Mohammed (2017), by using secondary data from a central statistical authority analyzed determinants of urban poverty in south nation nationalities region using logistic regression and he found marital status, family size, total dependency, education level, saving habit, and source of energy were found to be statistically significant variables. In other studies, Melese et al. (2017) conducted research to identify and analyze the extent and determinants of urban poverty in the case of Nekemte town. The study used both primary and secondary data; where the primary data

were collected from a total of 203 randomly selected households in six urban kebeles of the town. The logit estimation result revealed that family size and rural-urban migration have positive and significant effects on the probability of a household being poor.

Beshir et al. (2016), assessed determinants of urban household poverty in the Arsi administrative Zone, Oromia, Ethiopia, and the sex of the household head, education level, and salary employment were found to have negative and significant effects on poverty. Overall, poverty has dynamic nature and it can be different in some urban areas than in others due to the fact that individual cultures and institutions in some areas are deficient in objective resources that are essential to generate income and sustain well-being (Morrill and Wohlenberg, 1971). The findings of previous research support the above argument and show the contradictory result which leaves place for further study. Therefore, this research will try to fill the gap by looking at what determines the level of urban poverty in this area. In addition, it will provide an important information on the extent of poverty in the area by using poverty headcount, poverty gap, and severity index.

This study is conducted by having the general objective of examining the determinants of urban poverty in North Wollo Zone of Amhara regional State, and specifically, to determine the poverty line in the study area, determine the incidence, depth, and severity of household poverty and to identify the basic factors determining poverty in the study area

Literature Review

In literature, there are three main schools of thought concerning the definition and measurement of poverty. These are the welfares school; basic needs school, and capability school (Garza, 2001; and Yared, 2005). These schools although perceive poverty differently, there are areas in which they share some common meaning, which is all of them judge a person to be poor whenever he/she is lacking with respect to the reasonable minimum standard.

The Welfares School approach refers to the numerous microeconomic precepts and postulates that economic actors are rational and that they behave in ways to maximize their benefit, in other words, the welfare or satisfaction that they derive from their consumption of goods and services. In this scene, the role of the government should be limited, even though it is still possible for the government to implement mechanisms that increase individual benefit and measure aggregate

social benefit. In this sense, the welfarist approach will be favorable to the implementation of economic policies oriented primarily toward increasing productivity, employment, and income growth (Esubalew, 2006). The welfare school relates the definition of poverty to the economic well-being of society. It assumes that when societies are not able to attain a level of economic well-being deemed to constitute a minimum by the standard of that society, then a person faces poverty. It sees income as a determining factor for the presence of poverty (Dorothée B., 2004; Yared, 2005). Nevertheless, this approach has been criticized in two grounds (Garza, 2001; Fitsum T., 2002; and Dorothée B., 2004).

The Basic Needs School defines poverty when one lacks basic needs (goods and services). It concentrates on the degree of fulfillment of basic human needs in terms of nutrition, food, health, shelter, education, transport, and so on. Yared (2005) tried to explain the limitation of the basic needs approach as a definition and measure of poverty. He argues that the set of basic goods and services is different for different individuals depending on age, sex, type of activity, etc. of the individual that is under consideration. One of the basic problems he cited is how to determine the set of basic needs. There is even a high disagreement among professionals on the determination of basic needs. What is emphasized in the Capability School is neither the economic well-being nor the basic needs deemed to satisfy the minimum standard by society; it is nevertheless, human abilities or capabilities to achieve a set of functioning. This is an alternative criterion for the definition and measurement of well-being which tells the extent to which people have capabilities to be and to do things of intrinsic worth.

Sen (1999) wrote that the "value of the living standard lies in the living, and not in the possessing of commodities". Such an approach to the definition and /or measurement of poverty suggests a broader set of criteria for assessing poverty than just income and/or consumption. The measure is said to include publicly provided but non-marketed services; like, sanitation, health care, education & life expectancy. Sen (1987) also introduced the notion of capabilities in poverty definition and assessments. He defined poverty not only as a matter of a low level of well-being but also as a lack of ability to chase well-being specifically because of a lack of economic means. He favored the capability to function as criteria for assessing the standard of living, and by implication poverty rather than the utility that might be derived from using that capability.

However, the difficulties of this method lie in the application of the concept of capabilities in practical poverty assessments. This school assumes that if one is devoid of the right to participate and does not perform the functioning, he/she is considered to be poor. It is said that it neither offered a practical criterion for evaluating the various capabilities to function nor sought any aggregation of social values of separate capabilities (Sallila S., and Hiilamo H., 2004). Thus, the availability of different definitions of poverty, which is, in turn, a result of the multifaceted concept, had led to the availability of different definitions of the poverty line.

Mulugeta (2019), studies the determinants of urban poverty in Debre Birhan town, with the probability of a household being poor as a dependent variable, and a set of demographic and socio-economic variables as the explanatory variables. Another study by Fisseha et, al. (2018) investigates the factors that affect the destitution level in the Kalu district of the South Wollo zone. The paper presents the basic actualities of destitution and its determinants based on information collected from 200 arbitrarily chosen family units within the Kalu area of the South Wollo zone of the Amhara region. In spite of more than three-decade broadly and globally bolstered advancement programs in farming and country advancement, maintained influx of nourishment help and emergency help operations within the think about the region, the assessed lists of the frequency, profundity, and seriousness of destitution appear the enhancements are constrained. The determinants of family destitution are connected with the family estimate, asset possession, and get expansion administrations.

