

2020-10-14

# የጾታ ጾታዊ ስራዎች ለጾታዊ DIVERSIFICATION IN OFF / NON-FARM ACTIVITIES IN FOGERA DISTRICT, AMHARA REGION, NORTH-WESTER

MELAK, ALAMIREW

---

<http://hdl.handle.net/123456789/11396>

*Downloaded from DSpace Repository, DSpace Institution's institutional repository*



**BAHIR DAR UNIVERSITY**

**COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCE**

**DEPARTMENT OF RURAL DEVELOPMENT AND AGRICULTURAL  
EXTENSION**

**RURAL DEVELOPMENT MANAGEMENT PROGRAM**

**RURAL HOUSEHOLDS' LIVELIHOOD DIVERSIFICATION IN OFF / NON-FARM  
ACTIVITIES IN FOGERA DISTRICT, AMHARA REGION, NORTH-WESTERN,  
ETHIOPIA**

**MSC.THESIS**

**BY:**

**MELAK ALAMIREW ABEBE**

**July, 2020**

**Bahir Dar Ethiopia**



**BAHIR DAR UNIVERSITY**

**COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCE**

**DEPARTMENT OF RURAL DEVELOPMENT AND AGRICULTURAL  
EXTENSION**

**RURAL DEVELOPMENT MANAGEMENT PROGRAM**

**RURAL HOUSEHOLDS' LIVELIHOOD DIVERSIFICATION IN OFF-farm/ NON-  
FARM ACTIVITIES IN FOGERA DISTRICT, AMHARA REGION , NORTH-WESTERN  
, ETHIOPIA**

**MSC.THESIS**

**BY:**

**MELAK ALAMIREW ABEBE**

**SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE (M. SC) IN RURAL DEVELOPMENT MANAGEMENT**

**MAJOR ADVISOR: ASSEFA ABELINEH (ASSISTANT PROFESSOR)**

**CO-ADVISOR: BERIHANU MELESE (ASSISTANT PROFESSOR)**

**July, 2020**

**Bahir Dar, Ethiopia**

## APPROVAL SHEET

We, the undersigned, members of the board of examiners of the final open defense by Melak Alamirew has read and evaluated his thesis entitled “**Rural households’ livelihood diversification in off-farm and non-farm activities in Fogera district, north western Ethiopia**” and examined the candidate. This is therefore to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree of Master of Science in Rural Development Management.

Wuletaw Mekuria (Ph.D.)



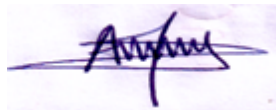
18/08/2020

\_\_\_\_\_  
Name of External Examiner

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Alemaz Gizew (Ph.D.)



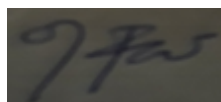
18/08/2020

\_\_\_\_\_  
Name of Internal Examiner

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Girmachew Seraw (Ph.D.)



18/08/2020

\_\_\_\_\_  
Name of Chair Person

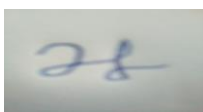
\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## DECLARATION

I declared that the thesis entitled “**Rural households’ livelihood diversification in off-farm and non-farm activities in Fogera district, north western Ethiopia**” is my original work. It has not been presented for higher degree at any other University or anywhere for that award of any academic degree or diploma. Advisors had the required supervision and assured the work is original and standard for this requirement. The assistance received during the course of these investigations has been duly acknowledged. Therefore, we recommend it to be accepted as fulfilling the thesis requirements.

Melak Alamirew



18/08/2020

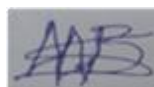
\_\_\_\_\_  
Name of the Student

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

This thesis has been submitted for examination with my approval as a University advisor.

Assefa Abelineh (Assistant Prof.)



18/08/2020

\_\_\_\_\_  
Name of Advisor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Berihanu Melese (Assistant Prof.)



18/08/2020

\_\_\_\_\_  
Name of co-Advisor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## **BIOGRAPHY**

The author was born in south Gondar zone, Fogera woreda in November, 1983 in a small kebele called Abuwakokit which is found in Fogera district of the Amhara region. The author attended his primary and junior secondary education at kokit and Woreta Dudemegn junior school 1991-1999. He completed his high school and preparatory education in (2000-2001) and (2002-2003) at Woreta general Secondary School and Addis Zemen Preparatory School respectively. Then, he joined Hawassa University in October 2004 and graduated with Bachelor Science degree in Rural Development and family sciences in July, 2006. Soon after his graduation, he was employed in Bureau of trade and industry and urban development for 9 and 3 years in Amhara region respectively and served until he joined college of agriculture and environmental sciences of Bahir Dar University for his Master of Science degree in rural development management.

## ACKNOWLEDGMENT

First, and foremost, I would like to thank my families, who gave me the forte to work through this paper starting from the commencement up to its completion. I would also like to extend my sincerest gratitude to my advisor **Assefa Abelineh** (Assistant Prof.), **Berihanu Melese** (Assistant Prof.) and instructors who helped me with their constructive ideas and comments throughout the work.

Finally, I am highly grateful to all households in Anguko, Abuwakokit and Kuharmichale kebeles for the information they delivered.

## **DEDICATION**

This thesis is dedicated to my spouse **W/ABAYE DEREJE** for her devoted in the success of my life, my father **ALAMIREW ABEBE** whom, I lost in 2019 and my mother **ASABENESHE TESEMA** for their dedicated in the success of my life with affection and love.



## **LIST OF ABBREVIATIONS AND ACRONYMS**

CI	Confidence Interval
CSA	Central Statistical Agency
DA	Development Agent
FGD	Focus Group Discussion
FWLDO	Fogera Woreda Livestock Development Office
FWPCO	Fogera Woreda Plan Commission Office
FWRDO	Fogera Woreda Rural Development Office
FWRMD	Fogera Woreda Risk Management Disk
GDP	Growth Domestic Production
GO	Governmental Organization
HH	Household
HHH	Household Head
IPMS	Improving Productivity Market Success
KA	Kebele Administrators
KII	Key Informative Interview
NGO	Non-Governmental Organization
OR	Odds Ratio
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
WB	World Bank
WFP	World Food Program

## TABLE OF CONTENTS

<b>Contents</b>	<b>page</b>
<b>APPROVAL SHEET</b> -----	<b>iii</b>
<b>DECLARATION</b> -----	<b>iv</b>
<b>BIOGRAPHY</b> -----	<b>iv</b>
<b>ACKNOWLEDGMENT</b> -----	<b>v</b>
<b>DEDICATION</b> -----	<b>vi</b>
<b>LIST OF ABBREVIATIONS AND ACRONYMS</b> -----	<b>vii</b>
<b>TABLE OF CONTENTS</b> -----	<b>viii</b>
<b>LIST OF TABLES</b> -----	<b>xi</b>
<b>LIST OF FIGURES</b> -----	<b>xii</b>
<b>LIST OF APPENDIXES TABLES</b> -----	<b>xiii</b>
<b>ABSTRACT</b> -----	<b>xiv</b>
<b>CHAPTER 1.INTRODUCTION</b> -----	<b>1</b>
1.1 Background of Study-----	1
1.2. Statement of Problem -----	2
1.3 Objective of Study-----	4
1.3.1 General of objective -----	4
1.3.2. Specific objectives of study -----	4
1.4. Research Questions -----	4
1.5. Scope and Limitation of the Study -----	5
1.6. Significance of the Study -----	5
<b>CHAPTER2.LITERATURE REVIEW</b> -----	<b>6</b>

2.1 Definition and Concepts of key terms-----	6
2.2. Theories of Livelihood Diversification Activities -----	7
2.3. Empirical Evidences in Off-farm/Non-farm activities -----	9
2.3.1. Types and status of livelihood diversification in off-farm and non-farm activities	9
2.3.2 Determinants of livelihood diversification in off-farm/ non-farm activities -----	11
2.3.3 Challenges to engage in off-farm/non-farm activities -----	14
2.4. Conceptual Framework -----	15
<b>CHAPTER 3. METHODOLOGY OF STUDY -----</b>	<b>29</b>
3.1. Description of the Study Area-----	29
3.2 Study Design -----	33
3.3. Sampling Procedures and Sample size determination-----	33
3.3.1. Sampling Procedures -----	33
3.3.2 Sample size determination-----	33
3.4. Types, Sources and Methods of Data Collection -----	34
3.5. Methods of Data Analysis -----	35
3.6. Dependent Variables vs. Independent Variables -----	36
3.6.1. Dependent variable -----	36
3.6.2. The Explanatory/ Independent variables-----	37
<b>CHAPTER 4. RESULTS AND DISCUSSION -----</b>	<b>40</b>
4.1 Demographic and Socioeconomic Characteristics of Respondents -----	40
4.2. Assessments of Types and Status off-farm/non-farm Activities -----	42
4.2.1 Types of livelihood diversification -----	42
4.2.2 Status of Livelihood Diversification -----	44
4.3. Challenges of households to engage in off-farm/ non-farm activities -----	52
4.4 Determinants of Rural Household Off-farm/ Non-farm activities-----	54
<b>CHAPTER 5. SUMMARY, CONCLUSIONS AND RECOMMENDATION -----</b>	<b>61</b>

5.1 Summary and Conclusion .....	61
5.2 Recommendations .....	62
<b>REFERENCES .....</b>	<b>64</b>
<b>APPENDIX .....</b>	<b>69</b>

## LIST OF TABLES

Table 3. 1 The sample size distributions in the sample kebeles.....	34
Table 3. 2 Summary of operational definition of variables .....	39
Table4 1Demographic characteristics of respondents in relation to dummy variables.....	40
Table4 2 Descriptive statistics of continuous explanatory variables .....	41
Table4 3 Assessment of types and status livelihood diversification.....	42
Table4 4 Types of livelihood diversification in Sample households .....	43
Table4 5 Chi square tests results of categorical variables.....	46
Table4 6 T-test results of continuous variables.....	51
Table4 7 Challenges to engage in livelihood diversification activities.....	53
Table4 8 Binary logistic regression model results .....	57

## **LIST OF FIGURES**

Figure2. 1Conceptual framework .....	16
Figure3. 1Map of study area .....	32

## LIST OF APPENDIXES TABLES

Appendix 1 : TLU value of conversion factors of live stocks .....	69
Appendix 2Multicollinarty tests of continuous variables by using variance inflation factor (VIF) values .....	69
Appendix 3: Test of Multicollinarty of categorical/ dummy variables using contingency coefficient value.....	69
Appendix 4: Test of goodness of fit by value of omnibus tests of model coefficients .....	69
Appendix 5: Hosmer and Lemeshow test of goodness of fit .....	70
Appendix 6: test of goodness of fit by using value of PesudoR2 .....	70
Appendix 7:Survey Questioners .....	70

## **ABSTRACT**

*Taking of agriculture as the sole means of income generation activities is difficult to lives of rural households. This is because diminishing returns of productivity over time. Due to this factual reason, focusing on livelihood diversification in off-farm and non-farm activities as a primary or supplementary source for rural household's livelihoods becomes vital. The main purpose of this study was the assessment of rural households' livelihood diversification in off-farm and non-farm activity to support households' livelihood in Fogera district, north western Ethiopia which is mainly dominated by rain fed agriculture. A cross-sectional study design was used. Data were collected from randomly selected 192 households by using semi-structured interview seclude and key informative interview guides. The descriptive statistics was used to identify challenges and types of off-farm and non-farm activities. Similarly, inferential statistics such as independent sample t-test and chi-square test were applied to identify association and relationship among diversified and not diversified groups. A binary logistic regression was used to identify determinants of households in engaging diversified income generating activities. Results from descriptive statistics indicates that lack of knowledge, lack of capital, lack of market information, lack of credit access and lack of infrastructure were the well-known identified challenges in the study area. Because of these challenges, only 28.6 percent of the household engaged in diversified household livelihood diversification activities. The binary logistic regression result revealed that educational status of rural household heads, access to training, access to credit, and household size were significant determinants influenced livelihood diversification of households. From this study the basic factors which influenced the livelihood diversification activities were household's demographic and institutional characteristics plus challenges in related to knowledge, information, capital and access to infrastructure to engage in diversification. Thus in improvement of education in sustainable way, creating on credit access, easily accessing market information, providing training in relation to income generating activity and ensuring infrastructure service facility are the most imperative tools for rural households to participate in off-farm and non-farm activities.*

**KEYWORDS:** *Diversification; livelihood; farming; off-farm, non-farm, income generating activities*



# CHAPTER 1.INTRODUCTION

## 1.1 Background of Study

The economic development trends in both developed and developing countries indicated the production of agriculture is the primary and initial means of livelihood income. According to Alkire *et al* (2014) revealed that, 85 percent of the world poor live in rural areas. In developing countries, the share of agriculture in GDP and in employment opportunity for example, Asia on average 20 and 43, in Eastern Europe and Latin America 8 and 22 and in sub-Saharan African countries 34 and 64 percent respectively(Muse, 2011).

In Ethiopia, agriculture is the main source of rural households' livelihood by accounting 43 and more than 80 percent of total in GDP and employment respectively(Seid, as cited in UNDP, 2014). Despite its significance, the agriculture sector is still surrounded by a number of problems such as high population growth, diminishing farm land size, etc. and given these factual problems, even if the contribution of agriculture for rural farm household's livelihood is high but agriculture only cannot alleviate rural poverty(Lewis, 2017).

Due to this fact, off-farm and non-farm employment is important for the livelihoods of rural people in developing countries. It is widely associated with reduction of poverty, risk and pressure on natural resources(Ellis, 1993, Ellis, 2000 and Haggblade *et al.*, 2010.).Empirical research has shown that off-farm and non-farm sources contribute from 40–50 percent to across the developing world (World Bank, 2008) and its rural labor markets are well designed to absorb in the agricultural sector itself which is opportunity for off-farm and non-farm activities(Ellis, 2000).According to Ellis, in developing world such as Latin America and Asian countries, the compelling force of participation in off-farm and non-farm activities are female-headed households with good education as well as access to credit. Whereas men who have been with a low level of education is has to participate in off-farm wage activities.

In Africa, especially in Sub-Saharan Africa(SSA) and South Africa, household's income from off-farm and non-farm sources account 35–50 and 80–90 percent respectively(Haggblade *et al.*, 2010, Losch *et al.*, 2011). The main reason rural households to participate in off-farm and non-farm activity is due to the productivity of agriculture is characterized by decreasing farm

land with ratio of population growth, low level of productivity per farm owned, low soil fertility, risk, uncertainty and seasonality(Adepoju and Oluwakemi, 2013 andAcs *et al.*, 2008).Trends in many rural African countries, the market for agricultural wage labor is poorly developed. So, in these countries, a seasonal labor shortage has occurred in agriculture due to the dependence of households on their own supply of labor. As result, household members must go another place to participate in active labor markets and semi-permanent migration to distant work opportunities especially notable in Southern African countries(Ellis, 2000).

In Ethiopia, there is a wide difference between literatures regarding the share of off-farm and non-farm income with compared to developing worlds and SSA countries. The share of off-farm and non-farm income on average 26 percent has contributed and it is widely linked with risk of crop failures and diminishing land size (Barrett *et al.*, 2001a, Amare and Belaineh, 2013,Yenesewet *al.*, 2015).However, the types of off-farm and non-farm income, and its determinant factors were not well addressed in the study area. Thus, this study is designed to assess the determinants of rural households' livelihood diversification in off-farm and non-farm activities in the Fogera district, which has high potential for off-farm and non-farm activities but has recently experienced by high population growth with low farm land owned and incidence of high flood hazards. It is with this background that the researcher is interested to study the determinants of households' livelihood diversification in off-farm and non-farm activities in the Fogera District.

## **1.2. Statement of Problem**

In Ethiopia, due to decline in carrying capacity and vulnerability of the agriculture sector the participation in off-farm and non-farm income sources have been a critical issues (Getachew and Melese, 2012 and Seid, 2017).With this participation, the main compelling forces to participate in off-farm and non-farm activities is characterized by seasonality, risks and in general serve as an alternatives outlet to cope with during crop failure. In the same way, determinant of livelihood diversification have studied in Ethiopia over the years (Amare and Belaineh, 2013; Gebrehiwot, 2018 and Yenesew *et al.*, 2015). Their studies have found that, human capital related variables (such as education status of the head and family size), livestock holding, availability of credit and transfer income, and infrastructure related variables affect livelihood diversification of households significantly.

