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BAHIR DAR UNIVERSITY

COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

PROGRAMME: RURAL DEVELOPMENT MANAGEMENT

ANALYSIS OF RURAL HOUSEHOLD POVERTY IN WEST BELESA, ETHIOPIA

MSc. THESIS

BEYADEGIE WUBIE WORKU

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BAHIR DAR UNIVERSITY

COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

ANALYSIS OF RURAL HOUSEHOLD POVERTY IN WEST BELESA, ETHIOPIA

A Thesis Submitted to the Department of Rural Development and Agricultural Extension, School of Graduate Studies, Bahir Dar University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science in Rural Development Management

By

Beyadegie Wubie Worku

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November, 2019

Bahir Dar, Ethiopia

THESIS APPROVAL SHEET

As members of the examining board of M.Sc. thesis open defense examination, we certify that we have read and evaluated the thesis prepared by Beyadegie Wubie and examined the candidate. We recommended that the thesis be accepted as fulfilling the thesis requirement for the degree of Master of Science in rural development management.

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Final approval and acceptance of the thesis are contingent upon the submission of the final copy of the thesis to the council of graduate studies (CGS) through the departmental or school graduate committee (DGC or SGC) of the candidate.

DECLARATION

This is to certify that this thesis entitled **"Analysis of Rural Household Poverty in West Belesa, Ethiopia"** submitted in partial fulfillment of the requirements for the award of the degree of Master of Science in "**Rural Development Management**" to the Graduate Program of College of Agriculture and Environmental Sciences, Bahir Dar University by **Mr. Beyadegie Wubie Worku** (ID. No. 1017834) is an authentic work carried out by him under our guidance. The matter embodied in this project work has not been submitted earlier for the award of any degree or diploma to the best of our knowledge and belief.

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STATEMENT OF THE AUTHOR

First I declare that this thesis is my original work and all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of M.Sc. degree of Rural Development Management at Bahir Dar University and this deposited at the University Library to be made available to readers under the rule of the Library. I declare that this thesis is not submitted to any other institution for the award of any academic degree.

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Name: Beyadegie Wubie

Place: Bahir Dar University

Date of submission

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BIOGRAPHY

Beyadegie, the author was born in January 1985 in Amhara Regional state South Gondar administration Zone, Fogera woreda a small town called Alember from his father *Ato* Wubie worku and his mother *W/ro* Asegejiw Wubie. When his age reached to schooling he attained his elementary school (1-8 grades) at Alember elementary school and he also attained grade 9 at Woreta secondary school. Grade 10 and preparatory school was attained at Debretabor Tewodros II secondary school. He joined Haramaya University College of agriculture in 2004 and received a Bachelor of Science Degree in Rural Development and Agricultural Extension in 2006.

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DEDICATION

Dedicated to the economically poor but resource rich rural community of west Belesa

ABBREVIATIONS AND ACRONYMS

AE	Adult Equivalent
ETB	Ethiopian Birr
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
Fig.	Figure
GARC	Gondar Agricultural Research Center
GDP	Gross Domestic Product
HH	House Hold
Kcal	Kilo calorie
MDG	Millennium Development Goal
MOFED	Ministry of Finance and Economic Development
PCA	Principal Component Analysis
PPP	Purchasing Power Parity
PRA	Participatory Rural Appraisal
Sig.	Significant
SPSS	Statistical Package for Social Science
TLU	Tropical Livestock Unit
UNDP	United Nation Development Program
USD	United States Dollar
VIF	Variance Inflation Factor

ABSTRACT

Appropriate poverty measurement and identification of consumption-based rural poverty determinants are the key steps to formulate appropriate poverty reduction strategies. Several poverty measures were done by different methods at different locations. To overcome consumption-based poverty problem area specific research data is pertinent. So this research was conducted at west Belesa woreda, Central Gondar zone of Ethiopia in 2019. The objective of this research is to analyze the extent of rural poverty and identify the determinants of consumption-based rural poverty at the household level. To collect the data, 194 households were selected at 4 representative kebeles by simple random sampling technique. The Primary data were collected from the respondent by schedule interview and focus group discussion. The secondary data were collected from reports, journals, proceedings, and books. The collected data were analyzed using descriptive statistics (percentage, mean, minimum and maximum) and inferential statistics such as t-test, chi-square test, binary logit, Principal Component Analysis (PCA) and poverty indices. To measure the extent of rural poverty, asset-based and consumption-based poverty measurement approaches were applied. The calculated asset poverty line generated by Principal Component Analysis method was 0.75 while the food and non-food consumption poverty line calculated by the cost of basic need approach were 2949.40 birr per AE per year and 1485.78 birr per year per AE respectively. The rural poverty indices were calculated on the consumption-based poverty line. Headcount index, Poverty gap, and severity of poverty were 38.1 percent 8.84 percent and 3.1 percent respectively with the inequality Gini coefficient of 0.26. A binary logit analysis result shows that family size had a significant and positive relationship on consumption-based rural poverty but landholding size, tropical livestock unit, amount of off-farm income and distance of agricultural office had a significant and negative relationship on consumption-based rural poverty. Consumption-based poverty is deep and complex in the study area. 38.1 percent of the rural people live in consumption-based poverty. To reduce asset-based and consumption-based rural poverty in the woreda, multidimensional poverty reduction strategy should be launch. Awareness creation and income generation activities should expand at the community as well as the household level.

Keywords: Asset, Consumption, Expenditure, Logit, Rural poverty, Ethiopia

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1. INTRODUCTION

1.1 Background and Justification

Poverty is a multidimensional problem that deprived man-kind throughout the world (World Bank, 2016; Ravallion, 2016; Sabina *et al*., 2017). Asset-based and consumption-based rural HH poverty is the main challenging problems in the least developing country (Arndt, *et al*., 2016:3). Absolute poverty and relative poverty are the most common ways of explaining poverty in the economic side of society (Gale, 2006:1). Absolute poverty means that a person's basic subsistence needs (for food, clothing, and shelter) are not being met while relative poverty, on the other hand, typically means that a person's needs are not being met in comparison to the rest of his or her society (Gale, 2006: 1; Ravallion 2016:201).

In the world 1.3 billion people live in under poverty among this 1.1 billion poor people live in rural areas. More than 342 million (56 percent) poor people live in Sub-Saharan Africa (OPHI, 2018:14). The estimation of poverty in sub-Saharan Africa in 2017 by 1.9 dollar per day estimation headcount index, poverty gap, and poverty severity were 41 percent, 16 percent and 8.4 percent respectively (Ferreira, 2017:4).

Ethiopia is the second populous country in Africa after Nigeria which has 104344901 people lives in the country with a population growth rate of 2.46 percent a year. Among the population, 79.47percent and 20.3 percent of the people live in rural and urban areas respectively (Aynalem, 2017:5). The economy of Ethiopia depends on agriculture. Agricultural production accounts for 38.8 percent of GDP; 73 percent of the labor force engaged in agriculture and 70 percent of suppliers of raw material come from the same sector (Zerihun *et al*., 2016:3). However, 25.6 percent of rural communities still remain under poverty (UNDP 2016:21).

Ethiopia had the highest poverty rates in the world, with 56 percent of the population living below US$1.25 PPP a day and 44 percent of its population live in below the national poverty

line which is US$1.45 a day and also 20.4 million people have got less than 1.9 dollars per day (Max and Esteban, 2019).

According to Ethiopia MDG, (2014: 5) report, the government spent over 73 percent of the budget on the poverty reduction programs. The number of people living below the poverty line (measured by poverty incidence), the distance from the poverty line (measured by poverty gap) and the level of inequality among the poor (measured by poverty severity) have declined by 34.9 percent, 39.5 percent, and 39.2 percent respectively but increased the consumption-based poverty incidence in Amhara region by 14 percent (MOFED 2013: 36). The hunger index weighted equally on three indicators consisting of malnourishment, children's underweight and child mortality, declined from 43.2 percent in 1990 to 28.7 percent in 2010/11. The Ethiopia per capita income increased to 794 USD from 725 USD a year ago and poverty is estimated to have dropped to 22 percent (National Bank of Ethiopia, 2015/16: 6). Even though many poverty reductions observed, the deep-rooted poverty is not well addressed in Ethiopia so 49 percent of the people can't achieve their daily minimum consumption level and the people lead uncomfortable ways of life (Dawit, 2015: 34). According to the NPC (2015/16) report, 25.6 percent of the rural people in Amhara region were living under poverty. This study, therefore, focused on measuring poverty status and determinants of consumption-based rural household poverty in West Belesa woreda, Centeral Gondar Zone of Amhara National Regional State.

1.2 Statement of the Problem

Poverty is a serious problem in the world. 805 million people in the world haven't enough food to eat and 22000 children die each day due to food poverty. In Sub-Saharan Africa, 60.1percent of the population are affected by poverty and got $1.90/day (World Bank, 2016: 5; Sabina*et al*., 2017: 5). And also 38 percent of the rural HH in Ethiopia was under consumption-based poverty (NPC, 2015/16). By any standard, the majority of people in Ethiopia are among the poorest in the World.

In order to combat such debilitating poverty in view of very scarce resources available to be allocated for the purpose, the poor must be properly identified. To indicate the extent and

severity of poverty suffered by the poor in a particular area, Poverty indices should be constructed (Ayalneh, *et al*., 2005). So Empirical data required to design and implement appropriate poverty reduction interventions in the specific area.

By multidimensional nature of poverty; extent, severity, and factor of rural poverty are different from location to location. In spite of this West Belesa community lead a penury ways of life that is why this research was conducted at that particular area to identify the extent and how much severs the poverty at the household level.

Area-specific poverty measurement is a pertinent activity that used as the first step of alleviating poverty. The few available poverty-related studies were conducted at national, regional and zonal levels, whereas a meaningful formulation and implementation of poverty alleviation strategies require area-specific research. There are also several reasons to undertake asset-based and consumption-based rural poverty analysis. These include the provision of feed-back to the scientists and the system including policymakers, for accountability purposes including establishing the credibility of the public sector research and development, as justification for increased allocation of resources, learning from and adjusting to new strategies to alleviate deep-rooted rural poverty. This calls for a better understanding of the constraints and opportunities for strategic mitigation of rural poverty at the grass-root level.

1.3 Objectives

1.3.1 General objective

The main objective of this study was to analyze rural household poverty and its determinants in West Belesa Woreda Ethiopia.

1.3.2 Specific objectives

The specific objectives of this research are:

To assess asset-based rural household poverty in West Belesa

To assess consumption-based rural household poverty extent and status in West Belesa

To identify determinants of consumption-based rural household poverty in West Belesa

1.4 Research Questions

This research attempted to address the following research questions:

1 What was the status of asset-based rural household poverty in the study area

2 What was the status and extent of consumption-based rural household poverty in the study area?

3 What are the major determinants of consumption-based rural poverty in the study area?

1.5 Significance of the Study

The study focused on measuring the determinants and extent of rural household consumption-based poverty at the rural household level. Scholars and policy advisors will use the document to design appropriate area-specific poverty-reduction strategies as well as adding some scientific knowledge about poverty analysis. In addition, it helps to formulate a poverty-focused project to the benefit of the people to lift out of the deep-rooted rural poverty.

1.6 Scope and Limitation of the Study

Because of the multidimensional nature of poverty, measuring by single approach is very difficult. The study focused on measuring the status and extent of poverty and analyzes the determinants of rural household poverty through consumption-based and asset-based measurement approaches through the cost of basic need approach. The research is focused only asset-based and consumption-based poverty in the rural household. So this research didn't address all issues that are related to rural household poverty. And also the finding may not generalize the whole community lives in rural Ethiopia rather it describes the rural community of west Belesa woreda.

2. REVIEW OF RELATED LITERATURE

2.1 Definition and concept of Poverty

Poverty is not an easy concept to define and explained which had multidimensional definitions and concepts that influenced by different disciplinary approaches. Poverty can impose a cognitive burden on individuals that makes it especially difficult for them to think deliberatively (Kabuya, 2015:79; Rohwerder 2016:3).

"Poverty is the chronic and multidimensional social, economic, political, institutional and environmental problems that challenge most developing countries in the world" (Abu, 2013:19). It is deprivation of wellbeing that the person doesn't have enough income and consumption under the minimum requirements and lack capabilities, socioeconomic and political freedoms in the society. It is also the lack of necessities which is basic food, shelter, medical care, and safety are generally thought necessary based on shared values of human dignity (World Bank, 2005; Bradshaw, 2009; MOFED, 2013; Samuel *et al*., 2013; Muhdin, 2015).

"Poverty is the oldest and the most resistant virus that brings about a devastating disease in the third world called under development. Its rate of killing cannot be compared to any disease from the genesis of mankind. It is worse than malaria and HIV/AIDS which are claimed to be the highest killer diseases" (Kabuya, 2015:5).

2.2 Type of Poverty

Absolute poverty: is subsistence poverty when a person is short of basic foodstuff, shelter, and clothing and adequate or sufficient health care. What poverty under relative terms is what a person lacks in relation to others (Klugman, 2002). It represents a specific minimum level of income needed to satisfy the basic physical needs of food, clothing, and shelter in order to ensure continued survival in life. Those with incomes and consumption expenditures below the poverty line are considered as poor. It differs from country, nature, and context(Gale, 2006).

Relative poverty: is often defined based on comparison of particular aspects of life such as household expenditure, family budget, and household livelihood with respect to acceptable living standard and style of livelihood. It concerns the wellbeing of societies with respect to others in the same societal groups, ethnic groups, and religions (Arndt *et al*., 2016). Relative measures are usually preferred to absolute for it examines deprivation subject to household s' social and economic context (Jesuit *et al*., 2002).

Transient poverty: is defined as the contribution of consumption variability to expected poverty over time which is associated with a fluctuation of income around the poverty line (Ravallion 1998:15).

Chronic poverty: is absolute poverty that is experienced for an extended period of time for many years, or even over the life course. A person living in absolute poverty is not able to satisfy his or her minimum requirements for food, clothing or shelter Such poverty may be passed from one generation to another, and this is of particular interest given the known possibilities of interrupting such transmission which is devastating and hard to reverse (Ravallion, 1998; Jean *et al*., 2007; Tony *et al*., 2009).

Shepherd (2007) identified 3 interrelated forms of chronic poverty which is long term poverty, life-course poverty, and intergenerational poverty.

Long term poverty: poverty that is experienced by an individual or household for so many years which is difficult to escape from poverty if the situations are not changed.

Life-course poverty: poverty is experienced over the entire length of a person's life he/she cannot meet their minimum consumption level throughout their life.

Intergenerational poverty: is transmitted from parents (or other older careers) to children via the conditions of childhood, youth, and inheritance. These happen when the parent transmitted the poor working habit and experienced poverty throughout their life.

2.3 Theory of Poverty

There are two major theories or schools of thought that focus on the causes of poverty which is individualistic theories and structural theories. The individualistic perspective generally considers poverty as a condition resulting from the shortcomings of impoverished individuals while the structural perspective focuses on the roots of impoverished conditions from the deficiencies in social structures, infrastructures, and systems (Amanda J. *et al*., 2007; Barbara S., 2009; Davis *et al*., 2015).

"*Poverty drew on liberal theory and three basic liberal conceptions of poverty: poverty as a matter of morality, poverty as a matter of justice, and poverty as a matter of utility*" (Barbara, 2009:13).

2.3.1 Individualistic theories of poverty

There are groups of theories arguing that poverty results from the deficiencies of individuals or the shortcomings of poor people themselves. Economic and political distortions reduce individuals' opportunities to increase incomes, assets, and wellbeing that led to poverty. These theories are collectively called the individualistic theories of poverty that poverty should be attributed to bad moral character. These theories of poverty focus on the biogenic theory of poverty and inequality, the human capital theory, and the cultural theory of poverty (Davis & John, 2003; Barbara, 2009).

The biogenic theory of poverty and inequality believes that the primary force that creates and divides modern social classes is not family background but inherited cognitive ability. Hence, the upper class and the lower class represent a distinction between the class of intelligent people and the class of those who lack relevant intelligence levels. Thus, the biogenetic theory of poverty and inequality argues that native intelligence, rather than social status, influences the life prospect of an individual. Nature essentially determines the socioeconomic status of an individual. People with a high level of intelligence are destined to become rich while those with a lower level of intelligence are naturally fated to become poor (Mihaela *et al*., 2016).

The classical theorist like Adam Smith believed that the free market is essential for development that can lead to improving the wealth of nations (Smith, 1976). The driving forces of different income flow due to the different actor's involvement in the market. So poverty is the consequence of individual choice. If the person lacks competition for the resources the people become poor and also believe that the poor people are poor because of their decision this ideology is not always true because many inside and outside factors can affect the personal commitment of doing any work to tackle their poverty (Ravallion, 2016:1).

