

**DETERMINANTS OF RURAL WOMEN EMPOWERMENT IN EAST
HARARGHE ZONE, ETHIOPIA**

MSc THESIS

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ACRONYMS AND ABBREVIATIONS

5DE	Five Domain Empowerment
CSA	Central Statistical Agency
FAO	Food and Agricultural Organization of the United Nations
GPI	Gender Parity Index
IFPRI	International Food Policy Research Institute
MoWA	Ministry of Women's Affairs
OLS	Ordinary Least Squares
SDGs	Sustainable Development Goals
USAID	United States Agency for International Development
WEAI	Women Empowerment Agriculture Index
WEI	Women Empowerment Index

BIOGRAPHICAL SKETCH

The author was born in Bale, Ethiopia, in September 1981. She attended her education in Bale, Goba town, and completed her high school studies in 1998.

In September 1998, she joined the then Alemaya (now Haramaya) University and graduated with B. Ed. Degree in Geography in 2002. After her graduation, she was employed by the Addis Ababa Bureau of Education and served for about four years in Ayer Tena Secondary School as a teacher. In 2011, she started serving as a record officer under the Continuing Education Program of Haramaya University. In 2012, she joined Haramaya University for her MSc degree studies in Agricultural Economics and Rural Development under the CEP program.

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DETERMINANTS OF RURAL WOMEN EMPOWERMENT IN EAST HARARGHE ZONE, ETHIOPIA

ABSTRACT

Several decisions are made by farm households with family members who contribute labor, time, and knowledge, and by those who have stake in all activities of households. These members mainly include the household head (male or female), spouse, productive youth, and the elderly. Rural women in the developing world in general and throughout Ethiopia in particular make critical contributions to household agricultural production and consequently to household and national food security. However, it is often mentioned that most of the household decisions related to production, processing, and marketing are dominated by male members of the households. Women not only need access to productive resources but also need to use those resources efficiently by making necessary decisions in farming activities. Because of socially constructed roles, various factors may affect women's level of involvement in such decision-making. This study was aimed at describing the responsibilities, access, and control of farm resources among men and women members of the households; assessing women's role and contribution to farm household decision making; and assessing factors influencing women's level of participation in household decision-making process. Data were collected from household heads and their spouses from a randomly selected 140 male-headed households in Gurawa, Kobmolcha, and Meta woredas of East Hararghe zone. Descriptive analysis and a multiple linear regression model were employed to analyze the data. The results indicated that women's decision-making power is better for activities related to livestock production while all activities related to crop production are dominated by their men counterparts. However, the level of satisfaction of women in terms of the workload they shoulder is very less. Overall, only about 8.8% of women have achieved adequate empowerment. The regression model result indicated that level of education of the household head, access to irrigation, market distance, and age of women positively affected decision-making power of women; while land size and access to credit negatively affected women's empowerment. It is, therefore, necessary to put in place sound public policies that recognize the roles of women; to strengthen adult education both for male and female members; to offer trainings to broaden understanding of the community on the roles of women members; to encourage use of irrigation technologies; and to decrease workloads of women in rural households, for instance, through introducing labor saving technologies.

Keywords: Women; Decision-making; Five-Domain Indicators; Empowerment Index.

1. INTRODUCTION

1.1. Background of the Study

Development policies for the rural sector have always targeted improvements in farm productivity, without giving due attention to decision-making power of rural farm household members in an effort to bring the intended increment in productivity. Fairly distributed roles and responsibilities among different family members including men, women, productive youth, and the elderly is very important at farm household levels where most farm decisions are made. Agricultural production involves a chain of activities. These activities, in general, are done by male and female family members including the head, spouse, and children. Within the indicated production cycle, therefore, women are reported playing vital roles (Stamoulis and Zezza, 2003).

The roles that women play in agriculture vary from region to region and country to country. Women make up almost 50 percent of the agricultural labour force in sub-Saharan Africa. The averages in Africa range from just over 40 percent in Southern Africa to just over 50 percent in Eastern Africa (SOFA team and Doss, 2011). In fact, women make essential contributions to the agricultural and rural economies in most developing countries. In the predominantly agrarian Ethiopian economy as well, women are key players in agriculture, especially within rural communities. However, women across the developing world are disadvantaged relative to men (Okafor *et al.*, 2008). This is because, women have limited access to a wide range of physical assets including agricultural inputs, technological resources, land, and so forth (Oumer *et al.*, 2014; Arndt and Tarp, 2000) and yet they face formidable obstacles (Akinsanmi *et al.*, 2005; Kandiwa, 2013). It is, therefore, important to have a strategy to put men and women's concerns and experiences at the center of development interventions and national policies.

Men and women within the rural Ethiopian household pursue both on farm and off/non-farm activities and have different endowments such as land rights and education, and different access to technologies, to factors of production such as labor and capital, and to support services such

as extension and credit and their level of decision making differs on productive inputs and other household activities. Such factors affect households engaged in agricultural production differently.

Recognition of gender disaggregated constraints, gender imbalances, differentials in gender roles and decision making as related to agricultural production, technology utilization, method of farming, processing, and the likes are important for transforming agriculture in Ethiopia in general and in East Hararghe zone in particular. The situation in East Hararghe zone, in terms of the roles and decisions of both male and female members of the households, may not be different from that in Ethiopia in general.

