



**GENDER ANALYSIS IN IMPROVED BREAD WHEAT
(*Triticum aestivum L.*) PRODUCTIVITY IN JARDEGA JARTE
DISTRICT HORO GUDURU WOLLEGA ZONE, OROMIA
REGION, WESTERN ETHIOPIA**

MSc. THESIS

BY

BELAY MOLLA ABDETA

**NOVEMBER 2019
JIMMA, ETHIOPIA**

**GENDER ANALYSIS IN IMPROVED BREAD WHEAT
(*Triticum aestivum L.*) PRODUCTIVITY IN JARDEGA
JARTE DISTRICT HORO GUDURU WOLLEGA ZONE,
OROMIA REGION, ETHIOPIA**

*The Thesis Submitted to Jimma University College of Agriculture and Veterinary
Medicine School of Graduate Studies Department of Rural Development and
Agricultural Extension*

*In Partial Fulfillment of the Requirement for Master of Science Degree in
Rural Development and Agricultural Extension (Specialization in Rural
Development)*

BY

Belay Molla Abdeta

Major Advisor: Akalu Dafisa Sima (Msc, Assistant Professor)

Co-Advisor: Dereje Hamza Mussa (PhD)

November 2019

Jimma, Ethiopia

Jimma University
College of Agriculture and Veterinary Medicine
Thesis Submission Request Form (F-08)

Name of Student: BELAY MOLLA ABDETA ID No. RM1106/10-0

Program of Study: Degree of Master of Science (MSc.) in Rural Development.

Title: Gender Analysis in Improved Bread Wheat (*Triticum aestivum L.*) Productivity in Jardega Jarte District Horo Guduru Wollega Zone, Oromia Region, Ethiopia.

I have completed my thesis research work as per the approved proposal and it has been evaluated and accepted by my advisors. Hence, I hereby kindly request the Department to allow me to resent the findings of my work and submit the thesis.

Belay Molla Abdeta _____

Name of student Signature of student

We, the thesis advisers have evaluated the contents of the thesis and found it to be satisfactory, executed according to the approved proposal, written according to the standards and formats of the University and is ready to be submitted. Hence, we recommend the thesis to be submitted.

Major Advisor: Akalu Dafisa (Msc, Ass. Prof) _____
Name Signature Date

Co-Adviser: Dereje Hamza (PhD) _____
Name Signature Date

Internal Examiner (If Depends on the Verdict)
Name _____
Name Signature Date

Decision/suggestion of Department Graduate Council (DGC)

Chairperson, DGC Signature Date

Chairperson, CGS Signature Date

DEDICATION

I dedicate this thesis to my family for nursing me with affection in my academic success and life, especially, to my wife Alemitu Adamu who sacrificed much to bring me up to this level.

.

STATEMENT OF AUTHOR

First, I declare that this thesis: Gender Analysis in improved Bread Wheat productivity in Jardega Jarte District of Horo Guduru Wollega Zone Oromia Region western Ethiopia. It is my real work and that all sources of materials used for this thesis have been properly acknowledged. This thesis has been submitted in partial fulfillment of the requirements of M.Sc. Degree at the Jimma University and is deposited at the University Library to be made available to the borrower under the rules of the Library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgment of the source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the Rural Development and Agricultural extension department or the Dean of the School of Graduate Studies when in his or her decision the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

BIOGRAPHICAL SKETCH

The author was born in November 12/1979 in Agamsa Kebele, Amuru District of Horo Guduru Wollega Zone, and Oromia National Regional state Ethiopia, from his father Molla Abdeta and his mother Kibitu Tolera. He attended his elementary school at Agamsa and his High school education at Amuru secondary school. Then he joined Mersa ATVET College of Agriculture in 2003 and graduated with Diploma in plant science issued on July 23, 2005, soon after his graduation, he employed by the Bureau of Agriculture at Woreda level as a development agent and Agricultural extension expert. He was graduated with a B.Sc. degree in rural development on November 23, 2010, from Yardstick International College of Distance and open learning. After that, he employed and has worked in the Oromia Region of Horo Guduru Wollega Zone Jardega Jarte District Agriculture and Natural Resource Office. Then, he joined Jimma University in 2017/18 to pursue graduate studies for the M.Sc. in rural development and agricultural extension.

ACKNOWLEDGEMENTS

First, I want to give my thanks to Almighty God for giving me the strength to pass through all the track during my study period, without his assistance everything is impossible. Next to God, I would like to extend my heartfelt thanks to my academic major advisor Mr. Akalu Dafisa (MSc. Assistant Professor) for his time, masterly guidance, advice, generous counseling, collaboration and constructive comments from the beginning to the completion of this paper. Special appreciation thanks also goes to my co-advisor Dr. Dereje Hamza (PhD), as he added valuable and constructive comments in the proposal and thesis. My sincere and special thanks should go to Mr. Reta Fikadu for his facilitation role to join postgraduate program, and I would like to acknowledge all JUCAVM School of Graduate Studies Department of Rural Development and Agricultural extension instructors and students for their demonstrated shared learning and contribution in my thesis write-up.

Words cannot express my heartfelt to my wife Alemitu Adamu who stood by me and extend all possible support to complete this work. She has created a convenient environment and most of all for shouldering the entire family responsibility throughout my study. I would like to thank my father Molla Abdeta, my mother Kibitu Tolera, and my brothers for their wishes patience and encouragement during the course of my research work.

Finally, my appreciation goes to enumerators, the members of the sample household respondents, and FGD for their cooperation during data collection and generous devotion of their precious time. I am also grateful to Jardega Jarte woreda Agriculture and Natural Resource office for providing me with relevant materials, secondary information and facilitating the fieldwork to accomplish my study successfully.

ACRONYMS AND ABBREVIATIONS

ATA	Agricultural Transformation Agency
CSA	Central Statistical Agency
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
FHH	Female Household Headed
GAD	Gender and Development
GDP	Gross Domestic Product
HAF	Harvard Analytical Framework
Ha	Hectare
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
JUCAVM	Jimma University College of Agriculture and Veterinary Medicine
KM	Kilometer
Kg	Kilogram
MHH	Male Household Headed
MOARD	Ministry of Agricultural and Rural Development
OLS	Ordinary Least Square
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
STATA	Statistical software Package
TLU	Tropical Livestock Unity
USDA	United States Department of Agriculture
USAID	United States Agency for International Development
JJWANRO	Jardegga Jarte Woreda Agriculture & Natural Resource Office
WID	Women in Development

TABLE OF CONTENTS

Contents	Page
DEDICATION	ii
STATEMENT OF AUTHOR	iii
BIOGRAPHICAL SKETCH	iv
ACKNOWLEDGEMENTS	v
ACRONYMS AND ABBREVIATIONS	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF TABLES IN APPENDIX	xi
ABSTRACT	xii
1. INTRODUCTION	1
1.1. Background	1
1.2. Statement of the problem	3
1.3. Objectives of the study.....	5
1.3.1. General objective.....	5
1.3.2. The specific objectives	5
1.4. Research questions	5
1.5. Significance of the study	6
1.6. Scope of the Study	6
1.7. Limitation of the Study	6
1.8. Organization of Thesis	7
2. REVIEW OF LITERATURE	8
2.1. Theoretical Review of Gender Role.....	8
2.1.1. Basic Concepts of Gender	8
2.1.2. Theory of Gender	9
2.1.3. Gender analysis	11
2.1.4. Gender roles	13
2.1.5. Gender in agricultural production and bread wheat production.....	14
2.1.6. Gender Division of Labor in Agricultural production	16
2.1.7. Gender differences in access to and control over resources.....	18
2.1.8. Gender and Institution	19
2.2. Empirical Review on Gender Role	20
2.2.1. Review of empirical evidences on Gender Role in related to Bread Wheat Production	20
2.2.2. Gender Division of Labor	22
2.2.3. Gender Difference in Access to and Control Over Resources	24
2.3. Conceptual Frame works of the study.....	25
3. RESEARCH METHODOLOGY	26

3.1. Description of the study area.....	26
3.1.1. Location.....	26
3.1.2. Physical features and area coverage.....	27
3.1.3. Population.....	27
3.1.4. Economic activities	27
3.1.5 Infrastructure and marketing services	28
3.2. Research Design.....	28
3.3. Sampling technique and sample size.....	29
3.4. Type and Sources of data	31
3.5. Methods of data collection	31
3.6. Method of data analysis	33
3.6.1. Descriptive and Inferential statistics	33
3.6.2. Model Specification for Ordinary Least-Squares (OLS) Regression.....	34
3.6.3. Definition of variables and hypothesis setting	34
4. RESULT AND DISCUSSION.....	39
4.1. Characteristics of sample households	39
4.1.1. Ethnicity, Religion and Marital status of the Household heads	39
4.1.2. Age structure and Level of education of the household head	40
4.1.3. Farm Characteristics of the Male and Female household head.....	41
4.1.4. Descriptive statistics of dummy variables.....	44
4.2. Gender Division of Labor in Improved Bread Wheat Production	44
4.2.1. Reproductive role of Gender (%)	47
4.2.2. Intra household decision making.....	49
4.2.3 Time spent of gender roles	50
4.3. Access to and control over resources in related to bread wheat production	51
4.4. Determinants Affecting Improved Bread Wheat Productivity.....	55
4.4.1. Testing procedures	55
4.4.2. Interpretation of Econometric Results.....	56
5. SUMMARY, CONCLUSION AND RECOMMENDATION.....	59
5.1. Summary	59
5.2. Conclusion	60
5.3. Recommendation.....	61
6. REFERENCES.....	65
7. APPENDIX	73

LIST OF TABLES

Table 1. Main Periods and Approaches in the Historical Perspectives of Gender	11
Table 2.Types of Livestock reared in the study Area	28
Table 3. Distribution of Sampled Households in the study area.....	30
Table 4. Summary of Explanatory variables and working hypothesis.....	38
Table 5. Marital Status of the Sample Household headed (%)	40
Table 6. Descriptive statistics of continuous variables	41
Table 7. Accesses to Credit, Member in Social Organization and Access to Pesticide of the Household heads.	44
Table 8.Reproductive Activity of the HHs by gender and Household Members (%)	48
Table 9. Intra HH Decision making in related to improved bread wheat (%)	50
Table 10. The Mean hour devoted in the households	51
Table 11. Table Access to and control resources in the household (%)	54
Table 12. OLS estimate result on Determinants of Gender differences in improved Bread wheat productivity.....	58

LIST OF FIGURES

	Page
Figure 1. Conceptual Frameworks to analyze determinants affecting bread wheat yield ..	25
Figure 2: Map of the Study Area.....	26
Figure 3. Sampling procedure	31

LIST OF TABLES IN APPENDIX

	Page No
Appendix Table 1. Conversion factor used to compute Tropical livestock unit (TLU)	74
Appendix Table 2. Conversion factor used to compute adult equivalent	74
Appendix Table 3 Multicollinearity test among continuous variables	74
Appendix Table 4. Contingency coefficient of dummy variables	75
Appendix Table 5. The Questionnaires used for household respondents	75
Appendix Table 6. Harvard Analytical Framework checklist	77

ABSTRACT

Ethiopia is the second-largest wheat producer, next to South Africa in Sub Saharan Africa (SSA). Bread wheat is the second most important food crop in Ethiopia after maize and also widely grown in the Oromia region in general and Jardega Jarte district in particular as food and cash crop. This study was designed to analyze gender roles in improved bread wheat productivity in Jardega Jarte District, Oromia Region, Western Ethiopia. For this study, the cross-sectional study design was employed in five randomly selected kebeles for the survey. Primary data were collected from 184 households of improved bread wheat producer farmers (143 MHH and 41FHH) through using a structured interview schedule, focus group discussion and key informant interview. Both descriptive and econometric data analysis technique were applied. Harvard analytical framework of gender activity profile was used to assess gender roles, access to and control over resources in the improved bread wheat productivity. The t-test result indicated that there was the mean difference between MHH and FHH in terms of Age, education level, size of cultivated land, improved seed, labor, frequency of extension contact, fertilizer use, annual income, oxen owned and farm experience in improved bread wheat productivity. The chi square test indicated that there was statistically significant relationship between MHH & FHH being in membership in social organization and access to pesticide. The study findings revealed that there were gender differences in access to and control resources. Women engaged in unpaid reproductive roles and have more work burden; as a result, they faced economic and financial constraints in the study area. Moreover, OLS regression showed that the educational level, size of cultivated land, frequency of extension contact, amount of fertilizer used, accessed to pesticide, and farm experience were significantly affected the improved bread wheat productivity positively. Whereas distance from market was influenced negatively. Hence, to reduce women's unpaid burden and to create paid job access to women's government and development organizations necessary to introduce and endorse labor saving technologies, supporting women's development through increasing women's involvement in credit and savings, income generating activities and empower them. Hence, improve access to agricultural inputs to improved bread wheat productivity in general; enhance provision of inputs and services to FHH farmers' in particular. In order to improve gender differences in the study area awareness raising on gender equality and equity in access and control over resources, including land, income from improved bread wheat produced among household members should be improved.

Keywords: Gender roles, OLS, Bread wheat productivity, the Harvard gender framework.

1. INTRODUCTION

1.1. Background

Bread wheat (*Triticum aestivum* L.) is the world's leading cereal grain where more than one-third of the population of the world uses as a staple food (Jemal *et al.*, 2015; Leghari *et al.*, 2016). Annually, Wheat produced on 220 million hectares of the world's arable land having 734.24 million tons produced in 2015 and the crop that produced almost all over the world (USDA, 2016). The challenges of globally low and unstable wheat production, rising consumer demand and higher food prices require efforts to improve farm-level wheat productivity and reduce global supply fluctuations. Increasing crop productivity is considered one of the long-term solutions to these challenges. In Africa, demand for wheat is growing faster than for any other food crop. In addition, it is cultivated in Africa on 34.37 million hectares and from this area; 87.88 million tons of production was gained in 2015 (USDA, 2016). Ethiopia is the second-largest wheat producer in sub-Saharan Africa, after South Africa (ATA, 2014 and Yasin, 2015).

Ethiopia is one of the least developed countries in which majority of its population depend on agriculture, more than 85% of people depend on agriculture as their primary source of income and its economy based on agriculture, which accounts for 36.3% of GDP and 73% of total employment (UNDP, 2016).

Bread Wheat, accounts for 60 percent of production in Ethiopia, and Durum Wheat, accounting for the remaining 40 percent (Bergh *et al.*, 2012). wheat has become one of the most important cereal crops ranking 4th in total grain production (15.6%) and 4th in area coverage next to teff, maize and sorghum (CSA, 2014) and accounts for about 10-15 percent of all the calories consumed in Ethiopia (Berhane *et al.*, 2011; FAO, 2014). Ethiopia is still deficient in terms of wheat production to meet the national requirements. In 2009, the country had about a 10% wheat production deficit, which led to its imports of about 40% of its total supply (FAO, 2013). Wheat is one of the major staple crops in the Ethiopia in terms of both production and consumption. In terms of caloric intake, it is the second most important food in the country behind maize (FAO, 2014; Yasin, 2015).

Wheat is produced mostly for household food consumption, seed, and industrial use in Ethiopia. wheat production in Ethiopia in 2017 is 4.5 million tons from 1.76 million

hectares of land out of this figure Oromia accounts for more than half of the national wheat production (58.7%) followed by Amhara (29.1%); Southern Nations, Nationalities and Peoples (7.2 %) and Tigray (5 %) region (CSA,2017). According to the report of CSA 2017 Oromia region was produced 2.6 million tons of wheat from 898,455.57 hectares of land out of this Horo Guduru Wollega zone was produced 65,675.6 tons of wheat from 27,580.58 hectares of land and Jardega Jarte district was produced 14,319.8 tons of wheat from 6,226 hectares of farmland.

Agriculture is the backbone of Ethiopia's economy like many other developing countries, which acquire significant labor force out of which women make almost half. Ethiopian rural women play a significant role in crop and livestock production in addition to their reproductive and community roles. Nevertheless, their relative access to and control over resources is limited in comparison with men. This is believed to contribute its part to the sector's low performance (Yaekob, 2010).In agricultural development; more attention has been given to men, so realizing gender equality needs rebalancing by paying greater consideration to women. However, the importance of relations between women and men, as well as the differential roles and responsibilities of women and men of different ages, ethnicity and social class desire to be reserved in mind in both analysis and programming (FAO&IFPRI, 2014).

Gender roles are roles that are played by both men and women and which are not determined by biological factors but by the socioeconomic and cultural environment or situation to change based on changing norms, resources, policies, and contexts. Every society is marked by gender differences, but this difference widely by culture and can change dramatically within or between cultures over time (FAO & IFPRI, 2014). In almost all societies, women and men differ in their activities and undertakings, regarding access to and control over resources and participating in decision-making (Mohammed & Abdulquadri, 2012).

A gender difference affects the distribution of resources, wealth, work, decision-making, political power as well as the enjoyment of rights and privileges within the family and in public life (Welch *et al.* 2000). Women from poor households employ a variety of income-generating and expenditure-saving activities. In some cases, these activities complement the contribution by males while in others they are the primary or the sole source of household

d livelihoods (Kabeer, 2003). Women are twice as expected as men to be involved in agriculture-related activities (Odame *et al.*, 2002).

Women are key players in agricultural production and they are involved in various agricultural activities including improved bread wheat such as land preparation, sowing, weeding, and fertilizer application, harvesting and threshing. Despite this active contribution, the importance of women's role in agricultural production is undervalued (FAO; WB; IFAD, 2009). The existing low level of awareness about the roles women play in the development of Ethiopia; the deep-rooted cultural beliefs and traditional practices that prevent women from playing their full roles in the development process of the country. Lack of appropriate technology to reduce the workload of women shortage of properly qualified female development agents to understand, motivate and empower rural women by eliminating the major constraints hindering their progress (United Nations 2002).

Accordingly in Ethiopia PASDEP was the government's main poverty reduction framework for the period 2005–10. PASDEP intended gender equality as way to eliminate poverty by giving priority to rural women's equal access resources and services, introducing safety net programs to poor women, emphasizing women and girls' literacy, education, and training, and calling for the need for gender mainstreaming in all government agencies, including increasing female managers and directors (Helina, 2015).

In the study area, women are more than half of the population of the district seems like to country level. To increase production and productivity of the improved bread wheat the role of men and women was desired. In recognition of the above fact, gender role analysis, specifically in improved bread wheat production looks like another agricultural crop production, have drawn the attention of a good deal of academicians, development planners, and practitioners. For that reason, the involvement of women in improved bread wheat production in the study area is very important. Thus, this study intended to conduct gender role analysis in improved bread wheat productivity in Jardega Jarte District.

1.2. Statement of the problem

Gender differences limit agricultural productivity and efficiency in doing so, challenge development agendas. Failure to recognize the different roles of men and women were extravagant because it results in misguided projects and programs, forgone agricultural

output and incomes, food and nutrition insecurity. It is time to take into account the role of women in agricultural production and to increase intensive efforts to enable women to move beyond production for subsistence and into higher value, market-oriented production (FAO; WB; IFAD, 2009). Women usually shoulder a big workload in agriculture in Ethiopia. However, men make most of the decisions; men have relatively well access to technologies, credit, and extension advice; and women have limited access to crucial resources and control over benefits in agriculture. Women are considerably disadvantaged as compared to men because of their lower status within the society concerning indicators such as earnings/benefits, workload, education, decision-making power, access to and control over household resources and services. The gender role differences and relations between men and women in their household livelihoods are unseen in the rural development programmers' and practitioners (Verma, 2001 and Sinidu, 2017).

The finding of Sinidu and Degye, (2017) show that the gender difference in agriculture refers to the fact that women typically have less access to and control over productive assets, inputs, productive resources, and services needed to make the most productive use of their time. Furthermore, women often have less decision-making ability in the household and community. These social and institutional barriers lead to a gender gap that hinders women's productivity and reduces their contributions to agriculture and the accomplishment of wider economic and social development goals.

Different studies conducted by (Owitti, 2015) in Gog District, Anywaa Zone of Gambella Region, South Western Ethiopia and (Dereje, 2013; Leulseged *et al.*, 2014) in four region of Ethiopia (Amhara, Oromia, SNNP and Tigray) show that gender roles in agricultural activities were different from place to place due to cultural, socio-economic, type of activities, institutional and other factors. Different percentage share of female holders who participated in cereal production is on average, lower than the percentage of male holders who engage in this activity.