"Poverty is attributed to the preferences of poor people—that they are lazy or imprudent or unwilling to take risks—or to past mistakes they have made" (Ravallion, 2016:4).

2.3.2 Structural theories of poverty

The structural theory of poverty is one of the theories of the causes of poverty. It presents the concept of structural poverty. The theory argues that macro-level factors such as demographic vulnerabilities, labor market opportunities, and resource distribution and geographical disparities can determine the susceptibility of individuals and communities to poverty. Structural functionalism is a framework in sociology used for developing theories based on the notion that society is a complex system composed of different parts that collectively work together to promote solidarity and stability. Proximity to the natural resource and infrastructures are important factors of wellbeing. This idea is not always true because many African countries had ample natural resources and coastal areas but the people lead the worst ways of life like Democratic Congo (Deaton, 2015).

2.3.3 Human capital theory

Human capital is the collection of competencies or skills and knowledge, as well as traits or personal attributes, behaviors, and habits embodied within an individual and needed to perform labor and produce economic value. When considered as a theory for explaining the causes of poverty, human capital provides a model for illustrating the relationship between the decision of an individual to invest in education or training and the pattern of his or her lifetime earnings. The different levels of investment in human capital can also determine different levels of earnings. The concept can also illustrate the relationship between age and earnings. Younger individuals are more likely to become poor because they have not yet accumulated enough human capital. However, older adults are also likely to become poor either because they are too late to acquire human capital or are not equipped with a time-relevant set of competencies (World Bank, 2017, UNDP, 2018).

2.3.4 Cultural theory

The cultural theory of poverty blames the prevalence of socioeconomic inequality not on the social structures or systems but on the deficiencies of impoverished individuals. If the biogenic theory specifically argues that poor people lack intelligence or cognitive ability, the cultural theory claims that they lack the motivation to achieve because of their negative values (Gajdosikienë, 2004).

This theory explains the values of an individual experiencing poverty play a critical role in perpetuating his or her impoverished condition. This assertion tries to explain why people in certain communities remain poor remains despite the existence of poverty alleviation programs. On this theory, poverty is generated from culture through spreading skill of generations, values, and beliefs that are socially created. The poverty transferred to the next generation through culture (Jordan, 2004).

The cultural theory of poverty does not only affect a particular individual but also the generations preceding and succeeding him or her. Poverty is essentially a result of negative

and counterproductive cultural values passed down through generations according to this theory (Davis and Sanchez, 2015).

Based on the above discussed poverty theory, human capital and structural theories of poverty are the most important theory for describing asset-based and consumption-based poverty.

2.4 Measurement of Poverty

Measuring poverty is pertinent and the first step of alleviating poverty. Poverty can measure monetary and nonmonetary dimensions. Poverty measurement has many advantages such as important to keep the poor on the agenda, to target interventions, to monitor and evaluate project and policy interventions towards the poor and it helps to the country to think systematically how the poor is improved and analyze the consequences (Alkire, 2014: 2).

2.4.1 Monetary measurement of poverty

Poverty has a linkage on a specific type of consumption and well-being of the people. If someone might not have a house, land, food, health and educational opportunity is considered as poor consumption. These dimensions of poverty can often be measured directly by measuring malnutrition. The poor lack social capabilities, or feel powerless and humiliations, or lack political freedoms that fail under deprivation (World Bank, 1998; 2005). Measuring poverty by monetary dimensions, consumption, and income will be a better indicator of poverty measurement for the developing country (World Bank, 2005:16).

Consumption: can express the HH's actual standard of living and ability to meet basic needs. Consumption expenditures reflect the services that a HH can consume based on its current income to satisfy their basic needs like food, shelter, cloth, medical service, education and social participation at the HH level. This consumption expenditure used as a proxy for measuring rural poverty other than income. Because of seasonal variation, harvest failure, or other circumstances income may fluctuate widely so it is not a good measure of poverty rather, it can support the consumption expenditure measurement approach (World Bank, 2005: 24; Samuel *et al*., 2013: 89; Rao, 2014).

2.4.2 Non-monetary measure of poverty

Poverty is associated not only with insufficient income or consumption but also with insufficient infrastructure like health, education, water, electric, information and, with deficient social capitals, insecurity, and low self-esteem and powerlessness must be considered when measuring poverty (Tionge *et al*., 2009: 25; Tesfaye, 2013: 44).

Human Poverty Index: The Human Poverty Index (HPI) measures deprivation in basic human development by combining the basic dimensions of poverty and reveals the differences between human poverty and income poverty. The HPI uses the indicators of the dimensions of deprivation, namely, a short life, lack of basic education and lack of access to public and private resources and services (Samuel *et al*., 2013: 92).

Human Development Indicators (HDI): It uses qualitative measurement rather quantitative measurement to determine poverty. Poverty is not measured by insufficient income and consumption expenditure but also measure with insufficient outcomes in health, nutrition, literacy, and deficient social relations, insecurity, low esteem, vulnerability and powerlessness as their indicators (UNDP, 2018:1).

2.5 Poverty Line and Extent of poverty Measurement

Theoretically, the poverty line can be interpreted as a point on which consumer's expenditure function, giving the minimum cost to a household of attaining a given level of utility at the prevailing prices for given household characteristics (World Bank, 1998; Nanak, 2003; Development Institutions, 2016). A poverty line helps to focus the attention of governments and civil society on the living conditions of the society especially the poor.

Poverty also measured by absolute poverty line and the relative poverty line. Absolut poverty line is constructed by fixing the maximum permitted values for the percentage of food expenditure against the total household income but relative poverty line is construct based on income and expenditure that people classifies as poor and not poor based on the relative situation of the given society (World Bank, 1998:16).

World Bank, (1998), Klugma, (2002) and Girma and Temesgen, (2018) indicated that the poverty measurement technique focuses on different poverty indices which are headcount index, poverty gap index and poverty severity are the most popular measure of poverty status.

Incidence of poverty (headcount Index): This refers to the number of the poor or portion of the population whose income is below the poverty line and who cannot afford the basic basket of goods. It is used to quantify those in poverty and extreme poverty (Klugma, 2002:34).

Depth of poverty (poverty gap): This gives information about: How far HHs from the poverty line. It gives information on income or consumption shortfall relative to the poverty line across the whole population. It is the total resources or money needed to bring all the poor to the level of the poverty line (World Bank, 2005: 72).

Poverty severity (squared poverty gap): Poverty severity takes into account not the only distance of the poor from the poverty line (poverty gap) but also indicate the inequality among the poor which is the further away from the line, the greater severity of poverty (Girma and Temesgen, 2018:25).

2.6 Empirical Evidences on Rural Poverty

2.6.1 Status and extent of consumption-based rural poverty

Sudhakara *et al*., (2013) conducted a research on Determinants of Poverty in Rural Tigray used cross-sectional HH survey data and analyzed the data by logistic regression model he identifies the determinants of poverty such as farm size, total livestock owned (TLU), value of asset, educational status of the household head, access to credit and access to off-farm income were strong negative association with the households' poverty status. And also by using the cost of basic needs approach the study found that the total poverty line (food and non-food poverty line) of the area is 2094 birr per year per adult equivalent. By using this poverty line as a benchmark 51 percent of the rural Tigray HHs are poor.

Girma and Temesgen (2018) examine the determinants and its extent of rural poverty in Ethiopia: Evidence from Doyogena District, Southern part of Ethiopia by collecting data from 150 random selected household and analyze the data via Logit model to identify the determinant of poverty and used cost of basic goods for setting poverty line and FGT index was used. The FGT result shows that 43.33% of the household in the district is found to be poor. The poverty headcount is 43% and the poverty gap in the study area is 23.25%. The total poverty line for the study area was 10.47 Birr per day per adult equivalent. The logit result shows that the amount of livestock in tropical livestock units, participation in off-farm income activities, and age use of improved seeds, total land size holding, family size, and access remittance income are found to be significant determinants of households' poverty in the district.

Mekore & Yaekob (2018) conducted research on the extent and determinant of rural poverty in Southern Ethiopia through survey method and identify the extent of poverty by household consumption expenditure approach. The identified poverty index shows that the total headcount index, poverty gap, and poverty severity indexes are 0.438, 0.25, and 0.1452 respectively and got an income of 10.47 Ethiopian Birr per day per AE. And also the binary logistic regression model result shows that size of cultivated land, remittances, dependency ratio, and participation in off-farm activities, livestock ownership and use of improved seeds are the determinant of rural poverty in the woreda. The researcher also identified that age, education, and sex of sampled household heads access to extension service and credit service were not statistically significant on the determinant of poverty at that particular district.

Haile & Haymanot (2018) examined the status and determinants of poverty and inequality among rural households in Girar Jarso district of Central Ethiopia by collecting the data through survey method and identify the status of poverty by cost of basic need approach. The identified poverty line was 4315.7 Ethiopian Birr and the incidence of poverty was computed to be 45 percent with an average poverty gap and squared poverty gap of 18.6 and 9.99 percent. Also, family size, remittance, farm, and non-farm income and receiving food aid are the identified determinants factor of rural poverty.

Muhdin (2015) conducted a case study on determinants of rural income poverty in Ethiopia in the case of Dodola district to examine the socio-economic determinants of income poverty in rural areas of Ethiopia by using simple random sampling. He selects 217 household heads from two rural areas Dodola district, Oromia Regional State, in the year 2012. The Binary logistic method was used to find the determinants of income poverty. The result reveals that household size, number of income sources of the household, livestock and farm-land ownership are determinants of income poverty in the studied area.

Gosaye (2018) examines rural households' poverty status and its determinants by using household survey. The data were analyzed by binary logit model and identify the determinants of rural poverty. Among the determinants, age of the household head, number of livestock owned per adult equivalent (TLUAE), and number of oxen owned, and fertile cultivated land owned by the household, frequency of contacts of the household with extension agent, food aid in years and number of holidays are the determinants of rural household poverty. And also the researcher identifies the poverty line by the cost of basic needs approach which is 1251.47 *birr*/year/AE based on this poverty line the incidence of poverty, poverty gap and severity of poverty were 72.14 percent, 16.77 percent, and 4.89 percent, respectively.

Tesfaye (2013) examine rural household's poverty and vulnerability in Amhara region Gubalafto Woreda. By using the survey data collection technique the researcher identifies 294.6 Et.birr per adult equivalent by using basic need approach and the extents of poverty incidence, mean vulnerability to poverty and consumption inequality index, which accounts for 30.08percent, 37.42 percent and 26.83 percent respectively. The Tobit model revealed that family size, employment on wage, distance to the main market and agro-ecological, oxen, land size, asset value, employment on own business, access to credit and access to extension service, asset holding, off-farm income participation, access to public services such as access to credit and agricultural extension services, village-level infrastructural facilities, access to market are the identified determinants of poverty in the district.

Tesfaye *et al*., (2017) conducted research on rural household poverty in Gubalafto Woreda Northern Amhara, Ethiopia. The data were collected from 250 random selected household through survey data collection method, to examine the extent and determinants of poverty, poverty gap, and poverty gap square, and to measure the income inequality in the study area by using the Cost of Basic Needs approach. The result shows that the poverty line of the study area is Birr 294.6 per month per adult. And the OLS and Tobit model result shows that family size, participation on wage employment, distance to the main market and *kola* agro ecological affect welfare status negatively and significantly.

Maru (2010) examined magnitude and determinants of rural poverty in Zeghe Peninsula by logit model that identify the determinants of poverty like large landholding size, better suitability of land for coffee production, participation of households in contractual farming activities, engagement of the households in petty trading, beekeeping and fishing activities decreased the probability of households to be poor. The incidence, depth, and severity of poverty in the peninsula which is 68.5% are poor and 18.7% are the poorest of the poor and the depth of poverty also 32.8%. The high dependency ratio and participation of households in firewood-selling activities increased the chance of households to fall into poverty.

Table 1: Poverty headcount ratio for the national poverty line by region

Regions in Ethiopia	Poverty Trend in Year				
	1996	2000	2005	2011	2015/16
Tigray	56.00	61.40	48.50	31.80	27.0
Afar	33.10	56	36.60	36.10	23.6
Amhara	54.30	41.80	40.10	30.50	26.1
Oromia	34.00	39.90	37.00	28.70	23.9
Somali	30.90	37.90	41.90	32.80	22.4
Benishangul	46.80	54.00	44.50	28.90	26.5
SNNP	55.90	50.90	38.20	29.60	20.7
Gambela	34.20	50.50		32.00	23.0
Harari	22.50	25.80	27.00	11.10	7.1
Addis Ababa	30.20	36.10	32.50	28.10	16.8
Dire Dawa	29.40	33.10	35.10	28.30	15.4

Source: National Plan Commission of Ethiopia, (2015/16:21)

2.6.2 Determinants of rural poverty

In the least developing countries multiple structural constraints, market failures and higher exposure to risks that prevent their agricultural productivity, including lack of rights (or rights not recognized) over natural resources (e.g. land, fishing and/or grazing rights), inadequate inputs utilization and technical assistance, lack of access to credit and insurance, as well as social protection and demographic characteristics aggravates rural poverty (FAO, 2018).

Sidikat *et al*., (2009) conducted research on determinants of poverty in Sub-Saharan Africa he examines the determinants of poverty by using a set of cross-country data drawn from 48 countries and analyze the data by multiple regression analysis. The result revealed that an increase in the rate of population, inflation, external debt, conflicts, and HIV/AIDS are contributed to the increase in the poverty rate in the sub-Sahara region.

Akpan *et al*., (2016) used logit model and identified the determinant of poverty in Nigeria. The identified determinant factors of poverty are youths' years in social organization, level of formal education, age of youths; the amount of non-farm income, farm size, agricultural extension activities and commercial purposes of agricultural production.

According to Zegeye (2017) estimation, the consumption expenditure poverty line that calculated by the cost of basic needs approach of Damot Gale District in Wolaita Zone was 3612.151 Bir and 56.17 percent of the rural household were poor. He also identified the determinant of consumption expenditure in the studied area. Family size, household head sex, household age, dependency ratio, and marital status were found to have a positive association with the poverty of the household and statistically significant. Meanwhile, Age square, cultivated land size, oxen, access to credit, off-farm activity, household health, remittance, and market access were the identified determinant variables of consumption expenditure rural household poverty.

Degye (2013) examines the dynamics of poverty and vulnerability in rural Ethiopia by household panel data survey between 2004 and 2009. The collected data were analyzed by probit model and identify the determinant of poverty like family size, household age, asset ownership, education, livestock holding, farming occupation, life status, social network, and other exogenous shocks.

Dawit (2015) conducted research on measuring vulnerability to poverty by empirical evidence from Ethiopian rural household survey data to identify the determinant of vulnerability poverty. HH size, possession of livestock, farm size, and off-farm income, amount of rainfall, and basic goods and services received are the variables that significantly determine the vulnerability of poverty. About 49% of households in Ethiopia are not achieving their minimum recommended daily kilocalorie (2200 Kcal/adult per day).

The main determinants of poverty in rural and urban Ethiopia are Size of household s, the educational level of household head, the degree and extent of dependency within the

household, asset ownership, the occupation of household heads, rapid population growth, major health problems, lack of infrastructure and extreme environmental degradation, ethnicity, income from non-farm activities, animal disease incidence and land ownership (Teshome Kebede *et al*., 2014).

Based on the above theoretical and empirical literature, it is possible to generalize that the status of poverty is different in a different area and identify various factors that affect the livelihood of the household experiencing in poverty. In the theoretical literature review, poverty can result from individual deficiencies, cultural belief systems, economic, social, and political distortions, and geographical disparities. The empirical evidence shows the common factor of poverty at different locations such as sex of the household head, family size, educational level of household head, marital status, off-farm activity, access to irrigation; landholding and livestock asset are the frequently identified factors. But the listed variables determine the poverty status of the rural community differently. Because of the heterogeneity of the society, the one-factor variable may affect the community strongly but may not other communities affected by that determinant factor equally. In spite of this area-specific poverty, determinant identification is very important to solve the deep-rooted poverty in the community.

2.7 Conceptual Framework

To analyze and examine the extent, status, and determinant of consumption-based rural HH poverty; it was important to identify how demographic, social and institutional factors influence the consumption-based rural poverty. These factors may also have a correlation for consumption-based poverty that can explain, to a certain extent, and answer why people or household s with certain characteristics tend to fall below or above the consumption poverty line.

Household demographics: the size of the household (number of people), the age structure, the dependency ratio, and the sex of the household head are known key determinants of household poverty (World Bank, 2005).

Characteristics of the household head: sex, age, employment status, level of educational attainment, property owned and socio-economic profession are key determinants of poverty.

Socio-economic characteristics of the household: landholding size, livestock asset, off-farm activity, remittance, drought, access to social infrastructure (market information, education, health service accesses, extension service), accesses to irrigation land and social capital are the determinant of poverty either the household poor or not.