As gender is about socio-culturally constructed roles, responsibilities, characteristics, attitudes, and beliefs towards men and women, these roles are defined, supported, and reinforced by societal structures and institutions (Alkire *et al.*, 2013). It is, therefore, necessary to look into the socioeconomic settings in which men and women operate for ensuring that they both benefit equally. This is taken up by this study based on the information collected from selected woredas in East Hararghe zone.

1.2. Statement of the Problem

Making adequate and timely farm household decisions by a farmer or group of farmers is a good management practice necessary for better livelihoods of the farming community. Several decisions need to be made by the farm households to ensure that the right things are done in the farm at the right time. The decisions can generally be about investment and marketing decisions and production and conservation decisions. These farm household decisions specifically include decisions related to choice and management of agricultural enterprises, allocation of labor, allocation of land, allocation of capital, acquisition of inputs, marketing, and conservation practices. These decisions are expected to be made by those members of the farm households who have contributed labor, time, and knowledge, and by those who have stake in all activities of the households. These members mainly include the household head (male or female), spouse, productive youth, and the elderly.

Rural women in the developing world in general and throughout Ethiopia in particular make critical contributions to household production and consequently to household and national food security. The majority of rural women contribute an increasing share of household labor in the drudgery of farming activities, though the levels may differ based on various factors including socio-cultural attributes, the type of farming systems, economic conditions, and the likes (Doss, 2010; SOFA team and Doss, 2011). Consequently, women are required to be at the forefront in taking various farm decisions. However, though women's contribution in farming activities is very immense, policies and programs often overlook the central role of women in agriculture and reinforce inequality in women's access to productive resources including land, labor inputs and technology and support services such as credit, extension and research (FAO, 1995; Deere, 2005; Doss, 2010; Trommlerová *et al.*, 2014). Furthermore, most of the household decisions related to production, processing, and marketing are often dominated by male members of the households, even in areas where women are the largest providers of farm labor (Mosha, 1992, Anyanwu and Agu, 1996; Amaechina, 2002).

In Ethiopia, women are not equally permitted to exercise any significant role in household matters as men, leading them to be excluded intentionally and unintentionally from matters affecting them (Gizachew, 2011; Thomas *et al.*, 2013). East Hararghe zone is not an exception to such situations. Decision making power of women in pertinent farm activities and operations seems very less.

Women not only need access to productive resources but also need to be able to use those resources efficiently by making necessary decisions in farming activities. Various studies in other countries have indicated various factors affecting the levels of household decision making by women members (Omokhudu, 1999; Sornes, 1993; World Bank, 2011; Trommlerová *et al.*, 2014). Because of socially constructed roles, various factors may also affect women's level of decision making in East Hararghe zone.

The community and household factors that affect women's contribution in farm household decision need to be studied. However, there is lack of systematic studies on factors affecting the levels of contributions of women to household decision making in Ethiopia in general and in East Hararghe in particular. This ultimately affected the efforts of building a realistic scenario of rural women's roles in farm household activities.

This study tried to answer the following key research questions:

- What is the level of women's participation in farm decision making?
- What factors determine the level of participation of women in such decisions?

1.3. Objectives of the Study

The general objective of this study was to assess the disparities between men and women in terms of the level of their contribution in household decisions related to production, soil and water conservation, investment, and marketing decisions.

The specific objectives of this study are:

1. To describe the responsibilities, access, and control of farm resources among men and women members of households;
2. To assess women's role and contribution to farm household decision making; and
3. To investigate factors influencing women's level of participation in household decision-making process.

1.4. Significance of the Study

The output from this study will serve as an input for policy makers, economic planners, and donor institutions to place a high priority on supporting and empowering women farmers for hastening economic development. The output of this study is also expected to ensure that government, economic planners and donor institutions place a high priority on bolstering women farmers. The study will provide important findings on gender roles in farm household decision making process to guide policies and program interventions that will improve the productivity of rural households. Women farmers and other practitioners will be benefit out of the results of this study. Furthermore, it will serve as a source of information for researchers

who are interested to undertake further research activities in a related topics and in other socio-cultural settings.

1.5. Scope and Limitations of the Study

This study covers decision making of women at household level and not at community level. It considers women in farm households headed by men. Since, in most of the cases, there is no restrictions in decision making for women who are heading households, women-headed households are not considered for this study. Furthermore, female children are not considered. The focus is on married women spouses. Furthermore, the study considered major decisions related to production domain including asset, income, leadership, and time allocation domains of women's empowerment. Geographically, the study focused on three selected *Woredas* of East Hararghe zone. The major reasons for such limitations are because of time and budget constraints and very intensive data requirements beyond the capacity of the researcher.

1.6. Organization of the Study

The thesis is organized in five major parts. The first part introduces the background, problem statement, objectives, significance, and limitations of the study. The second part reviews relevant literature. The third part deals with the research methodology. Results, both descriptive and econometric, are presented and discussed in the fourth part. The fifth part summarizes the main findings of the study and draws appropriate recommendations.