Esubalew (2006) assessed determinants of urban poverty in Debre-Markos, Ethiopia based on primary household survey data of 260 households. The logistic model was employed to identify the determinants of poverty and sex, household size, and health status of the household were positively correlated with the probability of being poor while income, educational level, marital status, employment, age, housing tenure, water source, electricity connection, and telephone service were negatively correlated with the probability of being poor. According to Bogale (2011), the extent and determinants of rural household poverty in the eastern highlands of Ethiopia suggest that poverty is location specific, and depends on access to irrigated land and access to non-farm income. The result also shows that household well-being is negatively affected by household size, and positively affected by age of the household head. The probability of being in poverty is also strongly associated with involvement in governance, social and production-related networks.

Muhdin (2015) analyzes Determinants of Income Poverty in Ethiopia by considering a sample of 217 household heads from two areas of Dodola district, Oromia Regional State, using the binary logistic model and finds out that family size is positively related to poverty. On the other hand Poverty status and the number of income sources of the household, livestock, and farmland ownership are negatively related. Nega (2015) by employing the same methodology with Muhdin but in a different study area and carried out using cross-sectional household survey data of 191 sample households and examine determinants of rural poverty at Gulomekeda Wereda of Tigray National Regional State and found that family size and dependency ratio have a positive association with the poverty of the household. But farm size, total livestock owned, value of the asset, educational status of the household head, access to credit, and access to farm income have emphatic negative associations with the poverty status of households. Both Muhdin and Nega using the Binary logit model found that family size and poverty status of households have a positive relationship, and livestock, farmland ownership, and income are negatively related.

Ermias et al (2019) examine the main determinants of household poverty in the district of Dejen in the Amhara regional state using primary data collected through a questionnaire. In like manner, about 49% of the tested provincial households live underneath the destitution line with a normal destitution crevice of 0.083 and destitution seriousness hole of 0.065. Based on the probit show examination yield, family measure, sex of family units, reliance proportion, and animals' proprietorship are found to be the key determinants of rustic destitution. Poverty status is adversely related with add up to the number of animals a family claimed and the sex of family heads.

Methodology of the Study

North Wollo is one of 15 zones of the Amhara Region of northern Ethiopia. It is bordered on the south by South Wollo, on the west by South Gondar, on the north by Wag Hemra, on the northeast by Tigray Region, and on the east by Afar Region. Its highest point is Mount Abuna Yosef. Its towns include Lalibela (known for its rock-cut churches) and Woldia. North Wollo acquired its name from the former province of Wollo.

According to North Wollo zone planning commissions projection of 2012, this Zone has a total population of 1,763,245, of whom 882,537are men and 880,708 women; with an area of 12,172.50 square kilometers, North Wollo has a population density of 123.25. While 155,273 or 10.35% are

urban inhabitants, a further 2 persons are pastoralists. A total of 367,343 households were counted in this Zone, which results in an average of 4.48 persons per household.

Figure 1

Map of the study area

Source: North Wollo Planning Commission

Types, sources, and methods of data collection

Qualitative and quantitative data from primary and secondary sources are collected for analysis. Primary data will be collected directly from households to achieve the objective of the study. The major instruments for collecting the primary data are Questionnaire, interview and focus group, and key informant discussion. First, the questionnaires will be given for 397 sampled household heads. Second, interview is also used to gather information from focused groups which may have better information about the socio-economic and demographic characteristics of the population in the study area. For this purpose, in each town, three workers from the office of agriculture, Education office, safety-net coordinators, health office, and religious leaders had been purposively selected and then a total of 75 individuals (15 from each town) were included to be part of the discussion. Third, for more additional information, key informant discussion had been applied and with this regard 10 government officials (cabinets) from each town (a total of 50 persons which includes the chairman and secretary of five randomly selected kebeles from each town), had been incorporated and discussion on each aspect of poverty in the tows held.

Sample size and sampling procedure

The sampling unit of this study is households. In this study, to obtain information from households multistage sampling techniques are applied. First, the purposive sampling technique is applied to selected towns to be incorporated into the sampling frame. North Wollo administrative zone has 6 centers of city administration Namely, Woldia, Mersa, Kobo, Lalibela, Gashena, and Hara with various socio-economic features and religious differences. But the two towns, Mersa and Hara have similar socio-economic features, climatic conditions, and religious components and we omit Hara town for this case. Secondly, a systematic random sampling technique is applied to select individual households from each kebele of the town for the sake of obtaining the necessary information for the study.

From the total population appropriate sample size will be selected by applying sample size determination of the Taro Yemane formula (1967), as cited in Bartlett *et al*., (2001). That is:

$$n = \frac{N}{1+N(e)^2} \qquad = \frac{49172}{1+49172(0.05)^2} = 396.54 \approx 397$$

Where; n = desired sample size   e = margin of error (0.05)

N = total population (total number of households)

Finally, after identifying the sampling frame which contains the complete list of all households within each selected town a total of 397 sample households have been randomly selected in proportion to their total number of households.