Regarding the gender roles different researches were conducted on the role of rural women in farm management decision (Damisa *et al.*,2007, Ogato G.S., *et al.*, 2009 and Sintayehu, 2011) Gender Roles in Crop Production and Management Practices this focus only on role not show determinants of gender differences in crop productivity. The studies focuses on women only rather than gender and gender difference on household income

and asset building and most of the studies conducted on general crop production not in specific crop (Debalke, 2016). However, those the above listed researches lack to analysis the gender roles on improved bread wheat productivity. In the study area, both men and women perform different agricultural activities including improved bread wheat production but the enrollment of women, men in a different stage of improved bread wheat productivity was not verified, studied and documented scientifically. Therefore, this study Motivates researcher to identify the major gender role in improved bread wheat production and analyze determinants affecting improved bread wheat productivity. Hence, this study intends to fill the gap of Knowledge/information on gender roles in improved bread wheat production in Jardega Jarte District.

1.3. Objectives of the study

1.3.1. General objective

The general objective of this study is to analyze Gender role in improved bread wheat productivity in Jardega Jarte District.

1.3.2. The specific objectives

- To identify gender roles in improved bread wheat production in the study area.
- To assess the gender difference in access and control to resources for improved bread wheat Production in the study area.
- To analyze determinants affecting improved bread wheat productivity in the study area.

1.4. Research questions

The study were tried to answer the following questions:

- What are gender roles in improved Bread wheat production in the study area?
- What are the gender differences in access to and control over resources in improved bread wheat production in the study area?
- What are the determinants affecting improved bread wheat productivity in the study area?

1.5. Significance of the study

The findings of this study will be expected to benefit agricultural and natural resource office and women affair office of Jardega Jarte district in terms of improving the knowledge base for the improved bread wheat productivity difference of household farmers'. Understanding the role of male and female and determinants of improved bread wheat productivity helps local development planers to make an appropriate plan that address with households need. Carrying out such empirical research would have both basic (academic) and applied (practical) purposes. Academically, since literature concerning determinants of gender difference on improved bread wheat productivity is scarce in the study area, the findings of the study will be expected to contribute towards filling the existing literature gap. Therefore, the result of this study enabled to know the sources of improved bread wheat productivity differences between men and women farmers working in a similar environment. Furthermore, provided some basic information need for concerned institutional interest in the study area.

1.6. Scope of the Study

The study was conducted in Jardega Jarte District, Horo Guduru Wollega Zone of Oromia Region Ethiopia. From five kebeles of the District by a sample size of 143 Male and 41Female household headed farmers who are selected randomly and based on cropping year of 2010/11 E.C data. The study was regarded to analyze gender role differences in improved bread wheat productivity, men and women division of labor, the gender difference in access to resources and control on resources for improved bread wheat production in the study area. The type of research design used in this study was cross-sectional study and data were collected with the aid of structured questionnaires from sampled households.

1.7. Limitation of the Study

The study was geographically limited only to Jardega Jarte District of the Horo Guduru Wollega Zone of Oromia Region Ethiopia. One of the limitations of this study was the use of cross-sectional study. Because productivity can differ from time to time depending on the existing natural and human factors. Therefore, its scope is limited in terms of area coverage and depth due to limited budget and time available and since the respondents were, maybe not read and write, they cannot fill the questioners by themselves.

1.8. Organization of Thesis

The thesis is composed of five chapters. It starts with introduction, including the background, statement of the problem, objective, significance, scope and limitation of the study. Chapter two provides literature review on the subject matter and explained empirical studies. Chapter three provides the description of the study area and the methodology used in the study. Chapter four presents results and discussion of the study and finally last chapter five present summary, conclusion and recommendations.

2. REVIEW OF LITERATURE

2.1. Theoretical Review of Gender Role

2.1.1. Basic Concepts of Gender

Gender refers to the socially constructed roles and position of women and men, girls and boys. It is a set of ethnically specific characteristics defining the social behavior of women and men and the relationship between them. Therefore, gender is, not about women but about the relationship between women and men gender refers to the roles, behavior, attitudes, and activities that society assigns to men and women. Gender denotes the power relations between men and women in a given society. Therefore, gender is the result of the interplay of cultural, religious and similar factors of society. It starts in childhood in the household. They are transmitted or internalized by children through action or role demonstration by those who assume the roles, proverbs, and sayings (ILRI, 2012).

According to (USAID, 2010 and ILRI, 2012) key definitions of gender-related words are described as follows. Gender equality: Includes the idea that all human beings, both women and men, are permitted to develop their personal abilities and make choices without the boundaries set by stereotypes, rigid gender roles, or biases. Gender equality means that the different behaviors, objectives and the needs of women and men considered, valued and favorite equally. It does not mean that women and men have to become the identical, but that their privileges, responsibilities, and opportunities will not depend on whether they are born male or female.

Gender roles: Gender roles are learned behaviors in a given society/community that condition which activities, tasks and responsibilities are perceived as male and female. They are reflected in activities attributed to men and women based on perceived differences, which are reinforced through the gender division of labor. Gender roles, status, and relations vary according to place (countries, regions, and villages), groups (ethnic, religious, and caste), generations and stages of the lifecycle of individuals. In general, gender roles can be categorized as productive, reproductive and community roles (UNO, 2001 and ILRI, 2012).

Productive role: Productive works are any kind of activities/ works done to obtain payment in cash or kind and have exchangeable value, includes marketable goods that

have exchange value and consumable goods (at home) which have use-value. Both women and men undertake this role. Consequently, Gender division of labor is the result of how society divides work among men and women according to what is considered appropriate. Mostly considered men's role and women undertake the role it is unrecognized. Example farming activities, Wage employees.

Therefore in this study productive roles are gender division of labor in all agricultural activities undertaken by men and women in improved bread wheat production include farmland clearing ploughing, planting seed, fertilizer application, weeding, Applying pesticides, harvesting, threshing, winnowing, transporting, storing, selling the produced and livestock production activities.

A reproductive role (or domestic role): reproduction refers to all activities necessary for the maintenance and survival of human life. There are three levels at which the term is used. These are biological reproduction, social reproduction and labor reproduction. Biological reproduction includes childbearing and lactation while Social reproduction is a comprehensive category that is conservation of ideological circumstances, which reproduce class relations and maintain the social and economic prestige. Labor reproduction involving the daily regeneration of the labor force through cleaning, cooking food, washing clothes, nursing family, looking after and educating children. In most societies, reproductive roles mostly tend to fall upon the shoulders of women (ILO, 1998). Therefore in this study, the reproductive role includes cleaning the house, fetching water, cooking food, collect firewood, childcare, washing clothes, boiling coffee, buy kitchen tools, buy clothing for children, care or nursing sick in the family, fence & maintain the house.

2.1.2. Theory of Gender

Gender theory is the study of what is understood as masculine and/or feminine and/or queer behavior in any given context, community, society, or field of study (including, but not limited to, literature, history, sociology, education, applied linguistics, religion, health sciences, philosophy, cultural studies). The concept of gender, as we now use it came into common terminology during the early 1970s. It was used as an analytical category to draw a line of differentiation between biological sex differences and the way these are used to inform behaviors and competencies, which are then assigned as either 'masculine' or 'feminine' (Oakley, A., 1972).

The purpose of affirming a sex/gender division was to argue that the actual physical or mental effects of biological difference had been overstated to maintain a patriarchal system of power and to create a consciousness among women that they were naturally better suited to 'domestic' roles. In a post-industrial society, those physiological sex differences, which do exist, become arguably even less significant, and the difficulty to women of childbirth is considerably pointed by the existence of effective contraception and pain relief in labor. The term sex refers to categories of the biologically observable human body, female and male or intersex (i.e., nature), while the term gender refers to the categories of social expectations, roles, and behaviors, feminine and masculine (Oakley, A., 1972 and Jaggar, A. M., 1983).

Tasli (2007) stated, the GAD concept emerged in the 1980s out of the criticisms of the earlier WID concept, and has its roots in socialist feminism. The GAD concept sees women as driving forces of change rather than as passive recipients of development efforts. Moreover, unlike the WID concept, it puts a strong emphasis on women's liberation. The WID concept assumes that any improvement in women's economic situation will automatically lead to advancement in other spheres of their lives. The GAD concept, nevertheless, is not that positive about this assumption. Women's fault in socio-economic and political structures, as well as their limited bargaining power, puts them in a very disadvantageous position. In addition, the authors stated that one of the strategies suggested by the GAD approach is the self-organization of women at the local, regional and national levels. A very important strategy and instrument of the GAD concept is the so-called 'gender mainstreaming' (also referred to as 'gender awareness'), which aims at increasing gender awareness in all areas and all levels of public life.

These different theories have its implication and analyze the various theoretical frameworks of different developmental paths. It provides the tasks of applying different approaches to gender studies. No perfect approaches to development exist; each has its own strengths and limitation. For the purpose of this study the researcher, consider gender from the GAD perspective. Generally, there are six specific approaches through WID and GAD evolved in gender development thinking as follows (table 1).

Table 1. Main Periods and Approaches in the Historical Perspectives of Gender

Approach	Period	Area of interventions	Focused on
Welfare	1950-1970	Reproductive roles (food aid, malnutrition and family planning)	Women
Anti-poverty	1970 onwards	Aid given to poor women	Women
Equity	1975-1985	Introducing Political and economic interventions Women that reduce inequality with men (fair and justice in any development process)	Women
Efficiency	Post 1980	Women's economic participation, and capacity building to address problems related to time and unpaid labor	Women
Empowerment	1985 onwards	Advocacy and grass root projects to empower women for their self-reliance	Women
Equality	Since 1995	Power sharing and more equitable partnership between women and men	Men and women

Source: Adapted from (Owitti Ojulu Lual., 2015)

2.1.3. Gender analysis

According to Miller and Razavi (1998) gender analysis is a systematic gathering and examination of information on gender differences and social relations in order to identify, understand and redress inequalities based on gender. It is a tool to assist in strengthening development planning, implementation, monitoring and evaluation, and to make programs and projects more efficient and relevant. It should go beyond classification differences to identifying inequalities and assessing relationships between women and men. Also helps us to frame questions about women's and men's roles and relations in order to avoid making assumptions about who does what, when and why.

There are a number of different approaches to gender analysis, including the Gender Roles identification known as Harvard Analytical framework, a tool that is employed in this study. The analysis seeks to extract and organize information pertaining to the differences between men and women in the allocation of their labor to production and routine domestic tasks and the difference in the distribution of resources and assets to which they have access or which they control (Almaz, 2000).

The Harvard Analytical Framework is often referred to as the Gender Roles Framework Published in 1985; it was one of the first frameworks designed for gender analysis. Researchers at the Harvard Institute developed it for International Development in the

USA, working in collaboration with the WID office of USAID, at a time when the 'efficiency approach' to integrating women in development work was gaining prominence in development circles (Overholt *et al.*, 1985). The Harvard Framework was designed to demonstrate that there is an economic case for allocating resources to women as well as men. The framework aims to help planners design projects that are more efficient and improve overall productivity. It does this by mapping the work and resources of men and women in a community and highlighting the main differences.

As pointed by Overholt *et al.*, (1985) the Harvard Analytical Framework is a grid (also known as a matrix) for collecting data at the micro-level (i.e., at the community and household level). It is a useful way of organizing information and can be adapted to many situations. The Harvard Analytical Framework has four main components (tools). The first is the Activity Profile. This tool identifies all relevant productive and reproductive tasks and answers the question: who does what?

The second is the Access and Control Profile - resources and benefit: This tool enables users to list what resources people use to carry out the tasks identified in the Activity Profile. It indicates whether women or men have access to resources, who controls their use, and who controls the benefits of a household's (or a community's) use of resources. Third is Influencing factors: This tool allows you to chart factors which influence the differences in the gender division of labor, access, and control as listed in the two Profiles (Tools 1 and 2). Identifying past and present influences can give an indication of future trends. Fourth Checklist for Project Cycle Analysis: This consists of a series of questions. They are designed to assist you to examine a project proposal or an area of intervention from a gender perspective, using gender-disaggregated data and capturing the different effects of social change on men and women.

A gender analysis which focuses primarily on roles takes as its starting point the gender division of labor, and the gendered distribution of resources. A gender-roles analysis therefore sees a community mainly in terms of who does what, who has what, what is the socio-economic context and what gender considerations are needed for the project.

Therefore in this study the Harvard analytical framework was employed to identify the role of men and women include activity profile this means productive and reproductive

roles, access and control profile in this who access to resources and who control the resources in related to improved bread wheat production in the study area.

2.1.4. Gender roles

Gender roles are social classification of responsibilities/tasks assigned to women and men. They vary among different societies, cultures, classes, age and during period in history. Gender specific roles and responsibilities are often conditioned by household structures, access to resources, specific impact of the economy and other locally relevant factors such as ecological conditions. Thus different tasks, responsibilities and expectations that society defines and assigns to men and women. These are not necessarily determined by biological make-up and can change at any time hence gender roles is a product of stereotype (UNO, 2001).

According to Bogalech (2000) gender is that people are born female or male but learn to be girls and boys who grow into women and men. They are trained what the suitable behavior, attitudes, roles and activities are for them and how they should relate to other people. This learned behavior makes up gender identity and decides gender roles. Gender role stems from the socio-cultural construction of what a female or a male is expected to do, perform or take responsibilities in a given cultural context. It refers to determined patterns of behavior in terms of rights, duties, obligations and responsibilities assigned to female and male in a given society.

According to Sinidu and Degye (2017) Gender roles include; productive roles that generate income women engage in paid work and income generating activities, but gender disparities persist in terms of wage differentials, contractual modalities, and informal work. Reproductive roles related to social reproduction, such as growing and preparing food for family consumption and caring for children; community managing roles that include unpaid and voluntary activities, mainly carried out by women. To complement their reproductive role for the benefit of the community, such as fetching water for the school; and community or politics roles related to decision-making processes, such as membership in assemblies and councils. Role of Women's can identified as reproductive, productive, and community managing, while roles of men's are categorized mainly as either productive, community, or politics. Women's multiple and competing roles lead to their time poverty, which can imply asset and income poverty. The unequal value placed

on roles of women compared with men is mainly responsible for their inferior status and the persistent gender discrimination they experience.

Therefore, in this study the role of men and women in improved bread wheat production is significant and crucial for the provision of adequate food supply in the household. Understanding the gender roles, needs and priorities is fundamental, as these characteristics are different between men and women. Failure to recognize them will affect the effort to achieve effective agricultural development.

2.1.5. Gender in agricultural production and bread wheat production

According to FAO (2011) globally, women account for nearly half (43 percent) of the world's farmers, although their contribution to the agricultural labor force can be much higher (more than 60 percent) in some countries. Women grow or raise much of the world's food. They could be doing much more, if they had access to needed resources and had a voice in the decisions that have an impact on their lives and the lives of their families. In addition, it indicated Women farmers are 20-30 percent less productive than men are, but not because they manage their farms less well, or work less hard. The main reason for the gap between men's and women's performance is that the former have access to resources seldom available to female farmers including land, financing and technology, among other things. In addition, women do not share in benefits such as training, information and knowledge. Nevertheless, if women had the same access to those resources as men, they would produce 20-30% more food and their families would enjoy better health, nutrition and education. If women had equal access to agricultural resources and services, food security would be greatly improved and societies would grow richer, and not only in economic terms.

According to FAO (2011), Women comprise on average 43 percent of the agricultural labor force in developing countries. The female share of the labor force ranges from about 20 percent in Latin America to almost 50 percent in Eastern and Southeastern Asia and sub-Saharan Africa. The share of rural household heads who are female, many of whom are farmers, ranges from about 15-40 percent in Latin America, 10-25 percent in Asia, and 20-45 percent in sub-Saharan Africa. Today, if men and women had equal access to productive resources in agriculture, food output in developing countries would increase by between 2.5 and 4 percent enough to pull 100-150 million people out of hunger. However,

in many countries, obtainable and historically based cultural discrimination against women means that they have less right than men to own or hold land or to make decisions about their lives.

Haregewoin and Emebet (2003) describe Women's participation in food production is vital, with an estimated 60 and 80 percent of the total labor expended on farming activities in Africa contributed by them. However, as transformation reorganizes agricultural production and marketing of women are more and more marginalized. They continue to work in production, their labor may increase but they lose access to the new resources that increase productivity. As agriculture become dedicated to cash crops, women are absent to provide for family food consumption on the least productive land, while men specialized in production of these new crops for cash sales.

Fifteen percent of Ethiopian farming populations were women. It estimated that the average working day of 12-14 hours, much of it spent in hard physical labor. Women's role as producers in its present form is generally detrimental to their wellbeing and that of their children. In the peak agricultural season, women exhausted up to 10 hours per day in the field. The heaviest workload on a woman during the pre-harvest and harvest in general matches with the period of lowest household food availability increasing the strain on her, the situation being aggravated if she is pregnant or lactating (Haregewoin & Emebet, 2003).

Peterman *et al.* (2010) sated a number of possible factors may lead to agricultural productivity differences between men and women in the developing world. Primarily, assuming men and women have the same agricultural production role and use the same technique for the same crop, the amount of inputs such as labor, fertilizer and seeds applied by men and women. Second, the quality of inputs may be different. Third, men and women may have different agricultural production functions or by other considerations such as the lack of resources to cultivate specific crops and the culturally appropriate division of labor. Fourth, even if men and women have the same agricultural production role, tracker prices of inputs and credit may lead the women's production boundary to lie lower than the men's boundary, implying that women are less productive.

Ethiopian women do not have equal access to land, credit, agricultural resources, technology, or agricultural extension services (Frank 1999). This disparity hinders

women's ability to benefit equally from farming activities. Furthermore, although women have an active role in wheat production and processing, they were often not considered "farmers" within cultural perceptions and the social framework in Ethiopia. It should be noted that concerted efforts have been made in the past decade to focus policy more on gender within the agricultural system, but access to resources and participation in extension activities remain a major constraint to gender equity. Despite the large contribution to farming activities by women, many communities still, do not consider women to be farmers. Rural communities define the term "farmer" as someone who can independently perform the activities of plowing and sowing (Frank 1999).

Different clarifications for the variation in gender roles in wheat-based agriculture had been suggested. Findings from Afghanistan indicate that women's involvement in wheat-production and other cropping activities depends on a number of factors including: economic standing, marital status, labor resources, land ownership, as well as the degree of stigma related to men's and women's involvement in certain activities, and how strongly individuals and households adhere to these (Grace, 2004 and Thakur *et al.*, 2001). Additional factors that may influence the division of labor in wheat growing households include increasing male out-migration (Klawitter *et al.*, 2009 and Jafry 2013).

2.1.6. Gender Division of Labor in Agricultural production

The gender division of labor is an important issue in farming areas, which define what activities thought appropriate for males and females in developing countries. In these areas, certain tasks considered carrying out solely by either males or females, and there can be gender division on who can make decisions about those tasks. Gender division of labor vary by country, agro-ecosystem, socio-economic status, cultural norms, degree of mechanization, market orientation (subsistence and commercialized), and availability of male labor (Paris, 2013). The gender division of labor varies significantly across societies. In some cultures, women actively participate in employment outside of the home, while in others there is a clear specialization of tasks along gender lines. Women tend to remain within the home and do not participate in activities outside of the domestic sphere (Alesina *et al.*, 2011).

Rural women do play multiple roles in the world's agricultural production systems. They may be mothers, housekeepers, wage laborers, agricultural processors, market women, and

entrepreneurs as well as agricultural producers. Most rural women make constant tradeoffs in allocating labor time and productive resources among their roles and obligations. Most farming systems display mixed patterns of women's agricultural responsibilities, combining production cycles where one sex is primarily responsible with crops where responsibility is shared. Women are often responsible for the livestock, vegetables and tree crops cared for near their dwellings. They are more likely to be involved in cereal production in hoe cultures and irrigated rice systems than in extensive plow cultures (Kathleen, 1985). In addition the authors indicated that the class also influences women's participation in agricultural production in Bangladesh, Indonesia, and Peru. All found that women in more affluent farm families devoted less time to field work and more time to cooking for hired laborers. Although in low technology systems poor women are likely to do more fieldwork than more prosperous women, in highly mechanized systems, many women in prosperous farm households do substantial amounts of fieldwork.