Coming to the Amhara region, studies undertaken in Deber Elias Woreda the only 11.1 percent of household's average net annual income are obtained from off-farm and non-farm activities (Yenesew *et al.*, 2015). In their study, gender, education, dependency ratio, credit access, proximity to town and market infrastructures have been positively significant but age, cultivated land size, and training are negatively significant. Off farm and non-farm income sources has substantial income share for rural livelihoods where agricultural activities are conducted seasonally (Amogne *et al.*; 2017 and Wondim, 2019). From this perspective, development of livelihood diversification of off-farm and non-farm activities should be a national agenda for ensuring food security in the country in general in the study area in particular. Agricultural land resource is limited and scarcity of agricultural land is increasing in the study area due to population growth and increased unemployment rate in the country as well as in the study area. Most farmers are cultivating their land once in a year using rainfall due to limited irrigation facility infrastructure expansion (Fogera woreda rural development and agriculture office, 2018). In addition, farmers are busy in their farming activity only few days in a week due to cultural and religious reasons.

Previous studies in this area are also focused only about agricultural productivity such as cattle milk production and marketing (Belete *et al.*; 2010), about onion crop commercialization (Taye Melese, 2018), small-scale irrigation (Eguavoen *et al.*; 2012) and improved rice seed production and marketing (Afeework and Lemma, 2015). However, studies and analysis of rural off-farm and non-farm income promoting are the most ignored research area in the district. In spite of that, rural households in the study area have been responding to livelihood diversification through participating in limited income generating activities. But, there was no empirical data that supports the existing livelihood diversification mechanisms practiced by the rural households in the area. Thus, these are the gaps of knowledge that this study intends to bridge. Hence, focusing on livelihood diversification activities in off-farm and non-farm as a primary or supplementary source for rural household's livelihood is used as decreasing a burden of agriculture and natural resource. On the other hand, the study area has great potentials in both farm and off-farm and non-farm activities and already selected as growth corridor for every development (especially market center) in the region and the country which compared to other districts in the region.

In this regard, the researcher is peculiarly interested to study of households' livelihood diversification in off-farm and non-farm activities in the study area. Generally, this study tries to assess the determinants of rural households' livelihood diversification in off-farm and non-farm activities in the Fogera District, which paradoxically has high land scarcity but high population growth and extent of flood hazards and brings more insights and recommend policies and investment strategies.

### **1.3 Objective of Study**

Based on the background of the study and the statement of the problem outlined in the above two sections, this study is designed to have both general and specific objectives.

#### **1.3.1 General of objective**

The general objective of the study was to assess the determinants of rural households' livelihood diversification in off and non-farm activities in Fogera District, Amhara Region of North-Western, Ethiopia.

#### **1.3.2. Specific objectives of study**

- To identify the types and status of off-farm and non-farm activities existing
- To examine the challenges of the households to engage in off-farm and non-farm activities.
- To analyze determinants of households' livelihood diversification in off-farm and non-farm activities.

### **1.4. Research Questions**

- What types and status of off-farm and non-farm activities existed in this study area?
- What are the main challenges of the households' livelihood diversification to engage in off-farm and non-farm activities in the study area?
- What are the determinants of rural households' livelihood diversification which influence rural households' participation in off-farm and non-farm activities in the study area?

### **1.5. Scope and Limitation of the Study**

The study was focused on assessing the rural household's livelihood diversification in off-farm/non-farm activities and identified the major determinants which influenced participation status of the households by comparing their demographic and socio-economic factors. However, in this study, the qualitative data which gathered from focused group discussion to make triangulation of household's survey data were not proceeding due to covid 19 epidemics. Similarly, lack of previous studies in the study area also had its own limitation to identify gaps and compared to current investigation. Thus, it is limited to addressing the abovementioned of aims of this study. This study is limited to only households located in Fogera district of Amhara Region, North-Western of Ethiopia.

### **1.6. Significance of the Study**

Due to high population growth with limited land resources and increasing land scarcity with high unemployment rate in general in the country, in particular in the study area calls different strategies to cope up this income burden of rural households. The findings of this study could be used in guiding policymakers and development planners concerned with designing appropriate strategies to implement development projects to enhance participation status of rural households in off-farm/non-farm alternative income sources in the study area. In addition, information gathered from this investigation will be used as a foundation for somebody needs to conduct research in the area of livelihood diversification in off-farm/non-farm activities.

## CHAPTER 2. LITERATURE REVIEW

This section will discuss some concepts and evidences about rural households' livelihood diversification in off-farm and non-farm activities. Mostly the discussion focuses on about topic of this study with related to its general and specific objectives such as types of off-farm and non-farm activities, determinants of households' livelihood diversification in off-farm and non-farm activities and main challenges faced for households to engage in off and non-farm activities in Ethiopia as well as in the study area with based on literatures in different countries experiences.

### 2.1 Definition and Concepts of key terms

As many different authors have been written with relation to the titles of this study topic, the key words are defined based on its concepts.

**Diversification:** is defined as a process that small-holder farmers or households create different set of income generating activities for survival and in order to get better living standards (Hengsdijk *et al.*; 2007) and reduces the risk of livelihood failure by accessing more than one income source (Allison and Ellis, 2001).

**Livelihood diversification:** Similar studies also defined as livelihood diversification comprises the capability, assets (including both materials and social resources) and activities required for a means of living (Chambers and Conway, 1992). In this study, livelihood diversification also defined as a process in which rural households have participated in different income activities from their level of primary production into market oriented production activities and also led to diversify from sole agriculture activities to off-farm and non-farm activities.

**Off-farm activities:** Based livelihood diversification definitions, off-farm activities here refer to agricultural activities which take place outside the person's own farm as wage labour or self-employment activities in relation to agricultural and natural resource based activities (Barrett *et al.*; 2001).

**Off-farm wage:** It is definition as an activity in which includes local daily wage labor at village level or the neighboring areas in return for cash payment or the agricultural work at another person's farm in return for part of the harvest in kind.

**Off-farm self-employment:** It is types of activities in which related to agricultural and natural resource-based activities like firewood and charcoal selling.

**Non-farm activities:** It is defined as out of farming activity in which rural households generated income as a form of non-farm wage or non-farm employment or both to support their family needs is said to be non-farm activities (Barrett *et al*; 2001).

**Non-farm wage:** It may include non-agricultural wage employment such as participated in commerce, mining, manufacturing, transport, and services sector.

**Non-farm self-employment:** It is another definition of non-farm activities in which rural households participate in non-farm self-employment activities outside the agricultural sector. It includes handicraft activities (weaving, spinning, carpentry, house mudding, poet making, remittance etc.) petty trade (grain trade, fruits and vegetables trade), selling of local drinks, trading of small ruminants and cattle, and remittance transfers within and across nations. Therefore, the concepts and definitions of livelihood diversification of off-farm and non-farm activity refer to uses of alternative means of livelihood income for rural household to secure their well-being of life.

## **2.2. Theories of Livelihood Diversification Activities**

In many literature theories stated that rural livelihood diversification is a process and as well as a norm. Mostly, diversification for rural households is considered to as obligation (necessity) and options(choice) which is governed by six main pinpoint factors like seasonality, risk, labor markets, credit markets, asset strategies, and coping strategies(Ellis, 2000). On the other hand different literature evidence stated that the productivity of agriculture is characterized by decreasing farm land, low-level of productivity, a high degree of subsistence nature farming, soil fertility, and poor infrastructural, not compatible population

growth with current production capacity of the farm land and uncertainty (Jirström *et al.*, 2010; Adepoju and Oluwakemi, 2013 and Weaver, 2008). Due to this fact, rural households have participated in multiple livelihood diversification activities and their level of production is changed from subsistence or hand to mouth level to provide some amounts of product to the market. The implication of this process tells as favorable environments are created to diversify the sole means of agricultural income is changed to off-farm and non-farm livelihood activities. Especially evidences showed that farmers where nearest to urban center, the process of rural households' livelihood diversification is the norm for many semi-arid agro-ecologies of rural Africa and developing economies (Perlman *et al.*, 2010). This Shrinking of the agricultural sector and expanding non-agricultural activities are likely features of economic growth (Winters *et al.*, 2009). However, during this transition, rural households accumulate assets and they tend to be a great participation in off-farm and non-farm economy. The implication of above statement when the per capita income of rural household increases, the share of income from the off-farm and non-agricultural economy grows but the share of household income from farming is declined.

In Ethiopia, agriculture is the dominant economic sector in which the country relies for its social and economic development. However, the pattern of rural development seems to developing countries and advanced economies trends in relation to rural households' livelihood diversification due to diminishing returns of agricultural productivity through over time. Studies verified in Ethiopia rural livelihood diversification strategies are on farm, non-farm and off farm activities with characterized by pushes and pull factors that affect diversification process (Nagler and Naudé, 2014b; Weaver, 2008 and Hogue *et al.*, 2018). So, from this study concludes that the different theories of rural households' livelihood diversification in off-farm and non-farm activities of developing and advanced countries almost have similar patterns based on main factors like seasonality, risk, labor markets, credit markets, asset strategies, and coping strategies. Therefore, as theoretical evidence, off-farm and non-farm income can be used as a mechanism to stabilize the households' income and reduces farming crisis of rural households' livelihood.



## **2.3. Empirical Evidences in Off-farm/Non-farm activities**

### **2.3.1. Types and status of livelihood diversification in off-farm and non-farm activities**

From previous studies the author understood the concepts and theories of rural households' livelihood diversification in off-farm and non-farm activities in many developing countries and low developed countries with its relative difference. However, in this part also researcher was reviewed types of rural livelihood diversification participation in off-farm and non-farm activities based on empirical evidence across the countries

As many studies stated that on-farm, off-farm and non-farm activities are major income sources for many rural households in developing countries (Barrett and Reardon, 2000). It is widely associated with reduction of poverty, risks and pressures on natural resources.

In rural African, households' livelihood diversification strategies are classified into four groups with its character (Barrett *et al*; 2000). First livelihood strategies are full time farmer strategy which a rural household depend only their own agricultural activities (animal or crop production for income) with characterized by sufficient farm land and absorbs the household's whole working age labor force. Second livelihood strategies are farmer and farm worker strategy (combine strategies) in which rural households uses both own on-farm production with wage labor on others' farm with characterized by insufficient land, given labor endowments, to survive entirely off own production. Third livelihood strategies is farm and non-farm earning strategies (mixed strategy) which is rural households participated in on-farm agricultural production, unskilled on-farm or off-farm wage employment and non-farm earnings from trades, commerce and skilled (often salaried) employment characterized by market access simply because people must be able to sell their handicrafts, processed farm products, labor for mining or factory work, etc.

In Ethiopia, as seems like to least developed countries, the main sources of rural livelihood diversification strategies are on-farm, off-farm and non-farm activities in its degree of exception(Agutuu *et al.*, 2017 and Gebrehiwot, 2018).However, participation in on-farm ,off-farm and non-farm activities of rural households in Ethiopia the issue of diversification is necessity rather than choice even if households depending on on-farm production which does

not absorb the household's whole working age labor force. Because most of studies showed that participation in off-farm and non-farm activity in Ethiopia are characterized by seasonality, different risks, and in general serve as an alternatives outlet to cope with. From the above empirical and theoretical literatures, it is possible to conclude that in developing countries experience including Ethiopia the rural households' livelihood diversification in off-farm and non-farm is critical to alleviate rural poverty, income inequalities and food insecurity in addition to conventional rural farm activities. In addition, the economic growth story of many developing countries showed that agriculture is means for income diversification but doesn't by itself led to fast economic growth without the catalyzing effect of off-farm and non-farm activities.

Besides, farming activities of rural household's livelihood diversification in most parts of the developing world are characterized by seasonal ties and risks in which implying that households have to rely on different options for their livelihoods in different times of the year. When the environment and economic conditions are changing, farmers have a chance to participate in off-farm and non-farm activities and get better income from those activities to safe and secure their livelihood activities. In many literatures showed that for rural households' livelihood diversification, households' characteristics are very critical to decided rural households to participate in new economic activities(Yenesew *et al.*, 2015).On their studies stated that the age of household headed and male of household headed are very critical for rural household's livelihood diversification to participate in off-farm and non-farm activities. When the age of rural household headed is older have higher accumulated experience in rural way of life and hence helps them households decide to diversify their income activities due to having high economic empowerment. Similarly, Male headed households have a chance to diversify their income more than female headed households because of cultural differentiation of activities for men and women. In their study, the educational level of rural households and family member which have been a significant role. That is way households including family member which have a better educational level have been a better alternative to participate in off-farm and non-farm activities. Other households' characteristics to diversify their livelihood income are family size in which live in the house together. Households who have a large family size have a chance to engage in new and different economic activity to secure their family needs(Buchanan *et al.*, 2012).

The second characteristic of rural household's livelihood diversification is related with farm. In many studies indicated that rural households which have a large size of land have no more engaged in off-farm and non-farm activities but rural households in which have small size of land have enforced into many alternative incomes sources to secured their family needs due to insufficient land with given labor endowments. Similarly, in their study showed that the livestock holding of rural household have significant effect to diversify their income. In the same way in this study, for rural household's which have large number of livestock holding is have significant effects to participate in off-farm and non-farm incomes. It implies that, farmers with large number of tropical livestock unit are less likely to diversify livelihood than those who own small number of TLUs due to better opportunity to earn more income from livestock(Wondim, 2018).

Third major characteristics of rural household livelihood diversification to engage in off-farm and non-farm activities are infrastructure facility and financial facility. Rural households in which have a better infrastructure and financial accessibility have a betterment engaged into different livelihood activities but where rural areas in which have poor infrastructure and credit facility no more chance to participate in different livelihood activities(Yenesewet *et al.*, 2015).

### **2.3.2 Determinants of livelihood diversification in off-farm/ non-farm activities**

The main compelling factors in which rural household's livelihood diversification to participate in off-farm and non-farm activities are pushing factors(Reardon *et al.*, 2009). On their study, pushing factors are both an external and internal factors that causes for the fluctuation such as weather conditions; policy change, urban expansions, population growth and farm fragmented are common cause for rural livelihood diversification activities. This fact is leads to increase household's motivation in adopting new income diversification strategy to mitigate the adverse effect of these factors. In addition, poor resource endowments, agricultural seasonality, frequent climatic hazards, and poor access to credit may all push rural households to undertake a wider range of activities in order to secure their livelihood. Experiences in SSA countries, push factors are related to minimizing risks, in particular those associated with a high dependency on agriculture, managing the aftermath of shocks or use of

surplus family labor(Nagler and Naudé, 2014b).On their study, the outlet mechanisms to minimizing risks in which related to crop failure and surplus family laborer mainly used alternatives income sources.

In our country Ethiopia, it is seemed not exception to in sub-Saharan African countries (Nagler and Naudé, 2014a, Nagler and Naudé, 2017). It is concluded that in their study, the main pushing factors in Ethiopia are crop failure due to highly dependency on rain fed agriculture, urban expansion and imperfect labor market. To sum up the determinant factors to participate in off-farm and non-farm activities for rural farm households are the existence of different pushing factors in which occurred in the area is critical factors.

As showed the pushing factor's effect on the development of off-farm and non-farm activities, pull factors are also opportunities for diversification of income sources which is linked to expansion of commercial agriculture, improved infrastructure in rural areas, proximity to an urban area, better market access, etc. (Nagler and Naudé, 2014b).On their study, the despite positive effect of the situation such an individual and households' level of capabilities, including educational attainment and assets, as well as institutional and regional features, such as access to credit and infrastructure, are considered to be significant role for rural livelihood diversification. Some studies find that market access is a key determinant of diversification of activities(Kuttippurath and Nikulin, 2012). The implication of their study, with access to adequate assets and infrastructure and faced with appropriate incentives engage actively in markets, but lack of one or more of those three essential elements largely, the rural household's livelihood diversification has not promoted. Similarly, proximity to market center creates opportunities to sell output, and purchase inputs, incomes from self-employment activities as well as opportunities for off-farm and non-farm wage employment. In Ethiopia many studies stated that the main pulling factors in which rural households to participate in off-farm and non-farm activities are due to highly urban expansion, growth of education capability, distance to market center, establishing of different infrastructures and access to micro finance are major implication of pulling factors(Weaver, 2008 and Hoque *et al.*, 2018).On their study implies that farm household with higher educational qualification, access to credit, well provision of infrastructure are rural households more inclined to diversify in off-farm and non-farm activities.

Different literatures in developing worlds and SSA countries, trends, the main reason of rural households engaging in off-farm and non-diversification activity is due to low productivity of agriculture because of decreasing farm land(low level of productivity per farm owned), a high degree of subsistence farming in nature(not competent),low soil fertility, poor infrastructural, different risk in related to agricultural productivity, not compatibility population growth with the current production capacity of the farm land, uncertainty(like price shocks) and seasonality are the main cause for income diversification to rural farm households(Dimova and Sen, 2010 and Reardon and Barrett, 2000).Ethiopia as least developing countries, it has similar character.