Table 1
Household Size of Surveyed Towns

Towns	Woldia	Mersa	Lalibela	Gashena	Kobbo	Total
Total household	18395	7535	6876	6025	10341	49172
Sampled household	148	61	56	49	83	397

Source: Own Computation using Survey data (2021)

Probit Regression Model

The probit regression model is the standard normal cumulative distribution function (CDF) expressed as an integral and this model is preferred to other binary choice models by assuming the data will follow normal CDF and even Robust regression can be applied to capture the effect on non-normality in the estimation procedure.

$$G(z) = \Phi(z) = \int_{-\infty}^{z} \phi(z)dz,$$

$$\phi(z) = (2\pi)^{-1/2} e^{-z^2/2}$$

Where $= \dfrac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2}$

Then, G(z) becomes:

$$G(z) = \Phi(z) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2} dz \qquad \text{Where Z = XB+ e}$$

In this study, the probit model will be used to identify the determinants of urban household poverty in the North Wollo zone. To specify the relationship between the dependent variable and the independent variables, the study considers a household with per adult consumption expenditure "Y" and characteristics "X", where X is an mx1 vector. Denote the poverty line by "Z", and then it is defined by $Y^* = Z - Y$ and assumes that consumption is determined by the model.

$Y^* = \beta X + \varepsilon$

Where: β a 1xm is the vector of returns to characteristics and ε is the stochastic error term with zero means. With a representative sample of the population, X can be used to predict poverty. The dependent variable is the household's poverty status represented in the model as poor ($Y = 1$) if its total consumption per adult equivalent per year is less than the poverty line or non-poor ($Y=0$) if its consumption short fall is greater than or equal to zero.

Consider an econometrics model $\qquad Y^* = \beta_0 + \sum_{j=1}^{n} \beta_j X_{ij} + \varepsilon_i$

Where $Y^* =$ is not observed, it is commonly called a "latent" variable. What we observe is dummy variable Y_i defined by $\qquad Y_i = \begin{cases} 1 \text{ if } Y^* > 0 \\ 0, Otherwise \end{cases}$

$Y^*$is the probability of a person being poor $P_i = prob(Y_{i=1}) prob[\varepsilon_i > -(\beta_0 + \sum_{j=1}^{n} \beta_j X_{ij})]$

$\qquad = 1\text{-F}[-(\beta_0 + \sum_{j=1}^{n} \beta_j X_{ij})]$

Where; F is the cumulative distribution function to represent ε. If the distribution of ε is symmetric, since 1-F (-Z) = F (Z), we can write

$$P_i = F(\beta_0 + \sum_{j=1}^{n} \beta_j X_{ij})$$

$$pov = \beta0 + \beta1\text{gen} + \beta2hhs + \beta3age + \beta4mstat + \beta5drat + \beta6hous + \beta7educ + \beta8 + \beta9\text{agri} + \varepsilon i$$

Where cred = household access to credit, gen = the sex of household head, hhs=Number of Household Members, hous = house owner ship of the house hold head, age = Age of the Household Head (in year), mstat = marital status of household head, drat = dependency ratio educ = education level of the household head and agri = household participation in urban

Definition of Variables and Expected Sign

In our model, the dependent variable is binary variable that takes value 1 for poor and 0 for non-poor. The following socio-economic and demographic variables are used as an independent variable to look their effect on poverty.

Gender (gen): dummy variable which shows the gender of house hold head, it takes the value 1 for female and 0 for male. A consideration of gender in urban poverty is important because men and women experience urban poverty in different ways as a result of gendered constraints and opportunities (in terms of access to income, resources, and services). In this research, it is expected that female-headed households are more likely to be poor than male-headed households.

House Hold family size (hhs): is continues variable that shows Number of Household Members in a single household. Household composition in terms of the size of the household is often quite different for poor and non-poor households. Large household were more likely to be poor than small household because larger households probably had more young children, that encounter financial burden due to high cost of living, education, health and other social as well as societal activities and vice versa. In short, the larger the family size, more resources are required to meet the basic need of the household (Geda et al., (2005), Lekobane&Seleka (2017)). Empirical works shows that the poor tend to live in larger average family size. Accordingly, we expected that the higher the number of family size the more likely the household is poor.

Age (age): is an individual characteristic and continuous variable that shows the Age of the household Head. Analysis indicates that the poverty level reduces with the increase of age of the head of the household. The lowest incidence of poverty is found among the higher age because households probably had some assets, more experience, and relatively more earners, so less poverty in the household. The opposite can also be true if members become dependent as their age increase their consumption level is also expected to increase as age in the household increase.

Marital status: Marital status of the head: Represents the marital status of the head. Married heads and living together are (1= live together and, 0 otherwise) more likely to escape poverty than their counterparts. This is due to the fact that couples can lead their families cooperatively compared to those who are living without their partners.