All over Africa, men and women have separate responsibilities and play different but complementary roles. Though the gender division of labor differs considerably across border depending on culture and economic status, women universally carry the major burden of producing food and providing food daily for consumption to the family (Adamon and Adekele, 2016). Women work longer hours than men do in most developing countries when both paid and unpaid works taken into consideration. However, much of their work remains undervalued because it is unpaid and confined to the domestic sphere. Women often spend less time on average in paid market work than men do, whereas they are largely responsible for water and fuel wood collection, food preparation, household chores, childcare and care of the sick and elderly (FAO; IFAD; ILO, 2010).

Almaz (2000) Gender studies on division of labor in agricultural sector in Ethiopia revealed that 20-40% of farming activities was done by rural women, especially in food production and processing. Despite the significance of woman's role in agricultural development, evidence of developing countries show that women's farming productivity and efficiency levels often remain very low. Among the key reasons for this is lack of technical advice on production and marketing, cultural practices, skills and technology. Extension services frequently fail to provide adequate information to women farmers through failing to recognizing their specific needs. In addition to their productive everyday jobs they are frequently over burdened with household responsibilities which they cannot

delegate, they are often less educated than men and have a more limited access to resources such as credit. If an extension program deals effectively with those constraints, it will be easier for women farmers to get involved in activities (FAO, 1996).

Therefore, in this study gender division of labor in improved bread wheat production activities were indicated that means productive roles of men and women in the agronomic activities of improved bread wheat. such as farm land clearance, tilling farm land, sowing seed, fertilizer application, weeding, pesticide application, harvesting, threshing, winnowing, transporting and storing and the livestock production activities are pen construction, feeding animals, watering, milking, traditional milk processing, and strew collection. Reproductive roles of women and community management activities were included.

2.1.7. Gender differences in access to and control over resources

In Agriculture gender, difference is the constraints in accessing productive resources, markets, and services are usually more severe among women farmers, farm workers, and rural entrepreneurs than among men. This gender difference affects women's productivity and reduces their contribution to output of the agricultural sector (FAO, 2011). There are socio-economic indicators of gender inequality these consist determine of employment, education, health, ownership of property and income differences. Gender difference results from inequality in decision-making power, which leads to inequality in access to resources and by the differential treatment given to women and girls as compared to that given to men and boys. Gender discrimination exists as element of the social system and runs through all aspects of life and at different levels such as at family level, community level and institutional level (Bogalech, 2000).

Gender inequality enforces costs on productivity, efficiency and economic development. By hampering the buildup of human capital in the home and labor market and by thoroughly not including women or men from access to resources, public services or productive activities, gender discrimination diminishes economy's capacity to grow and to raise living standard (World Bank, 2010). Similarly, Sinidu and Degye (2017) show that the gender difference in agriculture refers to the fact that women typically have less access to and control over productive assets, inputs, productive resources, and services needed to make the most productive use of their time.

Furthermore, women often have less decision-making ability in the household and community. In rural communities of Ethiopia, women play important roles in food production and household nutrition but are disadvantaged in terms of access to resources, level of education, membership of cooperatives and participation in household and community decision-making processes (MoARD, 2010). These situations have put women at a disadvantageous position with respect to agricultural resources; leading to low productivity of female-headed households. This will further decrease their participation in economic activities. These social and institutional barriers lead to a gender gap that hinders women's productivity and reduces their contributions to agriculture and accomplishment of wider economic and social development goals.

Accordingly, the study will attempt to analyze the gender differences regarding access to productive resources and decision-making power or control over resources in relation to improved bread wheat production in the study area. Such resources are farmland, livestock (oxen, cow, heifers, calves, bulls, goat, sheep, donkey, poultry, agricultural inputs (improved seeds, fertilizers, pesticides, farm implements), stored wheat production, credit, milk and milk byproducts.

2.1.8. Gender and Institution

For a long period, a commitment to promote gender equality in economic outcomes, as in other areas of social development and human rights, has emphasized women's empowerment. There is evidence that those expanding women's opportunities in particular health, education, earnings, rights, and political participation drive down gender inequality and accelerate development. In developed countries, women are also considered responsible for the reduction in economic gender disparities. However, regardless of important advances towards equality, differences in the socioeconomic outcomes of men and women persist (Farre, 2012). In many cases, social and cultural norms against women and greater time burden are obstacles to their mobility and participation. Women often lack capacity, education, self-confidence and limited opportunities to join in groups and organizations, which often serve as platforms for consultations and information sharing with other actors including policy makers, researchers, and technical experts (Regasa, 2012).

Recently, policy makers and social scientists have begun to give emphasis to the crucial role and responsibility of men and boys in reducing gender differences. In both developing and developed world, men still exercise huge power over many aspects of women's lives. In the public spheres, as heads of states and government ministers, as leaders of religious and faith-based institutions, as judges, as heads of armies and other agencies of force, or as village heads, men design and implement policies that may or may not support women's priorities and needs. As public authorities, they also apply control over a large variety of resources such as health, education, transportation or finance. Legal or regulatory barriers that restrict women's access to those resources be responsible for gender inequality in many parts of the globe (Farre, 2012). Hence, in this study institution in relation to gender at community level includes family, *Edir, equib*, primary farmers' cooperatives, women associations, farmers training centers.

2.2. Empirical Review on Gender Role

2.2.1. Review of empirical evidences on Gender Role in related to Bread Wheat Production

The Studies conducted in Ethiopia, Pakistan, Afghanistan, India, and Nepal reported that men are more likely to prepare the land and plant the wheat crop. whilst harvesting and transport/carrying of head loads is shared between men and women, weeding and post-harvest processing is either shared or mainly done by women (Addis, *et al.*, 2001; Klawitter *et al.*, 2009; Grace, 2004; Taj *et al.*, 2007; Tavva *et al.*, 2013; Thakur *et al.*, 2001). However, as indicated by some authors (e.g., Nelson, 2013; Olesen *et al.*, 2005), the discourse on the local division of labor, i.e., the categorization according to local norms and ideals, does not always match the actual practice that can be observed with more in-depth or qualitative approaches. This is illustrated by (Nelson's, 2013) study from Ethiopia, where men use oxen to plow the fields, and where it is not culturally acceptable for women to plow. Therefore, land preparation considered a man's activity. However, the study found that women participate in land preparation by following behind the plow with a hand tool, breaking up the clods that were too large to be broken apart by the plow.

The study conducted by Shambel (2013) on Gender Differential in Agricultural Production and Its Impact On Household Farm Income in case of Fedis district of East Hararghe Zone of Oromia National Region State. The study used 74 male headed and 49 female-headed

households. The descriptive result of all explanatory variable showed that male-headed households had significantly better access to productive resources than female-headed households did. The result of econometric model showed that the explanatory variables such as, herbicide use, improved seed use and fertilizer use significantly affected the productivity of agriculture for farmers in the study area.

Debalke (2016) examined on gender differences in terms of household income and level of asset accumulation in Arbaminch Surrounding District, Gamo Gofa Zone, SNNPR, and Ethiopia. The result of the OLS regression model revealed that out of 13 variables included in the model, 10 explanatory variables are found to be significant up to less than 10% probability level. Those are age, education level of household head, cultivated land size, livestock holding, labor availability, membership to organization, frequency of extension contact, credit, distance to nearest market and irrigated land size were found to have significant association with household income and asset accumulation. Statistically significant difference persists between MHH and FHHs in household income and asset accumulation.

Wakweya (2004) examined the impact of gender, differences on agricultural productivity in Wenchi district of southwest Showa zone. The data used in the study were collected from 75 MHH and 65 FHH randomly selected from 6 PAs of the district. The result of the study further suggests that men's gross value of output per ha was 68.83% higher than that of women's. However, the descriptive statistics of this study show that there is a difference in household endowments, which have very large overall effects on the productivity difference between male and female-headed households by about 92.41%. If women had the same human capital and used the same amounts of inputs as men, the value of their output would increase by some 23.58% over the MHH.

Mekonnen *et al.* (2017) examined Gender based Productivity Differences in Ethiopia using Kernel density of productivity, by gender of household head and by gender of plot decision maker. They employed a cross-sectional instrumental-variable regression method using a regionally representative dataset of more than 7,500 households and 32,000 plots in four major regions (Tigray, Amhara, Oromia, and SNNP) the data that was collected in Ethiopia during the 2010 cropping season. They found that on average, the value of production per hectare of farming households was 10,942 Birr. Female households headed have significantly fewer value of production (mean=9,898 Birr/ha) than male headed

households (mean=11,273 Birr/ha). The most commonly grown crops in the survey areas are maize 19%, teff 14%, wheat 13%, barley 11%, sorghum 9%, and enset 9%. There are significant gender differences in crop choice. Female household heads are significantly more likely to grow enset, maize, potatoes and fruits; while male heads are more likely to grow teff and other pulses. There is no statistical difference between plots managed by males and those managed by females or those together managed by household members.

2.2.2. Gender Division of Labor

The work of Pankhurst, H., (1992) shows that among the society of Menz, in Northern Showa of the Amhara region of Ethiopia, women do not plough agricultural land. Rather, they help their husbands in supportive tasks except harvesting. They give food to their husbands, fetch water to men and livestock during agricultural fieldwork, help men during threshing and make grain seeds ready for sowing. Furthermore, (Frank, 1999) point out that land preparation, weeding, harvesting, threshing and storing have been some of women's primary responsibilities. In Amhara Region According to her, they are also in charge of shepherding, tending sick animals, watering, barn cleaning, milking and milk processing.

Unlike the women of the Menz society, the people in Awra Amba, Southern Gonder of the Amhara region, have no specific gender role in agricultural production. The women of the Awra Amba society equally participate with men in agricultural production. The women plough the land with oxen whereas men perform domestic activities at home. The division of labor, in this area, is based on age rather than sexual category. Therefore, both women and men are equally considered as producers and have equal position and value in both agricultural production and decision-making (Ferede T., 1994 and Dereje K., 2013).

In the case of Sidama, which is found in Southern Nations, Nationalities and Peoples' Region, the participation of women in agricultural activities is common. According to (Sintayehu, 2011 and Feleke *et al.*, 2016), manuring, harvesting, storing are exclusively the task of women. However, women culturally prohibited from agricultural practices such as ploughing, hoeing, sowing and weeding. They are not allowed to use farm instruments like plows, hoes and sickles. In the area, men are engaged in production of both food and cash crops.

The study of Regassa O., (2000) state that agricultural activities are predominantly men's task among the Maqi Oromo, South East Showa administrative zone of Oromia region. In this zone, women's participation in agricultural production, similar to the Menz community of the Amhara region, is not much different despite variations from one household to the other. Ploughing is entirely men's activity. Women never try it. There is a belief in the community that leaves 'If women cultivate, there will be no rain fall'. They have a strong belief about it. The people in the community believe that father is equivalent to God (Waqaa) and mother is to earth (lafa). God provides rain to the earth as a result earth stands different kinds of plants just as mother bears off springs after receiving the father's semen. Therefore, if a mother is similar to earth, she cannot till the earth. Among the Maqi Oromo, clearing the farming land, removing the bush, tilling, sowing, and preparing the threshing floor and farm implements were all carried out by men. Other agricultural activities like digging, weeding and storing to some extent contributed with women. Nevertheless, weeding is the most common duty of women. Similarly, the findings of (Sintayehu, 2011) shows that men carry out most agricultural works among the Oromo's of Ethiopia. As he states that cultivation, harvesting and threshing are all the activities of men whereas women are confined in cooking food, milking and keeping the house.

According to the study made by Wudinesh (2003) in Amhara (North Wollo and Humera), Tigray (Eastern and Southern), SNNP (North Omo), female farmers provide more than half (50-58%) of the total labor force and time inputs required for crop production in the surveyed areas. Similarly, they cover up to 77% of the total labor force and time inputs required in livestock production. Likewise, female farmers are not only involved in crop and livestock production but also in generating additional income for their families. They produce goods such as storage containers, baskets, etc. They also engaged in brewing and in petty trading of agricultural produces. Furthermore, female farmers play key roles in maintaining the daily life of their families and maintaining the social cohesion of families. About 33% and 67% of the overall labor force and time inputs required for household work, husbands and wives, respectively cover farm production, income generation and off-farm activities, etc. Therefore, as indicated in different studies, Ethiopian women farmers are the key actors in maintaining the daily lives of their families and in contributing to the rural economic development as a whole (Wudinesh,2003). Hence, this study will identify the major areas of involvement of both men and women in the

improved wheat productivity system and identifies gender-oriented activities in the study area.

2.2.3. Gender Difference in Access to and Control Over Resources

The study conducted by Damisa & Yohanna (2007) shows that the participation of women in decision making is limited but their opinion is considered during harvesting, storage, and marketing of the produce. Similarly, (Sinidu and Degye, 2017) show that the gender difference in agriculture refers to the fact that women typically have less access to and control over productive assets, inputs, productive resources, and services needed to make the most productive use of their time. Furthermore, women often have less decision-making ability in the household and community. These social and institutional barriers lead to a gender gap that hinders women's productivity and reduces their contributions to agriculture and the accomplishment of wider economic and social development goals. Accordingly, the study will attempt to analyze the gender discrimination regarding access to productive resources and decision-making power in the study area.

Kassie *et al.*, (2014) studies reveal that what Determines Gender Inequality in Household Food Security International Maize and Wheat Improvement Center in Kenya rural women farmers play a vital role in food production and food security. They account for 70 percent of agricultural employees, 80 percent of food producers 100 percent of those who process basic foodstuffs and they undertake from 60 percent to 90 percent of the marketing. Women take part actively in farming activities and processing farm products, in addition to their domestic and reproductive responsibilities. The women play roles in agriculture and the rural people are essential to farming and rural development in sub-Saharan Africa. Women in Ethiopia also contribute to agricultural production and productivity. However, female-headed households have limited access to and control over resources, which is crucial effectively meet their strategic and practical needs due to social and cultural biases in society. Similarly, the study conducted by (Takele B., 2017) shows that among the people of konso, despite their essential role in food production, women have no decision making power over important resources like land, livestock, and house.

2.3. Conceptual Frameworks of the study

Depending on the statement of problems and review of literature, the following conceptual framework was discussed. Based on theoretical review concepts and empirical studies a framework presented in figure 1. As shown in the figure, male and female farmers improved bread wheat productivity influenced by various factors like Demographic factors, Economic factors, Institutional factors and Social factors having an important role in the production process. The differences in bread wheat productivity of males and females are also explained by the following. Demographic factors such as Age, Educational level of the HH and farming experiences; socioeconomic characteristics participation in social organization, Household labor force, cultivated farm size, Number Oxen owned and Household Income. Institutional factors such as extension services, access to credit, improved bread wheat, Fertilizer use, pesticide use and distance from the market would have been significant effect on the Productivity of bread wheat.

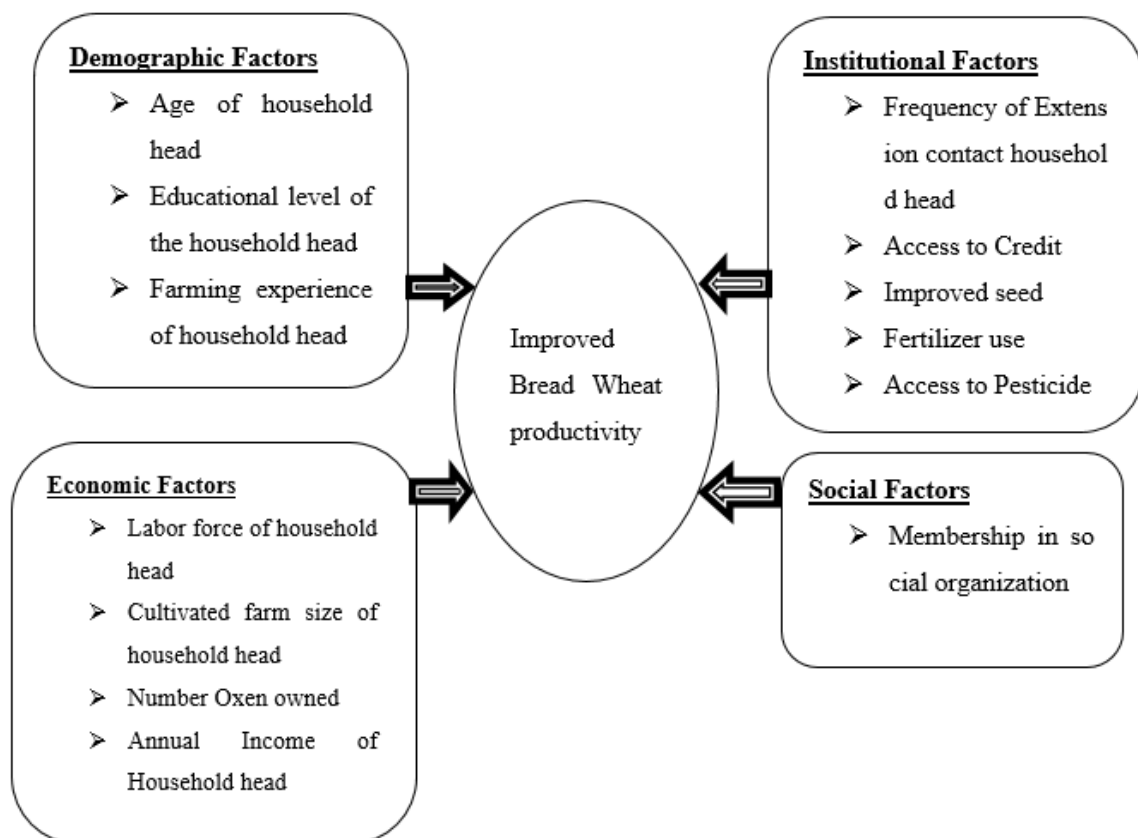


Figure 1. Conceptual Frameworks to analyze determinants affecting bread wheat productivity.

Source: Own sketch through review of literature

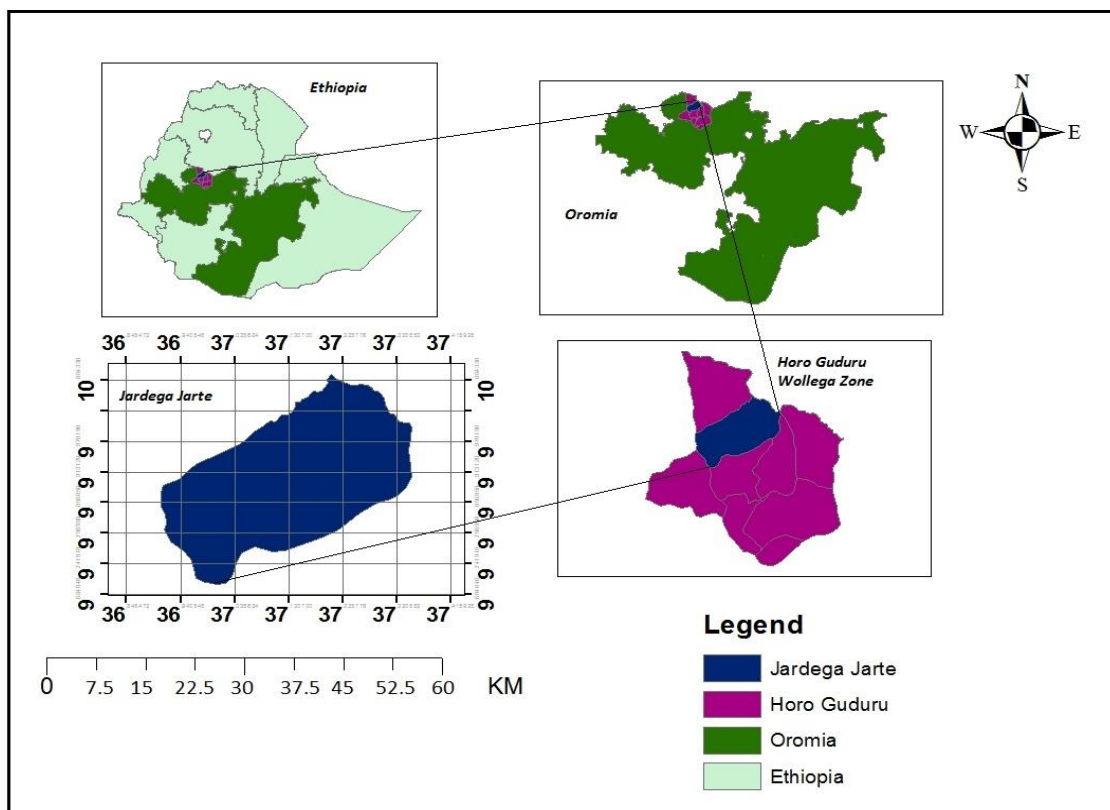
3. RESEARCH METHODOLOGY

This chapter discusses how the research was conducted. The chapter consists of the description of the study area, research design, sampling technique and sample size, Type and sources of data, methods of data collection, method of data analysis, definitions of variables and their hypothesis.