Figure 1: Conceptual framework of rural poverty

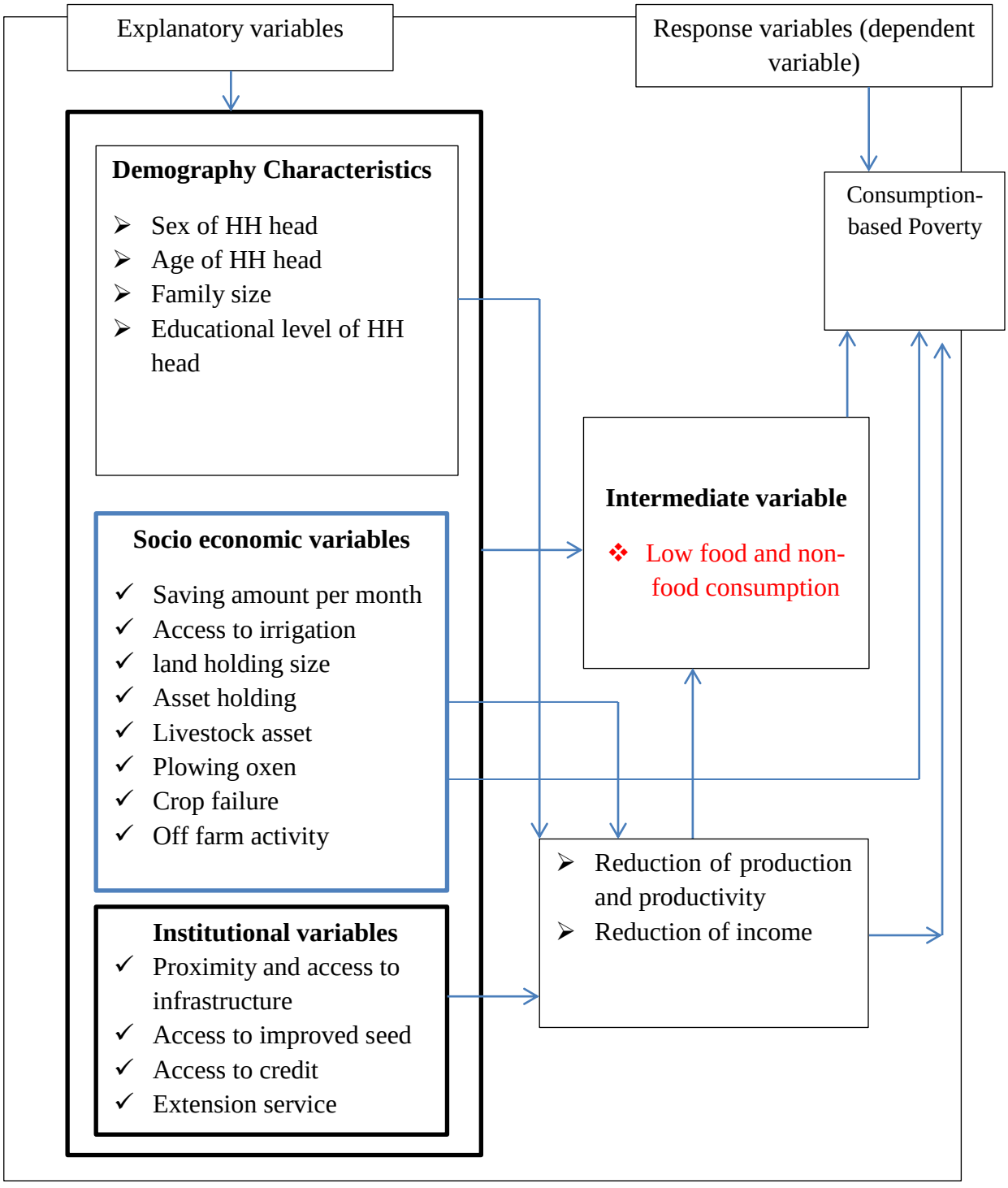

Figure 1: Conceptual framework

Source: Adopted from Abadi, (2014)

3. METHODS OF THE STUDY

3.1 Description of the Study Area

The study was conducted at West Belesa woreda Centeral Gondar Zone of Amhara Region Ethiopia. West Belesa is one of the moisture stress areas in Centeral Gondar Zone. The capital city of the woreda is Arbaya which is 82km far from the historic town, Gondar. The woreda is bordered by East Belesa, Gondar Zuria, Wogera, and Sekota woreda on East, South, West and North directions respectively. The woreda has 32 kebeles which is 12 kebeles are supported by food insecurity program and the rest 20 kebeles are not supported by the food security program. The woreda has *woina dega* (20 kebeles), *kola* (8 kebeles) and *Derek kola* (4 kebeles) agro-ecologies. Agriculture and allied activities are the predominant income sources and that farming is performed using plow with oxen and sowing the local seed with hand broadcasting. Chickpea, teff, and sorghum are the major crops grown in the area. They raise livestock like cattle, donkey, goat, and poultry. Year-round Flow Rivers like *Mena, Hota, sewaq, gurembaba, Derek wonze, and debari* are unutilized water resources that flow in the center of the woreda to Tkeze water shade (West Belesa woreda office of agriculture, 2018).

Table 2: Land Use and topography of the studied area

Land Use		Topography	
Land allocation	Area in ha	feature of land	percentage
Cultivable land	411336	Mountainous	10
Grazing land	7398	Plato	40
Land covered by Forest	11850	Plane land	50
Land covered by shrubs	5711		
Unutilized land/undulated	616	Annual rainfall 800-1200 ml per year	

Source: West Belesa woreda office of agriculture, 2018

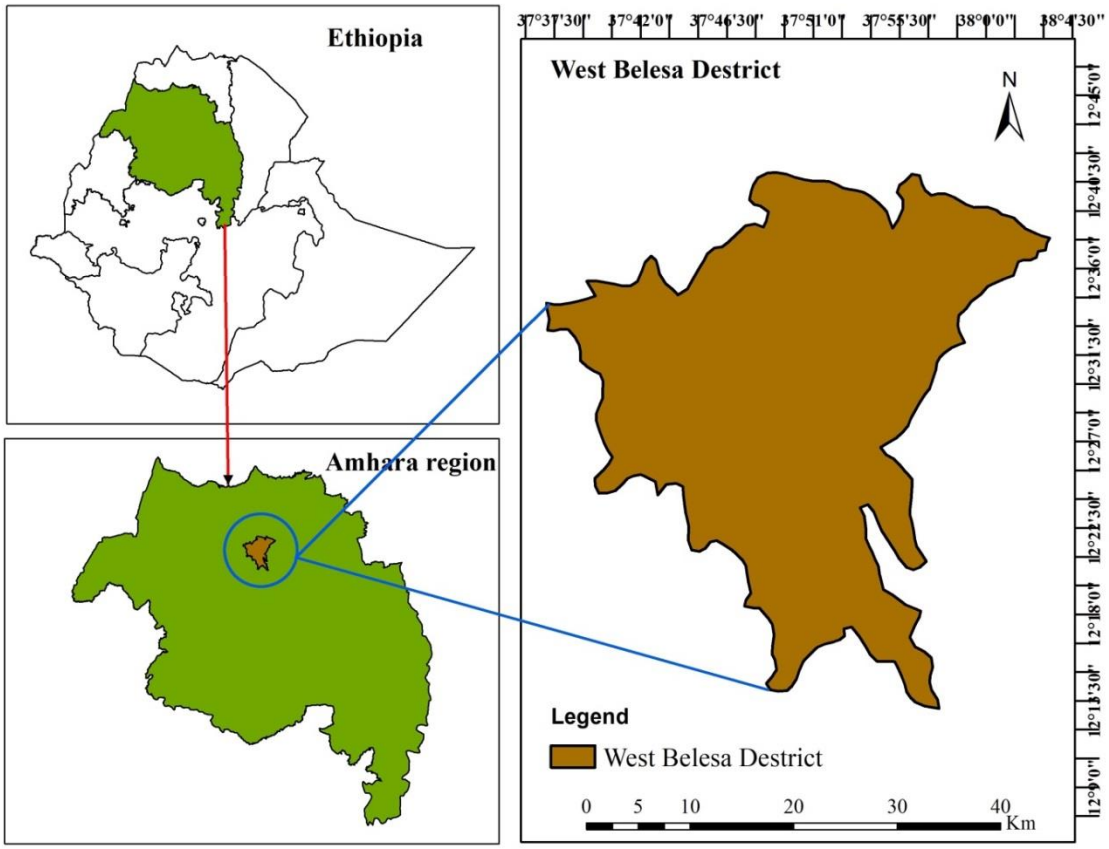

Figure 2: Geographical map of the study woreda (Retrieved from Ethiopia shape file)

3.2 Sampling Methods

To select sample respondents from the population, three stages of sampling method was used. At the first stage, kebeles were stratified as *woynadega* (20) and *kola (8) and Derek kola (4)* based on their agroecology to keep the HH homogeneity. At the second stage, three representatives' kebeles from *woinadega* agroecology and one representative kebele from *kola* kebeles were selected randomly but not selected kebeles from *Derek kola* because of security. At the last third stage, 194 sample respondents were selected simple random sampling technique within the sample frame at each selected kebeles by lottery method with the proportionate to sample size.

3.3 Sample Size

The number of households' for the survey was determined by the following simplified Yamane (1967) formula which is simplified formula that used for selecting the representative respondents from the randomly selected kebeles that has less than 10,000 households:

$$\boldsymbol{n = \frac{N}{1 + N(e)^2}}$$

Where n is the sample size, N is the population size, and e is the level of precision which is 0.07 (93 percent confidence level). 7 percent level of precision applied based on the homogeneity of the community in the stratified kebeles in the woreda.

Table 3: Sample size at each selected kebeles

Name of Kebele	Number of HHs	Agroecology	Sample HH
Ebrareg	532	*Woyna-dega*	47
Kalay	599	*woinadega*	51
Dikuana	533	*woinadega*	47
Talla	556	*kola*	49
Total	2220		194

Source: Agricultural office, (2018)

3.4 Data Collection

Qualitative and quantitative data were collected from primary and secondary sources. Secondary data were obtained from different sources like Statistical Authority, BoA, NGOs, woreda, zonal and regional concerned offices and others which are considered relevant sources for this study. To collect the primary data, questionnaire related to the assessment of poverty and its determinants like economic status, family size, and access to infrastructures, means, and type of household consumption expenditure in the study year during normal time. The baskets of foods in the area were asked using pre-tested interview schedule. In addition to the primary and secondary data, two focus group discussions (one FGD from male-headed and one FGD from female-headed) were conducted to complement the research finding with

qualitative information. During FGD households were came from different wealth status like poor, medium and rich households at different sessions. Each wealth group farmers identified the poverty strata based on different dimensions listed in Table 3.

3.5 Data Analysis Methods

Descriptive statistics were used to provide summary statistics like mean, standard deviation, percentage, minimum and maximum. Chi-square test was used to identify categorical variables that vary significantly between poor and non-poor rural households. Similarly, the t-test was used to see if there is any statistically significant difference between the mean of the respective poor and non-poor rural households with respect to continuous variables. The collected data from FGD were described and narrated by their contextual meanings. The logit model was applied for identifying the determinant factor of consumption-based rural household poverty. The poor and non-poor rural households were dummy variables that take the value one if the household consumes less than the minimum living standard (poverty line) otherwise take zero values. To describe and analyze the collected quantitative and qualitative data STATA version 13 software package was utilized.

3.5.1 Poverty measures

The extent and status of rural poverty were measured by using asset-based and consumption-based poverty measurement approaches at the household level.

3.5.1.1 Asset-based rural poverty measurement

An asset-based rural poverty measurement approach involves how asset enables households to overcome the shortfall in income and to continue sustainable consumption level by the Principal Component Analysis (PCA) method. The Principal Component Analysis (PCA) was used to create an asset-index.

The PCA is a multivariate numerical technique used to reduce the number of variables without misplacing excessive data in the process (Anyanwu, 2014; Muzindutsi, 2018). The

PCA method attains this by creating a fewer number of variables that explain most of the variation in the original variables. PCA generates a number of components that are completely uncorrelated and the subsequent component explains additional but less variation than the previous component (FAO, 2011). After the application of the PCA, factor scores were obtained and cut-off points were established to distinguish households into broad socio-economic categories. First, identify the list of assets that used for measure rural poverty status either the household possessed or not and then identify the poverty line from the weighted asset index by dividing the total household by very poor, poor, medium and rich. This identification of asset-based rural poverty status also discussed and identified during FGD.

The PCA approaches commonly used for generating cut-off points which involve the grouping of the lowest 40 percent of households into 'poor'; secondly the highest 20 percent as 'rich' and the rest 40 percent as the 'middle' group (Moratti *et.al*. 2012). The PCA scores show that the household with the most score and the least scores, meaning that the household s with less weighted assets were classified under low poverty status, while those who owned highly-rated assets were classified as being non-poor. In the case of PCA, the asset index for individual household defined as:

$$A_i = \sum_k \left[f_k \frac{(\ a_{ik} - \overline{\overline{a_k}}\ )}{S_k} \right]$$

Where $a_{ik}$the value of asset k is for household i_{ak} is the sample mean and $S_k$is the sample standard deviation.

To estimate the poverty line, group discussions were conducted and identified the wealth ranking of the population by setting criteria. Accordingly, group discussion with rural household s indicated two major categories of rural household s: the better off and the poor. The better-off wealth category was further grouped into rich and medium wealth category. Wealth category was depending on resource owned and used, engagement in grain sales, the capacity to afford an adequate supply of food for their family, and able to assist other household in the area and credit accesses when they need.

Similarly, the poor were categorized into two: the poor and the poorest (destitute). According to the wealth ranking of the communities, a household head is considered as the poorest, the household hadn't any livestock asset except chicken. The poorest have 1-2 *timads* of the land but they can't cultivate themselves rather they rented out to others. Most of the time the poorest were faces critical food shortage they covered their daily food consumption from October to April month only. They live in a grass-roofed house and most of the time they face health problems. The poorest always take a food copping mechanism through daily laborer from the farm and non-farm activity, cotton making, local beer selling, and safety net program.

The poor were characterized by he/she had livestock like 1 ox, 1 heifer, 2 goats, and 3 chickens. The poor household who have 3-4 *timads* of cultivable land but they can't cultivate rather they rented out to others. The poor can't fulfill their daily food consumption level throughout the year at the household level they face critical food shortage from July to September. They live in a grass-roofed house. Despite this, the rich household had a characteristic's of 1 and more milking cow, more than 2 oxen, more than 3-5 sheep, and goat, and more than 7 *timads* of cultivable land. He/she serve their family year-round daily food consumption. Most of the time, the rich households are healthy and live in a comfortable life as compared to other communities. The rich farmers participating in every social event and serve the other farmers by lending money and food crops as well as seeds. Their voice is listened to by others and can access credit service when they need most of them are influential farmers.

Table 4: Wealth category identified through FGD with Rural HHs, West Belesa

List of indicators	Poverty category			
	Poorest	Poor	Medium	Rich
Livestock in number				
Cow	0	0	1	>1
Ox	0	0	1	>=2
Heifer	0	1	1	1
Bull	0	0	1	>1
Goat	0	2	3	>4
Sheep	0	1	2	>2
Donkey	0	0	1	1
Chicken	5	5	4	4
Land holding in *timad*	1-2	3-4	4-6	>7
Land cultivation	Rent out	Rent out	own	own
Housing	Grass	Grass	Corrugated	Corrugated
Food availability	Oct.-April	Oct.-Jun	Year-round	Year-round
Credit availability from others by their collaterals (livestock, farmland)	can't access because of lack of collateral	Can't access because of lack of collateral	Can access	Can access
Income source	Non-farm and off-farm activity (cotton, daily laborer, local beer seller, safety net.)	Off-farm, non-farm, and agriculture	Mainly agriculture and some off-farm	Mainly agriculture and off-farm
Social participation like administration, *edir, senbetie*,	Not participated	Somewhat participated	Participated	Highly participated

Source: Community wealth ranking result, 2019

NB: *timad* is local farmland measurement unit that accounts for 0.25 ha of land

3.5.1.2 Consumption-based poverty measurement

Different scholars tried to measure poverty by different measurement approaches because many alternative measurement approaches exist. So to increase the accuracy of rural poverty measurement in the rural area, the application of an appropriate measurement approach is very imperative. Most researchers (Masru, 2010; Moratti *et al.*, 2012; Dawit, 2015; Muhedin, 2015; Girma *et al*., 2017; Kibrom, 2017; Tesfaye, 2017) measured poverty through consumption approach rather than income. Consumption is an indicator of a household's poverty status. Each food consumption items have to be adjusted by Kcal per day per AE. The adjusted calories are dividing by an adult equivalent scale computed on the basis of the nutritional requirement of each family member by age and sex (Deaton, 2015, Ravallion, 2016).