Similar to most developing countries, the importance of off-farm and non-farm activities in livelihoods of rural people in Ethiopia varies by region. This country level data has no constant trend across the different regions of the country. The share off-farm and non-farm income in rural Ethiopia contributed about 36 percent in 1989/90(Reardon and Barrett, 2000).In northern Ethiopia 33 percent of the annual net income of farm households derive from off-farm activities(Cortessis *et al.*, 2012). From their study ,Age, formal education of the household head and number of children with 10 years old or under are significantly a participated in off-farm wage work however sex of household head, number of adults male in household, credit use, livestock holding and distance to road or major market are strongly determined off-farm self-employment. However, Households with older heads, more adult males, and more children with five years old or under, higher livestock holding and far- from major market are earns lower wage income. On other hand, Amare and Belaineh (2013) Studied in Eastern Ethiopia, about 23 percent of total household income derived from non-agricultural sector or from off-farm and non-farm activities. From their study, sex of HHH, education, economically active family and size of cultivated land are positively and significantly affected income of off-farm and non-farm activity but age of HHH, distance to market or road are negatively and significantly. Moreover, from the total household income 15 and 11 percent derived from off-farm and non-farm activities even if having huge potential for the off-farm and non-farm income in the locality respectively(Getachew *et al.*, 2018). The age of household head, household family size, and household land size, and household yearly expenditure, access to market, urban linkage and input are significant determinants of income diversification except household's land size .

Coming to the Amhara region, studies undertaken in Deber Elias Woreda indicated that 88.9 percent of the average net annual income obtained from agriculture products and the only 11.1 percent of household's average net annual income are obtained from off-farm and non-farm activities(Yenesew *et al.*, 2015). From these studies it is possible to conclude that the development of livelihood diversification of off-farm and non-farm activity is almost a national agenda but the off-farm and non-farm income diversification activity in Amhara Region, where the study area is found, is poor despite the continuing diminishing returns on agricultural productivity. As mentioned above, the main reasons for rural households' participation in off-farm and non-farm activity is to reduce rural poverty, inequality and income vulnerability thereby improving rural livelihood. However, in Ethiopia and Amhara Region, rural household's livelihood diversification and participation in off-farm and non-farm activities is very low compare to the trend in developing countries and SSA countries. Like the case in other countries, taking of agriculture as the sole means of income generation is difficult to lives of smallholder farmers due to lack of productivity(Abduselam, 2001).Therefore, focusing on income diversification activities in off-farm and non-farm as a primary or supplementary source for rural household's livelihood is used as decreasing a burden of agriculture and natural resource.

### **2.3.3 Challenges to engage in off-farm/non-farm activities**

Livelihood diversification participation in off-farm and non-farm activities in rural area is an important strategy to survive and accumulate asset. Especially, infrastructural facilities have a potentially important impact on poverty reduction by contributing to the integration of national economies, improving the working of markets, speeding the flow of information, and increasing the mobility of people, resources and outputs (Ellis, 1999).Similarly, financial facility encourages the rural household's income diversification to engage new activities in off-farm and non-farm participation by providing startup capital(Getachew *et al.*, 2018).

However, there are many challenges in developing and least developed countries to engage in livelihood diversification including Ethiopia. In rural Africa during policy reform without considering of promoting of liquidity, market access, and human capital formation are major challenges to promote participation in off-farm and non-farm activities(Ambati *et al.*,

2003). Similarly World Bank (2008), the major challenge for SSA countries to participate in off-farm and non-farm activities are due to poor infrastructure, high risks, and high transaction costs and discourage private investment. Ethiopia as SSA countries, it is not having exception character.

However, there are also many challenges face in Ethiopia to engage in successful livelihood diversification especially rural households to participate in off-farm and non-farm activities. Some of the major challenges which affect rural livelihood diversification are lack of capital, poor infrastructures, lack of access to credit service, lack of access to market and marketing service, lack of job opportunities and farm land scarcity (Amare and Belaineh, 2013; Getachew et al., 2018 and Wondim, 2019;). In Amhara region, above major challenges identified as national level (Yenesew et al., 2015).

## **2.4. Conceptual Framework**

As many empirical and theoretical evidences explained that rural households' livelihood diversification off-farm and non-farm activities is determined by a wide variety of factors. Based on these empirical review researchers present the conceptual frame work that tries to link the major factors that are expected to determine household's livelihood diversification decision to participate in off-farm and non-farm activities and level of off-farm and non-farm employment income. These factors can be shown by categorizing as factors that influence relative returns to agricultural production and related risks, referred as incentives, and factors that affect the household's capacity of participation in different off-farm and non-farm activities (Henson and Reardon, 2005). Based on theoretical relationship and findings of empirical studies, the following explanatory variables are hypothesized to explain the dependent variable. Mostly these explanatory variables used for the analyses are grouped into household demographic factors, socio-economic factors and institutional factors. The demographic factors include age, sex, and family size, numbers of economically active family members and education of household heads. The socio-economic factor variables also include size of cultivated land, livestock wealth, and proximity to market center, nearest to weather road, access to telephone communication, on-labor income, and cooperative membership and agro-ecology. Institutional factors include variables such as access to credit; saving and training are the main explanatory variables which explain of rural household's livelihood

diversification in off-farm and non-farm activities positively or negatively. The conceptual framework, which is established as a foundation for the factors that determine off-farm and non-farm employment participation and income is presented in the figure below.

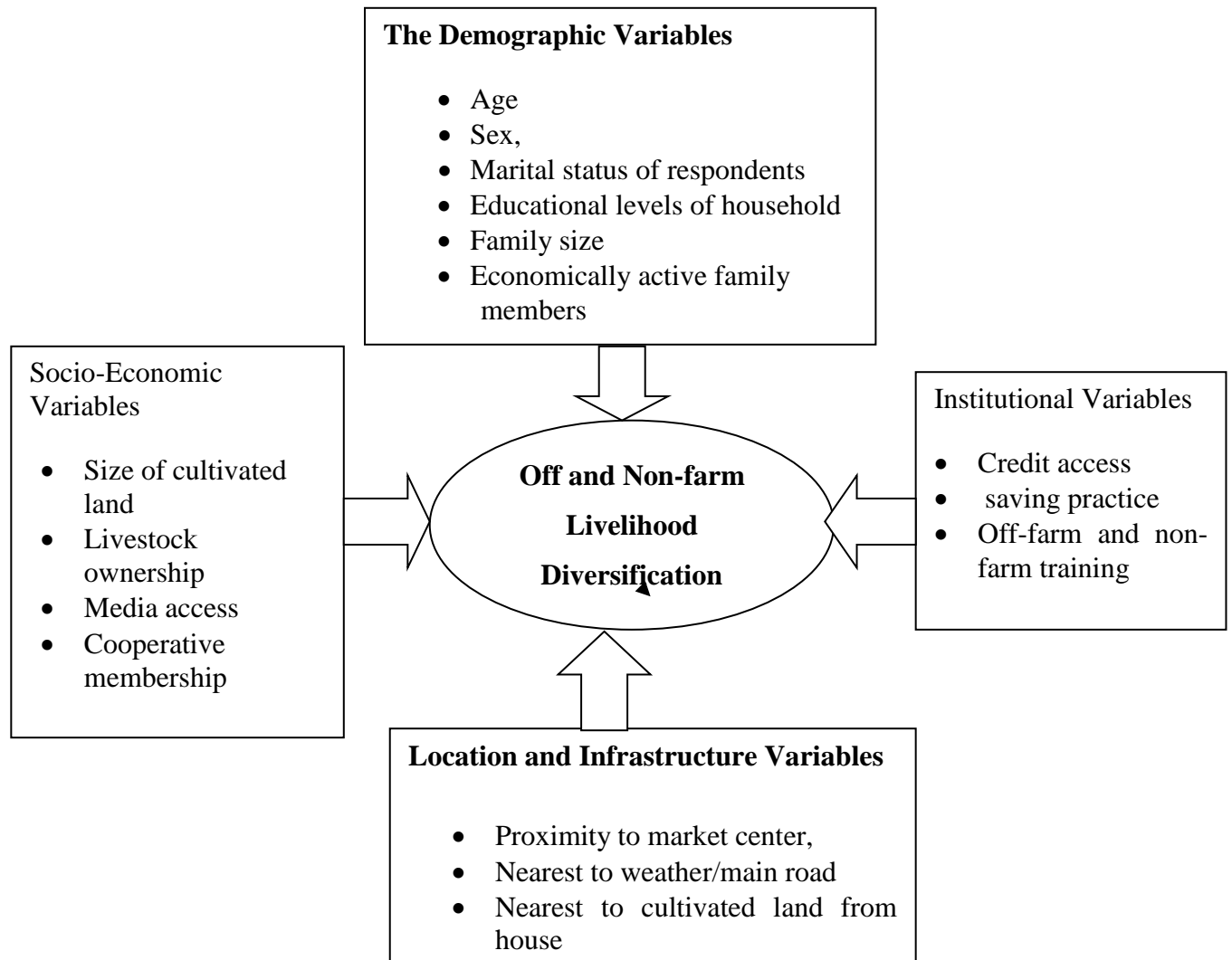


Figure 2.1 Conceptual framework

Sources: modified from Adem *et al* (2018)



## CHAPTER3. METHODOLOGY OF STUDY

### 3.1. Description of the Study Area

Fogera woreda is located in Amhara National Regional State in south Gondar administrative zone. It is one of 13 rural woredas and 5 urban towns in the south Gondar zone. The woreda is found at 11°58 latitude and 37°41 longitudes. The woreda has 31 rural kebeles and 2 Semi-Urban kebeles. It is adjacent with Libo Kemekem woreda in North, Dera woreda in South, Lake Tana in the west and eastern Farta and eastern Estie woreda in the east. Woreta is the main town of Fogera Woreda which is found 625 Km from Addis Ababa and 55 Km from the Regional capital city, Bahir Dar (Fogera Woreda Bureau of Agriculture, 2009).

The total population of the woreda is 261174(132,693 male and 128,481 female) among which economically active population age between 15 and 64, is 48.97 percent (127,900) and average number of family size is 5(Fogera District Plan Commission, 2018/2019). The total number of HHs is 75065 in which 67631 is male headed and 7434 is female headed HHS. Out of total population 9315 is urban dwellers but the rest of 251859 are rural dwellers. The predominant ethnic group is Amhara about 98 percent and they speak Amharic language 97.7 percent of the people are orthodox Christian followed by Muslim (2.84 percent) protestant christians are 0.11 percent (Fogera Woreda Culture and Tourism Office, 2018/2019).

According to Fogera District agriculture and rural development office, the total area is 117,414 hectares. The land use pattern of the woreda is characterized by different grouping of categories. According to the information gathered from the WARDO, out of the total area 50.77 percent is used for annual crop production, 13.38 percent for grazing land, 19.67 percent for water coverage, 6.78 percent for forest and, 3.7 percent unplugging land and 6.03 percent covered by the residential and other infrastructures. The average land holding per household is 0.5–1.0 hectares.

The agro-ecology of Fogera woreda is associated with the elevation that ranges from 1774 to 2410 m.a.s.l (Setargew *et al.*, 2012). According to Improving productivity and market success (Henson and Reardon, 2005), there are farming systems in the Woreda which grow different types of crops which are suitable for different species of livestock's production. Due

to this different ecological zone, the priorities of farming system of crop and livestock in the woreda are from the elevation 1700-1800 mainly produces (Rice, horticultural crops, noug, fish, cattle, sheep), from the elevation 1900 – 2000 also produces Cereals (like maize, tef, noug vegetables) apiculture, cattle, goats and from the elevation 2000 – 2400 produces (Barley, horse beans, potato) apiculture, sheep, cattle (Setargew *et al.*, 2012). Climate condition of the woreda is fully Winna Dega and its level of temperature is average 19.39<sup>0c</sup>, highest 27.3<sup>0c</sup> and lowest 11.48<sup>0c</sup>. The topography of the area is characterized by 76 percent plain, 13 percent mountainous, and 11 percent valleys/gorgeous ). The area of the soil types is 65 percent black soil, 20 percent brown, 12 percent red soil and 3 percent Gery soil.

According to Fogera woreda agriculture and rural development office yearly annual report (FWARDO, 2011); Belg and Meher are two cropping seasons for the woreda with short and long rainy periods respectively. The main and short rainy season of the woreda is from the June to September and March to the May respectively. The rainfall distribution of the woreda is estimated to be average 1216, lowest 1103 and highest 1336mm. The seriously rainy season in the area June, July and August are the months of the highest rain fall and mostly characterized by incidence of flood hazards, while, December, January, February, March and April are the dry months (FDRDO report, 2019).

The Fogera woreda is known as one of the surplus productive Woreda in the Region with potential of mixed agriculture (crop production and livestock rearing) is the main sources of livelihood for the rural households in this district. The major crops grown in the woreda are maize, *Tef*, rice, sorghum, chickpea, wheat, pea, hoarse beans, and barley. The woreda also is endowed with many cash crops such as pepper, red onion, white garlic and sunflower. Besides to rain-fed agriculture production, farmers traditionally and modernly practice in the small-small irrigation due to accessibility of water potential (like Rib and Gumara rivers). According to secondary data from FWARDO indicates that 35555 hectares of the land is available for the irrigation but now 32856 hectares of the land has been irrigated. The area also has very great potential for livestock production. According to the Fogera woreda livestock resource development office (report of 2019), the major local livestock resources are cattle (306992), goat (76120), sheep (41326), chicken (183878), beehives (15596), donkey (30855), mule (1274) and horse (13). In addition to agricultural production, different kinds of

off-farm activities are undertaken to generate alternative household income. Information gathered from Fogera district Micro and Small enterprise office, held by woreda finance and economy indicates that off-farm activities practiced by the community includes livestock trading (seasonal fattening), cart transportation services, petty trading, house buildings, metal and wood work activities, weaving and blacksmith.

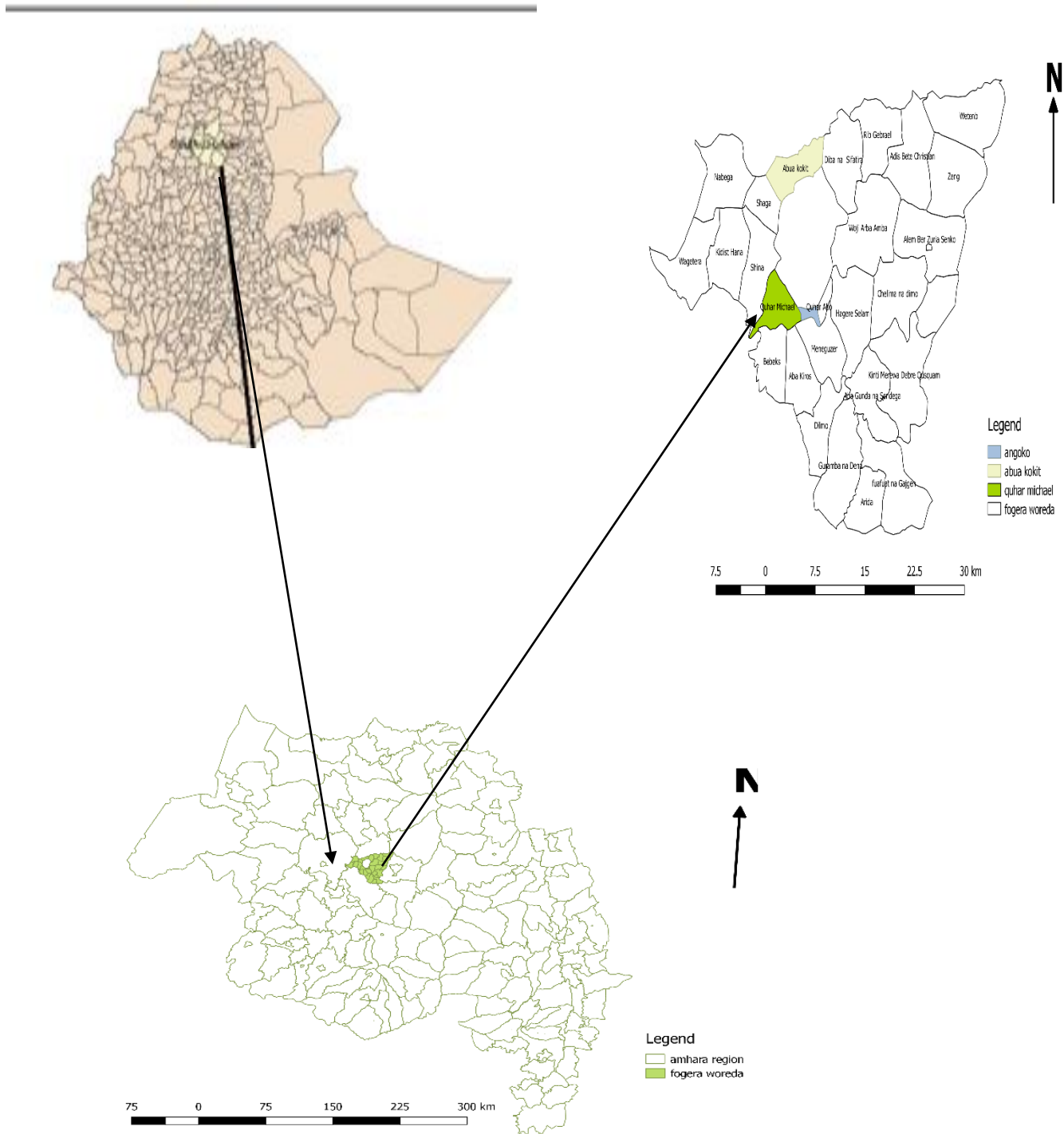


Figure 3.1 Map of study area

Source: Obtained from Fogera woreda land administration office

### **3.2 Study Design**

A cross-sectional survey design was used to examine the determinants of rural households' livelihood diversification in off-farm and non-farm activities. The study also used both qualitative and quantitative research approaches. Therefore throughout this study the researcher used quantitative method to compute and interpret numerical information and qualitative method to narrate and explain the information obtained from qualitative data.