3.1. Description of the study area

3.1.1. Location

Jardeg Jarte District is one of the eleven Districts found in *Horo Guduru Wollega Zone* of Oromia Region Western Ethiopia (Figure 2). It is located at a distance of 369 km from Addis Ababa, the capital city of the country. The District is 55 km from the *Shambu* capital of the zone. The Abay River in the north, Abe dengoro and Horo Districts bound the district in the southwest, *Abay Chomen* District in the east and *Amuru* and *Kiramu* Districts to the Northwest. The administrative center is *Alibo* (CSA, 2007).



Source: Ethio-GIS, 2019

Figure 2: Map of the Study Area

3.1.2. Physical features and area coverage

Jardega Jarte District is geographically located at about 9°54'14''N latitude and 37°4'4'' E longitude at an altitude of between 1600 up to 2372 meter above sea level. The mean maximum and minimum temperatures of the area are 23.50°C and 12.30°C respectively with an annual average rainfall of 1,200mm up to 1,559mm. According to the current administrative division, the district is subdivided into 24 *kebeles* (21 rural *kebeles* and 3 urban *kebeles*) administrations. The water resource found in the district comprises rivers such as *Hanger*, *Chego*, and *Gabate* are the tributaries of the *Abay* River (JJWANRO, 2019).

3.1.3. Population

According to CSA (2013) projected estimation, the total population of the district is around 60,769 of which about 30,285(49.8%) are male and the remaining 30,484(50.2%) are female. The district also has around 10,874 households. In sex ratio 8,985(82.6%) are male-headed household and 1,889(17.4%) are female-headed households. The religions of the district are Orthodox Christian (40.47%), Protestant (32.19%), Muslim (14.42%) and traditional beliefs (11.45%) of the population.

3.1.4. Economic activities

The predominant economic activity in the study area is agriculture. The agricultural system is mixed farming, which includes both crop production and livestock rearing. According to information obtained from the district agriculture office, total land of the district is 103,834 hectare out of this about 35,048 ha is cultivable,12,456 ha is grazing land,32,962 ha is natural forest land,7,219 ha is bush and shrubs,2,486 ha wetland, and 13,663ha covered by other categories. The major crops grown include cereals (maize, barley, wheat, and teff), pulses (horse bean, chickpea, and common bean), and oil crops (rapeseed, Niger seed, sesame, and linseed) (JJWANRO, 2019).

Crop production is dependent on rain fed and the major crops produced in the study area. according to their area coverage of the cropping year of 2010/2011 E.C Niger seed (24%),wheat (20%),Teff (18%), barely (10%),Maize (9%), pulses (horse bean, field pea and common been covering (9 %) ,sorghum (5%), sesame (3%), rapeseed and linseed (2%) of the total cultivated area. In the study area, livestock husbandry is a second

important component for the livelihood of smallholder farmers. Oxen provide traction power for the cultivation of the agricultural lands. On the other hand, livestock were kept as a source of income through milk. Livestock productivity is also low due to the absence of adequate feed and disease infestation (JJWANRO, 2019).

Table 2.Types of Livestock reared in the study Area

No	Types of Livestock	Number of Livestock
1	Cattle	131,634
2	Goat	18,934
3	Sheep	23,640
4	Horse	923
5	Poultry	62,449
6	Donkey	11,248
7	Mule	2,314
	Total	251,142

Source: JJWANRO (2019)

3.1.5 Infrastructure and marketing services

The existing social services found in the study area include six health clinics, twelve health posts, fifteen (15) first cycle school (1-4), nineteen elementary and junior schools (1-8 grade), five secondary schools (9-10) and one preparatory school (11-12). There are two large local market places in the district. There are also 3 medium and 5 small markets. When farmers want to sell some of their farms produces, they were to travel long distances to reach the market places. They use pack animals, loading over their backs of women, shoulder of men or earning high transportation costs to use vehicles (*Jardega Jarte* District Education Office, 2019).

3.2. Research Design

This study employed a cross-sectional study design. Where the cross-sectional design is useful in terms of time limitation and resource constraints (Bailey and Mouton, 1998) .The, study employed both male and female-headed households who engaged in improved bread wheat-farming activities from sampled *kebeles*. A cross-sectional study involves looking at people who differ on one key characteristic at one specific point in time. The

data was collected at the same time from people who are similar in other characteristics but different in a key factor of interest such as age, income levels, or geographic location. Because cross-sectional designs generally use survey techniques to gather data, they are relatively inexpensive and take up little time to conduct.

The cross-sectional design type of research differs from longitudinal studies in that cross-sectional studies are designed to look at a variable at a particular point in time. Longitudinal studies involve taking multiple measures over an extended period. Longitudinal studies tend to require more resources and are often more expensive than cross-sectional. Therefore because of the above reasons this study was used a cross-sectional study design.

3.3. Sampling technique and sample size

Appropriate sample size depends on various factors relating to the subject under investigation including time, cost and degree of accuracy (Daniel, 2008). Therefore, due to the reason of time series this study was used the following sampling techniques.

This study employed both probability and non-probability sampling techniques to draw a representative sample. Multi-stage sampling procedures were used to select sample *kebeles* and sample households. At first stage, Jardega Jarte woreda was selected purposively. At the second stage out of 21 rural *kebeles* 5 *kebeles* producers of improved bread wheat were selected randomly; At the third stage, stratifying MHH and FHH based on the list of household headed farmers obtained from each *kebeles* and 184HH (143 male HH and 41Female HH) were selected by using simple random sampling techniques.

The sample sizes of each Kebeles were determined using probability proportional to sample size (PPS). Accordingly, 48 households from *Tulu nono*, 37 households from *Sombo-Wato*, 33 households from *Kobi-dinsa*, 29 households from *Sombo-Kumi* and 37 households from *Sute kata Ali kebeles* were selected by PPS. The sample size was determined using the formula given by (Yamane T., 1967 cited in Sarmah, H.K. *et al.*, 2013) at 93 % confidence level and ± 7 % (0.07) precision level. The total sample frame of household size was 1908.

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

Where:

n-Denotes sample size;

N-Denotes total number of Male headed and Female Headed Households

e-Denotes the desired level of precision (taking 7%);

$$n = \frac{1908}{1+1908(0.07^2)} \quad n = \frac{1908}{1+1908*0.0049}$$

$$n = \frac{1908}{1+9.3492}$$

$$n = \frac{1908}{10.3492}$$

$$n = 184$$

To determine sample size for each kebeles, probability proportional to sample size sampling technique (verma and pandy, 2008) formula were employed;

$$n1 = \frac{n*N1}{N}, n2 = \frac{n*N2}{N}, n3 = \frac{n*N3}{N}$$

Where; n1, n2 and n3=sample size of respondent in each kebeles,

N1, N2 and N3=are total number of household in each kebeles,

n=total sample size of respondents in five kebeles,

N=the sum of five Kebele households.

Table 3. Distribution of Sampled Households in the study area

Study Kebele	Number of total household heads			Number of respondent household heads		
	MHH	FHH	Total	MHH	FHH	Total
Tulu nono	406	90	496	39	9	48
Sombo Wato	309	77	386	30	7	37
Kobi Dinsa	262	82	344	25	8	33
Sombo Kumi	206	92	298	20	9	29
Sute keta ali	298	86	384	29	8	37
Total	1,481	427	1,908	143	41	184

Source: JJ WANRO and survey sampling (2019).

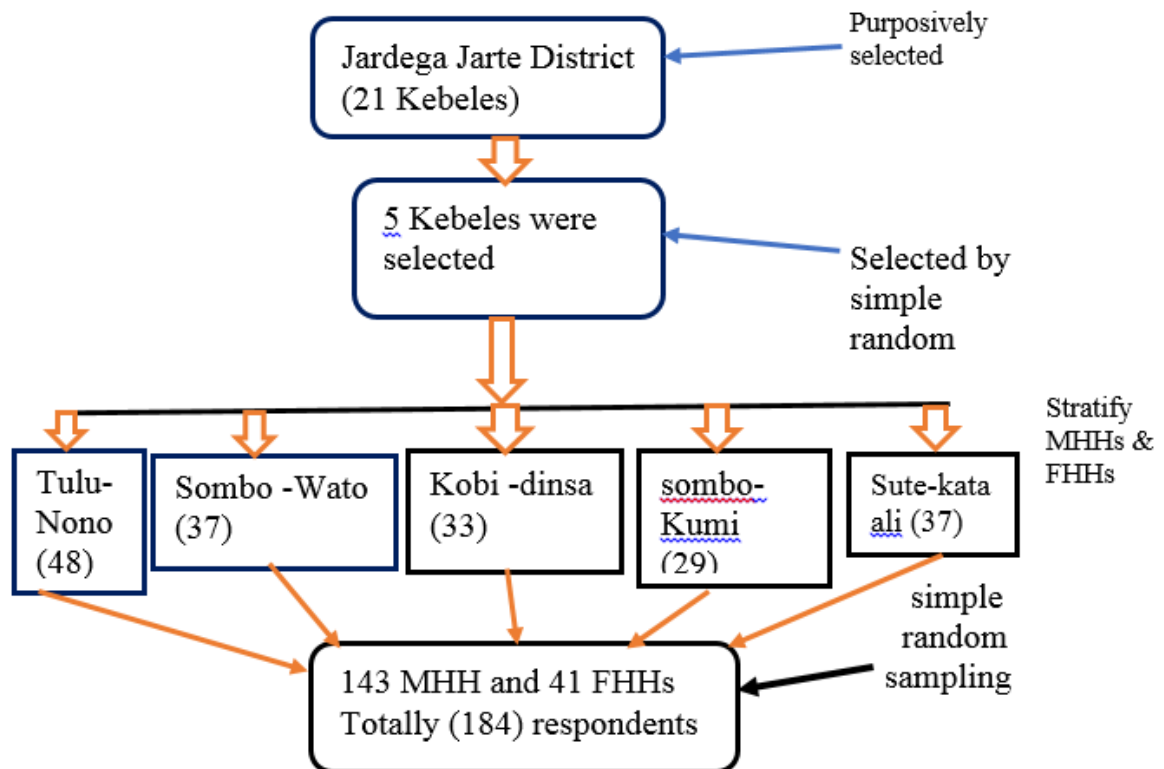


Figure 3. Sampling procedure

3.4. Type and Sources of data

To achieve the stated objectives, the types of data for this study were quantitative and qualitative data. The study used both primary and secondary sources of data. The primary sources of data were sampled male and female household headed through interview schedule. Moreover, source of secondary data were annual reports, published and unpublished papers, books, journals, dissertations and office records.

3.5. Methods of data collection

The methods of data collection were interview schedule, Focus-group discussions and key informant interviews. The primary data were collected from sampled male and female household headed through interview schedule. Moreover, secondary data were used from annual reports, published and unpublished papers, books, journals, dissertations and office records.

The questionnaire cover information on household demographics and farm characteristics, roles of male and female in improved bread wheat production. Both male-headed and fem

ale-headed household respondents were interviewed. Five enumerators who were trained on the subject matter of the questionnaire conducted the interview. Enumerators were employed based on pre-established criteria such as; ability in speaking *Afaan Oromo*, education level, experience in similar work, and knowledge of the study area. Training was provided to enumerators on how to approach the respondents and how to administer the interview schedule and how to record the responses from households. Before carrying out the actual data collection, pre-testing of questionnaire were done at field level to check the consistence, clarity and appropriateness of the instrument. The data collections were carried out from second week of February to March 30/2019.

Focus Group Discussions: Focus group discussion is a discussion developed to explore people's beliefs, attitudes, and opinions. Focus groups that can range from six to twelve members can vary according to the number of participants involved. To maximize the reliability of the study, the focus groups consisted of homogeneous members of the target population (Gill, P., *et al.*, 2008).

The Participants for focus group discussion members were purposively selected with the collaboration of development agents and Kebele leaders because of FGD members those have more information about the gender role and familiar with improved bread wheat production in rural farming community of the study area. In each of the FGD, five male and five female farmers were selected and participated. This helps to take into account different points of view and helps to strengthen with the data collected from household surveys. Accordingly, with the help of checklists discussions were held with 10 members in one FGD contains 5 Male and 5 Female farmers were participated in discussion separately and at different time in each of selected five *kebeles* of the study area.

Key informants were performed by targeting the respondents who have good knowledge concerning the gender practical situations of the area. Because of those two elders and six professionals working within the District office totally, eight key informants were selected . Hence from women and youth office one, from Agriculture office one, from Education office one, from Public service office one and development agents two those who act as gender focal person were contacted on the various issues relevant to the study. This helps to take into account different points of view and helps to strengthen with the data collected from household head surveys. Triangulation facilitates validation of data through cross verification from more than two sources such as FGD and Key informant interview were

used in the study. It tests the consistency of findings obtained through different instruments and increases the chance to control, or at least assess, some of the threats or multiple causes influencing the results.

3.6. Method of data analysis

To meet the research objectives the study was used descriptive statistics, inferential statistics, econometric model and Gender Analytical Framework.

The Gender analysis framework tool analyzed the first and the second specific objectives, which is the Harvard Analytical Framework (HAF) (CEDPA 1994). HAF was used to assess the activity profiles, gender roles, as well as the circumstances social, economic and cultural influencing gender access, and control profiles. Harvard framework was developed in the Harvard Institute for International Development in collaboration with the WID office of the USAID. It was organized based on the WID efficiency approach. It is usually called Gender Roles Framework or Gender Analysis Framework (GAF). It is one of the popular and widely used analytical tools (ILO 1998).

Descriptive and inferential statistics, as well as econometric models, were employed to meet the third specific objective of the study and the quantitative data were analyzed by using the interacted statistical software Package (STATA Version 13) and Microsoft Excel 2007.

3.6.1. Descriptive and Inferential statistics

Descriptive statistics were used to compare and contrast different categories of sample units concerning the desired characters. To investigate gender division of labor in bread wheat production activity and to assess access to and control over productive resources between male and female-headed households in the study area, and to compare general and farm characteristics of both male and female-headed households, by using descriptive statistics such as frequency, percentage, mean and standard deviation of the variables.

Inferential statistics includes Independent t-test and chi-square (χ^2) tests used to test if there is a significant difference in improved bread wheat productivity between male and female-headed households in the study area. Independent t-test was used to test continuous variables and chi-square (χ^2) test was used for categorical or dummy variables.

3.6.2. Model Specification for Ordinary Least-Squares (OLS) Regression

Ordinary Least-Square Regression (OLS) was used to identify factors determine improved bread wheat productivity of male and female farmers' in the study area. OLS regression is one of the major techniques used to analyze data and forms the basis of many other techniques, OLS regression is particularly powerful as it relatively easy also checks the model assumption such as linearity, constant variance and the effect of outliers using simple graphical methods (Craven, B.D. and Islam, S.M., 2011).

Therefore this study was preferred the OLS regression because of the dependent variable of the study was continuous which is improved bread wheat productivity measured in quintal and the OLS model was used for the third objective of the study.

The OLS regression model includes multiple explanatory variables by simply adding variables to the equation.

$$y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \epsilon_i \dots \beta_\chi\chi_n \quad (2)$$

Where y = Bread Wheat productivity of male and female household headed farmers measured in quintal per hectare.

Where α =Y intercept, and ϵ =random error term

x_1, x_2, \dots, χ_n Refers to all explanatory variables used in the model, indicates the value of y when all explanatory variables are Zero.

Each $\beta_1, \beta_2, \dots, \beta_\chi$ Parameter refers to the average change in the improved bread wheat amount produced (Y) that is associated with a unit change in an explanatory variable (x) while controlling the other for the explanatory variable in the model. Therefore, OLS regression analysis was used to examine what predicts determinants affecting improved bread wheat productivity of producers.

3.6.3. Definition of variables and hypothesis setting

Dependent variable: Improved Bread Wheat productivity expressed in quintal in production or cropping year of 2010/2011E.c (2018) was used as a dependent variable.

Independent variable: Aligned with the theoretical background and based on previous findings on similar topics of productivity analysis, the following independent variables hypothesized to affect the dependent variable.

Age of household head (AGEHH): Age is a continuous variable and is measured in terms of years. In this study, older farmers may have more experience, resources, or authority that would allow them more possibilities for trying new technologies. (Assefa and Gezahegn, 2010). It was assumed that age of household head has positively related to bread wheat productivity.

Education level of household head (EDUHH): Education is a continuous variable and it measured in a school attended. Education was assumed to increase farmers' ability to obtain, process, and use Agricultural information. The decision on what/how/how much to produce is made by the household head. Education levels have a bearing on farmer's access to improved farm techniques and effective use of information available on technologies (Hassen *et al.*, 2012 and Regasa, 2012; Afework H. and Lemma Z., 2015). This implies that the education level of the household head, as expressed in several years of schooling, was expected to have a positive impact on increase improved bread wheat production and productivity.

Labor force of Household head (LABHH): is a continuous variable and is measured in terms of the active labor force in the household. It was assumed that a labor of household with a large active labor force was positively related to improved bread wheat productivity (Tadele and Mahendran, 2015) because household with a large number of productive labor force able to supply more labor. Hence, a positive relationship was expected.

Size of Cultivated land of household head (SIZFALAND): It is a continuous variable and measured in a hectare. It was assumed that size of cultivated land was positively related with improved bread wheat production. Mulugeta and Hundie (2012) and Tadele and Mahendran (2015) showed that household larger farm size implies more resources and greater capacity to invest in the farm and increased production. Therefore, it was expected that a household who has large size of farmland would have the opportunity to acquire production inputs and thus improve his/her production. Hence, a positive relationship was expected.

Oxen owned by household head (OXENOWN): Is a continuous variable and is measured through TLU. It was assumed that oxen ownership positively related to improved bread wheat production. Coelli *et al.* (2002) indicated that livestock is a source of draught power and household. Oxen are the most important source of traction power and farmers who own oxen would be in a position to undertake farm activities on time. Therefore, it was

expected that a household who has oxen owned, as measured by TLU, would have the opportunity to acquire production inputs and thus improve his/her production and productivity. Hence, a positive relationship was expected.

Access to credit (ACCREDIT): is a dummy variable and it is measured 1 if the farmers have access to credit otherwise 0. It was assumed that access to credit positively associated to improved bread wheat production. Leake and Adam (2015) indicated that those farmers who have access to credit are believed to use modern technology than noncredit users. Therefore, it was expected that farmers who has access to credit might overcome their financial constraints and be capable of to buy inputs.

Frequency of Extension contact of household head (EXCOT): It is a continuous variable and is measured by the frequency of extension contact received per month in the study time. It was assumed that frequency of extension contact positively related to improved bread wheat productivity. Hassen *et al.*, (2012) indicated that more contacts with extension agents would increase farmers' acceptance of technologies. Therefore it was expected a household who has more extension contact was increased his/her improved bread wheat productivity. Hence, a positive relationship was expected.

Fertilizer use (FERUSE): It is a continuous variable stands for all kinds of chemical fertilizer (NPS and UREA) used for improved bread wheat is measured in terms of kg per hectare. It was assumed that amount of fertilizer positively related to improved bread wheat productivity. Million and Belay (2004) and shamle (2013) Fertilizer use was increased bread wheat productivity. Therefore, a positive association was expected.

Access to Pesticide (ACPESUSE): It is a dummy variable, which refers to chemicals used to control pests, and it takes the value 1 if the farmer is used otherwise 0. It was assumed that positively related to improved bread wheat productivity. Wakweya (2004). Therefore, it was expected that a farmer who has accessed to Pesticides increased bread wheat productivity. Moreover, it was expected to correlate positively.