2. LITERATURE REVIEW

In this chapter, major concepts and definitions, major decisions, empirical and conceptual framework, and review of related studies are presented.

2.1. Concepts and Definitions

Farm household: The farm household is the level at which most resource allocation decisions are made in the farming community. Decision makers in farm households may include household heads, spouses, and children.

Gender: Gender is the cultural interpretation of sex which considers socially constructed roles, responsibilities, characteristics, attitudes, and beliefs towards men and women. These roles are defined, supported, and reinforced by societal structures and institutions. It is a social construct as opposed to sex which is biological.

Empowerment: The 2030 agenda for sustainable development explicitly put achieving gender equality and empowering all women and girls as its 5th goal among its 17 major goals (UN, 2015). This fifth sustainable development goal (SDGs) has six targets where the fifth one clearly stipulates the need to ensure women's full and effective participation and equal equal opportunities for leadership at all levels of decision making in political, economic, and public life. This target is related to empowerment of women. Empowerment is a broad concept that is used differently by various writers, depending on the context or circumstance. Because the concept of empowerment is so personal, each person has a unique definition of what it means to be empowered based on his or her life experiences, personality, and aspirations. Naturally, context and culture also shape one's definition of empowerment (Alkire *et al.*, 2013). As a result, a number of definitions have been given to empowerment by different authors. In an attempt to come to a common understanding applicable across multiple domains and disciplines, Kabeer (2001) defines empowerment as expansion of people's ability to make strategic life choices, particularly in contexts where this ability had been denied to them. Alsop *et al.* (2006) describe empowerment as "a group's or individual's capacity to make effective choices, that is, to make choices and then to transform those choices into desired actions and outcomes". Narayan (2005)

defines empowerment as “the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives”, stressing four main elements of empowerment: access to information, inclusion and participation, accountability, and local organizational capacity.

2.2. Major Farm Household Decisions

Decision makers within a household have to make various decisions. Among these, production decision, marketing decision, investment decision, and conservation decision can be mentioned as the major ones. Based on Koppelman and French (2005), these decisions are explained as follows:

Production decision: In decisions on producing or providing products it is essential that the production of the product is well planned and coordinated, both within and with other functional area of the farm, particularly marketing. Production decisions can be of strategic type or of operational type.

Strategic decisions: These are the decisions, which involve heavy investment and have long lasting effect. These decisions give shape to overall organization of the farm business. These include decisions on the best farm size, decisions on farm labor and machinery program, decisions on construction of farm buildings, and decisions regarding irrigation, conservation, and reclamation programs.

Operational decisions: Operational decisions are continuously made to carry out the day-to-day operations of the farm. The investment involved in such decisions is relatively small and hence, the impact of such decisions is short-lived. These decisions are generally: i) what to produce? ii) How much to produce? How to produce? and when to produce?

Marketing decision: A farm decision maker has to buy various farm inputs and sell out the produces in which he/she has to take rational decisions. While purchasing inputs he/she has to consider the following aspects: a) What to buy? b) When to buy? c) From whom to buy? d) How to buy? and e) How much to buy? Similarly, in selling out the farm produces he/she has to

carefully ponder over the following points in order to maximize farm income: a) What to sell? b) When to sell? c) To whom to sell? d) How to sell? and e) How much to sell?

Conservation decision: As improvements of alkalinity, salinity and other soil defects require heavy investments, soil conservation and reclamation programmes often have to be spread over years. The choice of most economical method or a combination of methods of reclamation has to be made from among mulching, contouring, terracing and application of soil amendments, laying down of proper drainage and so on.

2.3. Role of Women in Agriculture

Women are the backbone of the rural economy elsewhere and in sub-Saharan Africa in particular. They make up almost half of the agricultural labor force, 60 percent are employed in the sector, and they produce the bulk of Africa's food (FAO, 2011; Manuh, 1998). In Ethiopia, women's participation is estimated between 45 and 75 percent, particularly in crop production (Bill & Melinda Gates Foundation, 2010). They involve in many production activities including planting, weeding, harvesting, and the likes. Yet, evidence suggests that women produce a third less per unit of land than male farmers due to gender specific barriers to input-use and access to agricultural extension services (ACDI/VOCA, 2013). This is attributed to the unequal access to, control over, and ownership of productive resources such as land, credit, and information that women have as compared to men. In 2005, only 18.6 percent of rural landholders were women, only 9 percent had access to agricultural extension services, and only 12 percent of those accessing agricultural credit were women (MoWA, 2005).

A woman who is empowered to make decisions regarding what to plant and what (and how many) inputs to apply on her plot will be more productive in agriculture. An empowered woman will also be better able to ensure her children's health and nutrition, in no small part because she is able to take care of her own physical and mental well-being (Smith *et al.*, 2003). Closing the gender gap – allowing women to own and control productive assets -in agriculture is essential to increasing agricultural productivity, achieving food security, and reducing hunger (FAO, 2011).