### **3.3. Sampling Procedures and Sample size determination**

#### **3.3.1. Sampling Procedures**

A multi-stage sampling technique was applied to select sample households for the study which involved both purposive and random sampling techniques. In the first stage, Fogera district was selected purposely from 13 rural districts of South Gondar Zone due to huge potential of off-farm and non-farm activities. In the second stage, 3 kebeles were selected from total of 31 rural kebeles by using a simple random sampling technique. Finally, households were randomly chosen from the sampling frame (list of farmers) that exists at the kebele level. Then, a total of 192 farm households were selected using systematic sampling for the study proportionally to sample size.

#### **3.3.2 Sample size determination**

For this study, a simplified formula provided by Yamane (1967) was employed to determine the required sample size. According to the Fogera woreda plan commission Office, there are 745, 1074 and 1500 households in Anguko, AbuwaKokit and Kuhar Michael Kebeles respectively with total population (N) of 3319. According to Yamane formula, Sample size was selected 192 sample households where living in three kebeles. By applying Yamane's formula, Sample size determination (n) was 0.07 precision errors (e) in this study area due to the fact that the population in study area is homogeneous in their socio-economic character. This formula is valid for 95% confidence interval: -Sample size for  $\pm 5\%$ ,  $\pm 7\%$  and  $\pm 10\%$  Precision levels where confidence level is 95%

$$n = \frac{N}{1 + N(e)^2} = \frac{3319}{1 + 3319(0.07)^2} = 192$$

Table3. 1 The sample size distributions in the sample kebeles

No	Kebeles	Total number of household heads	Total number of samples Households
	Anguko	745	43
2	AbuwaKokit	1074	62
3	Kuhar	1500	87
	Michael		
	Total	3319	192

Source: Secondary data obtained from kebeles 2019

### 3.4. Types, Sources and Methods of Data Collection

To conduct this particular study both primary and secondary sources of data were used. Primary data which includes both qualitative and quantitative data on households' socio-economic characteristics were collected from respondents. There searcher also gathered secondary data from various sources like Books, from different publications, articles, Journals and different governmental organizations reports.

Interview schedule for household survey was used. The semi-structured interview schedule was prepared first in English and then translated into Amharic because all the respondents are Amharic speakers. Based on semi-structured household survey, different type of information's was gathered from households' demography, livelihood asset status, diversification strategy and challenges in diversification processes. Furthermore, before actual data collection undertaken, a pre-testing was conducted. Next to that, the required data were collected through farm household surveys using revised semi-structured interview. For this study 192 households were interviewed from three kebeles due to its only one agro-ecology zone (Woyina Dega)

In addition to quantitative data, qualitative data was collected from key informants by using key informant interview guides to supplement the household survey data. However; due to covid-19 epidemics FGD supplement data did not proceed.

### 3.5. Methods of Data Analysis

The study employed both descriptive and inferential methods for data analysis methods. Descriptive statistics was applied to characterize the sample households' social, economic, demographic and institutional factors. Descriptive statistics described using frequencies, percentages and mean for both categorical and continuous data. In addition, chi-square tests and t-test were employed to testing the degree of association between some categorical and continuous predictor variables with the response variable respectively. Moreover, Binary logistic regression model was used because of the binary/dichotomous nature of the response variable. Binary logit analysis displays have a superior ability to predict the livelihoods diversification activity in off-farm and non -farm of rural households (Seid, 2017; Amogne *et al*; 2017 and Engdayehu and Sivakumar, 2017). Data analysis was conducted using SPSS version 23 software.

Let also  $P_i$ =probability that is  $y_i=1$  the probability associated with the off-farm and non-farm activities choices of household (diversified) and  $(1-p)$  =probability that  $Y_i=0$  if the Household does not participate (not diversified) in off-farm and non-farm work.

The model specification of binary logistic regression was applied to identify major predictors which determine the participation of rural households in livelihood diversification activities (Brant, 1990, Gujarati, 2003and Grofman, 2009).

Then the binary logit model can be given by:

$$Z(x) = \{ \text{Exp} (B_0 + B_i x_i) \} / \{ 1 + \text{Exp} (B_0 + B_i x_i) \} \dots\dots\dots (1)$$

Derivation of the logit model can be performed as follows:

$$\text{Let } p \dots\dots\dots (2)$$

$$\dots\dots\dots (3)$$

$$(p) / (1 - p = \exp = \text{odds}) \dots\dots\dots (4)$$

By using natural log of above: -

$$\frac{p}{1-p} = e(B_0 + B_1X_1 + B_2X_2 + \dots + B_nX_n) \dots \dots \dots (5)$$

$$\ln\left(\frac{p}{1-p}\right) = B_0 + B_1X_1 + B_2X_2 + \dots + B_nX_n \dots \dots \dots (6)$$

Where  $p$  = probability of rural households participated in livelihood diversification activity (like participation in off-farm and non-farm activity)

Whereas  $1-p$  = probability of rural households not participated in livelihood diversification activity (that is only depend on farming activity)

$X_i = X_1, X_2, X_3 \dots \dots \dots X_n$ : are the explanatory variables used in the model.

$B_i = B_1, B_2, B_3 \dots \dots \dots B_n$ : are the regression coefficients indicating the magnitude of change (increased or decreased risk) in the independent variable.

The odds ratio  $Z_i$  is the factor by which the odds change when  $i$ th explanatory variables increases by one unit.

Before estimation of model, the Multicollinarity of explanatory or predictors was tested by using variance inflation factor for continuous variables and contingency coefficient for discrete or dummy variables. The value of variance inflation factor (VIF) test were used to test the over lapping of explanatory variables between each other in the model used for continuous variables (Guajarati, 1995). Similarly, contingency coefficient value used to test the overlapping of discrete/dummy variables in the model (Saroje *et. al*, 2013). The maximum restricted values of continuous variables were 10 whereas for discrete variables were 0.75 respectively.

### 3.6. Dependent Variables vs. Independent Variables

#### 3.6.1. Dependent variable

In this study the dependent variable was participation of rural livelihoods' diversification in off-farm and non-farm activities. With this investigation livelihood diversification was dichotomous variable in nature and it represents the status of household's livelihood diversification taking value of 1 if sample households participated in livelihood diversification and otherwise 0.



### 3.6.2. The Explanatory/ Independent variables

Variables that tend to explained a given dependent variables is said to be explanatory or independent variables. The rural households' livelihood diversification in off-farm and non-farm activities was determined by a wide variety of factors. Based on theoretical relationship and findings of empirical studies, the following explanatory variables were hypothesized to explain the dependent variables of rural household's livelihood diversification in off-farm and non-farm activities positively or negatively. These explanatory variables were also taken from previous studies.

**Age of household head:** This is a continuous variable showing general experience that increases the marginal value of time in each activity. At the younger age the probability of participating in off farm activity increases and it decreases at older age (Cortessis *et al*; 2012).

**Sex of household head:** This refers to the characteristics of farm household; that is whether the household is male headed or female headed. Thus, its sign will be expected to be positive for male headed households than female headed households (Amogneet *al*; 2017).

**Education of household head:** Education is Categorical variable, representing the status of education of household heads. Education is expected to have positive sign on the off-farm and non-farm participation for both farm households (Dessalegn and Ashagrie, 2016).

**Family size:** Size of family is continuous variable that represent the number of family member in the household. Large size of family expected to affect off-farm and non-farm participation of the HHs positively (Wondim, 2018).

**Economically active family:** This is also continuous variable which shows the age of family members who have ages between 15-64 years of household members. This variable will be expected to affect positively the off-farm and non-farm participation positively (Amare and Belaineh, 2013).

**Off-farm and non- farm training:** This is dummy variable implying to whether households have taken training on off-farm and non-farm work activities. The presence of training

expected to positively affect the participation of farm household in off farm work (Gechoet *al*; 2014 and Seid, 2017).

**Location:** This is also continuous variable showing the relative distance of nearest from market center, main road and cultivated land of the farm households. For all variables, when the distance nearest to market center, main road and their cultivated land from their home is expected to affect positively the participation in off-farm and non-farm activity (Amogneet *al*; 2017).

**Size of cultivable land:** This refers to the cultivable land size will be measured in hectares. Small size of land is expected to encourage the participation of HHs in off farm activities (Amogneet *al*; 2017).

**Amount of saving:** Saving is dummy variable showing whether HHs have their own saving or not. Thus, households having their own saving in cash to their nearest bank are more likely participate in off farm activities than those households who do not have their own saving (Engdayehu and Sivakumar, 2017).

**Livestock holdings:** This refers to those animals like horse, donkey, and mules used as the means of transport in rural areas. The presence of draft animals is expected to affect the off-farm and non-farm participation of farm households positively (Amare and Belaineh, 2013 and Yisihake and Abebe, 2015).

**Credit access:** This is dummy variable the access to credit for farm households. Thus, the presence of credit will be expected to affect the off-farm and non-farm participation of farm household positively (Dessalegn and Ashagrie, 2016 and Engdayehu and Sivakumar, 2017).

**Cooperative membership:** -This is a dummy variable farm household who has participated in cooperative membership. Therefore, households which have been a member of cooperative have expected to participate in off-farm-and non-farm activities (Seid, 2017).

**Media user:** This is a type of dummy variable rural households who participate in media. Rural households who are a user of a media either radio, television, etc. have expected to participate in off-farm and non-farm activities positively.

Table 3. 2 Summary of operational definition of variables

Variables	Description of variables	Types	Expected Sign
Dependent variables	Households livelihood diversification status	Dummy variable(1=diversified,0=otherwise)	
Independent Variables			
SEX	Sex of respondents(male)	Dummy	+ve
AGE	Age of Respondents	Continuous	-ve
MARSTU	Marital status of respondents	Categorical	+ve
FARSize	Farm Size	Continuous	-ve
TLU	Tropical Livestock Unit	Continuous	-ve
EDU	Educational level	Categorical	+ve
ECOACFZ	Economically active family size	Continuous	+v
FAMSize	Family size	Continuous	+ve
MEDUSER	Media user	Dummy	+ve
TRAUSER	Training user	Dummy	+ve
CRUSER	Credit user	Dummy	+ve
COPPMSH	Cooperative membership	Dummy	+ve
DISMRO	Distance to main road	Continuous	+ve
DISMJMC	Distance to Market Center	Continuous	+ve
DISHCL	Distance home to cultivated land	Continuous	+ve
SAVUSER	Saving user	Dummy	+ve

## CHAPTER 4. RESULTS AND DISCUSSION

### 4.1 Demographic and Socioeconomic Characteristics of Respondents

For this study, primary data were collected from a total of 192 sampled households. Based on this data, among total sampled respondents in the study area, 92.7 percent were males and the remaining 7.3 percent were females (table4.1). In regarding to the marital status of sampled households, 93.8 percent of them were married. As to demographic factors, educational level is one of demographic factors for rural households to participate in different income generating activities. Among the respondents in the study area, 40.6 percent were in educational level that can't read and write whereas 59.37 percent of them were can read and write (table4.1). This result implies that the majority of respondents were can read and write in the study area. In regarding to institutional characteristics of respondents, 64.1 percent of respondent did not participated training whereas 35.1 percent of respondents were participated in training access. As descriptive statistics result is showed in table 4.1, 70.3 percent of respondent were not credit user whereas 29.7 percent of respondents were participated in credit service. Similarly, in table4.1 shows, 71.4 percent of respondent were not saving user whereas 28.6 percent of respondents were participated in saving service.

Table4 1 Demographic characteristics of respondents in relation to dummy variables

Variables	Categories	Frequency(N)	Percentage (%)
Sex	Male	178	92.7
	Female	14	7.3
Marital status	Married	180	93.8
	Single	12	6.2
Level of education	Cannot read and write	78	40.6
	Read and write	114	59.37
Saving user	No	137	71.4
	Yes	55	28.6
Training user of respondents	No	123	64.1
	Yes	69	35.9
Credit user of respondents	No	135	70.3
	Yes	57	29.7

Source: own survey data 2019/20

Number of observations (n) =192

In concerning economic characteristics of respondents, the average tropical livestock unit of rural households had 5.15 with standard deviation 2.77(table 4.2). Similarly, in table4.2 the average farm size of respondents had 1.19 with standard deviation of 0.55.

Table4 2 Descriptive statistics of continuous explanatory variables

Variables	Minimum	Maximum	Mean	Sd.Dev
On-farm income	0	128944.00	54765.55	26279.77
Tropical livestock unit(TLU)	0	15.74	5.15	2.77
Income from off and non-farm	0	46000.00	6136.33	11119.1
Total annual income	9700.00	128944.00	60599.74	25618.61
Age of respondents	24	83	45.15	11.34
Family size	1	9	5	2
Eco. active Family size(age 14-64)	1	6	2.82	1.32
Farm size	1	3.00	1.19	.55
Distance to nearest main road in km	0.002	15.0	1.95	2.08
Distance to nearest market center in km	3.00	17.00	7.83	2.34
Distance to cultivated land in km	0.004	2.00	1.34	1.93

Source: Own survey data 2019/20

Number of observation (n) =192

Annual income was one of the measures to describe the status of livelihood diversification in this investigation. As indicated in Table4.2, the average annual income obtained from off-farm and non-farm activities were only 6136.33birr and that of obtained from on farm activities only was 55807.21birr. On the other hand, the total average annual incomes obtained from both were 60599.74 birr. As it is indicated in table4.2, the mean distance of respondents from the main road and market center were around 2 and 8 kms respectively. From table 4.2 shows that the majority of average age of respondents was 45.15 with its 11.34 standard deviation which implies that the majority are in their productive age level. As it is indicated in table 4.2, the average family size of respondents in the study area was 4.98 with standard deviation 3.39. This result implies that, currently there is a large family member in some households in the study area as standard deviation value indicated.

## 4.2. Assessments of Types and Status off-farm/non-farm Activities

### 4.2.1 Types of livelihood diversification

In the study area, farm households were engaged in different types of activities that are practiced for fulfillment of livelihoods of farm households. The nature of livelihood diversification practiced in the study area which was identified in mixed types of activities such as on-farm plus off-farm, on-farm plus non-farm and on-farm plus off-farm plus non-farm, but the only one respondent was participating in both off-farm and non-farm activities (table 4.3).

Table 4 3 Assessment of types and status livelihood diversification

Variables	Categories	Frequency (N)	Percentage (%)
Livelihood diversification activities	Farming activity only	137	71.9
	Off +non-farm activities only	1	0.5
	On-farm + off farm only	15	7.8
	On-farm + non-farm activities	26	13.5
	On-farm+ Off + non-farm only	13	6.8
Total livelihood diversification status	Non-diversified	137	71.4
	Diversified	55	28.6

Sources: Own survey data 2019/20

Number of observation (n) =192

In this investigation, the one specific objective was to assessing types and status of off-farm and non-farm activities which are practiced in the study area. Due to this objective four major activities such as off-farm wage, off-farm self, non-farm wage and non-farm self-employment which categorized under off-farm and non-farm activities were focused and summarized in table 4.4.

In this result, under off-farm wage activity, around 10 percent of the respondents were engaged in agricultural wage whereas 90 percent of respondents did not participate any activity other than farming only. Similarly, a small number of participants were engage in food cash for work and others. Furthermore, under off-farm self-activities, 6.2 percent of the respondents were engage in charcoal and wood selling, stone and sand collection and selling;

3.6 percent of the households were engaged in renting oxen, draft animals and the like, and the only 1.6 percent of the households were participated in other off-farm self-employment activities.

Second category of livelihood diversification activity which was investigated in the study area are assessing the practiced of non-farm employment activities. As shown table 4.4, among total respondents, 3.6 percent were engaged in non-farm wage such as construction wage and skilled daily laborer however majority of respondents (96.4 percent) were did not participate in non-farm activity. Regarding the non-self-employed households, majority of participants (13 percent) have been participating on animal and grain trading, which is followed by petty trading (4.2 percent) and skilled salaries (1.6 percent). Hence, Table 4.4 indicates that the study area is a potential for non-farm self-employment (13 percent) and agricultural wage employment (10 percent) which is compared to other alternative income generating activities. As assured by key informant interview asked, the study area has a great potential for multiple income generating activities especially for agricultural wage, sand collection and selling, animal fattening and trading, grain and fruit trading and petty trading due to study area's market and road accessibility.