Membership in social organization (MEBRSO): is a dummy variable and it takes the value 1 if a farmer is a member otherwise 0. It was assumed that membership in social organization positively related to improved bread wheat productivity. Asres (2005) Farmers who were membership and leadership in community organizations and different cooperatives practices easily exposed to information. Therefore, those farmers who were participat

ed in some social organization as members or leaders suppose more likely to improve bread wheat productivity. Hence, a positive relationship was expected.

Annual Income of Household head (INCOME): It is a continuous variable and measured by the amount of ETB. It was assumed that the total income positively related to improved bread wheat productivity. Thus, those households with a relatively higher level of farm income are likely to purchase improved seeds and other essential agricultural inputs (Debalke D., 2016). Therefore, a positive association was expected.

Distance from the market of a household head (DISTAMARKET): Continuous variable measured in kilometers. Closeness to market centers creates access to market contact. Yalambirhan (2007) and Hailu (2008) Farmers were that had frequent contact to market a chance to get information from others. A farmer having more information, on the other hand, has a higher probability of utilization of new technology. Therefore, this variable was expected to influence the dependent variables positively.

Improved seed (IMPSEED): continuous variable introduction of improved seed varieties of bread wheat plays a vital role in improving productivity per unit of land measured in kilogram. It assumed that improved seed positively related to improved bread wheat productivity. Farmers who use improved seed expected to get a higher amount of product per plot of land (Shambel, 2013). Hence, a positive relationship was expected.

Farming experience of a household head (FARMEXP): It is a continuous variable. Farmers with longer farming experience in improved bread wheat production were supposed to have better competence in assessing the characteristics and potential benefits of new technology than farmers with shorter farming experience. Moreover, farmers with longer farming experience expected to be more knowledgeable and skillful. It assumed that farmers who have more farming experience in improved bread wheat production can get better produce than a farmer does with shorter farming experience (Aman and Tewodros 2016). Therefore, a positive association was expected.

Table 4. Summary of Explanatory variables and working hypothesis

Variables Code	Description variables	TYPE	Unit	Expected Sign
AGEHH	Age of household head	Continuous	Year	+
EDUHH	Education level of HH	Continuous	Year of schooling	+
LABHH	Labor force Household head	Continuous	AE	+
SIZFALAND	Size of cultivated land HH	Continuous	Hectare	+
OXENOWN	Oxen owned by HH	Continuous	TLU	+
ACCREDIT	Access to credit	Dummy	1 and 0	+
EXCOT	Frequency Extension contact	Continuous	Number	+
FERUSE	Fertilizer use	Continuous	Kg	+
ACPESUSE	Access to Pesticide	Dummy	1 and 0	+
MEBRSO	member in social organization	Dummy	1 and 0	+
INCOMEHH	Annual Income of Household	Continuous	ETB	+
DISTACMAT	Distance from market of HH	Continuous	Km	+
IMPSEED	Improved seed	Continuous	Kg	+
FARMEXP	Farm experience of HH	Continuous	Year	+

4. RESULT AND DISCUSSION

This chapter presents and discusses the results of the Harvard analytical framework, descriptive and econometric analysis. First, it gives the description of socioeconomic characteristics including characteristics of sample households, farm characteristics, gender based division of labor, access to and control over productive resources. Secondly, the results and discussion of econometric models result showing determinants affecting improved bread wheat productivity were presented.

4.1. Characteristics of sample households

This chapter discussed the nature and the socio economic characteristics of farmer respondent households in the study area. In brief, the gender roles in improved bread wheat production between male and female-headed households were also discussed.

4.1.1. Ethnicity, Religion and Marital status of the Household heads

The survey results showed that the sampled households were about 98.4% of the households headed farmers who produce improved bread wheat were Oromo while the rest 1.6 % were Amhara. In terms of religion, the result of the survey shows that 68.5 %, 30.8% and 0.7% of MHH farmers who produce improved bread wheat were Protestant, Orthodox, and Muslims respectively. About 82.9% of FHH farmers who produce improved bread wheat were protestant and 17.1% of FHH was Orthodox. Totally, 71.8% protestant, 27.7% Orthodox and 0.5% of respondents were Muslim. Regarding marital status of the sample respondents indicated that 100% of MHH were married, 17.1% of FHH were divorced and 82.9% of FHH were widowed (Table 5).

Table 5. Marital Status of the Sample Household headed (%)

Characteristics of Households	MHH		FHH		Total	
	N	%	N	%	N	%
Ethnicity						
Oromo	142	99.3	39	95.1	181	98.4
Amhara	1	0.7	2	4.9	3	1.6
Total	143	100	41	100	184	100
Religion						
Protestant	98	68.5	34	82.9	132	71.8
Orthodox	44	30.8	7	17.1	51	27.7
Muslim	1	0.7	0	0	1	0.5
Total	143	100	41	100	184	100
Marital Status						
Married	143	100	0	0	143	77.7
Divorced	0	0	7	17.1	7	3.8
Widowed	0	0	34	82.9	34	18.5
Total	143	100	41	100	184	100

Source: Field survey Result, 2019

4.1.2. Age structure and Level of education of the household head

There was a statistical mean difference between MHH and FHH in terms of the age of the sampled household at a 5 % significant level ($t = 1.99$, $p = 0.048$) (Table 6).

The survey result of the study shows that the mean level of education of households was 6.03, 2.21 for male, and female-headed households, respectively. There was a statistical mean difference between MHH and FHH in terms of the education level of the sampled household at 1 % significant level ($t = 6.17$).

Table 6. Descriptive statistics of continuous variables

Variable	MHH		FHH		T	p- Value
	Mean	SD	Mean	SD		
Age of HH	44.95	8.82	47.97	7.62	1.99**	0.048
Educational level HH	6.03	3.44	2.21	3.62	6.17***	0.000
Size of cultivated land HH	0.47	0.19	0.40	0.13	1.86*	0.064
Improved seed	76.84	35.17	62.31	36.24	2.31**	0.021
Labor force of HH	4.793	1.638	3.424	1.467	4.819***	0.000
Distance from market of HH	7.89	4.11	8.19	4.06	0.41	0.680
Frequency Extension contact	9.538	7.454	5.024	5.345	3.61***	0.000
Fertilizer use	81.67	35.29	68.90	34.36	2.05**	0.041
Annual Income of HH	24071.2	22514.4	13971	13645.2	2.729***	0.007
Oxen owned by HH	3.68	1.91	1.85	1.69	5.52***	0.000
Farm experience of HH	17.06	7.26	13.05	6.30	3.45***	0.000
Bread Wheat Production HH	12.05	5.94	9.70	4.76	2.32**	0.021

Source: Survey result, 2019 NB: ***, **, * = Significant at 1%, 5% and 10% probability level.

4.1.3. Farm Characteristics of the Male and Female household head

The size of cultivated land under the improved bread wheat was 0.47 and 0.41 hectares for MHH and FHH, respectively. According to the survey, 184 households were the producer of improved bread wheat during the main cropping season. According to the respondents, the major reason of improved bread wheat production was for consumption and cash purposes.

As the study shows that, there was a size of cultivated land that was allocated for bread wheat production had difference in the study area between the two groups. The cultivated land size holding of a male household headed in improved bread wheat production was a minimum of 0.13 ha and a maximum of 2 ha, while the farmland size holding of a female household headed was a minimum of 0.25 and a maximum of 0.75 ha. There was mean difference between MHH and FHH in terms of the size of the cultivated land of the sampled household a statistically significant at less than 10 % probability level ($t = 1.86$). The finding is consistent with that of (Asres *et al.*, 2015) on their case study in northwest

Ethiopia found that; female-headed households were lower as compared to their male counterparts in terms of land and asset ownership. Similarly Tadele and Mahendran (2015) found that in their study of gender differences and its impact on agricultural productivity in the case of Sheko district in Benchi Maji Zone of SNNP, Ethiopia, land holding of FHH was smaller than that of MHH.

Inputs like improved seeds and fertilizer are the most important ingredients to increase bread wheat production and productivity. They are widely used by farmers in the study area. Comparing the two groups of households, male-headed households were better in using agricultural input than the female-headed households. There was a statistical mean difference between MHH and FHH in terms of improved seed of the sampled household significant at less than 5 % probability level ($t= 2.31$). There was a statistical mean difference between MHH and FHH in terms of fertilizer use of the sampled household significant at less than 5 % probability level ($t= 2.05$). There was a statistical mean difference between MHH and FHH in terms of labor force of the sampled household significant at less than 1% probability level ($t= 4.819$). The result was consistent with findings of Tadele Melaku and Mahendran (2015) on the study conducted in SNNP of Ethiopia. Comparing the two groups of the households, male-headed households were better in using agricultural input than the female-headed households.

An agricultural extension service has implications for production and productivity. Farmers exposed by various agricultural services can be aware of and able to get more information and can uplifting production and productivity in general and in improved bread wheat production in particular. There was a statistical mean difference between MHH and FHH in terms of extension service contact of the sampled household at 1% significant probability level ($t = 3.64$). This result was consistent with (Doss *et al.*, 2003) findings in the meta-analysis of 22 case studies in Africa found that lack of access to agricultural extension is the major constraint faced by farmers, especially women farmers, which limit their uptake of technological innovations.

The analysis of the data indicated that the mean annual income of a household from the total was 24,071.2 ETB and 13,971.8 ETB in MHH and FHH respectively. There was a statistical mean difference between MHH and FHH in terms of income of the sampled household at 1 % significant probability level ($t= 4.084$).

Draught animals were used as a source of power for farming in the study area. As shown in the above (Table 6) on average, MHH had about 3.68 oxen while FHH had 1.85 oxen, There was a statistical mean difference between MHH and FHH in terms of oxen owned of the sampled household at 1 % significant level ($t = 5.25$). This shows that FHH has less access to draught oxen as compared to MHH. The most widely used method of overcoming the shortage of oxen was the exchange of labor for oxen, pairing oxen with others, borrowing oxen from relatives and hiring oxen. In some cases, women who have no oxen have their land plowed by giving services such as weeding, clearing the land for a week for the owner of the oxen. Similarly, if FHH has a male laborer, he can work for those who own oxen in exchange for the use of the oxen to cultivate the land.

On the other hand, those who have no adult male labors were forced to give outland to sharecroppers. Sharecropping (Qixxee) has practiced if she/he has land and not able to cultivate because of a shortage of labor, oxen, and other inputs, he/she provides the land to somebody and shares the production equally. In support to this (Degafa ,2005) argue that poorer households (mainly female-headed households) cannot cultivate their plot of land on time, or even at all, due to lack of labor, oxen and /or seeds. As regarding to gender based possession of oxen, due to cultural reasons in all the study area, draught animals were considered as the property of men.

The mean years of farming experience in improved bread wheat production of the sample households of MHH and FHH in the study area was 17.06 and 13.05 respectively (in above table 6). There was a statistical mean difference between MHH and FHH in terms of farm experience of the sampled household at 1 % significant level ($t= 3.30$).

The production of improved bread wheat between sample households was varying in MHH and FHH. Concerning the production of bread wheat production of the households, the survey result indicates that the mean productivity of improved bread wheat was 12.05 and 9.70 male and female household headed respectively. There was a statistical mean difference between MHH and FHH in terms of bread wheat productivity of the sampled household at 5 % significant level ($t =2.32$) (Table 6). The result is agree with Addis *et al.*, (2001) found that female-headed households had lower value of farm productivity per hectare than males.

4.1.4. Descriptive statistics of dummy variables

Table 7. Accesses to Credit, Member in Social Organization and Access to Pesticide of the Household heads.

Variables		MHH		FHH		X ² value	P=value
		N	%	N	%		
Access to Credit	Yes	65	45.5	16	39.0	0.534	0.465
	No	78	54.5	25	61.0		
Member in social Organization	Yes	123	86.0	24	58.5	14.975***	0.000
	No	20	14.0	17	41.5		
Access to Pesticide	Yes	90	62.9	18	44	4.762**	0.029
	No	53	37.1	23	56		

Source: Field survey Result, 2019 NB: ***, **significant at 1% and at 5% probability level.

Participation in any social organization facilitates information exchange among households. The survey result showed 86 % and 58.5% of MHH and FHHs were involved in social organization respectively, while the remaining 14.0% and 41.5% of MHH and FHHs were not involved, respectively. The chi-square test indicated that there was statistically significant association between MHH & FHH being in membership in social organization at less than 1% probability level ($x^2=14.97$). In terms of access to pesticide the chi-square test indicated that there was statistically significant association between MHH & FHH in access to pesticide at less than 5% probability level ($x^2=4.762$) (Table 7).

4.2. Gender Division of Labor in Improved Bread Wheat Production

Gender division of labor is the result of how society divides work between men and women according to what was considered suitable in agricultural activities in related to improved bread wheat production.

In the process of producing improved bread wheat crops for food and cash purposes, the several roles of both men and women were desired.

According to the survey, both men and women took an active part in improved bread wheat production activities. The households reported that the first activity in wheat production was started in March. Women and men have involved in different activities until the consumption and marketing process. The major activities performed in both

households were listed according to the family members participated in the activity (Graph 1).

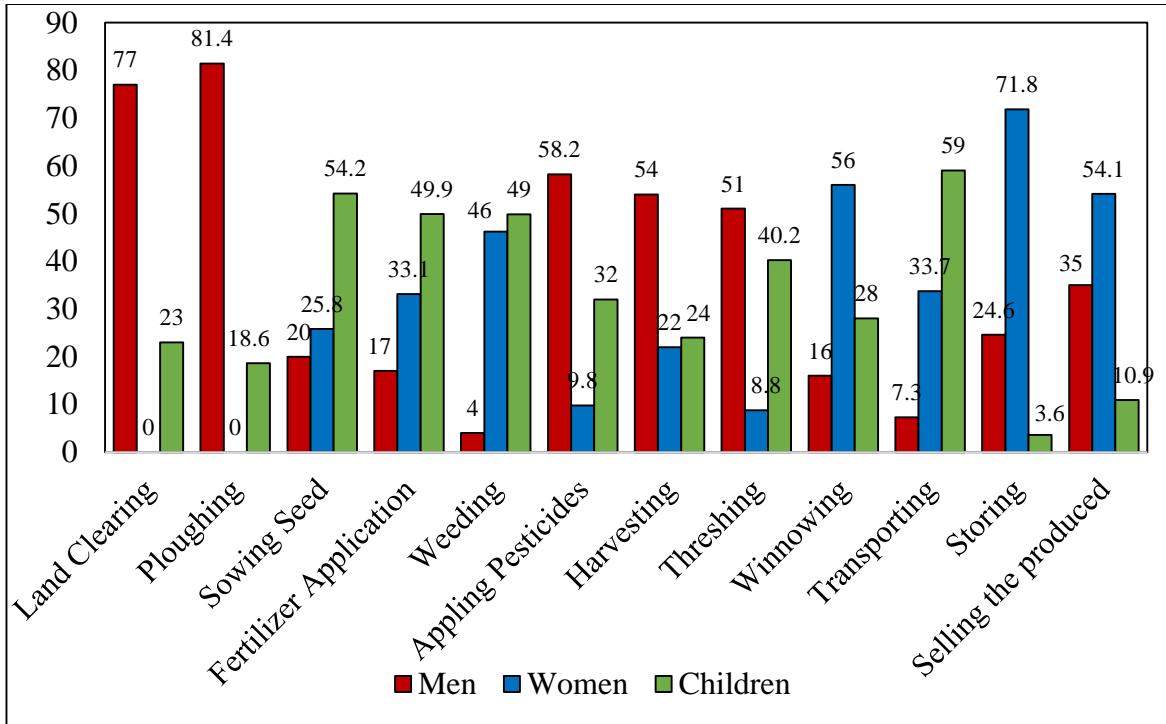
The survey result indicated that the family members of the MHH carried out land clearing. As indicated (Graph 1), but the share of the activities was different among the members. In MHH, 77% clear the cultivated land, 81.4% plowing and 71.8% storing bread wheat production activities were undertaken by men and the rest activities were carried out by the assistance of women and children. It was possible to conclude that plowing the land was limited to men's activities. This result was consistent with the result of (Regassa, O.,2000 and Sintayehu, 2011) nevertheless The result was contrasted to the study conducted in Awra Amba, Southern Gondar of the Amhara region, have no specific gender role in agricultural production (Ferede T.,1994 and Dereje K., 2013).

The result indicated that men's proportion is higher in pre-harvest crop production activities as compared to women in the study area. On the contrary, women's participation also observed in post-harvest crop activities as compared to men's activities. These variations in activities occurred because of work culture shaped by society for men and women. This result was consistent with the result (Addis *et al.*, 2001; Lemlem *et al.*, 2011; Tsegaye *et al.*, 2012), observed that on-farm activities like land preparation, tillage operation, seeding, and men usually do crop protection measures. Whereas, weeding, storage of produce and value addition of produce is done by women.

The entire members of the households in both MHH and FHH carried out sowing the improved bread wheat seed. As the study showed that, the shares of women were high in both households 25.8% and 43.4% in MHH and FHH respectively. In addition, a considerable percentage of children were involved in the activities in both households. This result was contrasted to the study conducted (Addis *et al.*, 2001) Planting generally male activity in SSA wheat production. In Gimbichu, Ethiopia no female household heads were involved in planting and in the Bale Highlands, only between 10% and 12% of females were involved.

The backside of human and equine made transporting of the bread wheat production. In the activity of equine transport, men were the chief of the activity in MHHs and FHHs. In this activity, women in MHHs did not take part and women in FHH take some part in the activity. In addition, members of both households participate in the activities of transport

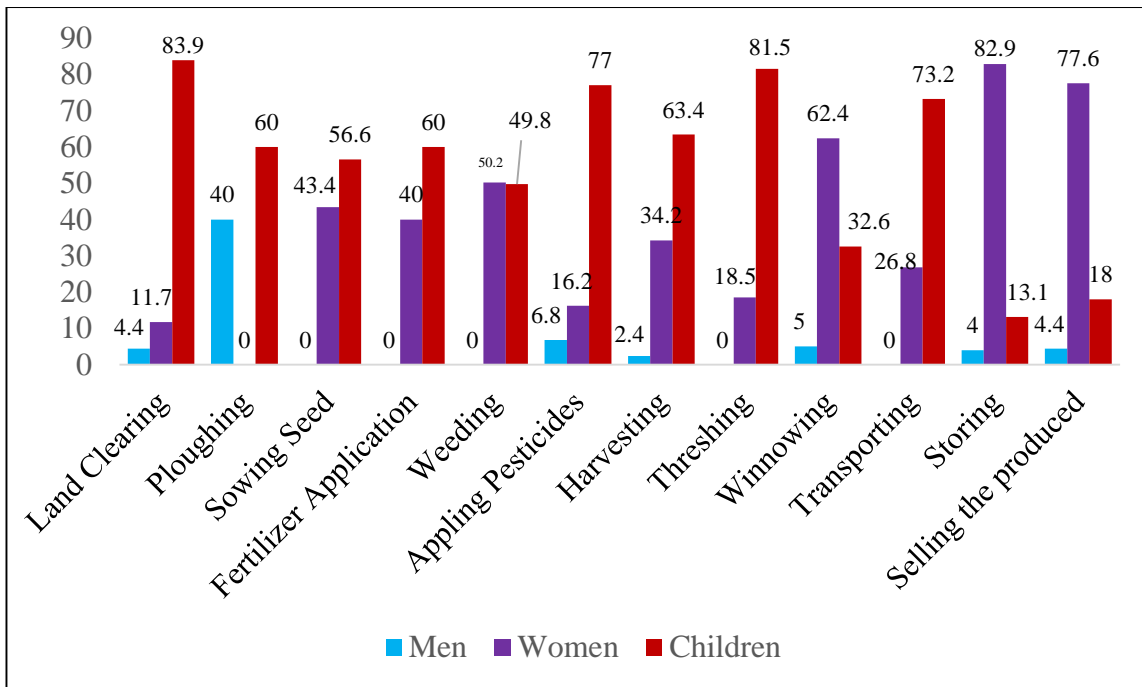
by the backside. In this activity, women and children would take the most shares than other members' 33.7% and 59 % women and children respectively in MHH. In FHH, children (73.2%) took most of the activities than others. This finding is similar to findings by (Ogato *et al.*, 2009; World Bank, 2010; USAID, 2010 and Asres E. *et al.*, 2015) show that women are thoroughly involved in all portions of the agricultural production process.