2.4. Conceptual Framework

As a general preposition, provided technologies and managerial decision making skills are the same, farmers who have identical access to identical factors (both quantity and quality) may produce identical outputs of a given crop which will have overall effect on their income and subsequent poverty status within the economic society. That is, their productivity will be identical. If they use different technologies, or different quantities of these factors, or there is difference in quality of these factors, their productivity will differ. There may be differences in the productivity of male and female farmers and their income will drop which may also make them poor (Pal, 2014). Men and women within the rural African household pursue both on farm and off-farm activities. They have different endowments such as land rights and education, and different access to technologies, to factors of production such as labor and capital, and to support services such as extension and credit and their level of decision making differs on productive inputs and other household activities. Such factors affect households engaged in agricultural production differently. Gender of the household head (farm manager) is an internal factor that may hinder achievement of efficiency in agricultural production amongst the smallholder farmers due to decision making ability. This decision making ability, also related to empowerment, deserve attention for achieving improvement in productivity and rural livelihoods. Hence, it is important to consider the ability to make decisions as well as the material and other resources needed to carry out those decisions. In addition, although women's empowerment is a multidimensional process that draws from and affects many aspects of life, including family relationships, social standing, physical and emotional health, and economic power (Alkire *et al.*, 2013), the focus of the current study is on those aspects of empowerment that relate directly to agriculture—at farm household level.

Women Empowerment in Agriculture Index (WEAI): The common and recent measure of empowerment is Women Empowerment in Agriculture Index (WEAI). The Women's Empowerment in Agriculture Index (WEAI) is a new survey-based index designed to measure the empowerment, agency, and inclusion of women in the agricultural sector.

For the WEAI, it is necessary to initially define five domains that reflected priorities from its agricultural programs as follows (Malapit *et al.*, 2014):

1. Production: This dimension concerns decisions about agricultural production and refers to sole or joint decision making about food and cash crop farming, livestock and fisheries, and autonomy in agricultural production, with no judgment on whether sole or joint decision making was better or reflected greater empowerment.

2. Resources: This dimension concerns ownership of, access to, and decision making power about productive resources such as land, livestock, agricultural equipment, consumer durables, and credit.

3. Income: This dimension concerns sole or joint control over the use of income and expenditures.

4. Leadership: This dimension concerns leadership in the community, here measured by membership in economic or social groups and comfort speaking in public.

5. Time: This dimension concerns the allocation of time to productive and domestic tasks and satisfaction with the time available for leisure activities.

The five domains of empowerment are measured using 10 indicators with their corresponding weights (Table 1). Each indicator is designed to measure whether each individual reached a certain threshold (has adequate achievement) with respect to each indicator.

Table 1. Domains and indicators of empowerment

Domain	Indicators	Weight
Production	Input in productive decisions	1/10
	Autonomy in production	1/10
Resources	Ownership of assets	1/15
	Purchase, sale or transfer of assets	1/15
	Access to and decision on credit	1/15
Income	Control over use of income	1/5
Leadership	Group member	1/10
	Speaking in public	1/10
Time	Workload	1/10
	Leisure	1/10

Source: IFPRI (2012)

The Five Domain Empowerment (5DE): Each domain is weighted, as are each of the indicators within a domain. Measuring the 5DE results in a number ranging from zero to one, where higher values indicate greater empowerment. An individual who has achieved ‘adequacy’ in 80% or more of the weighted indicators is considered to be empowered. The five domain empowerment (5DE) is measured in terms of percentage of women that are empowered (He), percentage of women who are not empowered (Hn), and percentage of dimensions in which disempowered women have adequate achievements (Aa) as in Alkire *et al.* (2013):

$$5DE = He + Hn(Aa)$$

Gender Parity Index (GPI): This sub-index reflects the percentage of women who are as empowered as the men in their households. For those households that have not achieved gender parity, the GPI sub-index shows the gap that needs to be closed for women to reach the same level of empowerment as men (Malapit *et al.*, 2014). According to the same source, the GPI is a relative inequality measure that reflects the inequality in 5DE profiles between the primary adult male and female in each household. This requires data on empowerment levels from both male and female members in the households. GPI is typically measured at the aggregate level (Alkire *et al.*, 2013). It is measured in terms of percentage of women with gender parity (Hp),

percentage of women without gender parity (H_w), and average empowerment gap between women compared with men in their household (R_p) as:

$$GPI = 1 - H_w(R_p)$$

Total WEAI formula is:

$$WEAI = 0.9(5DE) + 0.1(GPI)$$

$$\Rightarrow WEAI = 0.9(He + Hn(Aa)) + 0.1(1 - H_w(R_p))$$

Major activities in the farming community includes procuring farm inputs, producing, using farm outputs, and generating revenues (Koppelman and French, 2005). Farm household members make decisions on these all activities. In relation to farm inputs, decision makers have to decide on the type and amount of inputs to be procured, from where to buy the inputs, how much and when to apply in the production process, etc. In an effect of combining farm inputs to produce output in the production process, they have to also decide on the type of farm enterprises to be produced, how much resources (e.g. land) to allocate among the different commodities, methods of production (technology use) to be used, and on the production calendar (when to produce), among others (Ajewale *et al.*, 2015). In relation to the final output produced, farm households should also decide on how to utilize the outputs which require appropriating among how much to sell, save, donate, and consume. After selling part of their outputs, they have to also decide on how much money to save, invest, and consume.