House ownership: is dummy variable that refers to the ownership of the house the family lives in (1 if own house and, 0 otherwise). Housing markets can be expensive and low-income households may spend a considerable proportion of their income on rent for the house (UNCHS, 1996): It is hypothesized that households having their own houses have a lesser probability of falling to poverty.

Urban agriculture is a dummy variable in our model which shows whether the household head is engaged in urban agriculture or not. It takes the value 1 if the household head is engaged in urban agriculture and 0 if not. Since urban agriculture can be other sources of income for a livelihood the household who engages in it is less likely to be poor. Accordingly, in this study, it is expected to decrease the probability of being poor.

Education (educ.) is continuing variable which measures the highest education level attended by the household heads**.** Education is expected to affect poverty negatively because education increases the ability to better utilize resources (Isam et al., 2016). Accordingly, the likelihood of households that attend higher schooling being poor is less than the others.

The dependency ratio is the ratio of the sum of children below the age of 15 and old age of above 65 to active labor (15-64) expressed in terms of adult equivalent. The existence of a large number of children under the age of 15 and old age of 65 and above in the family could affect the poverty status of the household ((Edoumiekumo et al. (2014) and Isam et al. (2016)). Thus, in this research

we expected, a household with a relatively large number of dependent members is highly likely to be poor.

Access to Credit: is another urban poverty-determining variable measured in Birr. Theoretically, access to credit is expected to reduce poverty through investment in different productive activities and to generate better income and even consumption smoothing. Credit utilization and poverty status are negatively related (Alemayehu et *al.,* 2006). Thus, it is expected that households who have access to and make use of credit are less likely to be poor.

Results and Data Analysis

Poverty lines are country-specific and almost all countries have their own national poverty lines. Governments ultimately define what is meant by poverty in each country, to identify citizens whose income or expenditure falls below a level necessary to maintain a minimum acceptable standard of living. Accordingly, the 2015/16 HICE survey has declared the absolute poverty line of Ethiopia to Birr 7184 per year per adult person (NPC, 2017). Since this value is not recent and considering the high inflation rate from year to year, in this study, the absolute poverty line of the North Wollo zone is determined using the cost of basic needs approach as follows.

Table 1

Poverty Line of North Wollo Zone as Determined Using Cost of Basic Needs Approach

Item	Mean Kcal/KG	Average daily consumption per Adult in KG/L	Daily Kcal/adult	Daily per adult Kcal needed to get 2200 Kcal	Monthly food basket per adult	average price of items	Monthly expenditure
Teff	3551	0.101	358.303	383.743	3.027	52	157.407
wheat	3574	0.046	163.962	175.603	1.376	40	55.052
Maize	3750	0.107	399.646	428.02	3.197	40	127.887
Potato	897	0.032	28.667	30.702	0.959	20	19.175
tomato	307	0.025	7.794	8.347	0.762	20	15.232
Onion	713	0.032	23.123	24.765	0.973	20	19.459
Garlic	183	0.012	2.17	2.324	0.356	80	28.454
Lentil	1345	0.019	25.248	27.04	0.563	82	46.178
Pea	3553	0	1.227	1.314	0.01	75	0.777
Bean	3514	0.121	425.194	455.383	3.63	70	254.1
Barley	3723	0.007	26.387	28.261	0.213	65	13.821
Meat	1970	0.01	20.648	22.114	0.314	280	88.041
Milk	737	0.015	11.207	12.003	0.456	45	20.528
pepper	3601	0.019	67.797	72.611	0.565	210	118.612
Oil	8964	0.015	133.324	142.79	0.446	95	42.389
Sugar	3850	0.03	115.93	124.161	0.903	75	67.751
Egg	1634	0.149	243.907	261.224	4.478	6	26.869
					Food expenditure		**1101.731**
			2054.533	2200.404			
			1.071				

Source: Estimation Result

Under the cost of basic needs approach, the poverty line is the sum of food and non-food poverty lines. The food poverty line is the amount of money that an adult individual required to cover the consumption bundle of basic goods and services to get 2200 Kcal per day. So, the first step in our construction of the food poverty line is calculating the number of commodities (in Kilogram, litter or unit) that adult individual is consuming for each commodity under consideration per day. Then by multiplying this average daily consumption by the calories of each item contained per KG, we derive the daily Kilo calories individual are obtaining from the consumption of the commodities. Finally, after checking the daily Kcal reaches the minimum requirement (2200 kcal), by converting the daily consumption to the equivalent Monthly basket of consumption and multiplying with the respective price, the monthly food poverty line is determined to be 1101.7 Ethiopian Birr.

Unlike the food poverty line formulation, there are no generally acceptable and satisfactory methods to define non-food expenditures since basic non-food component varies from country to country depending on their level of development (FAO, 2005). Two alternatives are there to derive this non-food poverty line. First, the non-food poverty line can be derived by scaling up the food poverty line if there is no enough information about the non-food expenditure of respondents. This means the non-food poverty line can be taken as one-third or two-thirds of the food poverty line depending on the living standard of the samples under consideration. The second alternative is the least cost method which is related to directly calculating the non-food poverty line by calculating the average expenses made on basic non-food items like shelter, cloth, education, health, utilities such as water, electricity, and social obligation fees like Edir which are the basic necessity for life. Under this study, we used the second approach and the monthly non-food poverty line is estimated to be 1175.7 Birr.