As key informants revealed that even if having this good opportunities for income generating activities, however most of households depend on one activity rather than uses multiple income sources due to their low awareness, have no interest, they think as no profit to participate in agricultural wage and other non-farm activities which is in spite of this fact the study area has continued cultivated land scarcity and other hazards like commonly known as flood incidence in study area. Especially in study area, most of the households are exposed to flood and farm products are damaged.

Table 4.4 Types of livelihood diversification in Sample households

Category	Activities	Livelihood diversification
----------	------------	----------------------------

			Not diversified		Diversified	
			N	%	N	%
Off-farm activity	Off-farm wage	agricultural wage	173	90.1	19	9.9
		food cash for work	190	98.4	2	1.0
		Others	190	99.0	2	1.0
	Off-farm self-employment	charcoal and wood selling	180	93.8	12	6.3
		stone and sand collecting	191	99.5	1	.5
		Rented income(draft animals)	185	96.4	7	3.6
		Others	189	98.4	3	1.6
Non-farm activity	Non-farm wage	construction wage	187	97.4	5	2.6
		mining wage	191	99.5	1	.5
		salary skilled daily laborer	191	99.5	1	.5
	Non-farm self-employment	Food processing (milling,etc)	186	96.9	6	3.1
		Handcraft (waiving, carpentry)	191	99.5	1	.5
		Different services	191	99.5	1	.5
		petty trading	184	95.8	8	4.2
		skilled salaries	189	98.4	3	1.6
		Others (animal and grain trading)	167	87.0	25	13.0

Source: Own survey data 2019/20

#### 4.2.2 Status of Livelihood Diversification

As it is indicated in table 4.3 from total respondents, 28.6 percent were participating in different livelihood activities but majority of respondents (71.4 percent) were participate only farming activity. This result also better participation as compared to previous studies of 25 percent in Amhara region south Gondar zone in Lay Gayint district (Bazezew, 2015).The status of livelihood diversifications had measured through chi-square and an independent sample “t” test. Because the chi-square test and independent sample t-test indicates the extent of applications among and between groups associations between explanatory variables and livelihood diversification activities. In-group comparisons test, chi-square test used to test the



association of categorical variables between diversified and non-diversified households whereas the independent t-test is used to make a comparison between the diversified and non-diversified households based on their mean values of continuous variables and discussed in detail below.

As it is indicated in table 4.5, Chi-square test was employed to observe whether there is an associational difference between diversified and non-diversified groups in terms of different discrete variables and discussed in detail below.

As hypothesized in variable definitions, the sex of sample households in rural households' livelihood diversification is one of demographic factors that rural household to participate in different income generating activities. In the chi-square test result in table 4.5 indicates that among the households, 70.79 percent of males and 85.71 percent of females were not engaged in household livelihood diversification whereas 29.21 percent of males and 14.29 percent of female households were engaged in household livelihood diversification activities. This result indicates there is no great difference between male and female respondents to engage in different livelihoods diversification activities in the study area. Similarly, the chi-square test of association indicates that there was no significant association between sex and household livelihood diversification (table 4.5) and this result also similar to (Seid, 2017).

As it was expected in variable definition, marital status is identified one of demographic factors in the study area. As descriptive statistics result implies that the majority of respondents were married in the study area. Results in chi-square tests shows that 71.11 and 85.7 percent of respondents were not participated in diversified economic activities and 28.89, 40 and 14.3 percent of married, widowed and divorced were participate in livelihood diversified activities respectively (table 4.5)

According to result, there was no significant association between marital status and household livelihood diversification in this investigation.

As it was assumed in variable definition, among demographic factors educational levels is one of demographic factors for rural households to participate in different income generating activities. In previous studies, the educational level of rural households has principal importance in identifying and powerful development strategies to see alternative income

sources (Seid, 2017 and Amogne, 2017). Similarly in table 4.5 indicates that there was significant association between education level and household livelihood diversification. Hence, among the total participants, 83.33 percent of the non-educated households and 63.16 percent of the households who can read and write were not engage in diversified household livelihood activities where as 16.67 percent of the non-educated and 36.84 percent of household who can read and write were engage in diversified household livelihood activities (table 4.5). The result implies that rural households who have a better educational level has more chance to participate into different livelihood diversification activities which compare to those households who cannot read and write.

Table 4 5 Chi square tests results of categorical variables

Variables	Categories	Livelihood Diversification		P.value
		Not diversified (%)	Diversified (%)	
Sex	Male	125(70.22)	53(29.77)	0.757
	Female	12(85.71)	2(14.29)	
Marital Status	Married	128(71.11)	52(28.89)	0.551
	Single	9(75)	3(25)	
Education Level	Not read and write	65(83.33)	13(16.67)	0.002**
	Read and write	72(63.16)	42(36.84)	
Media User	Non-User	54(84.37)	10(15.62)	0.23
	User	83(64.8)	45(35.2)	
Training User	Non-User	103(83.73)	20(16.26)	0.00***
	User	34(49.3)	35(50.7)	
Credit User	Non-User	113(84.96)	20(15.04)	0.00***
	Participant	24(42.1)	35(57.9)	
Saving status	Non-participant	112(81.75)	25(18.25)	0.00***
	Participant	25(45.5)	30(54.5)	
Coop. Membership	Not member	31(83.78)	6(16.22)	0.681
	Member	106(68.4)	49(31.6)	

Source: own survey data 2019/20

To sum up from this investigation, educational level of rural households has important role to diversify their economic activities to support their family needs due to overcoming of scarcity resource in rural areas. In a developing country such as Ethiopia, where the majority of the

farmers are illiterate and due to this fact training service plays important role to rural households to use their capital (human and natural capital) in efficiently according to their endowment.

As hypothesized in variable description, rural households who have better training access about off-farm and non-farm activities will be had more chance to participate in many alternative income sources that compare to that non-user of rural households. As indicated in table 4.1, 64.1 percent of respondent did not participating training whereas 35.1 percent of respondents were participated in training access. From this result indicates that the majority of rural households did not participate in training activities whether lack of accesses of training facility by concerned bodies nor have no interest by respondents themselves. In table 4.5, 83.73 percent of the households who did not get training and 49.3 percent the households who got training were not engaged in diversified household livelihood activities. On the other hand, 16.62 percent of the households who did not get training and 50.7 percent of the households who got training were engaged in livelihood diversified activities. The chi-square test of association in table 4.5 revealed that there was significant association between training access and household livelihood diversification activities. In general, rural households who access to training get more chances to participate in different livelihood activities due to their improved enterprisers skills and business ideas. This finding is similar to previous studies (Amogne, 2017 and Engdayehu and Sivakumar, 2017).

As expected, credit access is one and a critical institutional factor to expand rural household's income generating activity due to their lack of capital to establish new business and for any other multi-purposes. Descriptive statistics result showed in table 4.1, 70.3 percent of respondent were not credit user whereas 29.7 percent of respondents were participated in credit. As indicated in table 4.5, credit access had significant association with household to be engaged in household livelihood diversification. From this chi-square test of association result, 84.96 percent households who did not get credit and 42.1 percent households who got credit were not engage in diversified household livelihood activities. On the other hand, 15.04 percent of the households who did not get credit and 57.9 percent of households who got credit were engaged in diversified household activities. The implications of chi-square test result, rural households who have a user of credit has a probability to participate in different livelihood activities which compared to those households did not user of credit access. In

many developing countries including our country Ethiopia, the culture of saving has been very low as compared to developed countries. Due to this factual reason, many African countries including Ethiopia have low investment performance and this cause for unemployment problem due to low performance of money generated from saving accumulation. There is positive association relationship between credit access and participation in off-farm and non-farm economic activities.

As it was hypothesized in this study, the main source of credit and own startup capital, saving practice is important tool for rural livelihood diversifications activity. In table 4.5 shows that, 81.75 percent of non- saver and 45.5 percent of saver were not engage in diversified household livelihood activities. On the other hand, 18.25 percent non- saver and 54.5 percent of saver were engage in diversified household activities. Result indicates that rural households who have a practice of saving have better performances in livelihood diversification activities. The chi-square test of association in table 4.5 indicates that there was significant association between saving users and livelihoods diversification activities.

As like chi-square test, independent samples t-test was computed to compare the mean differences between diversified and non-diversified households in relation to continuous variables and discussed in detail below.

The age of the sample household heads were the other demographic variable hypothesized to have an association with livelihood diversification activities in the study area. From table 4.2 shows that the majority of average age of respondents was 45.15 with its 11.34 standard deviation which implies that the majority are in their productive age level. Similar to categorical variables, the mean difference of continuous variables has been conducted by using independent sample t-test. Hence, the average age of households engaged in diversified household activities was 40.8 years and those engaged in non-diversified household activities were 47.2 years with standard deviations of 10.97 for each respectively (table 4.6). The mean age difference between diversified and non-diversified households in study area is tells that rural households who have younger ages has more chance to participate in off-farm and non-farm activities as compared to older ones. Similar evidence also similar to previous studies (Yishak, 2017 and Amogne, 2017)

As it was hypothesized that rural households who have large size of family members will be had a chance to participate in multiple economic activities due to scarcity of resources. Results in table 4.6 shows that, the average family size of household engaged in diversified household activities was 5.35 and those engaged in non-diversified household activities was 4.81 with standard deviations of 1.74 for each respectively. According to above result rural households who have a large family size has a probability to participate in diversified economic activities due to their extra labor forces existing in the household. This result also online with pervious study (Yishak *et al*, 2017).

A livestock unit is one part of farming activity which rural households using next to crop incomes and sometimes used as the driving forces of other economic activity for rural households. In spite of its significant, rural households which have a large number of livestock wealth did not participate in livelihood diversification activities due to concentration on livestock unit managing activities of the whole family labor forces (Wondim, 2018 and Yisihake and Abebe, 2015). As it was expected in this investigation, rural households which have large number of livestock unit have not participated in different income generating activities than those households which have a small number of livestock resources. As it is indicated in table 4.2, the average livestock of rural households had 5.15 with standard deviation 2.77. In group comparison result revealed that, the average livestock for those household engaged in livelihood diversification was 4.1 with standard deviation 2.98 and the average livestock for those household did not engage in livelihood diversification was 5.6 with standard deviation 2.5. This result implies that rural households who have a small number of livestock has a probability to participate in different economic activities those who have large number of livestock due to presence of extra labor forces in the household. To sum up due to size of livestock difference there was a significant different between diversified and non-diversified groups (table 4.6). For rural economy, accessibility of land is a backbone of any economic activity for rural households to lead their family needs and for other collateral purposes. Currently the land accessibility in rural area has been very limited due to its fragmented nature of land for different purpose taken by government and existing high pursuer of population by itself.

As it was estimated earlier, rural households who have low limited of land has to be enforced into different economic activity participations. The implication of this result the land holding size of study area is very low and it is not enough to cover the whole family labor force for their agricultural production activities. The independent sample test revealed that, the average farm size for those household heads engaged in livelihood diversification was 0.9 with standard deviation 0.48 where as those of household not engaged in livelihood diversification was 1.3 with t-value of 5.5. This mean difference indicates that there was significant different between the diversified and non-diversified groups (p-value <0.01). This implies that rural households who have low size of cultivated land has to be engaged in diversified economic activities which compared to those households has large size of land due to extra labor forces existing in a family.

Annual income was one of the measures to describe the status of livelihood diversification in this investigation. The independent sample t-test the result indicates in table 4.6, average annual incomes of the two groups were significantly different due to participation in only one activity (not diversified) and others participate in multiple activities (diversified). This tells us rural households who participated in diversified economic activity had performed better annual income as compared to those households did not engage in diversified livelihood activities (table 4.6). This imply that the rural households who engaged in on-farm, off-farm and non-farm activities will have a better opportunity to escape from multiple scarcity of resources than those who are only engaged in on-farm activities.

Road accessibility is backbone for any activities. Because many investments have been initiated based on accessibility of road to produce and easily transport their products after

Table4 6 T-test results of continuous variables

Continuous variable	Livelihood Diversification	N	Mean	Std.Dev.	t-value	Sig-value
Age of respondents	Not diversified	137	47.20	10.97	3.76	0.000***
	Diversified	55	40.84	10.97		
Total livestock unit	Not diversified	137	5.64	2.53	3.40	0.001**
	Diversified	55	4.14	2.98		
Family size	Not diversified	137	4.81	1.74	-.76	0.44
	Diversified	55	5.35	5.43		
Economically active family size	Not diversified	137	2.92	1.25	1.25	0.21
	Diversified	55	2.65	1.40		
Respondents farm size	Not diversified	137	1.33	.53	5.47	0.000***
	Diversified	55	.9087	.48		
Total annual income	Not diversified	137	61326.1	30747.77	-.92	0.030**
	Diversified	55	73317.4	100166.4		
Distance to market center	Not diversified	137	8.18	1.89	2.61	0.011**
	Diversified	55	7.10	2.96		
Distance to main road	Not diversified	137	1.95	1.85	.076	0.939
	Diversified	55	1.93	2.51		
Distance to reach from home to cultivated land	Not diversified	137	1.43	2.26	1.22	0.23
	Diversified	55	1.15	.92		

\*, \*\* and \*\*\*stands for statistically significant at 10%, 5% and 1% level of alpha

Source: own survey data 2019/20

Production to reach timely into the market for their customers other ways they exposed for extra costs when presence of poor road infrastructure accessibility. So, rural households to participate in different agri-business investment they need road accessibility to sell their products easily. As it was hypothesized in variable definition, road infrastructure accessibility and livelihood diversification activity have a positive direct relationship for rural households. As it is indicated in table4.2, the mean distance of respondents from the main road and market center were around 2 and 8 kms respectively. Similarly, the independent samples t-test in Table4.6 also revealed that there was significant difference in average distance from the market center for those rural households engaged in diversified and non-diversified livelihood activities. It implies that rural households who have access to road will be having a better

chance to engage in diversified economic activity those households have not access to road accessibility. As information obtained from key informants and descriptive statistics, rural households in the study area are living center to different towns like regional city of Bahir Dar, Deber Tabor, Gondar and Addis Zemen. In their explanation, at this time the area had a great potential to animal, grain and vegetable trading with those adjacent towns. Generally, as household survey and key informant result confirmed that proximity of market center are major pulling factors for rural households to involve multiple incomes generating activities in study area.

#### **4.3. Challenges of households to engage in off-farm/ non-farm activities**

Another critical question to answer in this study was identifying the major challenges of rural households to participate in livelihood diversification activity which existing in the study area.

**Lack of market information:** -Market information is a critical instrument for rural households to participate in different livelihood activities due to accessing potential information for participants in terms of input and product supply. As indicated in table 4.7, 95.8 percent of total respondents were faced to market information problem in study area. This result implies that rural households to participate in different livelihood activities, the role of marketing information are a critical reason to diversify their income generating activities. However, in study area the lack of market information are major challenges to see more diversified economic activities.

**Lack of training:** -There is association between human capital and livelihood diversification activity in rural economy. In table 4.5 indicated that 50.7 percent of rural households who had better knowledge about in off-farm and non-farm activity will be have more chance to participate in diversified economic activities which compared to those 16.26 percent of households were not had knowledge about income generating activities. The implication of this result shows that rural households who have access to training will have better knowledge about participation in livelihood diversification activities those who are not training access. In this investigation, among total respondents, 92.7 percent of rural households had a lack of knowledge to participate in diversified economic activities in study area (table 4.7). This implies that in study area majority of rural households has no sufficient knowledge about off-



farm and non-farm activities to understand easily economic environments. This finding also online with previous studies (Seid, 2017 and Wondim, 2019)

**Lack of capital:**-For any new or expanding existing activities, the availability of capital is critical to rural households (Seid, 2017). In this investigation, 77.6 percent of total households had a capital constraint to proceeds the engagement of different livelihood diversification activities in study area (table4.7). Because of this fact, majority of respondents in study area has low performance in regarding to off-farm and non-farm participation due to poor capital accumulation.