Consumption data were collected at the household level in the selected sampled kebeles, while poverty is naturally measured at the individual level to compare individuals in household of different sizes and compositions. When consumption data are aggregated at the household level, constructing appropriate weighting scales to account for different household structures has a long history in economics, but there is little consensus on the best approach (Deaton, 2015).

3.5.1.3 Methods of setting consumption-based poverty lines

Consumption-based poverty line defined as the monetary cost to a given person, at a given place and time, of a reference level of welfare (Ravallion, 1998). Poverty lines can be described as either absolute or relative thresholds for distinguishing the poor from the non-poor (Arndt *et al*., 2017:10). The poverty line was constructed by the aggregation of food and non-food consumption expenditure requirements through the cost of basic needs method. To construct the poverty line, identifying bundles of food consumed by the poor is the first step and then scaled the quantity of food to the predetermined minimum level of the calorie requirement (2200 calories) per AE. After that, the food items were valued by the local average price. To construct the non-food consumption poverty line, identifying the basic

needs expenses which are house rental value, cloth, education, health, governmental fees, and social ceremonies ware added and identified the share of food over the non-food expenditures. Finally, the study was constructed the poverty line by adding food and non-food consumption in the monetary values.

$$Consumption\ Poverty\ line = Food\ expenditure\ poverty\ line + Nonfood\ expenditure\ poverty\ line$$

Food poverty line: To construct the food poverty line through the cost of basic need approach, the following procedures were followed (Ravallion, 2016). First identified the 50 percent of the rural poor household through based on FGD wealth ranking and identified their common food items those who take frequently. Then evaluate each food items consumed by the rural poor people by Kcal listed in Appendix Table 2. Secondly the consumed Kcal food scaled out to generate 2200Kcal per day per AE which is the minimum food calorie level to lead a healthy life and valued the food items that gave 2200 Kcal by local average price which is a food poverty line. Thirdly the entire listed consumed food items were converted to Kcal by conversion factor listed in Appendix Table 2 and valued by local average price. Finally, the household was evaluated based on valued food expenditure per year per AE either he/she above the food poverty line or not. The adult equivalent (AE) conversion factors are listed in Appendix 3.

Non-food poverty line: The non-food poverty line was constructed from the basic need consumption of human beings that used to lead a healthy life. Among the basic needs in the rural area housing, closing, human and animal health, education, and social ceremonies were included. The data were collected from household survey data and converted to AE and evaluated the share of expenditure. In order to estimate the non-food component of the poverty line, Ravallion and Bidani (1994) proposed the use of a regression model. Their model takes the form:

$$h_i = a + \beta \ln(\frac{y_i}{zi^f}) + \sum_{j=1}^{n} \emptyset_j D_{ij} + x_i\pi + v_i$$

Where h_i is the food share of household expenditure for i^{th} household, Y_i is the per capita consumption expenditure of the i^{th} household, z_{if} is the food poverty line for the i^{th} household, and x_i is the vector of other exogenous variables (for example, demographic variables).

3.5.2 Measurement of poverty extent and severity at the household level

There are a number of aggregate measures of extent and severity of poverty that can be computed by different poverty indexes (World Bank, 2005; Ravallion, 2016). Among the indices, the following indices are used to identify the extent of consumption-based rural poverty in the studied woreda at the household level.

Headcount index: After the poverty line was identified the headcount index simply measures the proportion of the population that is counted as poor by the following formula (Klugma, 2002:34)

$$\boldsymbol{Po} = \frac{\boldsymbol{Np}}{\boldsymbol{N}} * 100$$

Where Np= Number of poor, N= Total population

We can also use $Po = \frac{1}{N}(\sum_{i=1}^{N} I(Yi < Z)$

Here, *I (.)* is an indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise. So if expenditure (*Yi*) is less than the poverty line (*z*), then *I(.)* equals to 1 and the household would be counted as poor. Np is the total number of the poor.

Poverty gap index: This adds up the extent to which individuals on average fall below the poverty line, and expresses it as a percentage of the poverty line. It indicates the depth of poverty, which is, the difference between the poverty line and the mean income of the poor expressed as a percentage of the poverty line. More specifically, define the poverty gap (Gi) as the poverty line (z) less actual income (Yi) for poor individuals; the gap is considered to be

zero for everyone else. Using the index function by the following formula (Girma and Temesgen, 2018: 25):

$$Pg = \frac{1}{N}\sum_{i=1}^{N}\frac{Gi}{Z}$$

Where Gi= poverty gap, Z= poverty line

Squared poverty gap ("poverty severity") index: It is an indication of the severity of poverty among the population living below the poverty line (Development Institutions, 2016).

$$P2 = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{Gi}{Z}\right)^{Z}$$

Where P2= Square poverty gap index, Gi= poverty gap, Z= poverty line

3.5.3 Inequality measurement

Gini coefficient is a popular measure of inequality, the Gini coefficient is derived from the Lorenz curve which ranges from 0 (perfect equality) to 1 (perfect inequality) (World Bank, 2005:95). To generate the Gini coefficient sorts the population from poorest to richest, and shows the cumulative proportion of the population on the horizontal axis and the cumulative proportion of expenditure on the vertical axis.

$$\boldsymbol{Gini = \frac{1}{N}\sum_{i=1}^{N}(y_i + y_{i-1})}$$

3.5.4 Econometrics model selection

Choice of the appropriate econometric model depends on the nature of the dependent variable. To analyze the determinant factors that differentiated whether the rural household either consumption-based poor or not, the logistic regression model was employed. Therefore, the study was adopted the non-parametric model which is a binary logit model to identify the detriment factors for consumption-based household poverty and estimate the strength of the relationship and explained each factor with the maximum likelihood estimates of poverty (Gujarati, 2004; Verbeek, 2004). Accordingly, in this model, the dependent variable poverty status of the rural household is a dummy variable. If the family can't achieve minimum daily consumption in the family, the household belongs to consumption-based poor they take the value one otherwise zero.

$$P\left(Y = {}^{1}/_{x}\right) = G(\beta_0 + \beta_1 x_{1+} \ldots\ldots \beta_k) = G(\beta_0 + x_\beta$$

Where *G* is a function taking on values strictly between zero and one: $0 < G(z) < 1$, for all real numbers *z*, X_i is the independent variables like sex, age, family size, household years of education, landholding size, livestock holding, proximity to infrastructure and extension service. and β_i is the coefficient of variables.

The estimated probability of poorness in the logit model (Gujarati, 2004; Verbeek, 2004) is given by:

$$P_i = \frac{1}{1 + e^{-z_i}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where P (i) is a probability of being poor at a given factor of i^{th} farmer and Z (i) is a function of explanatory variables (Xi), and

Z is expressed as:

$$z_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + - - - - \beta_n x_n \ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where β_0 is the intercept and β_i also the slope parameters in the model. The slope tells how the log-odds in favor of being poor.

The odds to be used can be defined as the ratio of the probability that a farmer is poor the variable P_i to the probability that he or she will not poor $1 - P_i$.

$$1 - P_i = \frac{1}{1+e^{zi}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Therefore the logit model expresses as the following formula:

$$\ln\left[\frac{P_i}{1 - P_1}\right] = \ln\left[e^{\beta_{0+\sum_{i=1}^{m}\beta_i x_i}} = Z_i \ldots\ldots\ldots\ldots 4\right]$$

If the disturbance term U_i is taken into account the logit model becomes:

$$Z_i = \beta_0 + \sum \beta_1 x_1 + U_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

And also express as the following formula:

$$Log(yi/z = a_0 + a_{1X_i^1} + a_{2X_i^2} + \cdots .. + a_{nX_i^n} \ldots\ldots\ldots 6$$

Where yi is consumption expenditure per AE, z poverty line, X_j^i is explanatory variable and a is the estimation coefficient.

3.5.5 Description of variables and hypotheses

3.5.5.1 Dependent variables description

Consumption-based poverty: Which is one of the outcome variable measured by the cost of basic need (CBN) approach. This outcome variable used both food and non-food consumption expenditure. The consumption-based poverty was estimated based on the poverty line constructed from food and non-food consumption. The food consumption was estimated from the food items that the household consumed to fulfill the minimum daily calorie requirement which is 2200 Kcal per day per AE. If the household consumes less than the minimum calorie requirement, the household becomes poor. The non-food consumption was estimated by the basic need approach. Among the basic needs required for the rural West Belesa; housing, clothing, education fee, human and animal health expenses, and social ceremony are the basic essential needs. If the household consumes less than the poverty line; the household belongs to the poor and take the value one otherwise zero. To identify the consumption-based poverty determinant variables, the binary logistic regression model was used.

Asset-based poverty: This outcome variable is durable and non-durable assets that possessed the rural household. The asset was evaluated at the household level by Principal Component Analysis (PCA) method. PCA helps to give index on factor value for each household that used for weight the asset. The weighted index helps to classify the rural household by very poor, poor medium and rich classification. The list of assets was locally available and potentially identifies the rural community of west Belesa.

3.5.5.2 Explanatory Variables and Working Hypothesis

Explanatory (independent) variables are variables that can potentially affect, identify and has to expect to have a correlation with the status of rural household consumption-based poverty through statistical procedures.

Sex of the household head: The level of poverty is directly related to sex of the household hypothesized that when the family is led by the female head. In the real situation, females do not have access to credit, training and have not social support into the community that affects the agricultural productivity and also involve the productivity role that can affect the income of the family (Teshome *et al*., 2014).

Age of the household head: The average age of the household head and level of poverty has a negative correlation. If the age of a person increases the farm experience and social capital also increase up to age reaches elder. So the adoption rate also increases that can increase the level of agricultural productivity (Rogers 1983). If agricultural production and productivity increase the status of rural consumption poverty reduce by increasing household incomes (Tesfaye *et al*., 2018).

Family size: The number of family sizes has a positive influence on consumption-based rural poverty. If the numbers of the family increase within the family consumption expenditure also increase drastically that leads to consumption-based poverty (Daniel *et al*., 2016).

Dependency ratio: Poverty level is increased when the dependency rations increase within the family. This situation happens when the number of aged less than 14 years and age greater than 65 years considered as dependent on their family. If the dependent people increase within the family daily consumption rate is higher than the daily income gained. The increments of consumption expenditure within the family may lead to income reduction per individuals. This situation is favorable for consumption-based rural household poverty exists in the household (World Bank Group, 2016).

The educational level of household head: The level of education and poverty has an indirect correlation. Education is a key determinant of individual innovativeness, opportunities, attitudes, and economic and social status. The educated person can analyze the real situation and can adopt the technology easily. If the person adopts the technology production and productivity of agriculture also increase and increase the income level of the family that can reduce the level of poverty within the family (Kafle, *et al*., 2016; Abbott, 2017).

Saving amount: Level of poverty has a negative correlation with saving amount that can determine by the individual saving amount either the individual poor or not. If the person has good saving practice of agricultural products as well as cash, which is wise utilization of expenditures, he/ she may not vulnerable to consumption poverty and can expand the choice of investment that can improve the income level and can afford the cost of agricultural inputs (Belina *et al*., 2017).

Access to improve seed credit: Level of poverty and access to improved seed has a negative relationship. If improved seed available in the area the farmer can access and utilize the seed to improve production and productivity of crops and increase livelihood income (Elnour & Ahmed, 2013).

Off-farm/ non-farm income: Level of poverty and off-farm activity has negative correlation, if the person involved in the off-farm/non-farm activity he/she diversify their income through trade, service, mining, and other activities can improve their wellbeing's that can reduce vulnerability of poverty (Girma and Temesgen, 2018; Nagler & Naud, 2014).

Access to irrigation: If the farmers have access to irrigation, the farmer can produce more crops than the rain feed dependent farmers and can generate additional income. Access to irrigation also improves agricultural production and productivity that can improve the income level of the family and reduces the level of poverty (Eneyew, *et al*., 2015).

Landholding size: It is a very important rural asset that has a negative relation with rural poverty. If the farmer has access to cultivable land; he/she can improve agricultural production as well as improve the level of income and reduce the extent of poverty (Muna, 2016).

Livestock asset: It is a very important rural asset that generates additional food and income for the family. It is also a source of additional income which supports farmers to buy improved crop varieties and farm inputs for improving agricultural productivity. The improvement of agricultural productivity has a direct relation with income or consumption that can reduce the extent of poverty (Abadi, 2014; Mekore *et al*., 2018;).

Proximity and access to infrastructure: Building better and more sustainable infrastructure will require mobilizing investment from both the public and the private sectors. Access and proximity of infrastructure is a major determinant of poverty at the community level. Social infrastructures like all-weather paved road, electricity, the proximity of large market, school and clinic, distance to government offices are the determinant of poverty (Kifle, 2015; Mekonnen, 2016; World Bank. 2017).

Extension Contact: Have a negative relationship with the consumption-based rural household poverty. Frequency of extension contact may improve the farmer's skill and knowledge through training and visiting the extension method. If the skill and knowledge of the farmers improve the adoption rate of agricultural technology also improve simultaneously improve agricultural productivity and reduce consummation-based rural household poverty (Tsegaye, 2014).

Field day participation: This event had a negative influence on consumption-based rural poverty. Field day is the most effective extension method used for improving skills and knowledge of the farmers. During field day farmers got a chance to see how the technology works on their locality then the farmers' accept the proven technology easily because he/she observed how the technology work. Most technology adopter farmers improve their agricultural income and consumption level within the family.

Training: Training is very essential instrument to improve skills and knowledge of human beings that influence poverty negatively. If the farmers get agricultural-related training, he/she become familiar with agricultural technologies that lead to improve agricultural production

and productivity. When agricultural production and productivity improve the household consumption level also improves that reduce poverty.

Table 5: The description and hypothesize effect of selected independent variables on the dependent variable

Name of variables **Demography Characteristics**	Variable type and description	Expected sign for poverty
Sex of household head	Dummy variable: Sex of household head: 1= Male; 2 = Female. If the household is female headed the probability of being poor is increase	+
Family size	Continuous variable: Total number of HH members that live in the same roof and share common goods and services	+
Age of household head	Continuous variable: age of household in years	-
The educational level of HH head	Continuous variable: Educational status of the household in education year	-
Socio-economic variables		
Infrastructure	Continuous variables: Distance of main road, nearest town, agricultural office from the residence in minute	-
Frequency of field day participation	Continuous variable:: number of field day participation in the event	-
Frequency of Agricultural related	Continuous variable: number of agricultural-related training participated within 12 months	-

training		
Access to improved seed credit and amount of credit	Availability of improved seed credit service 1=access 0= not access and amount of credit	-
Frequency of extension contact	Continuous variable: The number of contact that the agent advises the farmer	-
Amount of off farm / non-farm income	Continuous variable; household members participate in non-farm and off-farm activities and generate income	-
Land cultivated by irrigation activity	Continuous variable: size of farmland that cultivated by irrigation	-
Livestock asset	Continuous variable: Number of different livestock that holds the household converted into TLU	-
Landholding size	Continuous variable: include own, rent in, shared in and gifted lands	-

4. RESULT AND DISCUSSION

4.1 Measuring Poverty Status on Rural Household

4.1.1 Asset-based rural poverty measurement

The asset-based poverty status of the rural people was created by grouping the household based on the assets they possessed. Households with less weighted assets were classified under low poverty status, while those who owned highly-rated assets were classified as being non-poor. To measure asset-based rural poverty principal component analysis (PCA) method was applied which can reduce the list of assets into a single index without affecting the result (FAO, 2017).

4.1.1.1 Asset poverty line

The asset poverty line was determined by the asset-based weighted index constructed in the collected rural household data. To construct asset index 12 assets were included from durable, livestock and other socioeconomic variables. To score the weighted asset PCA method was applied. The results of the first PCA values were used as asset index or socio-economic index. The first PCA value captured the maximum variance which is important for classifying the rural people's poverty status based on asset ownership (Howe, 2008). The highest weighted values mean the highest asset value for the rural community. The exciting result showed that the highest weighted asset in the rural West Belesa was the number of cattle, number of plowing oxen, number of goat and sheep and landholding size respectively (Table 6).