It is known that the cost of basic needs approach differs from FEI method by incorporating nob food expenditure to construct a poverty line and then the poverty line is the sum of the food poverty line and the non-food poverty line. Based on this information, the total poverty line of the study area is given to be 2277.4 Birr.

Using the CBN approach, the poverty line of North Wollo zone is determined to be two thousand two hundred seventy-seven birr and individuals with less than this monthly expenditure is living under the absolute poverty line and vice versa. This figure is approximately equivalent to the international absolute poverty line of 1.9 US dollars per day as determined by World Bank.

The poverty line of this study area is determined to be 2277.4 Ethiopian birrs. This amount of money is required by adult individuals of the North Wollo administrative zone to cover their monthly expenditure on food and non-food basic necessities and converting it to daily expenditure gives us 75.9 birrs. By considering the exchange rate of the Ethiopian birr in terms of U.S dollar in January 2021which is the time of data collection (1Dollar = 39 Birr), the daily poverty line of the study area is given to be 1.94 and this figure is more or less equivalent with the internationally determined poverty line of the time.

Characteristics of the Sampled Households in Relation to Poverty

Gender is one of the important demographic characteristics, as many scholars argued and empirical work exposed, that determines the poverty status of the household. Looking the households' sex composition in our research, 122 (30.73 percent) is female-headed and the rest 275(69.27% percent) represents male-headed households. Accordingly, 27 (31.1% of the total household living in poverty) female-headed households and 50 (18.2% of the total household living in poverty) male-headed households are living in poverty indicating that their monthly adult equivalent expenditure is less than birr 2278. Therefore, comparing the incidence of poverty, there is a statistically significant difference between them at 5 percent level of significance. The poverty headcount ratio is higher (22.13 percent) in female heads than in male heads (18.2 percent).

Table 2

Gender and Poverty

Gender of Household heads	Total		Poor		Non-poor	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Female	122	30.73%	27	31.1%	50	18.2%
Male	275	69.27%	50	64.9%	225	81.8%
Total	397	100%	77	100%	275	100%
	Pearson Chi-Square (3) = 7.917 Pr. = .005					

Source: own computation using survey data (2021)

Urban Agriculture and Poverty

In urban areas households engage in different activities to broad their source of income. Urban agriculture is one of those activities households in the study area engaged with. Hence, to look its effect on poverty status in this study, we have two categories of households those who engaged in urban agriculture and not. In this study, from the total sample household, 36.5% (145) are engaged in urban agriculture whereas 63.5% (252) are households that are not engaged in urban agriculture. Only 15 households engaged in urban agriculture, which accounts 19.5% of the total poor households, are poor while the other 62 are non-poor. There is a significant difference, at 5% percent significance level, in the status of poverty among households that participate in urban agriculture and not.

Table 3

Poverty and Urban Agriculture

Household heads participation in urban agriculture	Total		Poor		Non-poor	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Engaged	145	36.52%	15	19.5%	130	40.6%
Not Engaged	252	63.48%	62	80.5%	190	59.4%
Total	397	100	77	100%	320	100%
Pearson Chi-Square= 4.086 Pr. = 0.043						

Source: own computation using survey

Different type of urban agriculture is experienced in the study area. From the total 145 households that engaged in urban agriculture in the study area, 47.22 % engaged in urban diary production, 45.83 % engaged in crop farming, 5.56% engaged in the production of fruit and vegetable, and 1.39% engaged in beef farming.

Credit access and poverty

Theoretically, access to credit is expected to reduce poverty since it helps households to engage in different productive activities, to generate better income and smooth consumption. Thus, it is expected that households who have access to and make use of credit are less likely to be poor. Therefore, to explain how poverty in urban North Wollo is determined on the basis of credit access of the head, the access to credit is divided into two categories. When we look at the composition of the household head's access to credit, 188 (47.36 percent) accessed credit and the rest 209(52.64 percent) household heads had not accessed to credit in the study period. Out of this, 20 households that accessed credit constitute 25.97% of the total poor, and 57 households that hadn't accessed credit, constitute 74.03% of the totally poor and are living in poverty.

Table 4

Credit Access and Poverty

| Household heads credit access	Total		Poor		Non-poor	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	188	47.36%	20	25.97%	168	52.5%
No	209	52.64%	57	74,03%	152	47.5%
Total	397	100	77	100%	320	100%
Pearson Chi-Square= .995 Pr. = 0.318						

Source: own computation using survey data (2021)

Therefore, comparing the incidence of poverty between households that accessed credit and not, there is a statistically insignificant difference between them at 5 percent level of significance. The other important thing to discuss is the source of credit for the household. In the study area, out of the total household who accessed credit 41 percent borrowed from savings and credit associations, 29 percent from banks, 16 percent from local money lenders, 9 percent from friends and family, and the remaining 5% borrowed from other unspecified sources.