Table 4 7 Challenges to engage in livelihood diversification activities

Challenges	Category	Frequency	Percent (%)
Lack of market information	No	8	4.2
	Yes	184	95.8
Lack of knowledge	No	14	7.3
	Yes	178	92.7
Lack of capital	No	43	22.4
	Yes	149	77.6
Lack of infrastructure	No	48	25.0
	Yes	144	75.0
Lack of credit access	No	57	29.7
	Yes	135	70.3

Source: Own survey data 2019/20

**Credit access:** Economic diversification activity and finance accessibility have positive significant relationship for rural households to expand their income alternatives. As result shows in Table4.7, 70.3 percent of respondents had a key issue of finance to participate in different economic livelihood diversification to cope up different agricultural product failures'. The reason shortage of credit access in study area is indicated that due to low attention given by government and finance institutions for non-agricultural economic growth for rural economy. This identified challenge existing in the study area was assured by officials during key informant interview. To sum up, this result also consistent with previous studies (Zelalem, 2018, Amare and Belaineh, 2013 and Wondim, 2019)

**Lack of infrastructure:** -Not only above-mentioned challenges but also for many rural dwellers' infrastructure facility are very important tool for livelihood diversification activities. Better infrastructure facility had good opportunity (pulling factors) for rural households to participate in different income generating activities which comparing to poor infrastructure access (Kuttippurath and Nikulin, 2012). As indicated in table 4.3, rural households who had nearest to main road and market center have better participation in off-farm and non-farm economic activities which compared to those households poor access to infrastructures facilities in study area. However, in this study area majority of respondents did not participate in off-farm and non-farm activity due to poor infrastructures facilities in study area (table4.6). This challenge also identified by previous studies (Amogneet *al*; 2017 and Seid, 2017).

#### **4.4 Determinants of Rural Household Off-farm/ Non-farm activities**

This part shows the econometric results of the determinants of rural households' livelihood diversification activities. To investigate statistically significant predictors of household livelihood diversification, a binary logistic regression was conducted.

Before estimation of model, the Multicollinarty of explanatory or predictors was tested by using variance inflation factor for continuous variables and contingency coefficient for discrete or dummy variables. As result of VIF and Pearson's chi-square test, there isno Collinearity problem between predictors (Appendix2 and 3). The maximum VIF and contingency coefficient value found were 1.599 and 0.677 respectively (which means under required restricted numbers from maximum value of 10 and 0.75).

Similarly, the model goodness of fit was measured its validity by chi-square test, Hosmer and Lemeshow test and Pseudo R-squares. The model chi-square defines as  $-2(\log \text{likelihood of current model} - \log \text{likelihood of previous model})$ . As shown in Appendix 4, the model chi square for final model was 88.839( $p\text{-value} < 0.05$ ) and the significant model chi square indicates that the model generated in the final step is significantly better in predicting subject membership than the models in previous steps and the constant-only model. Another checking up of goodness of fit of the model for this investigation was used Hosmer and Lemeshow test. This model helps to test the overall fit of a model to the observed data. In the current analysis the value of this test statistic of chi-square value and p-value was 2.546 and 0.96 respectively

(Appendix 5). So; we don't reject the null hypothesis that stated because there is no difference between the observed and predicted values, i.e. the model appears to fit the data reasonably well. The third assuring the goodness of fit of the model was Pseudo R-squares test. This model test value contains both the Cox & Snell and Nagelkerke R squared values. Their result can be interpreted in a similar manner as R square value in linear regression. It tells us the total percentage of variability in model is accounted due to influence of explanatory variables. Hence, the higher the value, the better the model fit. So; the value of Cox and Snell R<sup>2</sup> was 0.57 and Nagelkerke R<sup>2</sup> was 0.74 (Appendix 6). This indicated that about 74 Percent of total variation of interest variable was explained by explanatory variables.

Based on above background information, for this investigation the determinant variable's coefficients which were statistically significant at less than 10 percent of probability level were discuss below. Among potential predictors, level of education of household head, access to credit, access to training and family size had positively significance whereas farm size and livestock unit had negatively significance for livelihood diversification activities (table 4.8). However the other 10 predictors were insignificant variables.

**Access to credit:** In this study household's access to credit services and diversified household economic activities have found significant and positive association. It was hypothesized that rural households who have access to credit in the locality have more chance to participate in diversified economic activity. In binary regression model result indicates that the odds ratio of participants who got credit access being engaged in household livelihood diversification was increased by a factor of 4.508 as compared to those participants who did not get credit access ( $\beta=1.505$ , OR=4.508, p-value = 0.002) given the other things constant. This finding confirms that there is a positive association relationship of credit access and participation of rural households livelihood diversification activity in the study area. The key informants explained that the respondents who got credit access were participate in additional income generating activities such as animal and grain trading but respondents who did not get credit access were participate in diversified economic activities. As key informant explanation, even if having a credit access in the area, there is a great collateral problem for rural households. Generally, the finding shows rural households who have credit access have more probability to participate in different income generating activity. The result obtained in current investigation

also was supported by other previous studies(Gaba *et al.*, 2001;Engdayehu and Sivakumar, 2017 and Okurut *et al.*, 2011) but contradict with results of (Seid,2017; Yishak, 2017; Yishak *et al.*; 2014 and Oluwaseun and Sibongile,2019).

**Educational level of households:** As it was expected in explanatory variable definition, those households with better level of education have a better idea to be engaged in different income generating activities (off-farm or non-farm) in addition to farming. As regression model result indicates the educational level is one of predictors that rural households who hold better educational level have to more chance to participate in economic diversified activity which compared to those households did not have educational academic. Findings in table4.8 is indicated that, the odds of participants who can read and write being engaged in household livelihood diversification was increased by a factor of 1.245 as compared to those participants cannot read and writes ( $\beta=0.219$ ,OR=1.245, p-value = 0.003) given the other things constant. Furthermore; key informant interview got from woreda agriculture office, employment opportunity office and development agents also support this result. According to KII thought said that currently rural households who have better educational level were participating in different livelihood activities than non-educated households in the study area. This implies that rural households to participate in different economic activities, at least they attend the primary level of education to understand the business environment and can receive to apply better technologies given by development agents. This result is similar with previously conducted research findings(Van der Sluis *et al.*, 2005,Michálek and Podolák, 2011andSeid,2017).To sum up different authors and current investigation result is indicated that educational level of rural households are critical reason and main pulling factors to expand their alternative income sources.

Table 4 8 Binary logistic regression model results

Variables	Coefficient(B)/SE	p-value	Exp(B)
SEX (1)	.077(2.755)	.977	1.080
TLU	-.212(.094)	.029**	.809
AGE	-.037(.025)	.223	.963
FAMSIZE	.428(.188)	.048**	1.535
MARST (1)	1.395(2.904)	.631	4.033
EDU (1)	.219(.528)	.003***	1.245
ECOACFZ	.118(.266)	.697	1.125
FARSize	-1.993(.528)	.001***	.136
MEDUSER(1)	-.589(.576)	.335	.555
TRAUSER(1)	1.391(.434)	.003***	4.018
CRUSER(1)	1.505(.450)	.002***	4.506
COPPMSh(1)	-.206(.555)	.715	.814
DISMRO	.153(.120)	.217	1.165
DISMJMC	-.048(.202)	.829	.953
DISHCL	-.089(.106)	.412	.915
SAUSER(1)	.434(.460)	.346	1.543
Constant	.582(1.452)	.683	1.790

\*, \*\* and\*\*\* Stands for significant at the 10%, 5% and 1% level of alpha

Source: Survey Data 2019/20

**Access to training:** Training about use of off-farm and non-farm activities helps to make awareness for households as means of additional income generating activities. As was hypothesized in the earlier, training and livelihood diversification activity has a direct relationship in what rural households to generate additional income sources in addition to farming incomes. In binary logistic regression result indicates, the odds ratio of being engaged in household livelihood diversification for those participants who got training users was increased by a factors of 4.018 as compared to those participants who did not got training users ( $\beta=1.391$ , OR=4.018, p-value < 0.003) given the other things constant. This implies that rural households who have access to training makes the skill of household to be better to involve different diversified activities with assuring in production of quality product for the market. Further training about market assessment also important pulling factor how an entrepreneur to be competent with others and they can be also aware about customer handling

systems. In this investigation training also have important role for rural households to utilize efficiently their local resources due to capacitate their skills by training. The result obtained in current investigation is supported by previous studies(Gecho *et al.*, 2014 and Seid,2017) but contradict with studies of (Amogne,2017 and Yishak,2017). In general; the role of training to livelihood diversification activity is very critical to improve rural households' standard of living by improving their incomes however in this study area the coverage of training is very poor which was addressing only 35.9 percent of total sampled households(table4.1).

**Tropical livestock unit(TLU):** The econometrics model result shows in table4.8, as the number of livestock unit increased by unit, the odds of respondents being engaged in off-farm and non-farm activity was decreased by a factors of 0.809 given the other variables constant ( $\beta = -0.212$ , OR=0.809, p-value=0.029).As it was hypothesized that in independent variable definition, when the number of livestock of households increased, mainly rural household are engaged and being busy in managing their livestock's rather than showing diversified their livelihood activities. This investigation implies that rural households who have limited number of livestock size has enforced into alternatives livelihood diversification activity due to surplus or extra labor force accumulation in households. The result obtained in this research regarding the effect of size of livestock is supported by one of the previous researches(Devendra and Chantalakhana, 2002; Yaro, 2006;Amare and Belaineh,2013 and Yisihake and Abebe, 2015andWondim, 2018) however this result not consistent with(Amogne, 2017 and Mideksa and Eric,2019).

**Farm size:** As it was hypothesized, farm size has negative and significant effect for households to be engaged in diversified household's livelihood activities. As binary regression model result is indicated in table4.8, when the farm size of a households increased by one hectare, the odds of participants being engaged in households livelihood diversification (off-farm and non-farm) was decreased by 13.6 percent given the other factors constant ( $\beta = -1.391$ , OR=0.136, p-value=0.001).This implication is similar effect to that of rural households who have large size of livestock size. Because of this reason rural household who has a large size of the cultivated land they spent their time and family labor on managing of farming activity rather than participating in diversified economic activities. In addition to household survey result, key informant interview assured that rural households who have

limited cultivated land size participate in off-farm and non-farm economic activity due to their surplus family labor with insufficient cultivated land. On the other hand coming to the current situation of households regarding to farm size, they have fragmented land (very small size) through overtime due to different reason. Especially, the urban and national and regional project expansion in the region in general and the study area particularly (like Rib project), increased and the lands which were belongs to farmers are shared for those projects. Hence, the farmers have exposed cultivated land scarcity and pushing into different alternatives income sources(Christiaensen, 2013).This result of farm size is also consistent with another studies negatively significant(Niehof, 2004, Ellis and Allison, 2004) but positively significant( Haile,2012 andEngdayehu and Sivakumar, 2017)however contradict with(Seid, 2017 and Oluwaseun and Sibongile,2019).

**Family size:** Family size has positive and significant effect for households to be engaged in diversified household livelihood activities. As the result revealed that when the family size increased by one unit, the odds of being engaged into household livelihood diversification was increased by a factor of 1.535 given the other factors constant ( $\beta=0.428$ ,  $OR=1.535$ ,  $p\text{-value}=0.048$ ).As it was expected in the earlier statement in factor variable, there is a positive significant relationship between a number of households family size and diversified economic activity. Finally, the result of binary logistic regression model shows that, rural households who have large number of family size there is no full-time coverage of working age group on their own land size. On the other hand, rural households have an agriculturalseasonalityin nature (Reardon, 2007). Due to this surplus family labor of rural households might be pushing into different diversified activities as agricultural wage laborer and non-agricultural employment. In current conditions, in rural area have large and extended family size and such conditions also encourage the concerned bodies to promote household livelihood diversification. In general, from this finding, rural household who have a large family size have to be enforced into diversified livelihood activities to those households who have limited family size in order to meet their basic family need. This investigation also consistent with previous studies(Gecho *et al.*, 2014 and Seid,2017) but contradict with results of(Yishak *et al.*;2014; Engdayehu and Sivakumar, 2017; Amogne,2017 and Yishak, 2017).

**Others explanatory variables result:**-In this investigation, age of households, sex of households, marital status, media user, distance to main road, distance to market center, distance to cultivated land from house and cooperative membership were found to have no significant influence on farmers' participation in livelihood diversification activities in my study. This finding also similar with (Yishak *et al*; 2014; Seid, 2017; Amogne *et al*; 2017; Engdayehu and Sivakumar, 2017; Yishak, 2017 and Oluwaseun and Sibongile, 2019). However, cooperative membership, distance to market center and age (Seid, 2017 and Engdayehu and Sivakumar, 2017) and sex and media user (Amogne *et al*; 2017 and Yishak, 2017) were found to have a significant influence on farmers' participation in livelihood diversification activities respectively. These significance differences observed due to data nature and place variation of studies. In general, those variables which is insignificant in determinant factors means not to be considered has no a contribution to livelihood diversification activities as showed in chi-square test and an independent sample t-test result.



## **CHAPTER 5. SUMMARY, CONCLUSIONS AND RECOMMENDATION**

### **5.1 Summary and Conclusion**

Poverty and food insecurity are key problems in developing countries due to low participation in off-farm and non-farm alternative economic activities as result of decreasing return of agricultural productivity. These problems are relevant in Ethiopia in general and the study area in particular as the economy is mainly reliant on agriculture. Due to this realistic reason, rural households focusing on livelihood diversification in off-farm and non-farm activities is important role to maintain their family needs. The result of this study indicates that only 28.6 percent of sampled households had diversified their livelihood activities into different income generating livelihood diversification activities while the majority (71.4 percent) did not diversify their livelihood activities, which means non-diversified. As indicated in this study, the major off-farm and non-farm economic activities practiced in the study area are agricultural wage, animal and grain trading, food processing, sand and stone collection activities.

Based on inferential statistics in independent t-test and chi-square test of association result revealed that age of respondents, total livestock size, family size, distance to markets center are clearly show its mean difference to households livelihood diversification whereas, educational level of households, access to training, access to saving amount and access to credit indicates its association with rural households livelihood diversification activities.

As econometric model result in binary logistic prediction, among the different potential predictors of households to be engaged in different diversified economic activities, access to credit, access to training, level of education, farm size, livestock unit and family size are significant predictors for households being engaged in diversified household livelihood activities. Among these predictors, access to training, access to credit, level of education and family size are positively associated to engagement of households in diversified household economic activities. On the other hand, farm size and livestock unit have negative and significant correlation with the variable of interest (livelihood diversification).

In this study, agricultural seasonality, climatic hazards (flooding in Fogera context), urban and different national and regional project expansion such as Rib irrigation and dry port project at national level are major pushing factors for rural households livelihood diversification activities in the study area whereas proximity to urban area, access to education and access to media are pulling factors for sampled households to participate in different income generating activities.

According to the result obtained in current investigation, lack of knowledge, lack of capital, lack of market information, lack of credit access and lack of infrastructure (such as road, electricity) are the well-known identified challenges in the study area.

Based on this study, the basic factors which influenced the livelihood diversification in off-farm/non-farm activities are household's demographic and institutional factors plus challenges in related to knowledge, market information, capital and access to infrastructure to engage in alternative activities. Similarly, there was high difference between the study area and the national off-farm and non-farm activity status in terms of participation types and its influential factors. In addition to that, there was income inequality between diversify and non-diversify rural households.

## **5.2 Recommendations**

Previous studies conducted on livelihood diversification in Ethiopia concerning that due to declining productivity of agriculture through over time and will be a major challenge to rural households' livelihood income. Development policies and strategies designed to improve the overall income of the rural households through promoting different livelihood diversification strategies and institutional linkages in general and livelihood diversification activities enhancing programs in particular, in the study areas need to consider the major constraints, opportunities, and potentials. With the major findings of the study and the conclusion drawn, this is crucial, as off-farm and non-farm activities can remove some of the current pressure on farm land and reduce the rate of land degradation by providing alternative sources of income to rural households in densely populated in the study area.

Based on the investigation, the following recommendations are forwarded for the concerned stakeholders;

- As indicated in this study, the study area has a great potential to off-farm and non-farm (like agricultural wage, animal and grain trading, food processing, sand and stone collection etc.) activities. So, regional state, zonal and woreda government organizations such as micro and small scale enterprise, micro finance rural road authority, and trade and investment offices should be support by training, infrastructure development, credit access, and supplying marketing information.
- Education level of households including short-term training has a positive relationship with diversification of households' livelihood, to improve life of farm households. Therefore, government and non-government efforts such as education and technical and vocational sectors need to be continued in more aggressive manner on teaching and training of households to improve their knowledge and traditional experiences.
- Credit service has a significance relationship to improve household's livelihood. Hence, increasing credit and saving access by strengthening the credit institutional arrangement (by solving collateral problems) is much advisable to make this development possible and improve livelihoods of rural households.
- This study indicates that there are many challenges such as road and electricity infrastructure facilities, credit access and collateral problem and capital availability are identified which bottlenecked for livelihood diversification activity, so to solve this challenge policy makers should be focused to remove such constraints.
- In this investigation rural households who has large livestock and cultivated land size were negatively significant with livelihood diversification activity, Hence, concerned bodies should be encouraged the rural households who have a limited land size and livestock holding to participate in livelihood diversification activities ,by designing pro-poor policy to use their family labor resources efficiently.
- Generally, local organizations, private sectors, local and international organizations should be continued to work together on strengthening the livelihoods of rural households with considering social accountability to cope up different risks.