The major issue here is whether all members of the households (the head, spouse, and children) have power to make some of the above decisions, and how the power of decision making is shared among those who can decide (Pal, 2014). Of particular interest is whether women members of the farm households can make some of the farm household decisions, and if so to what level.

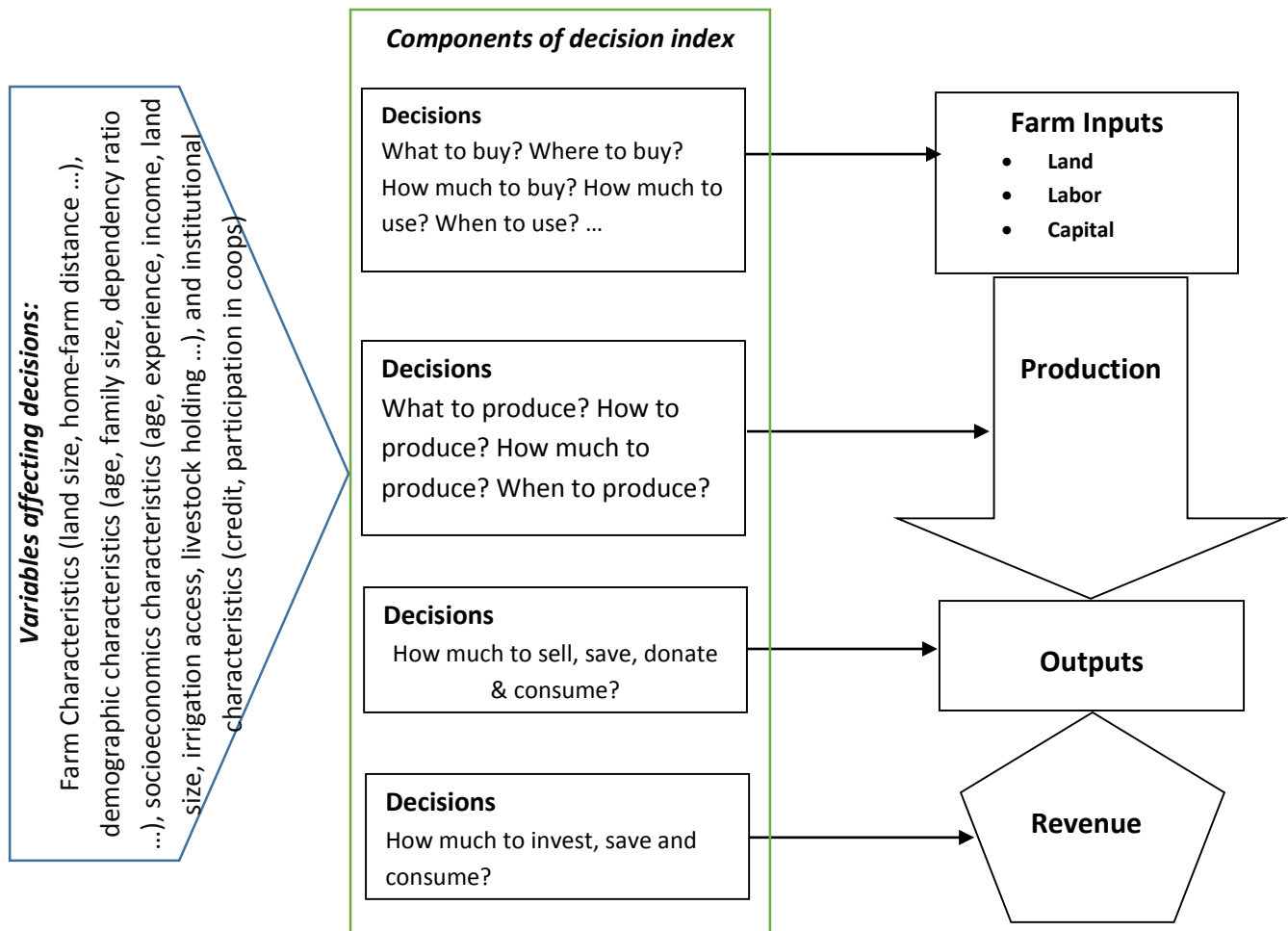


Figure 1. Empirical framework of activities and decisions available for household decision makers

Source: Own sketch based on theories and empirical literature cited

These are made separately and independently for all major farm household decisions including choice and management of agricultural enterprises, allocation of resources (land, labor, and capital), acquisition of inputs, and marketing decisions.

The level of decision-making can be put into a Likert scale type of measurement in five scales, where higher values indicate better level of decision making by women. Factors affecting these

five-leveled decision making process can be analyzed using an ordered Probit model, or after converting the scales into indices, by applying different forms of Tobit models or multiple regression model.

2.5. Review of Related Studies

Though there is very little research on the empirical drivers of empowerment (Trommlerová *et al.*, 2014), some empirical studies that have addressed similar research objectives or that have applied similar methodologies are briefly indicated under this section.