Graph 1. The average number of men and women family member participated in bread wheat production activities in MHH (%).

Source: Field survey Result, 2019

In FHH children were take the highest share in the activity. In addition, women and family relative member's men were involved to some degree in the activity. In FHH, men or family relatives were carried out the 40% plowing activities, While women in FHH carried out 43.4% of sowing, 40% of fertilizer application, 50.2% weeding, 62.4% winnowing, 82.9% storing, and 77.6% of selling the produced wheat and most of the field activities. In FHH were carried out by children these activities were 83.9% clear the farmland, 60% ploughing, 56.6% sowing, 60% fertilizer application, 49.8% weeding, 77% pesticide application, 63.4% harvesting, 81.5% threshing, 32.6% winnowing, 73.2% of transporting the produced improved bread wheat (Graph 2).



Graph 2. Bread wheat Production activities carried out by family members of FHH (%)

Source: Field survey Result, 2019

4.2.1. Reproductive role of Gender (%)

Reproductive and domestic tasks are the responsibility of women in most of society. These household tasks confirmed to women include cleaning the house, cooking, fetching water, collecting firewood, childcare, washing cloth, boiling coffee, buying kitchen tools, nursing sick person in the family (Table 8). Women regularly do those tasks and female children are assisting them when she reaches a certain age.

As the study, the result shows that cleaning the house was carried out by women (86.1%) and by children (13.9%) in MHH, in FHH carried out by women (53.2%) and by children (46.8%) respectively. Fetching water 51.8%, 48.2% House maintenance and fencing activity were the responsibility of men in MHH and children were assisting them in collecting the material for the activity. In FHH, the activity of construction fence and house maintenance was carried out by sons and collecting the material assisted by women in rare cases. Women in MHH and FHH were overburdened with domestic and reproductive activities; the burden was more acute for women in FHH. The household member of FHH was small thus; the shoulder of the activity was lifted on them. As a result, FHH in improved bread wheat producing farmer was less productive as compared to their MHH counterparts. Generally, women's work burden is more visible in unpaid

domestic household activities, where they are benefiting nothing, as compared to men in the surveyed study area.

Table 8.Reproductive Activity of the HHs by gender and Household Members (%)

Activities	MHH				FHH			
	Men only	Women only	Both	Children only	Men only	Women only	both	Children only
Cleaning the House	0.0	86.1	0.0	13.9	0.0	53.2	0.0	46.8
Fetching Water	0.0	51.8	0.0	48.2	0.0	61.8	0.0	38.2
Cooking Food	0.0	82.6	0.0	17.3	0.0	57.6	0.0	42.4
Collect Fire Wood	2.4	70.6	3.6	23.4	0.0	59.5	0.0	40.5
Child Care	0.6	90.1	2.0	7.3	0.0	80.7	0.0	19.3
Washing Cloths	0.0	85.1	2.0	12.9	0.0	63.4	0.5	36.1
Boiling Coffee	0.0	87.5	0.0	12.5	0.0	66.3	0.0	33.7
Buy kitchen tools	1.7	87.1	11.2	0.0	0.0	91.0	0.0	9.0
Buy clothe for children	54.6	34.8	10.6	0.0	0.0	97.3	2.7	0.0
Nursing sick family	0.5	71	28.5	0.0	0.0	95.6	4.4	0.0
Fence & maintain house	90	0.0	0.0	10	0.0	7.0	0.0	92.9

Source: Field survey Result, 2019

“As women, men focus group discussion members and key informants indicate that starting from morning up to night, women in both households carried out different reproductive activities. This led us (women) to think more about the home and home-related activities. Women FGD members said that our men and children did not support us because the children were go to school. Due to cultural norms, men did not support our reproductive activities. However, a small number of men supported some of the reproductive activities such as firewood collection, fetching water, child care and buy clothes for their children. Men conducted the activity if there is health problem encountered their spouse. Men FGD were said that women having longer working hours than men; they carry much of the burden of reproductive work in addition to their productive activities in our area”. The information of family members, family related men and children activities in bread wheat production were obtained from both male and female household headed sampled respondents.

4.2.2. Intra household decision making

The decision is the final say in which the household tie up the issue considered. It creates inequality between Male and females in the household. Women's limited to use resources employment opportunity, tied with cultural factors, reduces their decision making power in the society in general and in a household in particular. The survey result indicated that in MHH, men take the higher position regarding to type of crop cultivated 76.2% by men and 23.8% the decision made by both. In case of bread wheat production 75.5% and 24.5% decided by men and jointly or by both respectively. purchasing agricultural input s were 88.9% decided by men and 11.1% by both men and women; 59 %, 10.2% and 30.8% of selling improved bread wheat produced were decided by men, women and by both respectively, 75.5% and 24.5% of selling livestock was sold by the decision of men and both respectively (Table 9).

Men and Women in MHH decisions carried out jointly are made on social participation 90% and 10% decided by men; men and both decided 11.3% and 88.7 % of children education respectively; 7.6%, 3.6% and 88.8% of health care of family were undertaken by men, women and both respectively. Similar results stated by (Damisa & Yohanna, 2007) found that the contribution of women in decision-making is limited but their opinion is considered during harvesting, storage, and marketing of the produce. Similarly, Sinidu and Degye (2017) show that the gender difference in agriculture refers to the fact that women typically have less access to and control over productive assets, inputs, productive resources, and services needed to make the most productive use of their time. Furthermore, women often have less decision-making ability in the household and community. In FHH, in all activities, women made the major decision and they consulted the son in rare cases. Fekede *et al.* (2008) reported similar observation that women have limited access to market livestock. (Takele B., 2017) shows that among the people of konso, despite their essential role in food production, women have no decision making power over important resources like land and house.

Table 9. Intra HH Decision making in related to improved bread wheat (%)

Activities	MHH			FHH		
	men only	women only	both	men only	women only	Both
Types of crop cultivate	76.2	0.00	23.8	4.00	89.4	6.6
Variety selection	75.5	0.00	24.5	0.00	93.9	6.1
Sale of produced	59	10.2	30.8	0.00	91.5	8.5
Sale of livestock	75.5	0.00	24.5	0.00	92.2	7.8
Children Education	11.3	0.00	88.7	0.00	100	0.00
Nursing Family	7.6	3.6	88.8	0.00	100	0.00

Source: Field Survey Result, 2019

“Women FGD reported that most of them were support the survey result but in the role of in health care of family women decision was bold only in both households, the decisions made by the women in male households are mainly on how much produce to be stored? How to store the produce? And how much to put aside for home consumption?”

4.2.3 Time spent of gender roles

The labor contribution in related to improved bread wheat production activities in both productive and reproductive activities was identified in the study area. Women in both households spent a longer time in reproductive and domestic tasks. Thus, women are busy throughout the day. According to the respondents reported that in both households, the majority of women wake up before 6 O'clock, in the break of early and go to bed after 10 O'clock in the night at peak season. From the result (Table 10, Appendix 6) the contribution of men in reproductive activities was little, they spent the larger time on productive activity accounted for 10 hours per day especially in peak season. Whereas averagely women in MHH spent 10 hours per day in reproductive activity and they spent 5 hours per day in productive activity. Women in FHH spent 7 hours per day in productive activity and spent 9 hours in reproductive activity. Generally, women in MHH spent a total of 15 hours per day whereas women in FHH spent a total of 16 hours per day. Considering the time spent by men in MHH, it was accounted for a total of 11 hours per day.

An independent-samples t-test for mean comparison indicated that there was a statistical mean difference between MHH and FHH in terms of the productive role of the sampled household at 1 % significant level. The mean scores of daily productive time in hours for

men/males (Mean = 9.02, SD = 1.74) and women/females (Mean= 6.78, SD = 2.31(t=-6.71).

An independent-samples t-test for mean comparison also indicated that there was a statistical mean difference between MHH and FHH in terms of the reproductive role of the sampled household at 1 % significant level. The mean scores of daily reproductive time in hours for men/males (mean =1.54, SD = 0.88) and women/females (Mean = 9.31, SD = 2.19) (t=33.92).

This result agreed with the study conducted by (Owitti O. L., 2015) these statistical figures show that women have more workload or burden as compared to men in rural household activities of the surveyed study area. Women spent more time (in hours) per day in unpaid household reproductive activities as compared to men directing the productive ones.

Table 10. The Mean hour devoted in the households

Variable	MHH		FHH		Total		t-value
	Mean	SD	Mean	SD	Mean	SD	
Productive role	9.02	1.74	6.78	2.31	8.52	2.10	-6.71***
Reproductive role	1.54	0.88	9.31	2.19	3.27	3.48	33.92***
Total	10.56		16.09				

Source: Field survey Result, 2019 NB: ***, significant at 1% probability level

4.3. Access to and control over resources in related to bread wheat production

The common understanding of the word access to and control over resources needs to be identified. The term access refers to the ability to get and utilize the resources while Control refers to the power to decide how the resource is used and who has access to it, thus clearly attached to decision making in the resources being utilized. This study identified what resources are accessible to men and women and what benefit they drive from access and control over the resources in related to improved bread wheat production.

Land use is the source of income upon which the households improve their livelihood. Besides, it is the source of prestige and power in the community. As indicated by the result (Table 11), about 97.5% of the MHH respondents reported that cultivable land for crop production was jointly accessed. Regarding farmland operation male was more accessed in land transfer by 42.8%, land renting by 44.1% and sharecropping agreement by 43.4 % in MHH. Both males and females in the MHH accessed about 57.2% of land transfer, 55.9%

of land renting and 56.6% of sharecropping. In FHH, the land was predominantly accessed and controlled by women. This shows that women in MHH were disadvantaged in control over resources. Even in land transactions, the share of the joint accessed was small.

Regarding livestock possessions, there were differences in access to and control over in both MHH and FHH. The majority of the respondents reported, they jointly accessed livestock such as oxen. However, the benefit derived from it in the form of selling the live animal, the control of the money was assigned in the head of the household. In FHH, women had full access and control over the livestock and their byproducts and women are the sole decision-maker of the household.

Farm implements are important for the undertaking of agricultural activities. In the study area, there are different types of farm implements. About 90.6% of farm implements were under the control of the MHH head. In FHH, women were accessed and controlled over farm implements completely.

To increase agricultural production and productivity the role of agricultural inputs like fertilizer, improved seed and pesticide are crucial. The result of the study shows both men and women in MHH were accessed to agricultural inputs. However, men entirely controlled for more than 90 % of the agricultural inputs. Women in FHH were fully access and control over agricultural inputs. In access to stored grain, both men and women in MHH had full access. Regarding control over, men have about 82.9% control stored grain. FHH Women were fully accessed and enjoy the benefit of stored grain.

In general, the result shows that women in MHH and FHH are different in control over resources. Since women are involved in improved bread wheat production activities, the controls over resources are mostly in the hands of men in MHH. The result was consistent with the findings of (Tewodaj *et al.*, 2009) which state that crop marketing and the control over incomes from sales, are often gender-differentiated, and in some cases vary by crop type. The household head (who is nearly always male in households where the head has a spouse in the household) control the marketing and income from cash crops grown by the household in a larger scale. As is the case with many spheres in agriculture, control over the sale of and profits from livestock and livestock products is generally gender differentiated, with women tending to market animal byproducts. The sale of cattle and other large livestock is for the most part in the male position.

Regarding the milk and milk byproduct, the result of the study shows both men and women in MHH were equally accessed. However, women were entirely controlled for more than 82 % of the milk and milk by-products. (Marenya *et al.*, 2015) expressed that if the social, legal, and economic environment provides the household members (especially women) with credible fallback positions, such as divorce and legal recourse or social permission, then it may be possible to achieve an equitable sharing of joint production. Without such bargaining power, unequal intra household allocation is likely to be the outcome. The uncountable very common inequalities in intra household allocations such as reported in (Udry *et al.*, 1995, Quisumbing, 1995 and Doss, 2003) gives weight to this particular concern about inefficient household sharing. Similarly, the study conducted by Sinidu and Degye (2017) show that the gender difference in agriculture refers to the fact that women typically have less access to and control over productive assets, inputs, productive resources, and services needed to make the most productive use of their time.

Differences in access and control over resources between men and women give the feeling to be a direct reflection of the culturally arranged gender division of labor.

The focus group discussion (FGD) with selected women is why women's in the study area not control over resources. Most of members of FGD women were reported, "*There are a lot of factors which limit women farmers pointed by FGD to have access and control of productive resources as they said that due to the tradition, social norms and institutional factor women in MHH did not give the farmland for sharecropping and renting without their husbands' decision. Women in MHH fully control over the poultry, milk and milk byproducts only. Most of the men FGD were agreed with the idea of women pointed in the above section*".

Table 11. Table Access to and control resources in the household (%)

Resources	Access to Resources						Control to resources					
	MHH			FHH			MHH			FHH		
	Men only	Women only	Both	Men only	Women only	Both	Men only	Women only	Both	Men only	Women only	both
Land for wheat production	2.5	0.00	97.5	0.00	88.3	11.7	80.6	0.00	19.4	0.00	86.8	13.2
Land transfer	42.8	0.00	57.2	0.00	88.2	11.7	87.6	0.00	12.4	0.00	86.8	13.2
Land Renting	44.1	0.00	55.9	0.00	86.6	13.4	88.2	0.00	11.8	0.00	92.2	7.8
Land for share cropping	43.4	0.00	56.6	0.00	86.6	13.4	88.2	0.00	11.8	0.00	92.2	7.8
Oxen	20.8	0.00	79.2	0.00	88.5	11.5	90.0	0.00	10.0	0.00	94.1	5.9
Improved Seed	30.2	0.00	69.8	0.00	88.5	11.5	90.5	0.00	9.50	0.00	92.4	7.6
Pesticide	45.8	0.00	54.2	0.00	88.5	11.5	92.2	0.00	8.80	0.00	94.9	5.1
Fertilizer	45.8	0.00	54.2	0.00	88.5	11.5	52.8	0.00	47.2	0.00	94.9	5.1
Farm Implements	76.2	0.00	23.8	0.00	88.8	11.2	90.6	0.00	9.40	0.00	88.5	11.5
Wheat Marketing	10.0	5.90	84.1	0.00	94.6	5.40	76.5	0.00	23.5	0.00	89.0	11
Credit	19.0	4.90	70.2	0.00	89.8	10.2	19.0	0.00	76.5	0.00	93.4	6.6
Stored Grain	15.9	0.00	84.1	0.00	95.4	4.60	82.9	0.00	17.1	0.00	95.4	4.6
Milk and milk product	2.10	52.4	45.5	0.00	92.9	7.10	0.00	85.1	14.9	0.00	93.4	6.6

Source Field Survey Result, 2019

4.4. Determinants Affecting Improved Bread Wheat Productivity

4.4.1. Testing procedures

A multi-collinearity test among continuous variables and degree of association among discrete variables is important before running the analysis to identify whether there is a multicollinearity association or not. The reason for this test was, serious multi-co linearity among the variables will affects the estimates seriously. Following Gujarati (2004), Variance Inflation Factor (VIF) was used to test the existence of multi collinearity among the continuous variable and Tolerance level (TOL) where each continuous explanatory variable is regressed on all the other continuous explanatory variables and coefficient of determination is computed. The measure of multi co-linearity among the continuous variable defined by VIF is indicated as:

$$\text{VIF}(x_i) = \left(\frac{1}{1-R^2} \right)$$

Where, R^2 is the coefficient of determination when the variable, is regressed on the others Explanatory variables. Where R^2 is the coefficient of determination that is obtained when the continuous explanatory variable is regressed against all the other explanatory variables. As R^2 approaches 1, the VIF approaches infinity. That is, as the existence of collinearity increases, the variance of the estimator increases and in the limit, it can be infinity. If there is no collinearity between regressors, the value of VIF will be one. As a rule of thumb, if VIF of a variable exceeds 10, that variable is said to be highly collinear (Gujarati, 2004). Accordingly, in this study the VIF of continuous explanatory variables were computed and the result was small (VIF is less than 10) indicating that there was no strong multi co-linearity problem among the variables (Appendix table 2).

The contingency coefficient is used to check the association among the dummy explanatory variables. The values of the contingency coefficient range between zero and one, with zero indicating no association between the variables and values close to one indicating a high degree of association. Accordingly, the results of the computation reveal that there was no serious problem of association among dummy explanatory variables when the contingency coefficients did not exceed 0.75, which is often taken as a cut-off point. (Appendix Table 3).The existence of a heteroscedasticity problem that violates the assumption of constant variance was checked.

Test for fitness of model R-squared or coefficient of determination, adjusted R-squared, standard errors and F-test was used as criteria to judge the best fit of the model in OLS regression. The result indicates that the model was fit because all these indices exceed the criteria. The coefficients of OLS determinations (R^2) of the seven variables were 0.775 which explain about 77.5% of the variation in the dependent variables were explained by the independent variables.

4.4.2. Interpretation of Econometric Results

As the study revealed that fourteen explanatory variables were used for this study out of which seven variables such as; education level of household head, size of cultivated land of household head, distance from market of household head, frequency of extension contact of household head, fertilizer use, access to pesticide and farm experience of household head were significant in improved bread wheat productivity.

The coefficients of multiple determinations indicated that the variation in the value of improved bread wheat productivity per hectare associated with the factors of production included in the model was 0.775. The R^2 value of linear production was indicating that about 77.5% of the variations in the dependent variables were explained by the independent variables.

Education level of the household head: As expected positively the education of the household head was positive and had a significant effect at less than 5% probability level. Other factors being constant, an increase in one year of schooling increases the productivity of improved bread wheat of household head producers by 0.173 quintal. The result agreed with Afework H. and Lemma Z., (2015) the level of education of household had influence in the decision being taken by households and farm management.

Size of cultivated land of household head: As expected positively the size of cultivated land was positive and had a significant effect at less than 1% probability level on improved bread wheat productivity. Other factors being constant, an increase in one unit of size of cultivated land increases the productivity of improved bread wheat of household head producers by 4.279 quintal. Addis T. *et al.*, (2001) support the finding land size had a positive and significant impact on the gross value of output for MHHs and FHHs of Ada, Lume, and Gimbichu woreda of the central highlands of Ethiopia.

Distance from market of household head: Distance from market in contrary negatively influence productivity of improved bread wheat at 1% significance probability level. The possible explanation for a negative result is as market is away from farmers' village additional cost for transportation and they did not have market information. Other factors being constant, as market distance increase by one km from farmers' village, improved bread wheat productivity of producers decreased by 0.214 quintal. This study was supported by (Techane, 2002, Yalemberhan, 2007 and Hailu, 2008) were found that market distance has negative relationships with the acceptance of technology.

Frequency of extension contact of household head: As expected positively Frequency of extension contact was a significant and positive influence on improved bread wheat productivity at less than 1% probability level. Other factors being constant, a one unit increases in frequency of extension contact increases the productivity of improved bread wheat of producers by 0.018 quintals. The result is consistent with other studies of (Kassa, 2008; World Bank, 2010 and Regasa C., *et al.*, 2013). Additional the result agreed with Yu *et al.*, (2011), supported the finding in their studies of Cereal production and technology adoption in Ethiopia visits of extension agents have shown to be significant in explaining yield.

Fertilizer use: As expected, positively amount of fertilizer use was a significant and positive effect on improved bread wheat productivity at less than 1 % probability level. Other factors being constant, a one unit increases in amount of fertilizer use the yield of improved bread wheat productivity of producers increases by 0.034 quintal. The result agrees with the findings of (Okpolu and Victor 2015) indicate that fertilizer use is the important factor affecting the productivity level of bread wheat producers in Gboko local government area of Benue State Nigeria. In addition, the findings of Addis *et.al*, (2001) indicate the amount of inorganic fertilizer used had a positive and significant effect on the gross value of output in both types of households in the central highlands of Ethiopia.

Access to Pesticide: As expected, positively accessed to pesticide has a significant and positive effect on improved bread wheat productivity at less than 5% probability level. Other factors being constant, a one-unit increase in pesticide use increases the yield of improved bread wheat of producers by 1.244 quintals. The study result agrees with Regasa *et al.*, (2012) indicate Plot level productivity differences are statistically significant explained by the intensity of use of modern inputs such as pesticide.