Figure 2

Proportions of Sources to Credit
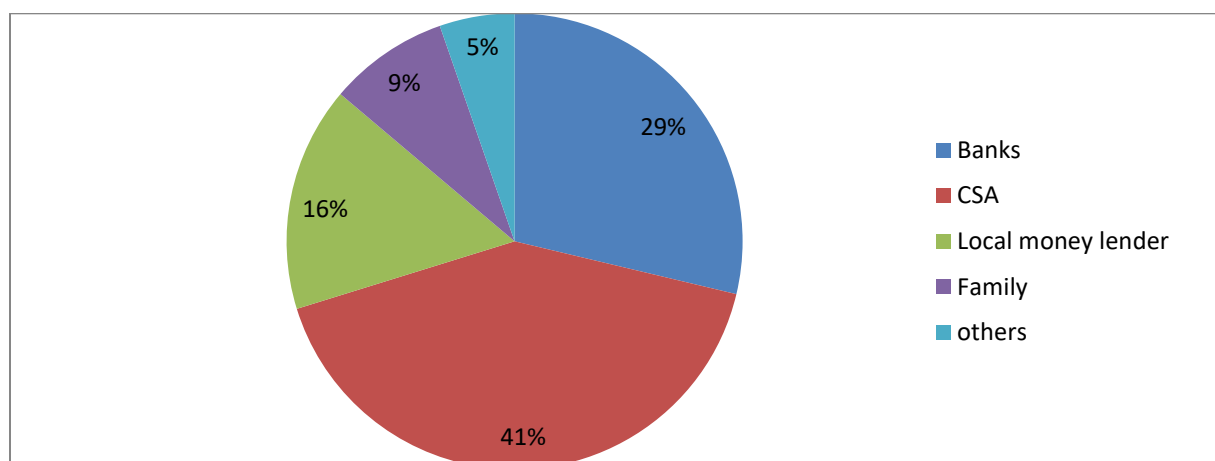
Source: Own Estimation

Household's poverty and coping strategies

Households living under the poverty line are expected to receive monthly income less than the average expenditure required to fulfill basic necessities. And hence copying strategy which enables to het money that enables households to cover their basic food and non-food item must be identified in this section.

Table 5

Households Poverty Status

Poverty status	Frequency	Percent	Cumulative
Poor	77	19.40	19.40
Non-poor	320	80.60	100.00
Total	397	100.00	

Source: Own estimation

As seen in the above table, 19.4% of the households are living under the poverty line and in need of extra source of money since their income can cover expenditure on basic necessities.

Figure 3

Proportions of Households Coping Strategy
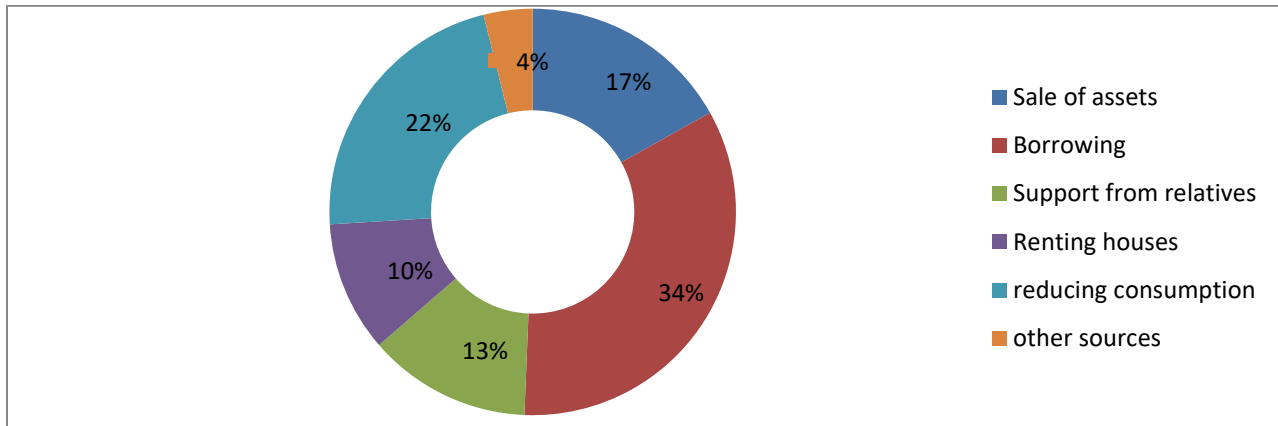
Source: Own Estimation

Out of a total of households living under the poverty line, the majority of the poor's 34%, 17%, 13%, and 10% are getting money from borrowing, sales of assets, and support from relatives and renting houses respectively for the sake of fulfilling their basic needs. In addition to 22% of the poor are reducing their consumption to make a balance between their income and expenditure and the remaining 4% are obtaining financial support from other unspecified sources.

The Depth, Incidence, and Severity of Poverty

One of the main targets of this study is determining the depth, incidence, and severity of poverty in urban towns of the North Wollo Zone. In line with this, the F-G-T approach is applied and the headcount ratio, average normalized poverty gap, and squared average normalized poverty gaps are estimated using the data collected from 397 sampled households in the study area. The poverty headcount index, which measures the proportion of the sample population below the poverty line in the study area, is estimated to be 19.39%. This value lies between the urban and national poverty lines of Ethiopia since it is the greater than national urban poverty headcount index of 14.8% but less than the national poverty level of 25.1%. The second estimated poverty index, the poverty gap index, provides information regarding how far households are from the poverty line. Thus, for the study, the poverty gap index is also estimated to be 9.17%. It indicates 9.176% of consumption expenditure is needed to bring all the poor in the study area to the level of the poverty line. Compared to the national and urban figures of Ethiopia, this value is higher than the national poverty gap and national urban poverty gap index values which are 6.7% and 3.6% respectively.