Table 6: List of weighted Asset in rural West Belesa

List of assets	weight	Mean	Std. Deviation	n
Number of mobile phone	.507	.67	.866	194
Number of plowing oxen	.746	1.14	.724	194
Number of plough sett	.631	1.21	.814	194
Number of sprayer	.429	.06	.242	194
Number of radio/tape	.229	.21	.422	194
Number of solar panel	.445	.25	.436	194
Number of cattle	.879	2.75	1.894	194
Number of Goat and Sheep	.693	3.44	5.699	194
Number of donkey	.725	.84	.827	194
Number of mature chicken	.413	4.14	5.536	194
Total own land	.455	4.60	5.662	194
Total cultivated land	.897	2.96	1.963	194

Source: Own survey data computation (2019)

The weighted index used for classifying the rural households' very poor, poor, medium and rich category based on their asset owned. To get the 20 percent rich people among the rural community the weighted asset index quartile was used. The very poor and rich households had the weighted asset index of less than -0.75 and greater than 0.75 percent respectively.

Table 7: Asset-based quintile of the poverty line

Asset-Based Poverty Status	Weighted asset index value
Very Poor	Less than -0.75
Poor	From -0.75 up to -0.1
Medium	From -0.1 up to 0.75
Rich	More than 0.75

Source: Own survey data computation (2019)

4.1.1.2 Asset-based poverty status of rural West Belesa

Based on the weighted asset-index result, 18.0 percent and 32.5 percent of rural people fall in the very poor and poor household respectively but 27.8 percent and 21.6 percent of the rural households were categorized under the medium and rich category of households respectively.

This result indicated that more than 50 percent of the rural household in the study woreda led subsistence farming system and used for current consumption. They didn't produce enough agricultural products for asset accumulation. So the community can't escape shocks like crop harvest failure without government support for one year.

Table 8**:** Asset-based poverty status of the West Belesa woreda

Poverty status	n	percentage
very poor	35	18.0
poor	63	32.5
medium	54	27.8
rich	42	21.6
Total	194	100.0

Source: Own survey data computation (2019

4.1.1.3 Asset holding

The collected data result describe that very poor household had the mean, minimum and maximum weighted asset value of -1.339, -1.955 and -0.753 respectively with the standard deviation of 0.298. The rich household had the weighted asset index of mean, minimum and maximum of 1.429, 0.757 and 3.934 respectively with the standard deviation of 0.767. If the household had a least weighted asset index, the household become asset poor while the household had a greater weighted index the household become better off (Kamal, 2014; Muzindutsi, 2018). These results showed that the majority of the rural people in the woreda were very poor in terms of asset possessed.

Table 9: Asset-Based Rural Poverty in West Belesa

	Statistics	Poverty status			
		Very poor	poor	medium	rich
Weighted asset	mean	-1.339	-0.398	0.22	1.429
	St. dv	0.298	0.179	0.226	0.767
	minimum	-1.955	-0.74	-0.095	0.757
	maximum	-0.753	-0.104	0.713	3.934

Source: Own survey data computation (2019)

The asset-based poverty measurement result had a significant difference in the consumption-based poverty measurement results. Even though there was a significant difference between asset-based and consumption-based rural household poverty; this research focused on the consumption-based poverty measurement. The subsequent analysis of the extent of consumption-base rural poverty was analyzed by Foster, Greerer, and Thorbecke (1984) indices and identify only for the determinants of rural household consumption-based rural poverty in the rural West Belesa.

4.1.2 Consumption-based rural household poverty status

Consumption measured in monetary terms and calorie intake per adult equivalent was taken as a proxy indicator of poverty at the household level (Rao 2014). In this section, the estimated poverty line and the extent of poverty among the sample rural households were presented using the approaches specified and discussed in the above methodological section.

The first part of this section deals with the estimation of the absolute poverty line, which is a benchmark of either the household poor or not. The second subsection addresses the differences in food and non-food consumption among the poor and non-poor households and measuring rural consumption-based poverty using poverty indices.

4.1.2.1 Food consumption poverty line

For determining the food consumption poverty line, the data were collected from the poorest half of the reference group who were consumed various food items by rural households. A food poverty line (2,200 Kcal/day/AE) was constructed by valuing a bundle of food items with local average market price. This amount of Kcal is the minimum energy requirement for a human being to lead a healthy life (CAAD, 2013). The calculated food poverty line was birr 2,949.40 per AE which is 66.50 percent share of the total consumption poverty line (Table 10), and the share of food at the poverty line was 67.16 percent.

$$Poverty\ line = food\ consumption + nonfood\ consumption$$

Table 10: Food consumption for the reference poor people and value of food poverty line at West Belesa woreda

Food Item	Kcal/kg	Actual kg/year in AE	kg/year/AE (scaled)	Consumption per adult per day in kg/lt	Kcal per adult per day needed to get 2200Kcal	Kcal share (%)	Mean price per kg/lt (Birr)	Cost per day (Birr)	Food Poverty line per year (Birr)	Expenditur Share (%)
	Cereals			0.501	1876.09	85.3	55.95	5.033	**1837.013**	**62.28**
Sorghum	3750	71.6	110.75	0.3034	1137.84		8.95	2.716	991.21	
Teff	3380	19.18	29.5	0.0808	273.18		17.5	1.414	516.25	
Maize	4060	21.1	35.5	0.0973	394.88		7.2	0.700	255.6	
wheat	3510	1.95	2.5	0.0068	24.04		13.2	0.090	33	
Barley	3740	2.6	4.5	0.0123	46.11		9.1	0.112	40.95	
	Puls			**0.028**	**101.140**	**4.600**	**33.000**	**0.483**	**135.000**	**4.580**
Chickpea	3650	4.85	7.5	0.0205	75.00		18	0.370	135	
Fildpea	3470	2.5	2.75	0.0075	26.14		15	0.113	0	
	Vegetables			**0.0795**	**48.26**	**2.20**	**28.45**	**0.62**	**224.90**	**7.60**
Shallot	660	5.2	8	0.0219	14.47		8.5	0.186	68	
Tomato	220	4	6	0.0164	3.62		9.25	0.152	55.5	
Potato	840	7.8	12	0.0329	27.62		7.7	0.253	92.4	
Kall	310	1.95	3	0.0082	2.55		3	0.025	9	
	Spices			**0.019**	**49.208**	**2.250**	**84.800**	**0.450**	**164.274**	**5.600**
Pepper	3470	2.6	4.12	0.0113	39.17		28.6	0.323	117.832	
Garlic	1310	1.95	2.75	0.0075	9.87		16.6	0.125	45.65	
Mixed spices	3110	0.0065	0.02	0.0001	0.17		39.6	0.002	0.79	
	Animal produce			**0.032**	**74.150**	**3.350**	**250.750**	**0.787**	**287.313**	**9.740**
Chicken	1460	0.64	1	0.0027	4.00		110	0.301	110	
Milk	3870	2.3	3.5	0.0096	37.11		13	0.125	45.5	
Beff	2370	1.3	2	0.0055	13.00		50	0.274	100	
Mutten	2650	0.16	0.25	0.0007	1.82		75	0.051	18.75	
Egg	1400	3.1	4.75	0.0130	18.22		2.75	0.036	13.06	

Food Item	Kcal/kg	Actual kg/year in AE	kg/year/AE (scaled)	Consumption per adult per day in kg/lt	Kcal per adult per day needed to get 2200Kcal	Kcal share (%)	Mean price per kg/lt (Birr)	Cost per day (Birr)	Food Poverty line per year (Birr)	Expenditur Share (%)
	Other food type			**0.0270**	**51.15**	**2.30**	**175**	**0.824**	**300.90**	**10.20**
Oil	5870	1.3	2	0.0055	32.16		29.6	0.162	59.20	
Sugar	3440	0.97	1.5	0.0041	14.14		22.9	0.094	34.35	
Coffee	1190	0.87	1.35	0.0037	4.85		111	0.411	149.85	
Salt	0	3.25	5	0.0137	0.00		11.5	0.158	57.5	
	Total			**0.69**	**2200.00**	**100.00**	**627.95**	**8.19**	**2949.40**	**100**

Source: The Kcal/kg data were got from the FAO food database (1968) but other data were own survey data computation (2019)

4.1.2.2 Non-food consumption poverty line

To estimate the non-food consumption, the food-poverty line which was constructed from the above data were used and found to be birr 1485.78 which is 33.5 percent of consumption expenditure line share. Thus the total poverty line of the household was obtained after adjusted the non-food consumption by using the average food poverty line which is constructed from 50 percent of the poorest household reference. So the rural household poverty line in West Belesa had a total of birr 4435.18. This result indicated that the community spent more money on food consumption than the non-food items. Most farmers in the study woreda produce agricultural products for their daily consumption. Majority of the rural household can't afford to buy non-food items. Zegey, (2018) was identified nearly the same result in Damot Gale District in Wolaita Zone which was 3612.151 Birr per year per AE and 56.17 percent of the rural household were poor.

Table 11: Poverty line and consumption share of West Belesa woreda

Expenditure	Line	Share (%)
Kcal per day per AE	2200Kcal/day/AE	
Food	2949.4 Et.Birr/year/AE	66.50
Non-food	1485.78 Et.Birr/year/AE	33.50
Total	4435.18 Et.Birr/year/AE	100

Source: Own survey data computation (2019

4.1.2.3 Prevalence of consumption-based rural poverty in West Belesa

Table 12 results indicated that 33 percent of rural household were classified under food poverty but 67 percent of rural household were not poor they can fulfill minimum daily food consumption calorie level. While 56.2 percent of the household has not fulfilled their daily non-food consumption rather 43.8 percent of the household were achieved their minimum daily non-food expenditure. This result implies that the rural West Belesa woreda have more proportion of poor people than the national average rural poor people which are 25.6 percent (NPC, 2015/16:14).

Table 12: Consumption-based rural poverty status of West Belesa

Type of Poverty	Poverty status	Sex of the respondent		Group Statistics	
		female	male	n	Percent
Food poverty	Non-poor	26	104	130	67
	poor	18	46	64	33
	Total	44	150	194	100
Non-food poverty	Non-poor	17	68	85	43.8
	poor	27	82	109	56.2
	Total	44	150	194	100
Consumption-based Poverty status of rural HH	Non-poor	23	97	120	61.9
	poor	21	53	74	38.1
	Total	44	150	194	100

Source: own survey data result, 2019

The status of rural poverty at selected sample kebele was not equal. At Kalay kebele 25.5 percent of the rural people were consumption-based poor but 74.5 percent of the people were non-poor but at Ebrareg kebele 63.9 percent of the rural people were non-poor while 36.1 percent of the people were poor. This result showed that poor people are highly concentrated at Kalay and Dikuana kebele than other kebeles.

Table 13: Consumption-based rural poverty of sample kebeles

		Kebele				
	level	Kalay	Ebrareg	Dikuana	Talla	Total
Poverty status of the HH	poor	13	17	12	32	74
	Non-poor	38	30	35	17	120
	Total	51	47	47	49	194

Source: Own survey data computation (2019)

4.1.2.4 Food and non-food Consumption-based rural household poverty in West Belesa

The survey data result showed that the poor people spent a mean of 2346.94 birr/year/ AE with the standard deviation of 648.50 for food expenditure while the non-poor rural people spent a mean of 5764.39 birrs per AE with the standard deviation of 2244.42 birrs/year/AE. The rural poor people of west Belesa spent a mean of 1060.95 Birr/year/ AE but the non-poor rural people spent a mean of 1801.69 birrs/year/AE with the standard deviation of 984.81birr/year/AE for non-food consumption. It implies that there is a high consumption difference between the poor and non-poor households. The non-poor households consume much more food and non-food items than the poor.

Table 14: Food and Non-Food consumption expenditure of rural West Belesa people

Descriptive	Food expenditure consumption		Non-food expenditure		Food and non-food expenditure	
	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor
Mean	5764.39	2346.94	1801.69	1060.95	7566.08	3407.9
Std. Deviation	2244.42	648.5	984.81	425.29	2458	738.43
Minimum	1991.57	910.31	34.64	292.54	4461.48	1249.94
Max	16589.9	3665.58	4983.17	2396.93	18808.3	4411.81
t	12.76***		6.12***		14.15***	

***-significant at 1 percent probability level
Source: Own survey data computation, 2019

4.1.2.5 Food consumption expenditure

The calculated share of calories obtained from different food items like cereals, pulses, vegetables, livestock products, and other food items accounted for 85.3, 4.6, 2.2, 3.35 and 2.25 percent respectively. The share of consumption of food over the nonfood consumption at the studied woreda was higher than the national average share which is 53 percent (NPC, 2015/16). This result showed that West Belesa rural households spent more on food consumption than non-food consumption. These results happen due to the reduction of crop prices at the kebele level. The crop price reduced due to lack of main market access at the near distance which has mean market distance of the poor household far from the residence and they traveled for an average of 69.15 minutes to reach the main market but the non-poor household traveled mean of 53.56 minute to arrive the main market. Because of market information and travel cost, the nearest farmers to market had a better opportunity to get different food items by lower cost than the far farmers.

Table 15: Food consumption expenditure per year per AE in west Belesa

Food consumption per AE	Poverty status	Statistics			
		n	Mean (Et.Birr/year/AE)	Std. Deviation	t-value
Creal consumption per year per adult equivalent	Non-poor	120	3238.43	1726.44	9.600***
	poor	74	1263.97	483.78	
Pulse consumption per year per adult equivalent	Non-poor	120	814.82	609.031	6.269***
	poor	74	345.70	263.54	
Vegetable consumption per year per adult equivalent	Non-poor	120	232.70	271.30	4.02***
	poor	74	97.92	124.35	
Spices consumption per year per adult equivalent	Non-poor	120	443.57	289.24	4.82
	poor	74	252.07	230.92	
Other food item consumption per year per adult equivalent	Non-poor	120	425.46	375.15	4.93
	poor	74	187.28	226.44	
Animal product consumption per year per adult equivalent	Non-poor	120	571.94	580.65	5.17***
	poor	74	200.03	271.66	
food consumption per year per adult equivalent	Non-poor	120	5764.39	2244.42	12.762***
	poor	74	2346.94	648.50	
Non-food expenditure	Non-poor	120	1801.69	984.81	6.12***
	poor	74	1060.95	425.28	

Source: Own survey data computation (2019)

The observed data showed that the majority of the rural people spent 62.28 percent of their food expenditure for cereals but 4.58 percent of their food expenditure was spent to purchase for pulses. The rural poor and non-poor people in the woreda spent more on food mainly for cereals and less on vegetables.

4.1.2.6 Non-food Consumption Expenditure

The executed result showed that rural households consume non-food items along with food items to fulfill the basic needs of the individual and household level. Among the non-food basic consumption expenditures, housing, clothing, health service for human as well as for animal and the social ceremony were listed as basic noon-food consumption. The non-poor household spent a mean of birr 2105, 2561.08, 968.67, 153.4 and 1596.88 for housing, clothing, health service for human as well as for animal and social ceremony expenditure

respectively but the poor household were spent a mean of birr 1569.73 1742.57, 498.67, 58.77 and 650.27 for housing, clothing, health service for human as well as for animal and social ceremony expenditures respectively. This result indicated that the poor household can't afford easily the non-food items and consume much less than the non-poor household. Even the poor household can't satisfy basic-needs.

Table 16: Non-food Expenditure at HH level in the rural west Belesa

Descriptive	Annual house rental value (Et. Birr/year/AE)		Clothing expenditure (Et. Birr/year/AE)		Medical expenditure (Et. Birr/year/AE)		Animal health expenditure (Et. Birr/year/AE)		Social ceremony expenditure (Et. Birr/year/AE)	
	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor
Mean	2105	1569.73	2561.08	1742.57	968.67	498.68	153.4	58.77	1596.88	650.27
Std. Deviation	1379.12	933.12	2458.49	1160.79	1581.87	873.09	229.92	60.26	1766.54	776.29
Minimum	240	180	0	150	0	0	0	0	0	0
Max	8640	4800	20000	5200	10000	6000	1700	230	9000	5000

Source: Own survey data computation (2019)

4.1.2.7 Extent of rural poverty through consumption expenditure approach

Absolute poverty measure developed by Foster, Greer, and Thtorbecke (1984) was used to explain the extent of poverty in the study area through headcount index, poverty gap index, squared poverty (severity of poverty) and inequality. Based on the consumption-based poverty line, the mean of total expenditure among the poor was birr 3407.896 Et.Birr/year/AE. Then the mean poverty gap was calculated. Based on the expenditure data, the mean poverty gap was 1027.284 Et.Birr/year/AE so the poverty indices were calculated.

$$mean\ of\ poverty\ gap = (Poverty\ line - total\ expenditure\ among\ the\ poor).$$

Headcount index: The household survey data shows that the headcount index, which measures the proportion of population below the poverty line of the study area, estimated that 38.1percent. The result also shows that 38.1 percent of the people can't achieve their daily minimum consumption per AE. These results showed that a number of poor people below the poverty line were higher in West Belesa as compared to Amhara region which had 28.8 percent of the rural household under the poverty line (NPC, 2015/16:21).