A study by Ajewole *et al.* (2015) on gender analysis of decision making among rice farming households in Nigeria disaggregated various farm household decisions into five categories: those made by male alone, joint but male dominating, joint with equal contribution, joint with female dominating, and female alone. Accordingly, about 80% of the decisions in productive resources, 79% of the decisions in the choice of innovation, 82% of the decisions in plot management, 81% of the decisions in distribution of output, and 81% of the decisions in distribution of income are made by male alone. The result generally indicated that female members of the households in rice production are less empowered.

A study in Gambia, by using advanced econometric techniques like instrumental variables regression, indicated that age, gender, marital status, nationality, economic activity, and health are found to be important determinants of empowerment at both communal and individual levels (Trommlerová *et al.*, 2014). Another study by Kabeer (2001) claimed that material, human, and social resources available to individuals and communities affect their empowerment. The study added that better control over economic resources, better education and access to information, and more social rights can all be important drivers of empowerment.

A study on a sample of ever-married women in India applied logit regression and revealed women's educational level, literacy, age, mass media exposure, and wealth of the household as significant correlates of women's empowerment (Gupta and Yesudian, 2006). Another study in the same country by Allendorf (2012) applied OLS regression to come up with family

relationship quality, area of residence, age, higher education, and employment outside the household as determinants of married mother's empowerment.

Other studies that have assessed determinants of empowerment through participation in decision making include Anderson and Eswaran (2009), Allendorf (2007), Garikipati (2008), Malhotra and Mather (1997), Hindin (2000), Jejeebhoy and Sathor (2001), Roy and Niranjana (2004), among others.

3. RESEARCH METHODOLOGY

In this chapter, description of the study area, types and sources of data, methods of data collection, sampling techniques, and methods of data analysis are presented.

3.1. Description of the Study Area

The study areas, East Hararghe, is found in Oromia regional state of Ethiopia. East Hararghe is the largest zone in the region with a population of about 3.37 million projected for the year 2015 (CSA, 2013). More than 90 percent of the population in the zone are rural dwellers.

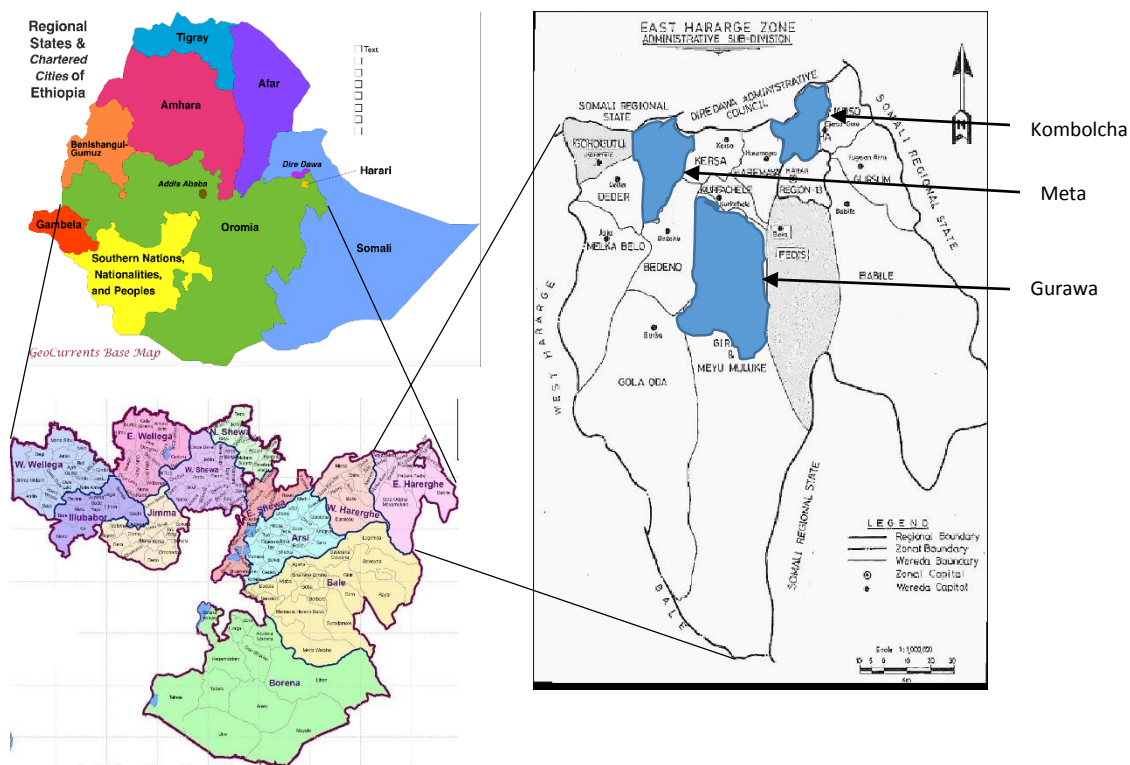


Figure 2. Location map of the study areas

Source: Combined from <http://www.ocha-eth.org/> and <http://www.geocurrents.info/gc-maps/geocurrents-maps-by-country/geocurrents-maps-of-ethiopia>

Farming systems in the East Hararghe zone of Ethiopia constitute complex production units involving a diversity of interdependent mixed cropping and livestock activities. The major annual crops grown in East Hararghe zone, in terms of area cultivated in 2014 main season, by ranking only those covering more than 1000 hectares, are sorghum, maize, groundnuts, wheat, haricot beans, sweet potato, *tef*, barley, faba beans, fenugreek, and linseed in that order (CSA, 2014). Cereal production in the zone is mostly for home consumption. In addition, the major cash crops like *t'chat* and coffee have a long-standing tradition in the zone. *T'chat* occupies a significant proportion of the area under cultivation, especially in the mid altitude areas of the zone. Production of *t'chat* makes the farming system in Hararghe highlands to be a cash crop-based mixed crop-livestock farming system, and not a mere grain-based mixed crop-livestock system, unlike the case in other parts of the country.