Farming experience of household head: It was assumed that farmers who have more farming experience could get better produce than a farmer could with shorter farming experience in improved bread wheat productivity. As expected positively the study, result showed that farming experience had a positive and significant effect in the improved bread wheat productivity at less than 1% probability level. Other factors being constant, a one-unit increase in the year of farming experience in improved bread wheat productivity increases the value of bread wheat productivity of household head producers by 0.256 quintals. The result was agreed with the finding of (Aman and Tewodros, 2016), Farming experience were found to be positively influencing the intensity of improved barley use this is as expected more experienced farmers might have better skills and access to new information about improved technologies.

Table 12. OLS estimate result on Determinants of Gender differences in improved Bread wheat productivity.

Variables	Coefficient	Std. Err.	T	P>t
Age of household head	-0.011	0.027	-0.44	0.662
Educational level of household head	0.173**	0.087	1.99	0.049
Size of cultivated land HH	4.279***	0.870	4.92	0.000
Improved seed	-0.011	0.008	-1.40	0.162
Labor force of household head	-0.082	0.138	-0.59	0.554
Distance from Market of HH	-0.214***	0.065	-3.30	0.001
Access to Credit	-0.150	0.407	-0.37	0.711
Frequency of Extension contact HH	0.018***	0.003	5.32	0.000
Fertilizer use	0.034***	0.013	2.55	0.012
Access to Pesticide	1.244**	0.573	2.17	0.031
Member of social organization HH	0.200	0.469	0.43	0.670
Annual Income of household head	0.614	0.583	1.05	0.294
Oxen owned by household head	0.034	0.138	0.25	0.805
Farm experience of household head	0.256***	0.042	6.11	0.000
Cons	0.908	3.355	0.27	0.787
R ²	77.58%			0.000
Adjusted R ²	75.57%			
F-Value	38.75			0.000

Source: Survey Result, 2019 NB: ***, **, * = Significant at 1%, 5% and 10% probability

5. SUMMARY, CONCLUSION AND RECOMMENDATION

This is the last chapter of the thesis, summarized and concludes the results of the study and forward recommendations for the government office and concerned bodies on relevant variables based on the findings.

5.1. Summary

This study briefly discussed the different roles that men and women played in agronomic activities in improved bread wheat production, assesses the gender difference in access to and control over resources in related to improved bread wheat and analyze determinants affecting improved bread wheat productivity. The analysis of gender role in improved bread wheat productivity for the sampled of MHH and FHH in Jardega Jarte district were conducted. The data used in this study were collected from 143 MHH and 41 FHH randomly selected from 5 Kebeles of the district through a structured questionnaire. Independent t-test was used to test the differences between MHH and FHH in terms of continuous variables and χ^2 -test used to test dummy variables. Gender analytical framework was examined the role of men and women, accesses to and control over resources in related to improved bread wheat productivity. Moreover, OLS used to analyze determinants affecting improved bread wheat productivity in the study area.

The t-test result indicated that there was the mean difference between MHH and FHH in terms of Age of household head, education level of household head, size of cultivated land of household head, improved seed, labor force of household head, frequency of extension contact of household head, fertilizer use, annual income of household head, oxen owned of household head and farm experience of household head in improved bread wheat productivity. The chi-square test indicated that there was statistically significant relationship between MHH & FHH being in membership in social organization and access to pesticide.

As Harvard analytical framework showed that In MHH and FHH there was varied involvement of household members in various bread wheat farm activities. Male and females in MHH and FHH were undertaking land preparation activities; the difference was women never plow using oxen in both households while in case of land preparation by hand digging they were taken part in the activities. Women in both MHH and FHH were overburdened; they were worked longer hours than men were as discussed in result. Whereas

the result shows that women in MHH and FHH are different in control over resources. Since women are involved in improved bread wheat production activities, the controls over resources are mostly in the hands of men in MHH.

The OLS result revealed that educational level of household head, size of cultivated land of household head, frequency of extension contact of household head, fertilizer use, access to pesticide, farm experience in improved bread wheat production of household head were statically significant and positively affected the productivity of improved bread wheat. Whereas, distance from market of household head is statically significant and affected negatively.

5.2. Conclusion

Improved Bread wheat is one of the major staple crops in the Ethiopia in terms of both production and consumption including the study area. However, the productivity of the improved bread wheat was low, due to different determinants affecting productivity. Hence, this study was conducted to analyze the determinants affecting improved bread wheat productivity and identify gender role in improved bread wheat in the study area.

The t-test result indicated that there was the mean difference between MHH and FHH in terms of Age of household head, education level of household head, size of cultivated land of household head, improved seed, labor force of household head, frequency of extension contact of household head, fertilizer use, annual income of household head, oxen owned of household head and farm experience of household head in improved bread wheat productivity. The chi-square test indicated that there was statistically significant relationship between MHH & FHH being in membership in social organization and access to pesticide. From the above results conclude that male-headed households had significantly gain more improved bread wheat productivity than female-headed households. This is due to male household headed farmers were utilized different agricultural technologies and information than female household headed.

As Harvard analytical framework showed that In MHH and FHH there was varied involvement of household members in various bread wheat farm activities. Male and females in MHH and FHH were undertaking land preparation activities; the difference was women never plow using oxen in both households while in case of land preparation by hand digging they were taken part in the activities; this is because of culture and social norms in the study area women cannot plow the farm land with oxen.

On the other hand, the study found that both men and women undertaken improved bread wheat production activities and role. Women in both MHH and FHH were overburden; they were working longer hours than men as discussed in result averagely women in MHH spent 10 hours per day in reproductive activity and 5 hours per day in productive activity. Women in FHH spent 7 hours per day in productive activity and 9 hours in reproductive activity. Generally, women in MHH spent a total of 15 hours per day whereas women in FHH spent a total of 16 hours per day. Considering the time spent by men in MHH, it was accounted a total of 11 hours per day this result show that the gap or the problem identified in the study area was there is the workload on women in both male and female household headed. This is due to shortage of modern technologies that not introduced and supplied to the rural farmers that was help to save women labor and time.

In MHHs, both men and women had access to resources. Nevertheless, men have more control over the resources and benefits. In this, women as the head of the household have unlimited access and full control over the resources and benefits. However, less endowment of the resources in the household, they were in a disadvantaged position compared to their MHH counterparts.

Generally from the study result concludes that educational level of household head, size of cultivated land of household head, frequency of extension contact of household head, fertilizer use, access to pesticide use, farm experience of household head were statically significant and positively affected the productivity of improved bread wheat. Whereas, distance from market is statically significant and affected negatively.

From the result, it can be concluded that MHHs were gain higher productivity by utilizing the available input level than FHH. This is due to the MHHs were had more extension services contact, accessed and get agricultural information as well as inputs than FHH.

5.3. Recommendation

Because of the major findings and conclusions, the following recommendations are drawn. The Gender divisions of labor in improved bread wheat production in the study area were identified. The surveyed result showed that in the study area men worked less time than women in terms of hours per day did. but the time women participated in agricultural activity was low due to the fact that women allocate much of their time and energy for home-based activities like prepare food, boiling coffee, fetching of water, collecting of firewood, washing of cloth, childcare and nursing sick in the family.

Therefore, encourage labor-saving technologies to save time, energy to reduce the burden of women farmers that decrease women's workload needs to be introduced by the district water and energy office, government and concerned body; Encouraging and creating awareness for men to share possible domestic activities effective gender sensitization programmes are required. This could be done through non-formal educational activities, agricultural extension meetings and mainstreaming gender issues in program at all levels. As the study, result shows that both men and women have participated in improved bread wheat production. However, the women's roles in production and reproduction activities were not recognized by society and they were not benefited as they do. Therefore, to overcome the problems attention must be given by the district government and concerned bodies is crucial to filling the knowledge and information gap on gender roles through gender sensitivity, awareness creation in the community.

The study result shows that education level of household head has positively and significantly affects improved bread wheat productivity of producers.

- Then district administration Agricultural and natural resource office and education officials should work together with the concerned body to develop and implement informal education in the short term, formal education and strengthen farmers' training centers seems necessary for improving bread wheat productivity of farmers in the study area.

The study result indicated that market distance has negatively and significantly related to improved bread wheat productivity.

- Therefore, district government and road authority should work together to building up more rural roads (main and seasonal roads) and increase better access to main market and agricultural technology transfer in the study area.

Frequency of Extension contact has positively affected the improved bread wheat productivity.

- For that reason the district agricultural and natural resource office should strengthen agricultural extension services, employ the development agents, building the

capacity of development agents by doing so; increasing the frequency of extension contact of farmers in the study area.

Fertilizer use was positively and significantly affected the improved bread wheat productivity farmers.

- There is a need to improve farmers' access to technological input supply such as fertilizers to increase improved bread wheat productivity of the male and female households. Therefore, the district cooperative office and zone union should supply fertilizer for farmers and strengthen primary cooperatives in the study area.

Access to pesticide was positively and significantly affected the improved bread wheat productivity farmers.

- Therefore, it is necessary to improve the supply of agrochemicals to increase improved bread wheat productivity of household farmers in the study area. District cooperative and Research centers should take part in enhancing to introduce resistance variety of improved bread wheat seed.

The study result shows that Size of cultivated land has positively and significantly affects improved bread wheat productivity of farmers.

- Size of cultivated land was found expected to have positive influence on improved bread wheat productivity. Agricultural strategies should be designed and implemented that would have effect on maintaining the existing land size on one hand and promoting intensive agriculture and livestock production on the other hand. Measures such as appropriate land use, improved technologies and proper extension services should be in place to raise land productivity. Rural development plans should include government and non-governmental organization in promoting biophysical conservation activities.

The study findings reveal that a significant difference between men and women household headed farmers where women engaged in unpaid reproductive roles, as a result they faced economic and financial constraints in the study area.

- Hence, to reduce women's unpaid burden and to create paid job access to women government and development organization necessary to introduce and endorse labor-saving technologies, support women's development through increasing women's involvement in credit and savings, income-generating activities and empower women farmers.

6. REFERENCES

- Adamon N. Mukasa and Adekele O. Salami., 2016. Sources of gender productivity differentials in Africa: A cross-country comparison.
- Addis Tiruneh, Teklu Tesfaye, Mwangi and Verkuijl, H., 2001. *Gender differentials in agricultural production and decision-making among smallholders in Ada, Lume, and Gimbichu Woreda of the Central Highlands of Ethiopia*.
- Afewerk Hagos and Lemma Zemedu, 2015. Determinants of improved rice varieties adoption in Fogera district of Ethiopia. *Science, Technology and Arts Research Journal*, 4(1):221-228.
- Alesina, A.F., Gualino, P. and Nunn, N., 2011. On the Origins of Gender Roles: Women and the plough. NABER working paper Series No17098, National Bureau of Economic Research, Massachusetts Avenue, Cambridge:
- Almaz Eshete, 2000. Why is Gender a Development Issue? In the Proceedings of National Workshop Institutionalizing Gender Planning in Agricultural Technology Generation and Transfer Process EARO. PP.37-45 Addis Ababa.
- Aman Tufa and Tewodros Tefera, 2016. Determinants of improved barley adoption intensity in Malga district of Sidama Zone, Ethiopia. *International Journal of Agricultural Economics*, 1(3):78-83.
- Lemlem Aregu, Puskur, R., & Sam brook, C. B., 2011. The role of gender in crop value chain in Ethiopia. IPMS conference Proceedings.
- Assefa Admassie and Gezahegn Ayele, 2010. Adoption of improved technology in Ethiopia. *Ethiopian Journal of Economics*, 1(5): 155-178.
- Asres Elias, Makoto N., Kumi Y., & Akira I., 2015. Does Gender Division of Labor Matters for the Differences in Access to Agricultural Extension Services? Cases study in North West Ethiopia, *Journal of Agricultural Sciences* 7(1): 1-10.
- Asres Elias, 2005. Access and Utilization of Development Communication by Rural Women in Dire Dawa Administrative Council, Eastern Ethiopia. M.Sc. Thesis (Unpublished) Presented to School of Graduate Studies, Alemaya University.
- ATA, 2014. Annual report. Transforming Agriculture in Ethiopia, Addis Ababa, Ethiopia.
- Bailey D. and Mouton, 1998. Method of Social Science Research. The free press Collier Macmillan publisher, London. 25pp.
- Bergh K., A. Chew, M. K Gugerty., & C. L. Anderson, 2012. Wheat value chain: Ethiopia. EPARB rief No. 204.

- Berhane Guush, Zelekawork Paulos, Kibrom Tafere, and Seneshaw Tamru, 2011. Food grain consumption and calorie intake patterns in Ethiopia. *IFPRI Ethiopia Strategy Support Program II (ESSP II) Working Paper 2*.
- Bogalech Alemu, 2000. Policy Approach to Mainstream Gender in Ethiopia. In *institutionalizing Gender Planning in Agricultural Technology Generation and Transfer Process*, 126-144, Ethiopia.
- CEDPA, 1994. Center for Development and Population Activities Gender and Development. The CEDPA Training Manual Series Volume III, Washington, D.C.
- Coelli T., R. Sandura and T. Colin, 2002. Technical, allocate and cost and scale efficiency in Bangladesh rice production: a non-parametric approach. *J. Agric. Econ.*, **53** (4): 607-626
- Craven, B.D. and Islam, S.M., 2011. *Ordinary least-squares regression* (224-228). Sage Publications.
- CSA, 2007. The population and housing census of Ethiopia, Central Statistics Authority, Addis Ababa, Ethiopia.
- CSA, 2013. Population projection of Ethiopia for all regions at woreda level from 2014–2017. *Central Statistical Agency of Ethiopia*.
- CSA, 2014. Agricultural sample survey 2013/2014. Vol. I. Report on area and production for major crops (private peasant holdings, meher season). Statistical Bulletin 532, Central Statistical Agency. Addis Ababa, Ethiopia.
- CSA, 2016/17. Federal Democratic Republic of Ethiopia, Central Statistics Agency agricultural sample survey 2016/2017 (2009 e.c.) Volume I Report on Area and production of major Crops (private peasant holdings, meher season)
- Damisa, M. A., & Yohanna, M., 2007. Role of Rural Women in Farm Management Decision. *World Journal of Agricultural Sciences*, **3**(4):543–546.
- Daniel Tadesse, 2008. Access and utilization of agricultural information by resettled farming households: the case of Metema woreda, north Gondar, Ethiopia a thesis submitted to the department of rural development and agricultural extension, school of graduate studies Haramaya University.
- Debalke Debala, 2016. Gender difference on household income and asset building: The case of Arbaminch Surrounding District, Gamo Gofa Zone, SNNPR, Ethiopia.
- Degefa Tolossa, 2005. Rural livelihoods, poverty and food insecurity in Ethiopia, A case study at Erensa and Garbi communities in Oromia Zone, Amhara National Regional State. *Doctoral Theses at NTNU. Printed by NTNU-try*.
- Dereje Kifile, 2013. Gender Role in Agricultural Production in Some Parts of Ethiopia: A Brief Review. *International Journal of Research in Applied, Natural and Social Sciences*, **1**(2):49-52.

- Doss, C. R., W. Mwangi, H. Verkuil, and H. de Groote. 2003. Adoption of Maize and Wheat Technologies in Eastern Africa: A Synthesis of the Findings of 22 Case Studies. CIMMYT Economics Working Paper 03-06. Mexico, D.F. CIMMYT.
- FAO, 1996. *Improving Extension Work with Rural Women*. Food and Agricultural Organization the United Nations Rome, Italy.
- FAO, WB, IFAD. 2009. Gender in Agriculture: Sourcebook
- FAO, IFAD, ILO.,2010. *Gender Dimensions of agricultural and rural employment: differentiated pathways out of poverty*.
- FAO, 2011. *The State of Food and Agriculture 2010-2011: Women in agriculture- Closing the gender gap for development*. Rome.
- FAO, 2013.Database on Agriculture. Food and Agriculture Organization of United Nations.
- FAO and IFPRI.,2014. Gender in Agriculture: *Closing the Knowledge Gap*. Quisumbing, A.R., Raney, R.D., Behrman, A.J.and Petrman.A. FAO, Springer.
- Farre, L., 2012. The role of men in economic and social development of women implication for gender equality. Instituted" Analysis Economics and Barcelona GSE.
- Fekede, Berhanu Kuma, Kedir Nesha and Yeshe Chiche, 2008. Gender based analysis of livestock production system in Kuyu Woreda.
- Ferede T., and Gemechu G., 1994. *Awra ambawoch*, in Addis Zemen Newspaper, *Megabit* 7, 1994 E.C, Addis Ababa.
- Frank, E. ,1999. Gender, Agricultural Development and Food Security in Amhara, Ethiopia: The Contested Identity of Women Farmers in Ethiopia, USAID/Ethiopia.
- Gill, P., Stewart, K., Treasure, E. and Chadwick, B, 2008. Methods of data collection in qualitative research: interviews and focus groups. *British dental journal*, **204** (6):291.
- Grace, J., 2004. *Gender roles in agriculture: case studies of five villages in northern Afghanistan*. Afghanistan Research and Evaluation Unit (AREU).
- Gujarati, D.N., 2004. Basic Econometrics: fourth edition, Mac Graw-Hill, New York.
- Hailu Beyene, 2008. Adoption of improved teff and wheat production technologies in crop-livestock mixed systems in northern and western Shewa zones of Ethiopia.
- Haregewoin Cherinet, Emebet Mulugeta, 2003.Towards gender equality in Ethiopia, a Profile of gender Relations. Swedish International Development Cooperation Agency.
- Hassen Beshir, Bezabih Eman, Belay Kassa, and Jema Haji, 2012. Determinants of chemical fertilizer technology adoption in North Eastern highlands of Ethiopia: the

- double hurdle approach. *Journal of Research in Economics and International Finance*, **1(2)**: 39-49.
- Helina Beyene, 2015. Final report National assessment: Ethiopia Gender equality and the knowledge society
- ILO, International Labor Organization. 1998. South East Asia and the Pacific Multidisciplinary Advisory Team ILO/SEAPAT's Gender Learning & Information module.
- Jafry Tahseen and Suleiman Rasheed, 2013. Gender-sensitive approaches to extension programmes design. *The Journal of Agricultural Education and Extension*, **19(5)**:469-485.
- ILRI., 2012. “*Strategy and Plan of Action to Mainstream Gender*”
- Jaggar, A. M., 1983. *Feminist Politics and Human Nature*, Brighton: Harvester Press.
- JJWANRO, 2019. Jardega Jarte Woreda Agriculture and Natural Resource office unpublished document.
- Jemal Abdulkerim, Tamado Tana., and Firdissa Eticha, 2015. Response of Bread Wheat (*Triticum aestivum* L.) Varieties to Seeding Rates at Kulumsa, South Eastern Ethiopia. *Asian Journal of Plant Sciences*, **14 (2)**: 50-58.
- Kabeer N., 2003. *Gender Mainstreaming in Poverty Eradication and the Millennium Development Goals: A Handbook for Policy Makers and Other Stakeholders*. Ottawa: International Development Research Centre.
- Kassa Habtemariam, 2008. Agricultural extension in Ethiopia: Historical evolution, relevant policies and challenges. In Taye Assefa (Ed.), *Digest of Ethiopia's national policies, strategies and programs*. Addis Ababa: Eclipse Printers.
- Kassie Menale, Ndiritu, S.W. and Stage, J., 2014. What determines gender inequality in household food security in Kenya? Application of exogenous switching treatment regression. *World Development*, **56**:153-171.
- Kathleen, C.1985. Women's productivity in agricultural system: consideration for project design. PP. 25-39 in Over Holt C., Anderson B., Cloud K., Austain E.J. (Ed.), *Gender Roles in Development Projects*. Harvard Institute of International development, kumarian Press, America: Case Book.
- Klawitter, M., Henson Cagley, J., Yorgey, G., Gugerty, M.K. and Anderson, L., 2009. Gender Cropping Series: Wheat in Sub Saharan Africa. *Evans School Policy Analysis and Research, University of Washington*.
- Leake Gebresilassie, and Adam Bekele, 2015. Factors determining allocation of land for improved wheat variety by smallholder farmers of northern Ethiopia. *Journal of Development and Agricultural Economics*, **7(3)**: 105-112.