Table 6

The Depth, Severity, and Incidence of Poverty Rom F–G-T Indices

Poverty Indices	Index values
Poverty Headcount index ($\alpha = 0$)	0.19395466
Poverty Gap/depth index ($\alpha = 1$)	0.09172949
Poverty severity/squared poverty gap/index ($\alpha = 2$)	0.059601332

Source: own computation by using survey data (2021)

Finally, the study area poverty severity index is found to be 5.96 % and the inequality among the poor in the study area is higher than the total national level and the national urban areas level since their value is 2.8 % and 3.1% respectively.

Econometric Analysis

Under this study regression analysis is applied to identify the determinants of poverty in Urban areas of North Wollo zone administration. By considering the discrete nature of poverty (had only two outcomes of poor and noon-poor) probit model is applied to show the effect of significance variables on a household's poverty status.

From the estimation result, the likelihood ratio test is better to be used as a god ness of fit measure, and with the probability $>$ chi^2 is given to be 0.000 indicating that the joint- effect of the explanatory variable specified in the model is significant (rejecting H0: all coefficients are zero) to mean that there is at least significance coefficient.

Additionally, the post-estimation test of the Cook-Weisberg test for heteroskedasticity, Shapiro-Wilk test for normality, and Multicollinearity with VIF is applied to be sure that the estimation and inferences we made are meaning full. The Haussmann model specification test is applied to check whether there is a model specification error or not since the Ramsey test can't be applied here because of the nonlinearity of the model.

Table 7

Estimation Result of The Probit Model

Expend.	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]	
House	.3609582	.1756306	2.06	0.040	.0167286	.7051879
Gender	.0088454	.1710001	0.05	0.959	-.3263085	.3439994
Age	-.012426	.0069623	-1.78	0.074	-.0260721	.0012194
Family S	.0869278	.0434155	2.00	0.045	.0018351	.1720206
DR	.0039154	.0011002	3.56	0.000	.0017591	.0060716
Education	.0292615	.0142315	2.06	0.040	.0013684	.0571546
Credit	.5266609	.1782188	2.96	0.003	.1773583	.8759634
UrbanAgi	.4833034	.1749746	2.76	0.006	.1403595	.8262472
Sector	.108107	.1850043	0.58	0.559	-.2544947	.4707088
Premises	.528026	.2202048	2.40	0.016	.0964332	.9596201
Cons	-.182435	.3639018	-0.50	0.616	-.8956699	.5307989

Wald chi2(10) = 58.61	Prob > chi^2 = 0.0000
Log pseudolikelihood = -162.39851	Pseudo R^2 = 0.1684

Source: Own Estimation

The coefficient of determination shows a result of 16% but it does not mean that this probit model result is bad to fit rather the R^2 values is pseudo(false) and can't show the exact change of poverty determined within the model. The model can be termed as good to fit because of having more significance variables (7 out of 10) in addition to the overall significant test applied above.

Under this model, the majority of variables are tested to be statistically significance with Z value greater than two in absolute terms. Starting from binary explanatory variables, access to credit, house ownership, access to premises, and participation in urban agriculture have citrus paribus significant impact on poverty status. We know that the magnitude of the probit coefficient can't be interpreted and only the sign either to be in the opposite or negative direction is used in the result of this model. Accordingly, being the owner of the house and premises, having access to credit, and being a participant in urban agriculture are positively related to the probability of being non-poor.

Among continuous regressors, years of schooling, dependency ratio, and family size have a positive relation with the probability of being non-poor. It is obvious level of education has the power to reduce poverty and individuals educated more are in the non-poor category. This result agrees with the findings of studies conducted by Dagim (2019), Bigsten *et al*. (2003), and Debeli (2019). In this study, increasing family size is also associated with increasing the probability of being non-poor supports the boozers-ups theory which considers population as an asset since every individual had specific skills and ability to create new technologies. This result also confirms the recent empirical findings of research done by Geda et al., (2005,), Fisseha (2011) and Mohammed (2017). The surprising result to be opposite of most empirical findings and theoretically developed models is related to dependency ratio, in this study dependency ratio is positively related to the probability of being non-poor and this may be arisen because of the committed nature of household heads when they have more dependent family members. This finding agrees with the result of studies made by Dagim (2019) Bogale (2011), and Esubalew (2006). The above estimation result of logit estimation with parametric coefficients can't tell the magnitude of change in probability of success due to a unit change in explanatory variables. Because of this, the marginal effect of the model is specified in the table below.