There are three broad agro-climatic areas in East Hararghe zone. These are lowlands (locally called *kola* or *gammoji*) with rainfall distribution of less than 700mm and constituting about 30 to 40 percent; midlands (*weyna-dega* or *badda-daree*) with rainfall distribution ranging from 700mm to 1200mm and constituting 35 to 45 percent; and highland (*dega* or *baddaa*) with rainfall distribution of more than 1200mm and constituting 15 to 20 percent of the whole areas in these zones. The lower the altitude the more important becomes the livestock-based economy. On the other hand, higher elevations allow more diversified crop cultivation with livestock being of minor importance for the livelihood of the population.

There are two rainy seasons in the zone, the short (*belg* or *badheessa*) rainy season extending from March to May and the main (*meher* or *ganna*) rainy season extending from June to September. *Belg* rain is mainly used for land preparation and planting of long cycle crops such as maize and sorghum and seed bed preparation for *meher* crops. The *meher* rain is used for planting of cereal crops like barley, *tef*, wheat and vegetable crops like onion, shallot and potatoes in the mid- and the highlands and peanut in the lowlands. Besides, *meher* rain is also responsible for the growth and development of perennial crops such as coffee and *t'chat*.

Increasing population density coupled with lack of alternative employment opportunities has led to progressive land pressure and caused subsequent shrinking of individual landholdings, fragmentation of available holdings, and expansion into fragile and marginal areas. In 2014

cropping season, for instance, average landholdings in East Hararge zone was about 0.66 ha per household (CSA, 2015). Land fragmentation is also very severe in the zone.

In addition, the zone is characterized by a rainfall which is highly unpredictable and uneven in its distribution leading to a wide range of climatic hazards which farmers have to deal with. As a result, food insecurity and dependence on food aid, especially in the lowlands, is very common.

The specific focus of this study is on the highland parts of the East Hararghe zone. The Hararghe highlands consist of a major part of the country's eastern highlands. The highland part is located some 200 to 400 kilometers east of the capital city Addis Ababa (Arega, 2003). This study specifically focuses on three districts of the Hararghe highlands, Gurawa, Kombolcha, and Meta.

Gurawa district: The altitude of the district ranges from 500 to 3230 meters above sea level (masl). The district has an estimated total population of 300,661 (CSA, 2013). The district is known for its production of staple crops (wheat, barley, and Irish potato) and fruit (apple) production (Nigussie *et al.*, 2012).

Kombolcha district: The altitude of the district ranges from 1600-2400 masl. The district is strategically located between the two main cities Harar and Dire Dawa. In addition, due to its proximity to Djibouti, the district has access to potential markets in the area. The total population of Kombolcha district (CSA, 2013) is 178,058. Lowland and midland agro-ecological zones characterize the district's climate. Annually, the district receives mean annual rainfall of 600-900mm, which is bimodal and erratic in distribution. The major crops produced in the district include sorghum, maize, vegetables (potato, tomato, cabbage, onion, and carrot), khat, groundnut, coffee, and sweet potato.

Meta district: Meta district, apart from its stalk and small cereals (like wheat production), is known for its potentiality in cash crops like coffee. A projected total population of the district, for the year 2016, is about 318,458 (CSA, 2013).

3.2. Types and Sources of Data

Both primary and secondary data were collected for the study. Primary data were collected from a randomly selected farm household heads and spouses. Secondary data were obtained from various governmental offices at Zonal and District levels.

3.3. Methods of Data Collection

A questionnaire consisting of questions related to household characteristics, farm characteristics, demographic characteristics, institutional factors, socio-cultural practices, and major farm decisions was prepared. The questionnaire was pre-tested on a few respondents where the input obtained from the pre-test was used to refine and finalize the questionnaire. The refined questionnaire was administered by involving experienced enumerators who speak the local language.

3.4. Sampling Techniques

Three districts from East Hararghe zone were randomly selected. These are Kombolcha, Meta, and Gurawa. From each district, two *kebeles* (Laft Elatatessa and Rasa Jeneta from Gurawa, Bakalcha Oromia and Hawi Bilisumma from Meta, and Bilisuma and Egu from Kombolcha) were randomly selected constituting a total of 6 *kebeles*. Finally, a total of 140 farm households were randomly selected based on probability proportional to size of households in the selected *kebeles*.

3.5. Methods of Data Analysis

Both descriptive and econometric methods of data analysis were employed to analyze the collected data for achieving the stipulated objectives of this study.