## REFERENCES

- Abduselam, S. 2001. An Application of expert systems on species selection: The Case of Forestry Research Center.
- ACS, Z. J., Desai, S. & Klapper, L. F. 2008. *What does" entrepreneurship" data really show? A comparison of the global entrepreneurship monitor and World Bank group datasets*, the World Bank.
- Adepoju Abimbola, O. & Oluwakemi, A. O. 2013. Livelihood diversification and welfare of rural households in Ondo State, Nigeria. *Journal of Development and Agricultural*, 5, 482-89.
- Afewerk H. Mesfin & Lemma Zemedu 2016. Improved Rice Seed Production and Marketing: Challenges and Opportunities: the case of Fogera District of Ethiopia. *Journal of Agriculture and Environmental Sciences* Volume 1, No. 2, 1-117.
- Agutu, N., Awange, J., Zerihun, A., Ndehedehe, C., Kuhn, M. & Fukuda, Y. 2017. Assessing multi-satellite remote sensing, reanalysis, and land surface models' products in characterizing agricultural drought in east Africa. *Remote Sensing of Environment*, 194, 287-302.
- Akoum, I. F. 2008. Globalization, growth, and poverty: The Missing Link. *International Journal of Social Economics*.
- Alkire, S., Foster, J. E., Seth, S., Santos, M. E., Roche, J. M., and Ballon, P. (2015). *Multidimensional Poverty Measurement and Analysis*, Oxford: Oxford University Press, Ch. 6.
- Allison, E. H. & Ellis, F. 2001. The livelihoods approach and management of small-scale fisheries. *Marine Policy*, 25, 377-388.
- Amare Demissie and Belaineh Legesse. 2013. Determinants of income diversification among rural households: The case of smallholder farmers in Fedis District, Eastern Hararge Zone, Ethiopia. *Journal of Development and Agricultural Economics*, 5, 120-128.
- Ambachew Molla and Ermias Ashagrie 2016. Determinants of Rural Household Livelihood Diversification Strategy. *Journal of Agricultural Economics, Extension and Rural Development* Vol. 4(8): pp, 548-560.
- Ambati, J., Anand, A., Fernandez, S., Sakurai, E., Lynn, B. C., Kuziel, W. A., Rollins, B. J. & Ambati, B. K. 2003. An animal model of age-related macular degeneration in senescent ccl-2-or ccr-2-deficient mice. *Nature Medicine*, 9, 1390-1397.
- Amogne Asfaw, Belay Simane, Ali Hassen and Amare Bantider 2017. Determinants of non-farm livelihood diversification: Evidence from rain fed –dependent smallholder farmers in north enteral Ethiopia, *Development Studies Research*, 4:1, 22-36.
- Analysis, 2nd Ed., New York: Harper and Row.
- Arega Bazezew 2015. Non-Farm and Off-Farm Activities in Achieving Livelihood Security in the Amhara Region: Case Study of Lay Gayint District. *Journal of Agriculture and Environmental Sciences*, vol. 1, n. 2, p. 36-56.
- Ayantoye, K., Amao, J. & Fanifosi, G. 2017. Determinants of Livelihood Diversification among Rural Households in Kwara State, Nigeria. *International Journal of Advanced Agricultural Research*, 5, 82-88.
- Barrett, C. B. & Reardon, T. 2000. Asset, activity, and income diversification among African agriculturalists: Some practical issues. *Available At Ssrn* 257344.
- Barrett, C. B., Benzene, M. & Aboud, A. 2001a. Income diversification, poverty traps and policy shocks in Côte D'ivoire and Kenya. *Food Policy*, 26, 367-384.

- Barrett, C. B., Reardon, T. & Webb, P. 2001b. Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. *Food Policy*, 26, 315-331.
- BeleteAnteneh, AzageTegegne, FekaduBeyene and Berhanu Gebremedhin. 2010. Cattle milk and meat production and marketing systems and opportunities for market-orientation in Fogera woreda, Amhara region, Ethiopia. Working Paper 19.
- Bernard Grofman and Carsten Q 2009. An Introduction to Crisp Set QCA, with a Comparison to Binary Logistic. Schneider Source: Political Research Quarterly, Vol. 62, No. 4, pp. 662-672
- Buchanan, K., Burt De Perera, T., Carere, C., Carter, T., Hailey, A., Hubrecht, R., Jennings, D., Metcalfe, N., Pitcher, T. & Peron, F. 2012.Guidelines for the treatment of animals in behavioral research and teaching. *Animal Behaviors*, 83, 301-309.
- Chambers, R. & Conway, G. 1992.*Sustainable rural livelihoods: Practical concepts for the 21st century*, Institute of Development Studies (UK).
- Cortessis, V. K., Thomas, D. C., Levine, A. J., Breton, C. V., Mack, T. M., Sigmund, K. D., Haile, R. W. & Laird, P. W. 2012. Environmental epigenetic: Prospects for studying epigenetic mediation of exposure–response relationships. *Human Genetics*, 131, 1565-1589.
- Demissie, M., Getahun, H. & Lindtjörn, B. 2003.Community tuberculosis care through “Tb Clubs” in rural north Ethiopia. *Social Science & Medicine*, 56, 2009-2018.
- Dessalegn, M. & Ashagrie, E. 2016.Determinants of rural household livelihood diversification strategy in south Gondar Zone, Ethiopia. *Journal of Agricultural Economics, Extension and Rural Development: Issn-2360-798x*, 4, 548-560.
- Devendra, C. & Chantalakhana, C. 2002. Animals, poor people and food insecurity: Opportunities for improved livelihoods through efficient natural resource management. *Outlook on Agriculture*, 31, 161-175.
- Dimova, R. D. & Sen, K. 2010. Is household income diversification a means of survival or a means of accumulation? Panel data evidence from Tanzania. *Panel Data Evidence from Tanzania (April 6, 2010)*.
- Eguavoen, I.; Derib, S.D.; Deneke, T.T.; McCartney, M.; Otto, B.A. and Billa, S.S. 2012. Digging, damming or diverting? Small-scale irrigation in the Blue Nile basin, Ethiopia. *Water Alternatives* 5(3): 678-699
- Ellis, F. & Allison, E. 2004.Livelihood Diversification and Natural Resource Access.*Overseas Development Group, University of East Anglia*.
- Ellis, F. 1993. *Peasant economics: Farm households in agrarian development*, Cambridge University Press.
- Ellis, F. 2000. *Rural Livelihoods and Diversity in Developing Countries*, Oxford University Press.
- Engdayehu Zewdie and Sivakumar, S. 2017.Determinants of off farm participation of rural farm households in Shebedino district of Sidama zone, southern Ethiopia. *International Journal of Development Research* vol. 07, (09), 15157-15165.
- Gaba, D. M., Howard, S. K., Fish, K. J., Smith, B. E. & Sowb, Y. A. 2001. Simulation-based training in anesthesia crisis resource management (Acrm): A decade of experience. *Simulation & Gaming*, 32, 175-193.
- Gebrehiwot, K. A. 2018. A review on water logging, Stalinization and drainage in Ethiopian irrigated agriculture. *Sustainable Water Resources Management*, 4, 55-62.
- Gecho, Y., Ayele, G., Lemma, T. & Alemu, D. 2014. Rural household livelihood strategies: Options and Determinants in the Case of Wolaita Zone, Southern Ethiopia. *Social Sciences*, 3, 92-104.

- Getachew, H. E. & Melese, A. M. 2012. The Impact of land use change on the hydrology of the Angereb watershed, Ethiopia. *International Journal of Water Sciences*, 1.
- Getachew, M., Abay, M., Zelalem, H., Gebremedhin, T., Grum, T. & Bayray, A. 2018. Magnitude and factors associated with adherence to iron-folic acid supplementation among pregnant women in Eritrean refugee camps, northern Ethiopia. *Bmc Pregnancy and Childbirth*, 18, 83.
- Gujarati, D.N. 1995 .Basic Econometrics. Third Edition, international editors.
- Gujarati, D.N. 2003 .Basic Econometrics. 4th Edition, McGraw-Hill, New York
- Haggblade, S., Hazell, P. & Reardon, T. 2010. The rural non-farm economy: prospects for growth and poverty reduction. *World Development*, 38, 1429-1441.
- Hengsdijk, H., Guanghuo, W., Van Den Berg, M. M., Jiangdi, W., Wolf, J., Changhe, L., ... Van Keulen, H. 2007. Poverty and biodiversity trade-offs in rural development: A case study for Pujiang County, China. *Agricultural Systems*, 94(3), pp.851–861.
- Henson, S. & Reardon, T. 2005. Private Agri-food standards: Implications for food policy and the Agri-food system. *Food Policy*, 30, 241-253.
- Hogue, M. A.-A., Phinn, S., Roelfsema, C. & Childs, I. 2018. Modeling tropical cyclone risks for present and future climate change scenarios using geospatial techniques. *International Journal of Digital Earth*, 11, 246-263.
- Jarso, A. 2017. *Morphological diversity and ethno botanical study of Enset (Ensete Ventricosum (Welw.) Cheesman) landraces in Kebena, Cheha and Ezha Woredas, Gurage Zone, Spnnrs, Ethiopia*. Addis Ababa University.
- Jirström, M., Andersson, A. & Djurfeldt, G. 2010. Smallholders caught in poverty flickering signs of agricultural dynamism. *African Smallholders. Food Crops, Markets and Policy*, 74-106.
- Kuttippurath, J. & Nikulin, G. 2012. A comparative study of the major sudden stratospheric warnings in the Arctic Winters 2003/2004-2009/2010.
- Lewis, K. 2017. Understanding climate as a driver of food insecurity in Ethiopia. *Climatic Change*, 144, 317-328.
- Losch, B., Freguingresh, S. & White, E. 2011. Rural transformation and late developing countries in a globalizing world: A Comparative analysis of rural change. *Final report of the rural structure program, Revised Version. World Bank, Washington, Dc*.
- Michálek, A. & Podolák, P. 2011. Impact of key socio-economic disparities on migration in Slovakia: Economic Diversification vs. Traditional Pattern. *European Spatial Research and Policy*, 18, 71-87.
- Mideksa Fufa Jilito and Eric Ndemo Okoyo. 2011 .An empirical study of livelihoods diversification strategies among rural farm households in Agarfa District, Ethiopia *Journal of Rural Development*, Vol. 37 No. (4) pp. 741-766.
- Mohammed Adem, Esubalew Tadele, Habtamu Mossie and Mezegebu Ayenal 2018. Income Diversification and Food Security Situation. *Cogent Food & Agriculture* Vol.4:27 PP
- Muse, A. 2011. *Diversification of livelihood activities as a strategy of promoting household food security: A Case of Daro Lebu Woreda of West Hararge Zone of Oromia Regional State, Ethiopia*. Addis Ababa University.
- Nagler, P. & Naudé, W. 2014b. Non-Farm entrepreneurship in rural Africa: Patterns and Determinants.
- Nagler, P. & Naudé, W. 2014a. *Non-Farm Enterprises in Rural Africa: New Empirical Evidence*, the World Bank.
- Nagler, P. & Naudé, W. 2017. Non-Farm entrepreneurship in rural Sub-Saharan Africa: New Empirical Evidence. *Food Policy*, 67, 175-191.

- Niehof, A. 2004. The significance of diversification for rural livelihood systems. *Food Policy*, 29, 321-338.
- Oduniyi Oluwaseun Samuel and TekanaSibongile Sylvia. 2019. Analysis of rural livelihood diversification strategies among maize farmers in North West province of South Africa. *International Journal of Entrepreneurship*, Volume 23, Issue 2, 1939-4675
- Okurut, F. N., Olalekan, Y. & Mangadi, K. 2011. Credit rationing and some development in Botswana: Implications for economic diversification. *Botswana Journal of Economics*, 8, 62-85.
- Perlman, J. M., Wyllie, J., Kattwinkel, J., Atkins, D. L., Chameides, L., Goldsmith, J. P., Guinsburg, R., Hazinski, M. F., Morley, C. & Richmond, S. 2010. Part 11: Neonatal Resuscitation: 2010 International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. *Circulation*, 122, S516-S538.
- Reardon, T. & Barrett, C. B. 2000. Agro industrialization, Globalization, and International Development: An overview of issues, patterns, and determinants. *Agricultural Economics*, 23, 195-205.
- Reardon, T., Barrett, C. B., Berdegue, J. A. & Swinnen, J. F. 2009. Agrifood industry transformation and small farmers in developing countries. *World Development*, 37, 1717-1727.
- Rollin Brant 1990. Assessing Proportionality in the Proportional Odds Model for Ordinal Logistic Regression. *Biometrics*, Vol. 46, No. 4, 1171-1178 pp
- Saroje, k., Habshah Midi and Sohel Rana. 2013. Collinearity diagnostic of binary logistic regression model. *Journal of Interdisciplinary Mathematics* vol.13 (2010), No.3, pp.253-267.
- Schwarzacher, J., Wendawek, A. M., Berhanu, A., Kallow, S., Janssens, S., Molla, E. L., Davis, A. P., Woldeyes10, F., Willis, K. & Dемissew, and S. Enset in Ethiopia: A Poorly characterized but resilient 4 starch staple 5.
- Seid Sani. 2017. Rural households' towards off-farm and non-farm employment opportunities in Assosa Zone, Western Ethiopia. *Journal of Agricultural Economics, Extension and Rural Development: ISSN-2360-798X*, Vol. 5(1): pp, 579-589.
- Setargew, M., Fentahun, T. & Chanie, M. 2012. Prevalence of Bovine Shistosomiasis in Fogera District, South Gondar Zone, Amhara National Regional State, Northwest Ethiopia.
- Taye Melese, Abebe Birara Dessie and Tadie Mirie Abate 2018. Determinants of commercialization by smallholder onion farmers in Fogera district, Ethiopia *Journal of Development and Agricultural Economics*. Vol. 10(10), pp. 339-351
- UNDP. 2014. United Nations Development Program in Ethiopia, annual report
- Van Der Sluis, J., Van Praag, M. & Vijverberg, W. 2005. Entrepreneurship selection and performance: A Meta-analysis of the impact of education in developing economies. *The World Bank Economic Review*, 19, 225-261.
- Weaver, C. 2008. *Hypocrisy Trap: The World Bank and the Poverty of Reform*, Princeton University Press.
- Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quiñones, E. J., Zezza, A., Azzarri, C. & Stamoulis, K. 2009. Assets, activities and rural income generation: Evidence from Multicounty analysis. *World Development*, 37, 1435-1452.
- Wondim Awoke. 2018. Impact of productive safety net program in rural community of Ethiopia: A Review Study. *Journal of Agricultural Extension and Rural Development*, 10, 84-88.
- Wondim Awoke. 2019. Determinants and challenges of rural livelihood diversification in Ethiopia: Qualitative Review. *Journal of Agricultural Extension and Rural Development*, 11, 17-24.
- World Bank 2008. *Agriculture for Development Policy*. Washington, D.C.

- Yamane, T. 1967. Elementary sampling theory.
- Yamane, Taro. 1967. Statistics, an Introductory
- Yaro, J. A. 2006. Is deagrarianisation real? A study of livelihood activities in rural Northern Ghana. *The Journal of Modern African Studies*, 44, 125-156.
- Yenesew, Y. S., Okoyo, E. N. & Beyene, F. 2015. Determinants of livelihood diversification strategies: The case of smallholder rural farm household's in Deber Elias Woreda, East Gojam Zone, Ethiopia. *African Journal of Agricultural Research*, 10, 1998-2013.
- Yishak Gecho, Gezahegn Ayele, Tesfaye Lemma and Dawit Alemu. 2014. Rural household livelihood strategies: Options and Determinants in the Case of Wolaita Zone, Southern Ethiopia. *Social Sciences*, Vol. 3, No. 3, pp. 92-104.
- Yishak Gecho. 2017. Rural farm households' income diversification: the case of Wolaita Zone, Southern Ethiopia. *Social Sciences*. Vol. 6, No. 2, pp. 45-56.
- Zelalem Jaleta 2018. Determinants of Income Diversification among Rural Households in Tulu District. Msc Thesis, Haramaya University, Ethiopia. 84 pp.



## APPENDIX

Appendix 1 : TLU value of conversion factors of live stocks

Animal category	TLU conversion factor of livestock
Oxen and cow	1.00
Calf	0.25
Weaned calf	0.34
Heifers	0.75
Sheep and goat(adult)	0.13
Sheep and goat(young)	0.06
Horse	1.10
Donkey(adult)	0.70
Donkey(young)	0.35
Poultry	0.013

Appendix 2 Multicollinarty tests of continuous variables by using variance inflation factor (VIF) values

Variables	Collinearity statistics	
	VIF	Tolerance
TLU	1.423	0.703
Age of respondents	1.181	0.847
Family size	1.144	0.874
Eco. Active family size	1.389	0.720
Farm size	1.599	0.625
Distance to main road	1.104	0.906
Distance to market center	1.040	0.962
Distance from home to cultivated land	1.160	0.862

Appendix 3: Test of Multicollinarty of categorical/ dummy variables using contingency coefficient value.