The poverty gap index: The poverty gap index measures the mean aggregate consumption poverty gap in the population relative to the poverty line which estimated to be 8.84 percent. This result was higher than the national poverty gap index which is 7.4 percent (NPC, 2015/16). This result indicated that there was a high poverty gap between the poor and non-poor rural household in West Belesa.

Poverty Severity: The FGT severity index (the squared poverty gap) result in consumption expenditure shows that 3.1 percent. This estimation indicated that poverty severity in the Woreda was lined with the national poverty severity index which is 3.1 percent (NPC, 2015/16).

Table 17: Extent and severity of poverty in West Belesa in percentage

Measurements	West Belesa	Poverty indices in Ethiopia	
		National	Rural Ethiopia
Poverty head count index	38.1	23.5	25.6
Poverty gap	8.84	6.7	7.4
Poverty severity	3.1	2.8	3.1
Gini coefficient	26	32.8	28.4

Source: Own survey data computation (2019) but the national data were collected from (NPC, 2015/16:19)

4.1.2.8 Gini coefficient of inequality

The most widely used single measure of inequality is the Gini coefficient (World Bank, 2005:97). It is based on the Lorenz curve, which is a cumulative frequency curve that compares the distribution of income/ consumption with the uniform distribution that represents equality. The Gini coefficient of the woreda is about 0.26. This result shows that the woreda had better consumption expenditure inequality among households as compared to the national rural Gini coefficient of 28.4 percent (NPC, 2015/16). If the value of coefficient approaches to 1 inequality becomes higher so the executed result showed that the value was below 0.5 that means in the area the gap of consumption expenditure between the poor and non-poor rural household were relatively at the same level.

Consumption expenditure inequality curve

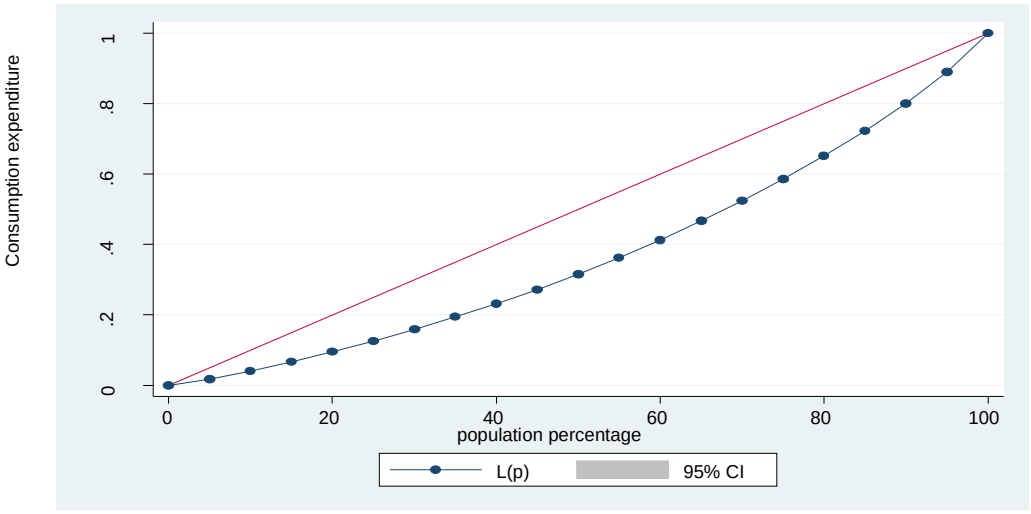

Figure 3: Lorenz curve show the consumption inequality between the poor and non-poor HH

4.1.3 Rural poverty and household characteristics

4.1.3.1 Demographic characteristics of the woreda

The surveyed data results showed that 21 (47.73 percent) of the respondents were poor female while 74 (34.67 percent) of the people were poor male but 23 (52.27 percent) female and 98 (65.33 percent) males were non-poor.

Table 18: Status of consumption-based rural poverty by sex

Sex of the respondent	n	Poverty status of the HH			Percent	Total	Percent
		poor	Percent	not poor			
female	n	21	47.73	23	52.27	44	100
male	n	53	35.33	97	64.67	150	100
Total	n	74	38.1	120	61.9	194	100

Source: Own survey data computation (2019)

Age of the household head: The average age of the poor household was 41.04 with the standard deviation of 10.67 while the age of non-poor household was 41.54 with the std. deviation of 11.21. This age group indicated that the majority of the rural households were in the active labor force category.

Family size: There is no significant difference in family size between the poor and non-poor household s. The poor household had a mean family size of 6.04 but the non-poor household had a mean family size of 5.68. The dependency ratio of poor household and non-poor household in the woreda were the mean of 0.41 and 0.39 with the standard deviation of 0.17 and 0.17 respectively. This result showed that the dependency ration of the people in the household who is aged less than 14 and age above 60 was not much higher as compared to national average 80.52 percent (World Bank, 2016).

Household head years of education: The average educational status of the non-poor household was grade 2.68 but the poor household head had a grade of 1.65. The rural household education status in the study area was very low. This result indicated that there is no education expansion and enrolment in the study woreda.

Table 19: Demographic Characteristics of the woreda

List of variables	Poverty status of Rural HH	Group Statistics			
		n	Mean	Std. Deviation	t-value
age of the respondent	poor	74	41.04	10.67	-.308
	Non-poor	120	41.54	11.21	
Family size	poor	74	6.04	1.79	1.340
	Non-poor	120	5.68	1.81	
Education status of HH head	poor	74	1.65	2.81	-2.162*
	Non-poor	120	2.68	3.47	
Dependency ratio	poor	74	.41	0.17	.930
	Non-poor	120	.39	0.17	

*: 10 percent significant level
Source: Own survey data computation (2019)

4.1.3.2 Economic characteristics and rural household poverty

The number of oxen: Oxen are among the very important assets in the rural community they used for draft power as well as an indication of wealth status. The mean number of trained plowing oxen for non-poor household was 1.28 with the std. deviation of 0.735 but the poor household holds 0.91 trained plowing oxen with the std. deviation of 0.645. This result indicated that the majority of the rural poor household possessed one ox or not have ox while the non-poor household possessed more than one ox. The poor household may not cultivate all lands due to the lack of plowing animals. This condition can affect crop production and reduce consumption and income of the rural household that leads to consumption-based poverty.

Land Holding Size: Land is a blood vessel of the rural community and the key productive asset. The rural community life is highly correlated to the land asset. The executed data results

show that the poor household holds less cultivable land than the non-poor which was the mean land size of 1.95 *timad* but the non-poor household holds a mean size of 2.429 *timad.* And also the poor and non-poor households cultivated the land during the 2009/10 cropping season had different land size. The poor cultivated the mean farmland of 4.15 *timad* but the non-poor household cultivated the mean farmland of 6.73 *timad* through rent/shared in mechanisms. The landholding size of the woreda is larger than as compared to the average landholding size of the Amhara region which is 0.4 *timad* per household (CSA, 2017:29). This result indicated that the farmers in the study area had more fragmented land. This land fragmentation may reduce agricultural production and productivity through reduction of agricultural technology utilization. This may lead to poverty.

Livestock ownership (TLU): In the woreda, farmers perform mixed agricultural practice they produce the crop and raise cattle, equine and poultry. In the calculation of TLU, oxen, cow, heifers, bull, and calves, donkeys, goat, sheep and mature chicken were evaluated based on their conversion factors. The surveyed data showed that there was highly (0.001) significant difference between the poor and non-poor households in the number of livestock holding. The poor household possessed 2.56TLU while the non-poor rural household possessed 4.01 TLU. This result indicated that the non-poor hold a higher amount of livestock than the poor rural HH. In the rural community, livestock is used as a source of food as well as a source of income. The household who has much livestock got much food and income so the HH who got much food and income he/she becomes under the non-poor category.

Irrigation Accesses: Irrigation activity is a very important technology for generating additional income from their cultivated land. The study woreda is characterized by unreliable rainfall and moisture stress area but the woreda blessed by many annual and seasonal rivers that used for irrigation activity, unfortunately, the rural household didn't utilize this ample resource because of many factors. The table 13 data result showed that the poor and non-poor rural household cultivated own irrigation land size in 2017/18 cropping season had no significant difference among them they cultivated a mean of 0.18 *timad* and 0.31 *timad* irrigation land respectively.

Table 20: Economic variable description in West Belesa

Variable	Poverty status	n	Group Statistics			
			Mean	Std. Deviation	F	t-value
Off/non-farm income in Et.Birr/year/AE	poor	74	1400.03	2859.95	6.50	-1.09
	Non-poor	120	2251.11	6298.96		
Number of plowing oxen	poor	74	0.91	0.65	4.88	-3.64***
	Non-poor	120	1.28	0.74		
Land holding size in *timad*	poor	74	4.15	2.70	3.31	-5.04***
	Non-poor	120	6.73	3.87		
Irrigation land cultivated in *timad*	poor	74	0.18	0.42	2.40	-1.53
	Non-poor	120	0.31	0.62		
Livestock holding (TLU)	poor	74	2.57	1.68	11.66	-3.95***
	Non-poor	120	4.01	2.85		

***: sig. at 1, percent probability level
Source: Own survey data computation (2019)

4.1.3.3. Participation of off/non-farm activities

Off/non-farm activity is very pertinent activity in the rural community to diversify the household income that used for smooth consumption levels throughout the year. So the data showed that 49 (25.26 percent) of the sampled rural household participated off/non-farm activity among this 28 (51.1 percent) and 21(42.9 percent) were the non-poor and poor households respectively. 32 (16.5 percent) of the sampled households were participated in a safety net program. Among the total participants, 19 (59.4 percent) and 13 (40.6 percent) were poor and non-poor households. The chi-square test result indicated that there was no significant difference in the participation of off/non-farm activity between the poor and non-poor households but there was a significant difference in the participation of safety net programs among the poor and non-poor household. The listed result indicated that the rural community in the study woreda had not participated in off/non-farm activities to generate additional income. This may happen due to lack of created off/non-farm activities in the study woreda.

One of the most criteria for participation in the safety net program is food-based poverty. So in the study woreda, the poor households have more participated in a safety net program than the non-poor households.

Table 21: participation of off/non-farm activity and safety net program at West Belesa

Answer		Participation of off/non-farm activity			Participation of the safety net program		
		Poverty status of rural HH		Total	Poverty status of rural HH		Total
		Non-poor	poor		Non-poor	poor	
no	n	92	53	145	107	55	162
	percent	63.4	36.6	100.0	66.0	34.0	100.0
yes	n	28	21	49	13	19	32
	percent	57.1	42.9	100.0	40.6	59.4	100.0
Total	n	120	74	194	120	74	194
	percent	61.9	38.1	100.0	61.9	38.1	100.0
Pearson Chi-square=.617, ns Likelihood Ratio= .612, ns					Pearson Chi-square=.7.321, ** Likelihood Ratio= 7.110, **		

4.1.3.4 Access to extension service

Well organized extension service is very important for the improvement of agricultural production and productivity through the improvement of farmer's skill and knowledge by different extension methods. Among the extension methods, extension visits, training and field day are very important group extension method used to transfer knowledge and skills for the rural community (Mesfin, 2018). Table 16 results showed that there was no significant difference in extension service among the poor and non-poor households. This situation happened due to the agricultural extension approaches. The development agent serves for both poor and non-poor farmers that live in the kebele. Also, the extension service is not such effective they contact the farmers a mean of 16.7 times within a year and the farmer participated field day and training not more than 2 times a year.

Table 22: Access to extension services at West Belesa

Variable	Poverty status	n	Group Statistics			
			Mean	Std. Deviation	F	t-value
Number of extension contact within 12 months	poor	74	16.70	22.16	1.50	0.18ns
	not poor	120	16.22	16.16		
Agricultural related training	poor	74	1.59	2.32	0.00	-0.51ns
	not poor	120	1.76	2.05		
Number of field day participated	poor	74	1.15	3.29	0.69	-0.28ns
	not poor	120	1.25	1.67		

Ns: no significant variables
Source: Own survey data computation (2019)

4.1.3.5 Accesses and proximity of infrastructure

Infrastructure is one of the basic factors of human development that improve the wellbeing of the community (UNDP, 2018:42). Proximity and access to infrastructure are a varied essential opportunity for leading an easy and comfortable life in the rural community they can access many things easily. Important infrastructures like the nearest market, farmer cooperatives, agricultural office, main road, and nearest town were evaluated based on proximity within walking distance in a minute. The rural poor and the non-poor households traveled a mean of 43 minutes (4.5 km) to access infrastructure. This result implies that most of the rural communities are not get infrastructure near to their residences that hinder information and can't access many agricultural inputs easily.

Market place is very essential infrastructure for the rural community. The executed result indicated that there is a significant distance difference between the poor and non-poor to access the nearest market place. The poor household got the nearest market after traveling 71.47 minutes while the non-poor farmer got the nearest market after traveling 52.13 minutes. In the rural community market place used for information sharing center; they exchange different information among themselves and also used for social interaction and exchange different ideas and goods.

Town: In our country town is the center of everything. Most infrastructures are constructed in the town better than the rural area. So to access information and agricultural inputs the farmer goes to the nearest town. The poor farmer travel 97.81 minutes to get the nearest town but the non-poor farmer travel 72.25 minutes.

Table 23: Accesses and proximity of infrastructure in West Belesa

Variable	Group Statistics					
	Poverty status	n	Mean	Std. Deviation	F	t-value
Distance of the nearest market from the residence	poor	74	71.47	57.857	9.067	2.546*
	Non-poor	120	52.13	47.040		
Distance of residence from farmer cooperatives	poor	74	28.57	37.929	1.412	.827
	Non-poor	120	24.64	27.989		
Distance of residence from farmer training center	poor	74	23.68	21.537	.334	.748
	Non-poor	120	21.47	18.940		
Distance of residence from main road	poor	74	18.61	21.371	.001	-.083
	Non-poor	120	18.86	19.794		
Distance of residence from nearest town	poor	74	97.81	79.933	22.797	2.577*
	Non-poor	120	72.25	57.824		

*: significant at 10 percent probability level
Source: Own survey data computation (2019)

4.1.3.6 Food shortage and copping strategy

The household survey data result showed that the majority of the rural household faces food shortage during July up to September. During this time there is no any type of crop harvested in the woreda so the rural people finished their food item and face critical food shortage this shortage mostly happened due to drought/moisture stress (23.34 percent). The food shortage problem faces the poor people than the non-poor household in the rural household. Food shortage is a chronic problem in the developing country that affects the daily activity of human being that leads to poverty. The rural household in the woreda face crop failure due to many constraints among the major constraints 51 percent of the crop failure was observed by pest and disease. To cop up the food shortage majority of the rural household either poor or non-poor household took credit from other used as food shortage problem coping mechanism.

Mostly the poor and non-poor rural community faces critical food shortage from June to September. This situation expected in subsistence farming system. Most farmers were not having enough food consumption for year-round much number of farmers face food shortage.

Crop failure: The occurrence of crop failure is the most important agricultural problem that aggravates food shortage in the community. The existence of crop failure may happen due to natural hazards, low agricultural input utilization and lack of crop management practice. During the 2017/18 cropping season, 37 percent of poor households and 63 percent non-poor households have perceived the existence of crop failure. The poor households were highly sensitive to crop failure than the non-poor households. Most of the time the poor household crops are sensitive to shocks because the poor can't afford the use of agricultural inputs. Agricultural inputs like fertilizer, seed, and chemicals are not affordable for the poor farmers.

Source of crop failure: the source of crop failure was drought/moisture stress, disease, and pest, flood and hail damage. Among the source of crop failure moisture stress and pest and disease was the major factor of crop failure at west Belesa. (51.7 Percent) of crop failure was occurred due to moisture stress while (66.7 percent) of the non-poor household expected that the crop failure occurred due to snow and flood damage. This result shows that most of the crop failure in the study woreda is occurred due to natural phenomenon. Due to these challenges, the community faces food shortage that leads to consumption-based poverty.