Table 8

Marginal Effect of The Probit Model

Variable	dy/dx	Std. Err.	Z	P>Z	[95% Conf. Interval]	
House*	.0838302	.04005	2.09	0.036	.005341	.162319
Gen*	.0020463	.03963	0.05	0.959	-.075629	.079721
Age	-.0028697	.00162	-1.78	0.076	-.006038	.000298
Fs	.0200748	.00992	2.02	0.043	.000623	.039527
Dr	.0009042	.00026	3.53	0.000	.000402	.001406
Edu	.0067575	.00323	2.09	0.036	.000431	.013084
Credit*	.1201777	.03956	3.04	0.002	.042643	.197712
Sector*	.0243038	.04057	0.60	0.549	-.055208	.103816
Premises*	.1044231	.0364	2.87	0.004	.033083	.175763
UrbanAgri*	.1045481	.03625	2.88	0.004	.033499	.175598

(*) dy/dx is for discrete change of dummy variable from 0 to 1

All variables which have significant coefficients also have statistically significant marginal effect values. Now we can make analysis of the quantitative change of probability of being non-poor due to a unit change in continuous explanatory variables and shift of discrete variable from one to another category.

Starting from discrete explanatory variables, the coefficients attached to them are measures of the difference in probability of being non-poor between the two categories. The households with the status of being a house owner is more-likely non-poor and their probability of being non-poor is higher than that of households with no access to houses by 8.4%. The other significant variable under this analysis is access to credit and households which obtained credit access are more-likely non-poor and hence had a probability of 12% more than those households without credit access in reference to being in the non-poor category of household's status. Similarly, to the above categorical, households which has premises (which are working place starting from small containers to large buildings), are more likely non-poor when compared to the base category with a higher probability difference in the intercept of 10.4%. In addition to the above variables, being a participant in activities of urban agriculture contributes a lot to a household's poverty status. The probability of being non-poor between the two categories of being a participant in urban agriculture and the base group differs by 10.5% and participants are more likely non-poor.

Finally, among continuous variables, the level of education, family size, and dependency ratio are statistically significance variables and there is straight forward interpretation of those marginal effects since the marginal effect of quantitative variables are indicators of change in the probability of success due to a unit change in regressors. With this regard, a one-unit increment in family size, dependency ratio and years of education are associated with rise in the probability of being non-poor by 2.00%, 0.090%, and 0.67% respectively.

This is tip to make clear the econometric analysis, specifically on the interpretation of coefficients and the marginal effects. Under this analysis, when we interpret the coefficients and /or marginal effects of a single independent variable, it is by considering the citrus paribus effect on the regressors of the household's poverty status. This means, when we interpret a parametric coefficient attached to one of the explanatory variables, it is by assuming the effect of other variables is held constant.

Conclusion and Recommendations

This study is conducted to analyze the urban poverty of the North Wollo zone administrative zone in the Amhara regional state in Ethiopia. Using primary data collected from randomly selected urban households in this zone, we start our study to address three specific objectives determining the poverty line of the area, measuring the depth, severity, and incidence of poverty, and identifying the determinants of urban household poverty. To answer the first objective, we apply the cost of basic needs approach and the poverty line of the study area is determined to be 2278 Birr, individuals required this amount of money per month to cover their basic food and non-food items.

Secondly, we tried to analyze the depth severity and incidence of poverty in the North Wollo zone. To address this objective, the F-G-T indices are applied and the poverty headcount index, which measures the proportion of the sample population below the poverty line in the study area, is estimated to be 19.39%. The second estimated poverty index, the poverty gap index, provides information regarding how far households are from the poverty line. Thus, for the study, the poverty gap index is also estimated to be 9.17%., it indicates 9.176% of consumption expenditure is needed to bring all the poor in the study area to the level of the poverty line. Lastly, the poverty severity index is estimated. This index measures, the inequality among the poor by placing a higher weight on those households further away from the poverty line. Accordingly, the study area poverty severity index is found to be 5.96 %. Likewise, the inequality among the poor in the study area is higher than the total national level and the national urban areas level since their value is 2.8 % and 3.1% respectively

Thirdly, to identify the determinants of urban household poverty in the North Wollo Zone, Econometric analysis specifically the probit model is applied. The coefficients and marginal effect of the discrete probit regression model help us to identify significant variables that can affect the household's status of being poor. The estimation result of this model shows that house ownership, having access to credit, being a participant in urban agriculture, and have premises is associated with a high probability of being non-poor. Among continuous variables, years of education, family size, and dependency ratio positively contribute positively to poverty alleviation.

Based on the estimation result of the probit model, the researchers draw the following recommendations. The zonal administration must give emphasis for households with no houses through the construction of condominiums and distribution to the poorest household to reduce the poverty head counts of the North Wollo zone. Households of the North Wollo zone are advised to involve more in urban agriculture since it contributes a lot in poverty reduction and the banks and credit unions, especially the Amhara Credit and saving association must play a significant role by providing credits for individuals who want to engage in urban agriculture.

As we can see from the estimation result, education is the power to alleviate poverty in society. So not only the government but also all the concerned bodies will participate in investments in any education sector to motivate individuals to join the school in mass in the opposite to migrating to Arab countries and again households must advise their children's not to drop up from school. Premises (working place to be either building or container) is also important in the poverty reduction process and then the officials of the zone will continue in their work of providing working places for youths as maximum as possible.

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