Categorical variables	SEX	MARSTU	MEDUSER	TRAUSER	CRUSER	COPPSH	EDUC	SAVUSER
SEX	1							
MARSTU	0.677	1						
MEDUSER	0.22	0.18	1					
TRAUSER	0.04	0.031	0.114	1				
CRUSER	0.04	0.026	0.04	0.130	1			
COPPSH	0.17	0.197	0.261	0.117	0.086	1		
EDUC	0.18	0.181	0.450	0.037	0.020	0.138	1	
SAVUSER	0.13	0.17	0.081	0.194	0.326	0.012	0.072	1

Source: Own computation, 2020

Appendix 4: Test of goodness of fit by value of omnibus tests of model coefficients

Chi-square	DF	Sig.
4.548	1	.033
88.839	9	.000
88.839	9	.000

#### Appendix 5: Hosmer and Lemeshow test of goodness of fit

Chi-square	DF	Sig.
2.546	8	.960

#### Appendix 6: test of goodness of fit by using value of PesudoR2

-2Log likelihood	Cox & Snell R Square	Nagelkerke	R Square
231.247	.52		.74

#### Appendix 7: Survey Questioners

##### Determinants of Rural Households' Livelihood Diversification in Off-Farm and Non-Farm

##### Employment: Evidence from Fogera Woreda Rural Households

##### Section A: Background information related questions

##### A1. Background Information

A101. Name of Enumerator (Code) -----

A102. Name of Interviewee (Preferably HH Head) -----Code -----

A103.Woreda: -----

A104. Name of PA/Kebele/ -----Code-----

A105.Date of data collection -----/-----/-----

##### Section B: Demographic related questions

##### B1. Household Characteristic

B101. Sex of HH Head 1= Male 2= Female

B102. Age of HH Head -----

B103. How many household members do you have? 1=male -----2=female-----B104.

Marital Status of the HH Head 1= Single 2= Married 3= widow 4= Divorced

B105. Religion of the HH Head 1= Orthodox 2= Muslim 3= Protestant 4= Catholic 5= Others

(Specify)

B106. Educational Level of the HH Head

1= cannot read and write 2= Read & Write 3= Grade 1 – 8 4= Grade 9 – 12 7= Above Grade 12

B107. Major Occupations of the Household

Occupation	Do you participate 1=Yes 0=No	Amount of income earned(birr)	Remark
0=farming			
1=weaving			
2=carpentry			
3=black smith			
4=carpet making			
5=petty trading			
6=daily labor			
7=cattle tending			
8=pottery			
9=food processing(bread, local beer)			
10=services provider(e.g. hair dressing, transport etc)			
11=others(specify)			

B108.How many economical active family members live in the household? -----

B109. What is the major factor that makes you not to diversify your income from farm, off-farm, non-farm, and farm and from both?

1=Lack of knowledge 2=Lack of capital 3=Lack information 4=Absence of land

5=Lack of market 6=high dependent family size 7=Absence of Livestock's

8=Lack of irrigable land 9=Road accessibility 10=Transportation problem

11=Lack of credit access

#### Section C: Socio-Economic Related Questions.

##### C1. Livestock holding and market participation related questions

C101.Livestock holding and market participation during 2019/2020 production year

Types of livestock	No livestock	oxen	Bull s	Calve s	Cow s	Heifer	Shee p	goat	Horse	Mul e	Donke y	Poultry	bee hiv es	other s
Code	0	1	2	3	4	5	6	7	8	9	10	11	12	98
Total livestock owned														
Total sold(in birr)														

C102.Livestock by Products

Type of Livestock by products	Unit	Total product Obtained	Total sold In kg (number)	Consumed by hh	Price/unit	Total value
Milk						
Butter						
Honey						
Egg						
Skin/hide						
Wax						

## C2. Crop Production

C201. Do you have own Land? 0= No 1= Yes

C202. If Yes to Question C201, what type of land access do you have in ha?

1= Private -----2= Rented/Borrowed----- 3= Share Cropping----- 4= Common-----

C203. What total size of land do you own in any form (Ha)? -----

C204. How do you compare your present land size with the need of your family?

1= More than Enough 2= Just Enough 3= Less than enough

C205. How do you plough your land?

1= Using Family Labor 2= Using hired Labor 3= Using owned oxen

4= Using rented oxen 5= Using borrowed oxen 6= others

C206. How do you compare existing production with that of 10 years ago?

1= Increasing 2= Decreasing 3= No change

C207. If Production has decreased what are the reasons?

1= Paste and disease 2= Shortage of land 3= Lack of rainfall

4= Shortage of input 5=Shortage of labor 6= Poor soil fertility 7= others

C208. Is there potential for irrigation cultivation in your PA? 0= no 1=yes

C209. If yes to Q C208, do you produce using irrigation? 0= no 1=yes

C210. If Yes to C209, what is the area of your irrigation land (in Hectare)? -----

C211. Did you participate in the new extension program in this year? 0= no 1=Yes

C212. If Yes to C211, did you apply agricultural inputs in this year? 0= no 1=Yes

C213. What quantities of inputs have you applied in this production season?

Input type	Quantity in Kg		Total price	code
------------	----------------	--	-------------	------

		Unit price		
Improved seed				1
Herbicides				2
DAP				3
Urea				4
Pesticide				5
Manure				6
Others				98
Total				

C214. Have you encountered labor shortage in this production season? 0 = No 1=Yes

C215. If Yes to QC214, mainly for what specific activities have you encountered labor

Shortage? 1= Cultivation of Land 2= Crop Harvest 3= Weeding 4= Threshing 5= Others (Specify) ----

-----

C216. If Yes to QC214, how did you overcome problems posed by labor shortage?

1= Hiring labor 2= Assistance from relatives 3= Social assistance 4= was not able to

Overcome the problem 5= others (Specify)

C217. How many oxen of your own do you use for farming? -----

C218. Production and Income (2019/2020 Years)

crop Type	Code	Amount of production(qty) 1=kg 2=quintal	Land(ha)	Income obtained(in Ethiopian birr)
Teff	21			
Maize	22			
Barley	23			
Haricot beans	24			
Lentils	25			
Faba bean	26			
Chick pea	27			
Grass pea	28			
Millet	29			
Rice	30			
Noug	31			
Rapeseed	32			
Ground nut	33			
Potato	34			
Tomato	35			
Cabbage	36			
Carrot	37			
Others	98			
Total	100			

C219. Different hazard related questions

C220. Do you know/remember any hazard that occurred in your Kebele/Village in the last 3 years

0= no 1= yes

C221. What was the hazards occurred in your Kebele/village in the last 3 years? (can be more than one response)

1=drought 2=flooding 3=disease outbreak 4=pest infestation 5=heat and fire 6=land slide

C222. Has any of the hazard(s) (mentioned above - occurred in your Village/Kebele) had effect/impact on your household and plots? 0 =no 1= yes

C223.What was/were the direct impact(s) of the top three most harmful hazards to your household in the last three years? (Can be more than one response)

1=lost crops/reduction of yield 2 =lost livestock 3= Food shortage for less than 3 months 4 = food shortage for 3 - 6 months 5 = food shortage for 6-9 months

6= unable to cover costs, education, health expenses etc....) 7 = family members died

8 = health impacts, disease outbreak 9=school dropout 10= conflict within or between community

11= migration/displacement 12= damage to assets 13=dependency on aid 14=decreasing food 98 =other (specify)

C224. How did you cope the hazard? -----

### C3.Off-farm and non-farm activity related questions

#### C301.Off-farm wage- employment earnings

Type of activity	Code	Do you participate? 0=no 1=yes	How many months does the hh member participated in this activity (2018-2019)	How many days per month does the hh member worked on this activity	How much does paid per day	annual income
Agricultural wage work	1					
Casual /non-agricultural wage work	2					
Salaried/regular wage Work	3					
Food/cash-for work	4					
Others	98					
Total income	100					

C302.If yes Q301, how many of your family members have been engaged in this activity? ----

C303. If no Q301 why?

1=Lack of knowledge/skill 2=Thinking as it has no profit 3=Lack of market

4= I have no interest 5=others (specify) -----

C401. Off-farm self-employment activities

Types of activities	Code	Do you participate? 1=Yes 0=no	How many months does the hh member participated in this activity (2019/20)	How many days per month does the hh member worked on this activity	How much does paid per day	Annual income(in birr)
charcoal and fuel wood selling	1					
stone collections	2					
sand collection	3					
Rented incomes (from an oxen, draft animals etc.)	4					
others(specify)	98					
Total income	100					

C402.If yes Q401, how many of your family members have been engaged in these activities? -----

-----

C402.In which season does your household involve in off-farm activities? -----

C403.Why does your household participate in off-farm activities? -----

C404.For what purpose does your household spent the income earned from off-farm sources? -----

-----

C405. If no Q401 why?

1=Lack of knowledge/skill 2=Thinking as it has no profit 3=Lack of market

4= I have no interest 5= Lack of initial capital 6=others (specify) -----

C501. Non-Farm Agricultural Wage Employments

Types of activities	code	Do you participate in? 0=no 1=yes	How many months does the hh member participated in this activity (2018-2019)	How many days per month does the hh member worked on this activity	How much does paid per day	Annual income(eth.birr)
construction wage	1					
factory wage	2					
mining wage	3					
daily loading and unloading wage	4					
any casual non-agricultural wages	5					
Skilled salaried wage	6					
others(specify)	7					
Total income	100					

C502.If yes Q501, how many of your family members are engaged in these activities? -----

-----

C503. If no Q501 why?

1=Lack of knowledge/skill 2=Thinking as it has no profit 3=Lack of market

4= I have no interest 5=others (specify) -----

C601. Non-Farm Agricultural Self- Employments/business incomes

Types of activities	Code	Do you participate? 0=no 1=yes	How many months does the hh member participated in this activity (2019/20 year)	How many days per month does the hh member worked on this activity	How much does paid per day	Annual annual income
In food processing (milling, food/alcohol selling)	1 2					
Handcrafts (waiving, poultry, slivery, ironsmith, mat making, carpentry etc.)	3					
trading of livestock's	4					
trading of grains	5					
Different services (tailors, barber, hair dressing, transportation etc.)	6					
Petty trading (sale of beverage, tea, coffee, soaped.)	7					
different rented incomes (e.g. Home and different equipment rented)	8					
skilled salaried wage	9					
others(specify)	98					
Total	100					

C602.If yes Q601, how many of your family members have been engaged in these activities? -----

-----

C603. Why did you engage in those non-farm self- employment activities

1= to supplement farm income 2= as a major mode of livelihood

3= Inherited from family 4= others (Specify) -----

C604. How did you obtain the knowledge to work on such activity works?

1= from family 2= from neighbors 3= from friends 4= Received training

5= Others (Specify) -----

C605. What types of instruments do you use to undertake the non-farm self- employment works?

1= Traditional 2= Modern/Improved 3= Others (Specify)

C606. How did you obtain these working instruments?



1= Purchased 2= Homemade 3= Inherited from families

C607. What are the potential sources of raw materials for your work?

1= Local market 2= Local environment 3= Outside markets 4= others (Specify)

C608. Where do you sell your product?

1= Village market 2= Markets of other PAs in same woreda

3= in the neighboring woredas 4=others (Specify) -----

C609. How do you transport your produces to market places?

1= Pack animals 2=Hired labor 3=Carried by family members 4=Car transport

5=Others (Specify)

C610. Who are your potential customers for your produces?

1= Local Farmers 2= Local Merchants 3= Merchants from other areas 4= others

C611. How do you compare non-farm self -employment and agriculture on the following parameters?

1= non-farm self -employment preferable 2=Agriculture Preferable

3= both are equally preferable

C612. Do you get any support from government and non-government institutions or any others agencies?      0= No      1= Yes

C613. If Yes QC614, what specific supports have you received?

1= Credit 2= Training 3= Material Provisions 4= Financial Provisions 5= Others (Specify)

C614. What are the major problems of non-farm self-employment activities?

1= Negative perception of the community 2= Lack of capital 3= Lack of market 4= Lack of Raw materials 5= Lack of skill 6= Lack of cooperatives 7=Lack of initial capital 8= others

C615. If no Q601 why?

1=Lack of knowledge/skill    2=Thinking as it has no profit    3=Lack of market

4= I have no interest      5= initial capital      6=others (specify) -----

C7. Please give details of your expenditure as per listed below!

Expenditure Items	Expenditure (Birr)This Year
Fertilizer	
Improved seed	
Pesticides	
Oxen	
Tax	
Church/Mosque	
Cloth & shoes	
Traditional welfare (edir)	
Traditional saving (equip)	
School fee	

Health	
Transport	
Coffee	
Kerosene	
Oil	
Soap	
Salt	
Animal feed,vaccination,medicine and shelter	
Spices	
Milling	
Relative assistance	
Recreation (drinks, chat etc.)	
Others	
Total expenditure	

#### C10.Major Challenges not to diversify in off and non-farm activities

C101. What is the major factor that makes you not to diversify your income in non and off-farm?

1=Lack of knowledge 2=Lack of capital 3=Lack information 4=Absence of land

5=Lack of market 6=high dependent family size 7=Absence of Livestock's

8=Lack of irrigable land 9=Road accessibility 10=Transportation problem 11=Lack of credit access

#### C11.multimedia related questions

C111. Do you have access to multimedia to have information? 0=No 1=Yes

C112. If yes to QC111 what an instrument you are using to be connected to multimedia's?

1= Mobil 2=Radio 3=Television 4= others

#### Section D: Institutional Support Related Questions

##### D1.Off-farm and non-farm training related questions

D101. Did you participate in any training about off and non- farm activities in 2019/20? 0=no  
1=yes

D102.If yes in Q D101, on what? 0=farming 1=agricultural wage 2=food for work  
3=unskilled salaried 4=livestock trading 5=charcoal and fuel trading 6=stone and sand  
collection selling 7=non-agricultural wage e.g. construction daily loading and unloading) 8=  
about handcrafts 9=petty trades 10=processed foods 11=services e.g. hair dressings, tailors, etc.)  
12= others (specify)

D103.Did you timely access market information? 0=no 1=yes

##### D2. Credit related questions

D201.Do you have borrowed money in the last 12 or before months? 0=no 1= yes

D202.If you yes Q D201, what is amount of money in birr you have borrowed-----

D203. For what purpose you have borrowed?

0=for farming activities 1=for off-farm self-employment

2=for non-farm self-employment 3=for others Specify) -----

D204. Sources of Credit Services

1=commercial bank of Ethiopia 2=Amhara saving and credit service 3=cooperative

4=local lenders 5=NGOS 6= relatives 7=others.

### D3. Saving Related Questions

D301. Have you been informal (formal) saving? 0=no 1=yes

D302. If yes Q D301, approximately how much money birr you have saved? -----

D303. which institution you have been saved

1=commercial bank of Ethiopia 2=Amhara saving and credit services

3=cooperative association 4=Equb/ider 5=others-----

D4. Institutions and organization/Cooperative membership

D401. Do you/your family members are Participated in local formal/informal institutions and organizations? 0=no 1=yes

C402. if you yes Qc401, what type of local organizations you/your family members are participated?

1=Farmer organization 2=Youth association 3=Women association

4=Multipurpose cooperative 5=saving and credit 6=cooperative 7=Equb /Ider

8=others (specify) -----

D403. if no QD401, what is reason you/or your family members did not participated any membership of organization-----

E. Geographic related questions

E1. Distance in minutes/hour takings

E101. How long does it take you accesses the main road from home? (Minute)----- (km-----)

E102. How long does it take you to access to your district town/market center to selling of your products or bought of goods? (Minute)----- (km-----)

E103. How long does it take you from your farm land from your residence? (Minute)--- (km--)

"Concerned bodies should be taken responsibility for quality of data gathering"

### Appendix 1: Checklist for KIIS

1. What are the types of major income source of rural households livelihood diversification activities currently farmers' performing?
2. What are the main reason rural households to diversify their income?
3. Is there land scarcity in your locality which compared to your community needs?
4. By what mechanism the scarcity of land will be solved?

5. What are the types of off-farm and non-farm activities takes place in the area?
6. What factors determine for development of off-farm and non-farm activities?
7. Do you think that the participation in off-farm and non-farm activities is relevant to farmers?
8. How do you evaluate the level of farmers' participation in off-farm and non-farm activities?
9. What is the role of farmers in off-farm and non-farm activities?
10. What is the role of kebeles, and district for the off-farm and non-farm expansion/development in the area?
11. What intervention must be used for expansion of off-arm and non-farm employment?
12. What are the opportunities farmers to participate in off-farm and non-farm activities in your locality?
13. What are the major challenges to participate in off-farm and non-farm activities in your locality?
14. What types of services you have been received from government and non-government organasionations?
15. Is there any credit and saving accesses in your locality
16. Which types of access are there for cooperative membership in your locality?
17. How long it takes to sell your products or purchase your inputs?

Thank you for your cooperation!