Table 24: Food shortage and copping strategies at West Belesa, 2017/18

Variables			Poverty status		Total
			Non-poor	poor	
Do you face food shortage in the family?	no	n	64	19	83
		percent	77.1	22.9	100
	yes	n	56	55	111
		percent	50.5	49.5	100
Which month face critical food shortage	January to March	n	0	2	2
		percent	0	100	100
	April to June	n	1	2	3
		percent	33.3	66.7	100
	July to September	n	53	46	99
		percent	53.5	46.5	100
	October to December	n	1	1	2
		percent	50	50	100
Do you face crop failure?	no	n	16	13	29
		percent	55.2	44.8	100
	yes	n	104	61	165
		percent	63	37	100
Source of crop failure					
unknown		n	10	10	20
		percent	50	50	100
drought/moisture stress		n	14	15	29
		percent	48.3	51.7	100
pest and disease		n	64	35	99
		percent	64.6	35.4	100
snow and flood damage		n	2	1	3
		percent	66.7	33.3	100
other		n	2	1	3
		percent	66.7	33.3	100
How to recover from food shortage?	relied on neighbor	n	7	15	22
	relied on family to send food	percent	5	5	10
	took credit	n	13	14	27
	relied on family send food	percent	2	1	3
	remittance from abroad	n	1	1	2
	government aid/support	percent	3	5	8
	sold animal	n	15	9	24
		percent			

Source: own data compilation, 2019

Housing Type: Housing belongs to the basic need of humankind. It is also an indicator of wealth in the rural community. In the study woreda, the type of constructed house is used as indicator of wealth status. If the farmers live in corrugated iron sheet house he/she considered as a better-off otherwise the farmers considered as poor. There are two types of house in West Belesa corrugated and grass roof (hat) type housing. 31.1 percent and 68.9 percent of the rural poor and non-poor households live in corrugated house type while 62.8 percent and 37.2 percent of the rural poor and non-poor households live in grass-roofed (hat) type of house respectively. This indicated that there are a lot of households live in a grass roof house in the study woreda. They can't afford to construct corrugated iron roof houses.

Table 25: Type of house owned by the rural community in West Belesa

Variables	Type of house		Poverty status		Total
			Non-poor	poor	
What type of house do you have?	corrugate	n	104	47	151
		percent	68.9	31.1	100
	grass roof	n	16	27	43
		percent	37.2	62.8	100

Source: own data compilation, 2019

4.2 Result of Econometric Analysis

4.2.1 Determinants of consumption-based rural household poverty

This section holds the econometric results of the determinants of rural household consumption expenditure poverty at a household level. A logit model was used to estimate the effects of the hypothesized explanatory variables on the probabilities of being poor or not in terms of consumption-based poverty.

Prior to the estimation of model parameters, the explanatory variables were checked either the explanatory variables have multicollinearity or not among the potential candidate variables. To test the degree of multicollinearity among the 10 continuous variables and 4 dummy variables, the variance inflation factor (VIF) was used for the degree of association among the discrete variables. As shown in appendix 8 and 9 problems of multicollinearity checked by using VIF (Variance Inflation Factor) was found the mean 1.28 which shows that there is no problem of multicollinearity. Normality test was tested by the Shapiro-Wilk test of normality test of residuals (Appendix Table 4) that indicated that the residuals are normally distributed. Omitted variables and Heteroskedasaticity problems were checked by Ramsey RESET-test and Breusch-pagan test, respectively (Appendix Table 6 and 5,) the result shows that there was no omitted variable problem but there is heteroskedasaticity problem in the model for consumption-based rural household poverty. To overcome the heteroskedasaticity problem and to obtain corrected variance estimates, robust option was applied in the final model.

The logistic regression results indicated that 5 variables were found to be significantly related to the status of consumption-based rural household poverty up to 10 percent probability level.

Table 26: Result of explanatory variables in the logit model

Variables	Robust			z-value	P>|z|
	Coef.	Odds Ratio	Std. Err.		
Sex of the household head	-0.013	0.987	0.472	-0.030	0.978
Age of the household head	0.025	1.026	0.020	1.250	0.210
Family size	0.362	1.437	0.126	2.860***	0.004
Household head Years of education	-0.080	0.923	0.061	-1.310	0.189
Land holding size	-0.338	0.713	0.104	-3.240***	0.001
Land cultivated by Irrigation	-0.751	0.472	0.476	-1.580	0.115
Livestock ownership (TLU)	-0.386	0.680	0.117	-3.300***	0.001
Off/non-farm income	-0.002	0.998	0.001	-2.700***	0.007
Distance of nearest market	0.007	1.007	0.004	1.470	0.142
Distance of agricultural office	-0.010	0.990	0.005	-1.810*	0.070
Distance to farmers multipurpose Cooperatives	0.008	1.008	0.006	1.290	0.196
Number of extension contact	0.013	1.013	0.009	1.450	0.147
Participation of agricultural related training in number	-0.013	0.987	0.078	-0.170	0.866
Participation of field day event in number	-0.034	0.967	0.079	-0.430	0.669
Number of tap/radio	-0.599	0.549	0.465	-1.290	0.197
Occurrence of crop failure	-0.491	0.612	0.464	-1.060	0.290
_cons	-0.653	0.520	1.104	-0.590	0.554

***,*Significant at1 and10 percent probability level, respectively
Source: Survey result, 2019

Among the variables hypothesized to influence the rural consumption-based poverty status at household level, total land holding size (Tot_own_land), Livestock ownership (TLU), income generated from off-farm/non-farm activities (Incon_off_farm) and distance to agricultural office variables were negatively and significantly associated with consumption-based rural poverty status. Conversely, family size (fam_siz) is positively and significantly associated with consumption-based rural poverty at the household level in the woreda. The variables like sex of household head, age of household head, education status of the household head, cultivated land by irrigation, distance to nearest market, distance to farmers multipurpose cooperative, extension contact, field day participation, numbers of radio/tap and crop failure

were not the determining variable of consumption-based poverty in the study area. Consumption-based rural poverty is highly dependent on agricultural production; that is why the significant variables are the factor of agricultural production. This result is also in lined with Muhdin, (2018) result. He conducted research at Dodola district of Ethiopia and identified family size, landholding size; livestock ownership (TLU), irrigable land size, and off-farm income were the significant determinants of consumption-based rural poverty.

Family Size: This explanatory variable was hypothesized to have a positive relation with consumption expenditure in rural poverty. The finding revealed that family size has a positive sign in the model that shows that there is a positive relationship with consumption-based poverty at a 5 percent significant level. The logit output indicated that, as the family size increase by one unit the probability of being poor increase by the factor of 1.437keeping other factors constant. The result indicated that in the study woreda off/non-farm activities are not available rather all the family members engaged with only agricultural activities. This finding is consigned with Daniel *et al*., (2016); Muhdin (2015).

Landholding size: This explanatory variable was hypothesized to have a negative relationship with the consumption-based rural poverty. The executed result indicated that total landholding and rural poverty had a negative relationship at 5 percent significant level. The logit output indicated that as the landholding size increase by one *timad* the probability of being poor reduced by a factor of 0.713keeping other variables constant. This result indicated that landholding size is the very pertinent asset used to produce crop production. The majority of the farmers in the study area produce agricultural production for the sake of consumption then they can reduce consumption-based poverty at the household level significantly. The finding is consistent with the findings from Girma and Temesgen, (2018) in Southern Ethiopia, at Doyogena district and Girma and Temesgen, (2018) in Southern Regional State of Ethiopia Gamo Gofa zone in 5 districts identified the variable landholding size have a significant factor of rural poverty reduction.

Livestock ownership (TLU): During the planning time the variable was hypothesized that consumption-based poverty and livestock ownership had a negative relationship. The logit output indicated that livestock ownership and consumption-based rural poverty had a negative relationship. As the number of livestock increases by one unit the extent of consumption-based rural poverty reduces by the factor of 0.680 units, keeping other variables constant. Livestock is a very important asset for the rural livelihood in the mixed farming system area. It is the second-largest source of cash income for rural households next to crop production. Households who have relatively larger livestock holdings gain more income from livestock sources and are better-off in escaping poverty than those who have lower or no income from the livestock sector (FAO, 2016). The findings from Abu, (2013); Bessler, (2014); Tsegay *et al*.,(2014); Lidi, (2017); Girma *et al*., (2018); Haile *et al*., (2018) identified that number of livestock holding have the negative determinant factor of rural poverty at different part of rural Ethiopia.

Off/ non-farm income: This variable was hypothesized that off/ non-farm activity had a negative relation to consumption expenditure poverty. Given the uncertainties of the surrounding crop production and the inadequacy of crop production in the study area, the community is also involved in the off/non-farm activities. This happens to maintain and smoothen the household food consumption level for the entire year-round at the household level. Many rural households engage in undertaking diverse activities in seeking additional income sources other than agriculture. Amount of off/non-farm income had a significant determinant of consumption-based rural poverty at 5 percent significant level. The logit output showed that as the off/non-farm activity income amount increase by one unit the probability of being poor reduced by the factor of 0.998, keeping other variables are constant. The income generated from off/non-farm income in the study area had no such influential factor of consumption-based poverty because; off/non-farm activities were not expanded in the study area. So the community can't generate additional income for their consumption. Zerihun, (2015); Hirvonen et al.,(2016) conducted research and identified that off/non-farm income had a significant determinant factor of rural poverty.

Distance of agricultural office: Agricultural office distance has a negative and significant influence on consumption-based rural poverty at a 10 percent significant level. This helps farmers to get advice frequently from agricultural experts about improved agricultural inputs and activities. In addition, new technologies are tested and demonstrated on the farmer's training center before distributed and applied by farmers. This is an opportunity for farmers, who are living nearer to the agricultural office, more likely to adopt new agricultural technologies in the stud area. A minute decrease to Agricultural office in the living kebele leads to reduce the probability of being poor by the factor of 0.99. Girma Mekore and Temesgen Yaekob (2017); Mesfin Fenta (2018) found similar results.

5. SUMMARIES, CONCLUSION AND RECOMMENDATION

5.1 Summary

Poverty is a serious and complex problem that can affect rural people through different dimensions. The complexity and severity of rural poverty vary from the two extremes which are the poorest category and the richest. Demographic characteristics, accesses, and proximity of infrastructure, social participation, economic situation and level of consumption and other conditions were varying from poor and non-poor rural household. So well understanding and dig out of area-specific empirical and relevant data about the main factor of rural poverty that hinder and aggravated the rural consumption-based rural household poverty and asset-based poverty was a key strategic point of formulating appropriate poverty reduction policy at rural household level or community level.

The study conducted in West Belesa woreda, Central Gondar administration Zone of Ethiopia. The main objectives of the study were to measure the extent of consumption-based rural household poverty and asset-based rural household poverty and analyze the determining factor of consumption-based rural household poverty in the studied woreda. The research was taking duration of 7 months from November 2018 to June 2019.

The study was used in the primary and secondary data source. The primary data were collected from 4 sample kebeles of West Belesa woreda. To collect the primary data at the household level, the study was used a two-stage probability sampling technique were adopted. At the first stage, 4 sample kebeles were identified from a total of 32 kebeles. The identified kebeles were *Talla, Dikuana, Kalay, and Ebrareg*. In the second stage, 194 sampled households were identified from 4 selected kebeles by probability proportionate to sample size. The primary data were collected about demographic characteristics of the rural household, accesses, and proximity of infrastructure, economic situation of the rural household, social participation and institutional aspects through scheduled interviews and FGD were used to supplement the scheduled information. And also the secondary data were

collected from GOs and NGOs reports and working papers as well as journals and proceedings.

To measure the extent of rural household poverty, estimation of the absolute poverty line was very pertinent task of this study. In this study, asset-based rural household poverty and consumption-based rural household poverty was used as a proxy of rural household poverty that used to calculate the absolute poverty line. The calculated absolute asset poverty line estimated by principal component analysis (PCA) method was 0.75 which is the middle quartile of the weighted asset index. Based on asset-based rural household poverty result 18.5 percent, 32.5percent 27.8 percent and 21.6 percent of the rural household were very poor, poor, medium and rich households respectively.

The rural household poverty also measured based on consumption per adult equivalent through the cost of basic need (CBN) approach. The calculated absolute poverty line was birr 4435.18 per year per AE. Among this, the food and non-food consumption expenditure were 2949.40 birr and 1485.78 birr per year per AE respectively. After the poverty line was estimated rural poverty indices were computed. The indices of the studied woreda showed that absolute poverty headcount index, poverty gap, and severity of poverty were 38.1 percent, 8.84 percent, and 3.1 percent respectively with the inequality Gini coefficient of 0.26.

In west Belesa 38.1 percent of the rural household were consumption-based poor that can't satisfy their minimum daily consumption at household level but 61.9 percent of the rural household were fulfilled their minimum daily consumption level.

Different characteristics of the rural household were executed by independent sample t-test and chi-square test of significance. To identified the determinant of consumption-based rural household poverty either the household poor or not, 18 potential candidate independent variables were evaluated by binary logistics model and identified 5 significant explanatory variables. The logistic model output result showed that family size, landholding size, livestock ownership (TLU), off/non-farm income and distance to agricultural office were found with a significant variable from 1 percent to 10 percent probability level.

5.2 Conclusion

The result of this study described in the above part of the paper indicated that the extent and determinant factor of asset-based and consumption-based rural household poverty in the study woreda were complex, deep-rooted and multidimensional in nature. Even though, the complex and deep-rooted rural poverty may reduce through integrated and well-organized poverty reduction strategy at the household and community level.

From the listed independent variables executed in the binary logit model, family size, landholding size, livestock ownership (TLU), off/non-farm income and distance of agricultural office were the significant determinant variables for consumption-based rural household poverty.

Family size had a positive determinant factor of consumption-based rural household poverty of the studied woreda. The higher the families size the higher consumption expenditure at the household level that can aggravate the rural household poverty.

Landholding size in the logit model output indicated that it is a negative significant determinant factor of consumption-based rural household poverty in the study area. To improve importance of land holding size; improving land fertility and productivity through different soil and water management practice is very essential. If the land soil fertility improves crop production and productivity also improved beside that the rural household poverty will reduce by increasing income and consumption level in the community.

The study woreda had mixed farming system practice; they grow agricultural crops along with rearing of livestock. The farmers in the study woreda used livestock as a major asset used to generating income and food for the rural household. The woreda had a favorable environment for goat and chicken. The logit result indicated that the livestock ownership (TLU) was a negative significant determinant factor of consumption-based rural household poverty.

Off/non-farm activity is a very essential job that can generate additional income for the family. This additional income used for smoothing family consumption level throughout the year and help to afford the agricultural input cost. The executed logit output showed that

off/non-farm income had a negative significant determinant variable for consumption-based rural household poverty in the studied woreda.

5.3 Recommendations

Based on the above results all determinant factors are under the factor of agricultural production. So to reduce consumption-based rural poverty in the study woreda agricultural production and productivity should be improved through irrigation activity, agricultural input utilization and animal production.

Appropriate family planning will reduce the number of families within the household through different family planning awareness creation methods. To reduce rural poverty significantly in the study area, government should be focused on untouched irrigation resource through expansion of modern scheme along with skill and knowledge improvement for the rural community and improve market linkage by upgrading the main road of the woreda to transport irrigation output to the consumer. GOs and NGOs should focus on the improvement of livestock production, especially goat and chicken through forage development and expansion of animal health facility in the woreda. And also, to diversify income sources to the rural community, the government should expand rural based cottage industries.