- Leghari, A.H., Laghari, G.M., Ansari, M.A., Mirjat, M.A., Laghari, U.A., Leghari, S.J., Laghari, Ab.H., Abbasi, Z.A., 2016. Effect of NPK and Boron on Growth and Yield of Wheat Variety TJ-83 at Tandojam Soil. *Advances in Environmental Biology*, **10(10)**: 209-216.
- Leulseged Kasa, Benson T., and David S., 2014. *Direct seed marketing program in Ethiopia in 2013: An operational evaluation to guide seed-sector reform* (Vol.1350).
- Marenya, p., Menaleassie, and Tostao, E., 2015. Fertilizer use on individually and jointly managed crop plots in Mozambique. *Journal of Gender, Agriculture and food security*, **1(2)**: 62-83.
- Mekonnen, Bernad H., Kassie, Zeng M., 2017. Gender based Productivity Differences in Ethiopia using Kernel density of productivity.
- Miller, C. & Razavi, S. 1998. "Gender Analysis: alternative paradigms", Gender in Development Monograph Series, No 6, UNDP, New York
- Million Tadesse and Belay Kassa, 2004. "Determinants of Fertilizer Use in Gununo Area, Ethiopia": Proceedings of the workshop held to discuss the socio-economic research results of 1998-2002. August 6-8, 2002, Addis Ababa, Ethiopia. Pp 30. EARO, 2004.
- MoARD, 2010. "Animal and Plant Health Regulatory Directorate." *Crop Variety Register* 13. Addis Ababa, Ethiopia.
- Mohammed, B.T and Abdulquadri, A. F., 2012. Comparative analysis of gender involvement in agricultural production in Nigeria. *Journal of Development and Agricultural Economics*, **4(8)**: 240-244
- Mulugeta Tsegaye and Hundie Bekele, 2012. Impacts of Adoption of Improved Wheat Technologies on Households" Food Consumption in Southeastern Ethiopia.
- Nelson K., 2013. Analysis of farmer preferences for wheat variety traits in Ethiopia: A gender-responsive study.
- Oakley A., 1972. *Sex, Gender and Society* (London, Maurice Temple Smith).
- Odame HH, Hafkin N, Wesseler G, Boto I., 2002. *Gender and Agriculture in the Information Society*. International Service for National Agricultural Research Briefing Paper No.55. The Hague, The Netherlands: ISNAR.
- Ogato, G.S., Boon, E.K., and Subramani, J., 2009. Gender roles in crop production and management practices: A Case Study of Three rural communities in Ambo District, Ethiopia, *Journal of Human Ecology*, **27(1)**:1-20.
- Okpolu, P. and Victor, C.2015. Gender Production Efficiency among soybean Farmers in Gboko local Government Are of Benue state, Nigeri, *International Journal of Agriculture Innovation and Research* **4 (2)**:2319-1473.

- Olesen, A., Le Duc, C., Pritchett, L.H., Moriarty, L. and Das, M.B., 2005. Afghanistan: national reconstruction and poverty reduction the role of women in Afghanistan future.
- Overholt, Anderson, Austin, and Cloud,.1985. Gender Roles in Development Projects, published by Kumarian Press, Connecticut; a second edition has been published by Lynne Rienner Publishers.
- Owitti O. L., 2015. Gender differences and relations in rural household livelihoods of Gog district, Anywaa zone, Gambella region, south western Ethiopia. *International Journal of Gender and Women's Studies*, **3(1)**:51-79.
- Pankhurst, H., 1992. Gender, development and identity: an Ethiopian study. Zed Books.
- Paris, 2013. Women farmers in research and Technology development.
- Peterman A., Qsumbing, A., Behrman, J., Nkonya, E., 2010. Understanding gender differences in agricultural productivity in Uganda and Nigeria. Poverty, health, and nutrition Division Discussion paper 01003. International food policy Research Institute.
- Quisumbing, A.R., 1995. *Gender differences in agricultural productivity* (No. 5). International Food Policy Research Institute.
- Regasa Catherine, 2012. Gender and institutional dimension of agricultural technology adoption: A Review of and synthesis of 35 case studies". Selected poster prepared for presentation at the International Association of Agricultural Economics (IAAE) Triennial conference August 18-24, Foz do iguacu, Brazil.
- Regassa Obama, 2000. "Gender and Agricultural Production among the Maqi Oromo." (MA Unpublished Thesis). A.A.U. Addis Ababa.
- Regasa Catherine, Berhane Guush., Fanaye Tadesse, and Alemayehu Seyoum, 2013. Effects of extension services on technology adoption and productivity among female and male farmers: Summary of ESSP working paper 49 (No. 21). International Food Policy Research Institute (IFPRI).
- Sarmah H.K., Bora-Hazarika, B. and Choudhury, G., 2013. An investigation on effect of bias on determination of sample size based on data related to the students of schools of Guwahati. *International Journal of Applied Mathematics & Statistical Sciences (IJAMSS)*, **2 (1)**:33-48.
- Shambel Worku, 2013. Gender Differential in Agricultural Production and Its Impact on Household Farm Income: The Case of Fed is District in East Hararghe, Ethiopia.
- Sinidu Gashaw, and Degye Goshu, 2017. Determinants of Rural Women Empowerment in East Hararghe Zone, Ethiopia (Doctoral dissertation, Haramaya University).
- Sintayehu Dejene, 2011. Gender Role in Agriculture Production among the Sidama of South Westweren Ethiopia, MA thesis, Addis Ababa University.

- Storck, H., Berihanu Adenew, Bezabih Emanu, Borowiecki and Shimelis W/Hawariat, 1991. Farming system and farm management practices of smallholders in Hararghe highlands.
- Tadele Melaku, and Dr. A. Mahendran, 2015. Gender difference and its impact on agricultural productivity: The case of Sheko district in bench Maji zone of SNNP, Ethiopia”, *International Journal of Current Research*, **7 (11)**: 22938-22942.
- Taj S., Akmal, N., Sharif, M. and Abbas, M., 2007. Gender involvement in rain fed agriculture of Pothwar. *Small*, **16 (50)**:26.
- Takele Bekele, 2017. The Expansion of Cash Cropping; Implications on Gender Division of Roles: A Case Study from Gedeo Community Southern Nation Nationalities and Peoples Region, Ethiopia. *International Journal of Sustainable Development Research*; **3 (2)**: 7-17.
- Tasli K., 2007. A conceptual framework for gender and development studies: from welfare to empowerment. In *ÖFSE Forum* (Vol. **32**).
- Tavva S., Abdelali-Martini, M., Aw-Hassan, A., Rischkowsky, B., Tibbo, M. and Rizvi, J., 2013. Gender roles in agriculture: The case of Afghanistan. *Indian Journal of Gender Studies*, **20 (1)**:111-134.
- Techane Adugna, 2002. Determinants of fertilizer adoption in Ethiopia: The case of major cereal producing area. M.Sc. Thesis (Unpublished) Presented to School of Graduate Studies of Haramaya University, Ethiopia.
- Tewodaj M., Cohen Marc. J., Birner, R., Lemma Mamush, Randriamamonjy, J., Tadesse D. & Paulos Z., 2009. *Agricultural extension in Ethiopia through a gender and governance lens*.
- Thakur, S., Varma, S.K. and Goldey, P.A., 2001. Perceptions of drudgery in agricultural and animal husbandry operations: a gender analysis from Haryana State, India. *Journal of International Development*, **13 (8)**:1165-1178.
- Tsegaye Dawit, Dessalegn Tadesse, Yimam Ahmed, & Kefale Minilek, 2012. Extent of Rural Women Participation and Decision Making in Seed Production Activities. *Global Advanced Research Journal of Agricultural Science*, **1 (7)**:186–190.
- Udry, C., Hoddinott, J., Alderman, H. and Haddad, L.1995. „Gender differentials in farm productivity: Implications for household efficiency and agricultural policy”, *Food Policy*, **20 (5)**: 407-423.
- UNDP (United Nations Development Programme), 2016. Ethiopian Economy. Available on www.africaneconomicoutlook.org
- UNO, 2001. Gender Issues and the Advancement of Women, Human Development Report. Oxford University Press, New York. 321pp.

- United Nations, 2002. Johannesburg Summit 2002: Ethiopia country Profile. From <<http://www.un.org/esa/agenda21/natinfo/wssd/ethiopia.pdf>> (Retrieved December 4, 2007).
- USDA, 2016.(United States Department of Agriculture), Agricultural Outlook Forum. 92nd Annual Forum's Theme.
- USAID, 2010. Gender equality and female empowerment policy. Available at http://transition.usaid.gov/our_work/policy_planning_and_learning/documents/GenderEqualityPolicy.pdf
- Verma, M.R., 2008. Samples allocation in different strata for impact evaluation of developmental program. *Rev. Mat. Estat*, **26 (4)**:103-112.
- Verma, O.S., 2001. Gender sensitization: Women in agricultural development. *Journal of Extension Systems*.**17 (2)**: 84-92.
- Wakweya T., 2004. Gender Difference and Its Impact on Agricultural productivity: The Case of Wenchi District in South West Showa Zone, Ethiopia. Alemaya University
- WB (World Bank), 2010. Gender and Governance in Rural Services: Insights from India, Ghana, and Ethiopia. The World Bank, Washington, DC.
- Welch CJ, Bogalech Alemu, Msaki T, Sengendo M, Kigutha H, Wolff A., 2000. Improving Household Food Security: Institutions, Gender, and Integrated Approaches. U.S.A: BASIS Management Entity.
- Wudinesh H., 2003. Gender and the Agricultural Economic Sector. Gender Policy Dialogue Series, (1).
- Yaekob Mentena, 2010. "The Role of Women in Agriculture: A Case Study of Arba Minch Zuria woreda, Semen Omo Zone." (MA Unpublished Thesis). A.A.U.: Addis Ababa.
- Yamane T., 1967. Statistics: An introductory analysis, 2nd Ed., New York: Harper and Row.
- Yasin Goa, 2015. Effect of Integrated Nutrient Management on Wheat: A Review. *Journal of Biology, Agriculture and Healthcare*. Areka Research Center, 5 (13), Areka, Ethiopia.
- Yalembirhan M., 2007. Integrating the Formal and Informal Wheat Seed Supply Systems to Improve Farmers' Access to Modern Cultivars in the North Shewa Zone of the Amhara Region, Ethiopia.
- Yu, B., Nin-Pratt, A., Funes, J. and Asrat G., 2011. Cereal production and technology adoption in Ethiopia. *Ethiopia Strategy Support Program II (ESSP II), ESSP II Working Paper, 31*. International Food Policy Research Institute.

7. APPENDIX

Appendix Table 1. Conversion factor used to compute Tropical livestock unit (TLU)

Animal	TLU	Animal	TLU
Chicken	0.013	Young bulls	1.0
Sheep/goat(adult)	0.13	Cows and ox	1.0
Sheep/goat(young)	0.06	Donkey(young)	0.35
Calf	0.25	Donkey(adult)	0.70
Heifers	0.75	Horse	1.1

Source: Storck *et al.*, (1991)

Appendix Table 2. Conversion factor used to compute adult equivalent

Age group	Gender	
	Male	Female
<10	0.6	0.6
10-13	0.9	0.8
14-16	1.00	0.75
17-50	1.00	0.75
>50	1.00	0.75

Source: Stroock *et al.*, (1991)

Multicollinearity problem test

Appendix Table 3 Multicollinearity test among continuous variables

Variable	VIF	1/VIF
EXCOT	2.20	0.454053
DISTAMARKET	2.13	0.468919
FERUSE	2.06	0.485359
IMPSEED	1.91	0.524860
SIZFALAND	1.78	0.560340
EDUHH	1.66	0.601560
FARMEXP	1.49	0.672252
INCOMEHH	1.46	0.683164
OXENOWN	1.32	0.755541
AGEHH	1.18	0.849240
LABHH	1.15	0.867432
Mean VIF	1.67	

Appendix Table 4. Contingency coefficient of dummy variables

	ACCREDIT	PESUSE	MEBRSO
ACCREDIT	1.0000		
PESUSE	0.2103	1.0000	
MEBRSO	0.1444	0.5430	1.0000

Appendix Table 5. The Questionnaires used for household respondents

This questionnaire is prepared for the study entitled **Gender Analysis in improved bread wheat productivity in Jardega Jarte District**. You are selected to supply the required information towards addressing the specific objectives of the study. I therefore request your co-operation to respond objectively as possible to the questions in the questionnaire. It is purely for academic purpose and all information supplied will be strictly confidential and for research purpose only.

Thank you for the anticipated cooperation.

Woreda: _____ Household Code _____ Kebele _____

Profile of Household Head

Gender of the Household 1. Male 0. Female

Age _____ years

Marital status: 1. Single 2. Married 3. Divorced/Separated 4. Widowed

Education level of the household head _____ years of schooling

Religion: 1. Muslim 2. Orthodox 3. Protestant 4. Catholic 5. Wakefata 6. Other specify _____

Ethnicity: 1. Oromo 2. Amhara 3. Others specify _____

Family size of the household

No	Name of household member	Sex		Age	Educational level of family members
		male=1	female=0		
1					
2					
3					
4					
5					
6					
7					

II. Size of cultivated land

Size of land under bread wheat production in 2010/11 E.C production season _____ hek

III. Improved seed Information

11. Which type of Bread wheat seed variety you use? _____

1, Digalu 2, Danda'a 3, Hidase 4, others specify _____

12. Why you prefer or choose this? 1, High grain yield 2, disease resistant 3, white seed 4, tillering capacity 5, bread making quality 6, long spike

13. How many kg do you get? 1, 120 kg 2, 60 kg 3, 30 kg 4, If others specify _____

IV. Labor availability

14. What are the sources of labor for Bread Wheat production? 1. Family labor 2. Hired labor 3. family member (relative) 4. Labor pooling mechanism (Dabo) 5. Others, specify _____

V. Market Information

15. Did you sell Bread Wheat in the production season? 1. Yes 0. No

2. If yes, where did you sell? 1. Farm gate 2. Local market 3. District market 4. Regional market 5. other specify _____

16. Distance of your residence from the nearest markets center: _____ Km. walks min. _____

VI. Accesses to Credit

17. Have you got credit service? 1. Yes 0. No

18. If yes the amount received birr _____ and for what purpose? 1. Improved seed purchase 2. Fertilizer purchase 3. Pesticides purchase 4. Home requirements 5. Livestock purchase 6. Other specify _____

VII. Extension service contact

19. Have you ever consulted extension agents (EAs)? 1. Yes 0. No

20. If yes, how frequently did you make contact with the EAs? _____ Number of days per a month.

IX, Fertilizer use

23. Do you have access or use fertilizer for one hectare bread wheat production? 1. Yes 0. No. If yes how many kilogram of Nps _____ and Urea _____

X. Access to Pesticide

24. Do you have accesses to pesticide for bread wheat production? 1. Yes 0. No

If yes how many Liter/ha _____

XI. Membership in social organization

25. Are you member of social association / cooperative society? 1. Yes 0. No

26. If yes in which? 1. Primary cooperative 2, Edir 3, equib 4, Women Association

XII. Source of income

27. What is your major source of income? 1. On- farm income 2. Off/Non-farm income

3. Both on-farm and off/non-farm income 4. Other sources _____

28. Total annual income from farm activities _____ birr.

29. Cash income from crop sale during 2010/11 E.c. Cropping season

Types of crop	Teff	Maize	Wheat	Barley	Niger Seed	Filed pea	Faba Bean	Others
Cultivated in Hek.								
Production (in quintals)								
Sold (in quintals)								
Total Birr Received								

30. Total income from crop sale in 2010/11E.C or 2018/2019 in ETB _____

31. Cash income generated from sales of livestock and livestock products during 2010/11 production season.

Types of animal	Oxen	Cow	Heifer	Bull	Calf	Shoat	Donkey	horse	mule	chicken	egg	Milk	Butter	Honey
Number														
Amount sold														
Amount received (birr)														
Total Birr Received														

32. Total income from animal sale in 2018/2019 in ETB _____

33. Did you engage in off/non-farm activities? 1. Yes 0.No

34. If yes what types off farm/non-farm? (Multiple answers are possible) 1. Petty trade
2. Charcoal making 3. Livestock trading 4. Wage labor 5. Employed 6. Other _____

35 . How much do you earned from off-farm/non-farm in ETB? _____

36. How long have you been in farming experience in improved bread wheat production?
_____ (In years)

Appendix Table 6. Harvard Analytical Framework checklist

37. Gender Activity Analysis for Bread Wheat production (Production activity)

Note: For all production and reproductive activities, Symbol (x) can used to represent who does that particular activity. An extra symbol (i.e. xx) is used to reflect the relative contribution of a person performing that activity i.e. who is spending more time on that particular task. In case both men and women share the task equally each of them get similar (i.e. each of them get x or xx), whereas if only one of them is entirely responsible for that particular activity the symbol will be noted only for that person.

Activities	MHH			FHH		
	Men only	Women Only	Both	Men Only	Women only	Both
Land clearance						
Ploughing						
wheat seed selection						
Sowing seeds						
Fertilizer application						
Bird control						
Hand weeding						
Applying pesticide						
Harvesting						
Threshing						
Winnowing						
Transport						
Storage						
Processing						
Selling the produced						

38. Daily activity profile in clock (24 – hour)

FHH	Time	MHH	Time
Wake up		Wake-up	
sweep the house		Releasing of animals	
Sweep the surrounding		Feeding animals	
Decorate the house		Break fast	
Baking and cooking food		Go to the farm field	
Feeding families break fast		Time for lunch	
Wash serving dish		Go the farm back again	
Milking Cow		Come back home	
Fetching water		Take a break (relax)	
Washing cloth		Dinner	
Collecting fire wood		Go to bed	
Go to the farm field			
Back to home			
Lunch preparation			
Bring the lunch to the farm place			
Time for lunch			
Come back after the farm			
Boiling Coffee			
Cattle to barn			
Milking Cow			
Dinner preparation			
Dinner time			
cleaning food equipment			
Mixing powder of meal			
Go to bed			

39. Reproductive activities of House hold by Gender

Activities	Responsibility (1.Men only 2.Women only 3. Both Men and women 4.Children)
clean the house	
clearing the surrounding	
Decorate the house	
Cooking	
Feeding whole families	
Wash dishes /tools	
Fetching water	
Collect fire wood	
Child care	
Washing cloths	
Boiling coffee	
Buy clothes for children	
Buy kitchen tools	
Vaccine for new born baby	
Buying food items	
Fencing	
Maintenance of the house	
Care of sick in the family	

A seasonal calendar is another participatory tool used to explore the seasonal changes of agricultural activities (in terms of months) that were conducted throughout the year for a given crop. It gives an idea about workload that both women and men have and in what specific time of the year. Mark (X)

XIII. Intra Household Decision Making in the household

40. Who has decision over resources Please mark as follows: 1 .By consultation (both) 2. Decide by husband (men) 3. Decide by wife (women)

No	Activities	Decision made by whom
1	Types of crop cultivated	
2	Bread wheat production	
3	Purchasing Input	
4	Social participation	
5	Sale of farm produce	
6	Sale of livestock	
7	Children education	
8	Health care	

XIV. Access to and Control over Resources

41. Please mark (√) as follows: if Men only or Women only and if both men and women

Resources	Who has access to Resources						Who has control the Resources					
	MHH			FHH			MHH			FHH		
	Men	women	both	Men	Women	both	Men	Women	both	Men	Women	both
Land use												
Land transfer												
Land Renting												
Land for share cropping												
Oxen												
Improved Seed												
Pesticide												
Fertilizer												
Farm Implements												
Wheat Marketing												
Credit												
Allocation of Income												
Stored Grain												
Milk and milk product												

Check List for Focus Group Discussion (FGD)

1. Are women's and men's farm activities divided by task in bread wheat production? If yes on what activities? (And the gender division of labor or roles)
2. What are the factors affecting male and female in improved bread wheat production?
3. Do women and men play balancing roles for the same crops?
4. What social and economic trends are affecting women and men?
5. As to your insight who works longer hours in both agriculture and other?
(men or women)
6. Do women have the right to sell livestock in your area? What type of animal is sold by men and women?
7. Who have the responsibility to manage the house?
8. What are the constraints of improved bread wheat production in your area?

Check List for Key Informants (KI)

1. How do you recognized the role of women in in productive and reproductive activities ?
2. As to your insight who works longer hours in both agriculture and other activities?
(men or women),the balance of work load in your area?
3. Male and female farmers are equally benefited from the resources in your area?
4. What social and economic trends are affecting women and men in the society?
5. Are female household headed farmers equally participated with male households in social and economic activities?