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7. APPENDIX

Appendix Table 1: A conversion factor of tropical livestock unit /TLU

The conversion factor used to estimate tropical livestock unit

Animal category	Tropical Livestock Unit(TLU)
Cow	1
Ox	1
Heifer	0.75
Calve	0.25
Goat	0.13
Sheep	0.13
Donkey	0.7
Chicken	0.013

Source: Storck *et al*., 1991

Appendix Table 2: Nutritional value of different food items and their price birr/kg

	Food Item	Kcal/gm	Average price birr/kg
1	Barley	3740	9.1
2	Sorghum	3750	8.95
3	Maize	4060	7.2
4	wheat	3510	13.2
5	Teff	3380	17.5
6	finger millet	3870	10.15
7	Chickpea	3650	18
8	Pepper	3470	28.6
9	Garlic	1310	16.6
10	Shallot	660	8.5
11	Tomato	220	9.25
12	Potato	840	7.7
13	Pumpkin	230	10
14	Mango	560	
15	Orange	490	
16	Banana	1110	
17	Sugarcane	620	
18	Honey	3100	
19	Sugar	3440	22.9
20	Coffee	1190	111
21	Chicken	1460	110
22	Milk	3870	13
23	Beef	2370	50
24	Mutton	2650	75
25	Egg	1400	2.75
26	Ginger	3010	35
27	Mixed spices	3110	39.6
28	Local Alcohol	400	5
29	Oil	5870	29.6
30	Lentil	3500	

31	Field pea	3470	15
32	Cabbage	170	
33	Kale	310	3
34	Mango	3700	
35	Grass pea	3480	
	salt	0	11.5

Source: FAO, 2012

Appendix Table 3: Conversion factor for adult equivalent/AE

Years of age category	Adult Equivalent Scale (AE)	
	Sex	
	Male	Female
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	0.7
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	0.8
30-60	1	0.82
>60	0.84	0.74

Source: Stefan Dercon and Pramila Krishnan, 1998

Appendix Table 4: Shapiro-Wilk test of normality of residuals

Variable	obs	W	V	z	Prob>z
Residuals	194	0.9521	6.952	4.456	0.0000

Appendix Table 5**:** Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Chi2(1)	5.47
Prob>Chi2	0.0194

Appendix Table 6: Omitted variable test by Ramsey RESET test

F(3,173)	1.59
Prob >f	0.194

Appendix Table 7: Heteroskedasticity and omitted variable tests by IM-test

Source	chi2	df	p
Heteroskedasticity	171.13	164	0.3355
Skewness	31.94	17	0.0153
Kurtosis	25.35	1	0.0000
Total	228.42	182	0.0111

Appendix Table 8: Multicollinearity test by a variance inflation factor (VIF)

Variable	VIF	1/VIF
TLU	1.89	0.528
Land holding size	1.87	0.534
Nearest market distance	1.45	0.691
Distance of agricultural office	1.41	0.712
Participation of agricultural related training in number	1.28	0.782
Off/ non- farm income	1.25	0.803
Irrigation land	1.23	0.813
Family size	1.2	0.831
Number of extension contact	1.19	0.840
Distance to farmers cooperatives	1.11	0.900
Years of household head education	1.1	0.907
Number of radio available	1.08	0.925
Occurrence of crop failure	1.06	0.945

Appendix Table 9: Survey Interview Schedule

SECTION 1: Prelude

1. Name of Respondent ……. Age…… Sex 2= male 1 = female
2. Are you the head of the HH 1= Yes 2= No
3. Kebele……village…….

SECTION 2: Demographic characteristics of the HH

	Let's discuss each member of your HH (all the people living in the same a compound, eating from the same "pot or plate" and working to sustain the family						
	First name **(start with the respondent)**		Gender **1=F 2=M**	Age (**Years**)	Literacy in years of education (formal + informal)	Involves in agricultural activities? **1= Yes 0=No**	Engaged in off-farm activities in the last 12 months?
1.	P1						
2.	P2						
3.	P3						
4.	P4						
5.	P5						
6.	P6						
7.	P7						
8.	P8						
9.	P9						
10.	P10						
11.	P11						
12.	P12						
13.	P13						
14.	P14						

SECTION 4: Access to infrastructure

Let's discuss community level infrastructures:

		In Km	In minutes of walking distance (**minutes**)	
1.	How far is the **nearest market** from your residence?			
2.	How far is the nearest **source of improved seed** from your residence?			
3.	How far is the nearest **source of fertilizer** from your residence?			
4.	How far is the nearest **source of herbicides/pesticides** from your residence?			
5.	How far is the **nearest farmer cooperative** from your residence?			
6.	How far is the **nearest agricultural extension office** from your residence?			
7.	How far is the **Farmer Training Center (FTC)** from your residence?			
8.	How far is the **nearest human health center** (not post) from your residence?			
9.	How far is the **nearest animal health center** from your residence?			
10.	How far is the **nearest school (grade 1-8)** from your residence?			
11.	How far is the **nearest school (grade > 9)** from your residence?			
12.	How far is the **nearest main road** from your residence?			
13.	How far is the **nearest town** to your residence?			
14.	How far is the HH obtain **drinking water?**			
15.	Does the HH have **ELECTRICITY**?	1 = Yes 0 = No		
16.	Where does the HH obtain **drinking water** from?	**Code F** 1 = Communal tap/stand pipe 2 = Rain water harvested from roof /runoff 3 = Surface water (lake/pond/stream/spring) 4 = Subsurface water		
17.	How many HHs share this **drinking water** source?	Number of HHs:----------		
18.	Where does the HH obtain **water for an animal**?	Choose from the above **Code**		

Section 5: ASSET

Ask about each of the following items and indicate how many of each is owned by the HH. (EXCLUDE BROKEN OR OUT-OF-FUNCTION ITEMS)

	Asset	How many […] do you have in the HH?	What is the current price of […] **(In Birr estimate)** *(if more than two items, take average price)*
	Animal scotch cart (the cart only)		

	Bicycle		
	Generator		
	Horse/mule cart		
	Mobile Phones		
	Motorbike		
	Grain mill		
	Plowing oxen		
	Ox-plough set		
	Sprayers		
	Bajaj (not English)		
	Improved grain storage		
	Private water well		
	Radio, cassette or CD player		
	Sewing machine		
	Television		
	Water pump		
	Solar panels		
	Ground balance		
	Other assets		

SECTION 6: Social Participation

6.1 Let's discuss whether any member of this HH is a member of any formal or informal institution.			
No.	Type of group/association	Is anyone in the family a member of [..]? **1=Yes 0=No**	Who is the member? 1= Husband 3= Children 2= Wife 4= Husband & wife 5=All 6 = Other
1	Producers' cooperative		
2	Local administration		
3	Women's association		
4	Youth association		
5	Seed growers Associations		
6	Multipurpose farmer cooperatives		
7	Saving and credit group/association		
8	Funeral association		
9	Water users' association		
10	Other, specify…….		
11	For how many years have you lived in this village? ……		
12	How many traders do you know in this nearest market who can buy your seed and grain?		

SECTION 7: Landholding and Crop production for 2009/2010 cropping season

	Subsection 7.1: Landholding (*timad*) during the 2010/2011 cropping season		
	Land category	Cultivated land size (vegetables + annual + permanent crops (e.g., tef, chickpea, sorghum,	Uncultivated land size (e.g. grazing, homestead, etc)
1.	Own land used		
2.	Rented/shared inland		
3.	Rented/shared outland		

Subsection 7.2: Plot characteristics

23.	**How many plots of farmland do you have?**						**Number of plots: …….**		
	Let's discuss about each of the plots:								
		Plot 1	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**	**Plot 6**	**Plot 7**	**Plot 8**
1	Name of plot								
2	Size of a plot (*timad*)								
3	How far is it from your residence to walk on foot? **MINUTES**								
4	How fertile is it? **Code C**								
5	How much the size of […] for irrigation?								
	Code A 1. Own 2.Rented in/shared in 3. Shared out/rented out 4. Gift 5. Loaned for free 6. Other						**Code C** 1.Very fertile 2.Fertile 3. Medium 4. Infertile		

Section 8: HH Income/Expenditure

Subsection 8.1: Production, consumption, and selling of *Meher* Crop for 2009/2010 cropping season

	Crop type	Amount produced (Kg)	Consumed at home from own product	Amount sold (kg)		Purchase from the market for consumption		Stored for the next season in kg
				Amount	Unit price	Amount	Unit price	
	Staple foods							
1	Tef							
2	Maize							
3	Wheat							
4	Barley							
5	Sorghum							
6	Chickpea							

7	Finger millet							
8	Potatoes							
10	Lentil							
11	Grass pea							
12	Field pea							
13	Haricot bean							
14	Sweet potatoes							
	Others							
	Vegetables							
15	Tomatoes							
16	Onions							
17	Cabbage							
18	Kale (Yehabesha Gomen)							
19	Carrot							
20	Pumpkin							
21	Pepper							
22	Garlic							
23	**others**							
24								
25								

No.	Crop type	Amount produced (Kg)	Consumed at home from own product in kg	Amount sold (kg)		Purchase from the market for consumption		Stored for the next season in kg
				Amount	Unit price	Amount	Unit price	
	Fruits							
26	Oranges							
27	Mangoes							
28	Bananas							
29	Sugar cane							

30	Coffee bean							
31	Tea (leaves)							
32	Local beer							
33	Soft drinks							
34	Bottled beer							
	Others							
	Fats and oils,							
35	Cooking oil							
36	Bread							
37	Biscuits							
38	Sugar							
39	Salt							
40	Curry (Spices)							
	Ginger							
	Others							
	Crop type	Amount produced (Kg)	Consumed at home from own product	Amount sold (kg)		Purchase from the market for consumption		Stored for the next season in kg
				Amount	Unit price	Amount	Unit price	
	Staple foods							
42	Goat meat							
43	Sheep meat							
44	Chicken							
45	Fish							
46	Eggs							

47	Milk							
48	Cheese							
49	Butter							
50	Yogurt							
51	Honey							
52	Other							

If you rented in land for *meher*, how much do you pay? ……..kg of …….. or …….birr

If you rented out the land for *meher*, how much do you got? ……..kg of …….. or …….birr

Section 8.2: Irrigation Activity

1. Do you have irrigation accesses 1=yes 2= no if yes, what is the source of irrigation water 1= dam 2=river diversion 3=spring 3=shallow well-5=motorized pump 6= pond 7= other specify…….

If yes how many irrigable plots do you have in *timad* --------- and type of crop grown

crop name	Area in *timad*		Amount harvest in kg		Pay for land rent	Sold		Consumed In kg	Stored in kg
	Own land	Rented in	Own land	Rented in	Amount	Amount	Unit price kg/birr		

If you rented in land for irrigation, how much do you pay? ……..kg of …….. or …….birr

If you rented out the land for irrigation, how much do you got? ……..kg of …….. or …….birr

If no, reason (multiple answers) 1=have no irrigation water 2= have no labor 3= have no capital 4=have no interest 5= have no awareness 6= security problem 7=market problem 8= other specify----------

Section 9: Labor Demand for *meher* and irrigation for 2009/2010 cropping season

Activity	Labor source						wage (man-day)
	Meher			Irrigation			
	Own family	Debo	hired	Own family	Debo	hired	
Land preparation							
Sowing							
Weeding							
Fertilization							
Chemical application							
Harvesting							
Threshing							
Other …..							

Section 10: Input Utilization

10.1 Seed used for 2009/2010 cropping season

Crop name	Have you purchased any seed for the 20010/011cropping season? 0. No (SKIP to Sec 10.2) 1. Yes						
	Variety name	Quantity (**Kg**)	Is it improved? **1 = yes 0 = no**	Where do you get (**cod A**)	How much did it cost **(Birr/kg)?**	Will you recycle/replant the seed? **1 = yes 0 = no**	**Code A** 1= from market 2=neighbor farmers 3= Agri office 4= Research center 5= other source
1	i.						
2	ii.						
3	iii.						
4	iv.						

10.2 Fertilizer, compost and chemicals (*meher* and irrigation) Utilization

Did you use fertilizer, compost, and chemicals for 2009/2010 cropping season?

1= yes 2=no (If no, **skip sec. 11**)

	Fertilizer				Chemical				Compost			
	Type	Amount in kg		Cost birr/quintal	Type	Amount **Specify unit**		Cost birr/lit/kg	Amount in kg			
		Meher	Irrig			*Meher*	Irrig		*Meher*	Irri		
1	DAP				Pesticide							
2	Urea				Herbicide		2`					
	Total											

SECTION 11: Livestock production and marketing

	Sub-section 11.1: Livestock ownership and estimated market value		
	Livestock type	How many […] do you currently own?	What is the current market price of your […]? (***Birr***) **(if more than one livestock, take average**
1.	Milking cows		
2.	Non-milking cows (mature)		
3.	Trained oxen for plowing		
4.	Bulls		
5.	Heifers		
6.	Calves		
7.	Mature goats		
8.	Young goats		
9.	Mature sheep		
10.	Young sheep		
11.	Donkeys		
12.	Horses		
13.	Mules		
14.	Mature chicken		
15.	Traditional beehives		
16.	Modern beehives		

Sub - Section 11.2: Livestock and livestock products selling and buying activities over the last 12 months

		Selling			Buying		
		Have you sold any […] over the last 12 months? **1 = Yes 0 = No**	Quantity sold	Average price (Birr/unit)	Have you bought any […] over the last 12 months? **1 = Yes 0 = No**	Quantity bought	Average price (Birr/unit)
17.	Milking cows						
18.	Non-milking cows (mature)						
19.	Trained oxen for plowing						
20.	Bulls						
21.	Heifers						
22.	Calves						
23.	Mature goats						
24.	Young goats						
25.	Mature sheep						
26.	Young sheep						
27.	Donkeys						
28.	Horses						
29.	Mules						
30.	Mature chicken						
31.	Traditional beehives						
32.	Modern beehives						
	Animal products						
33.	Milk and Yoghurt						
34.	Butter						
35.	Cheese						
36.	Eggs						
37.	Beef						
38.	Mutton						
39.	Honey						
40.	Fish						
41.	Hide						
42.	Skin						
43.	Manure						

Section11.3: Income Source from now/off-farm Activities

No.	**If any member of the family involves on off-farm activity 1= yes 0= no (** skip next section)				
	Name of participant	Type of activity **(Code A)**	The monthly average income in birr	Do you participate in a safety net program	
1				**1= yes 2= no**	**(If Yes) Amount received in birr**
2					
3					

Code (A)

1=Farm Worker (for wage like weeding, harvesting…..) 2=Hand craft (skin, pottery, metalwork, waving, carpenters, ……) 3=Professional (GOs and NGOs employee like a teacher, administration, health worker, guarding, etc..)

4= Trader 5= Soldier, 6= Driver/operator 7= unskilled worker (daily laborer out of agriculture)

8= House servant 9= Food/cash for work (sentient), 10= Remittance 11=others (specify) ____

Subsection 12: Market Information access

	Commodity	Did you get market information before you decided to grow/raise [..]?		Did you get market information before you decided to sell [..]?		Have you ever taken […] to the market and been unable to sell?
		1= Yes 0 = No	If **Yes**, Source? **CODE D**	**1= Yes 0 = No**	If **Yes**, Source? **CODE D**	**1= Yes 0 = No**
1	Livestock					
2	Crop					

Code D

1 = Government extension service 2 = Government research service 3 =Farmer Cooperatives or groups
4 = Neighbor farmers 5 = Seed traders/Agro-dealers 6 = NGOs
7 = Private and international research institutions 8 = Markets 9 = Radio/Television
10=Mobile phone 11 = Others

Section 13: Rural Credit

13.1 Let's discuss whether you have faced any fund shortage for agricultural activities and access to rural credit

1	Are there times you have a critical shortage of available funds for agricultural activities?	1 =Yes 0 = No (**SKIP to Qn 3**)
2	In which months do you face critical fund shortages?	1 = January to March 2 = April to June 3 = July to September 4 = October to December
3	Did you receive any cash and/or input credit of any source in the last 12 months for crop or livestock production or HH consumption?	1 =Yes 0 = No (**SKIP to que 1**)

Access to Agricultural extension services

Source	How many times did you interact with […] in the last 12 months?	How many field days did you attend in the last 12 months organized by [...]?	Did you discuss crop production with […] in the last 12 months? **1 = Yes 0=No**	How many farming-related training organized by [...] did you attend in the last 12 months?
Government extension service				
Research center				

13.2 Let's discuss the types, quantity, and source of each of the credit types you acquired

		Have you ever received [..]? **1 = Yes 0 = No**	From whom? **CODE G**	How much? (with **unit**)	Did you get the […] in time? **1 = Yes 0 = No**	Will you be able to pay back the [..] in time? **1 = Yes 0 = No 3 = Not applicable**	Do you plan to continue taking [..]? **1 = Yes 0 = No**
4	Cash loan						
5	Food loan						
6	Seed loan						
7	Fertilizer loan						
8	Herbicide/pesticide loan						
9	loan for farm implements/weeding, …						
10	Loan for plowing animals						
11	Loan for irrigation						
12	loan for non-farm business						
13	loan for another debt repayment						
14	Loan for utilities (water, education, etc)						
		CODE G: 1 = Bank 2=Primary cooperatives 3= Saving and credit association 4= Local money lender 5= Neighbor farmers 6 = NGO 7 = Government organization 8= Relatives 9= edir 10 = Other					

1. Do you participate in saving practice? what amount of monthly money deposit in the institution…….birr/month

1.2. Is it 1= formal 2= informal **specify the name**……

SECTION 14: Coping with food insecurity

Did you face crop failure for the last 12 months? 1= yes 2= no If yes what is the cause of crop failure

1= drought/moisture stress 2= past and disease 3= snow and flood damage 4=Tift 5= other specify……..

1.	In which months do you face critical food shortages?	1 = Yes 0 = No **(SKIP to Qn. 2) If yes which month** 1 = January to March 2 = April to June 3 = July to September 4 = October to December
2.	If there were, why did they happen?	1 = Drought/moisture stress 2 = Poor harvest 3 = Lost job 4 = Death in the family 5 = Unreliable income 6 = Inflation 7= Frost/hail damage 8 =Disease
2.	If there were, why did they happen?	9 = Other, specify -
3.	How did the HH recover from this?	1 = Relied on neighbors 2 = Relied on family to send food 3 = Took credit 4 = Relied on the family to send money 5 = Remittances from abroad 6 = Sent children away 7. Government aid/support 8 = sold animals 9= Other,

Section 15: Non-Food Expenditure in birr/year for all family members in the last 12 months

No	House rental value			Cloth and shoe	Educational expense	Transport Cost	Medical cost	Governmental fee	Animal feed	Animal health	Social ceremony	Another cost (soap, house materials
	Type (cod A)	No	Av. price									
1												
2												
3												

Code A, 1= corrugate 2= grass 3= cemented bricks

THANK YOU//