3.5.1. Descriptive analysis

Descriptive analytical tools such as means, standard deviations, frequencies, and ranges were employed together with tests based on chi-square and student's t-distribution.

The assumption here is that households consider many decisions simultaneously. These are broadly categorized into five, the five domains of empowerment (5DE) indicated under review of literature (Table 1). These indicators are production, resources, income, leadership, and time decisions with the indicated weights.

The level of participation of women in each of these decisions, based on the indicators, were considered by using a five-point scale ranging from one to five taking a value of 1 if the decision is solely made by male (household head), 2 if joint decision but male dominating (women only consulted), 3 if both the female and the male jointly and equally decide, 4 if joint decision but female dominating (men only consulted), and 5 if the decision is solely made by female (spouse).

For assessing factors affecting all major decisions aggregated at farm household level, women empowerment index (WEI) was computed from the above five-level Likert scale that are measured for individual decisions (IFPRI, 2011; Ajewole *et al.*, 2015). This index was computed as follows:

$$WEI = \left(\frac{\text{sum of scores for different individual decisions}}{\text{Possible total scores}} \right) 100$$

$$\text{i.e.} \quad WEI_{all} = \frac{\sum_{j=1}^n X_{ij}}{d} \quad (1)$$

Where

WEI_{all} = women empowerment index for all decisions per respondent (which lies between zero and one)

X = value of decision maker

j = code for the specific decision matter

d = total number of decisions replied by the respondent

n = number of decisions.

This index lies between zero and one taking continuous values. Higher values indicate greater empowerment. The possible categories of the values are as follows:

- A value of 1.00 means that the male head tend to be the sole decision maker
- A value above 1.00 and below 3.00 means that female heads join in making the decisions but the decision of the male head dominates
- A value of 3.00 means both the female and the male head makes the decision jointly with equal contribution
- A value above 3.00 and below 5.00 means that the female head dominates in decision making than the male head.
- A value of 5.00 means the female head is the sole decision maker.

The values for the five domain indicators of empowerment (5DE) were then aggregated, for a household, into one index with values ranging from zero to one. Measuring the 5DE results in a number ranging from zero to one, where higher values indicate greater empowerment. A woman is defined as empowered in 5DE if she has adequate achievements in four of the five domains or is empowered in some combination of the weighted indicators that reflect 80 percent total adequacy (Sraboni *et al.*, 2013). An individual who has achieved ‘adequacy’ in 80% or more of the weighted indicators is considered to be empowered. The five domain empowerment (5DE) is measured in terms of percentage of women that are empowered (He), percentage of women

who are not empowered (Hn), and percentage of dimensions in which disempowered women have adequate achievements (Aa) as (Alkire *et al.*, 2013):

$$5DE = He + Hn(Aa) \quad (2)$$

The Gender Parity Index (GPI) explained under review part were not be considered as it requires collecting data for all male and female household members. Since the decision-based data is collected from female (spouse) in the male-headed households, only 5DE of empowerment was considered.

3.5.2. Econometric model

Econometric tools were employed for the purpose of assessing determinants of the level of decision making of women members of the households.

Factors affecting household level aggregated decision making power of women were assessed by using the derived index as a dependent variable. Given the fact that the indicated dependent variable can theoretically be censored both at zero and one, a Two-limit Tobit regression model was proposed to be used (Long, 1997). However, the values of the dependent variable measured as an index are found to be all different from both censoring values zero and one. As a result, Ordinary Least Squares (OLS) is found to be an appropriate model as multiple linear regression results in efficient estimators as compared to the two-limit Tobit model. Hence, the index value which lies between zero and one is converted into a percentage points that lies between zero and 100.

Model specification for the multiple linear regression model is as follows:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_K X_{iK} + \varepsilon_i \quad (3)$$

Where

Y is the dependent variable or the regressand, in this case, a measure of the level of decision making indicated as an index; $X_1, X_2, \dots, X_K$ are the independent (explanatory) variables or regressors that are hypothesized to affect the level of decision making of a women (spouses) in

a male-headed households; ε_i is a random disturbance term (errors of the variables); and i is observations included in the model where $i=1, \dots, n$ (n is total number of sampled households).

Relevant tests for important assumptions of OLS including multicollinearity and heteroscedasticity tests are made. In order to check the severity of multicollinearity among explanatory variables, Variance Inflation Factor (VIF) was computed. Following Gujarati (1995), VIF_j is given as:

$$VIF_j = \frac{1}{1 - R_j^2} \quad (4)$$

Where R_j^2 is the coefficient of determination obtained by regressing the explanatory variable (x_j) against all other explanatory variables.

VIF ranges between one and infinity. The larger is the value of VIF_j , the more collinear is the j^{th} explanatory variable. As a rule of thumb, if VIF of a variable exceeds 10, that variable is said to be highly collinear.

Heteroscedasticity is also checked using Breusch-Pagan/Cook-Weisberg test for heteroscedasticity.

3.6. Definition of Variables

Dependent Variable

Level of decision making (empowerment) index: It is a continuous variable computed as an index from a Likert scale based ordered variables for different decision categories. The computed index which lies between zero and one is multiplied by 100 in order to convert the values into percentage points.\

Independent Variables

Though the list may not be exhaustive, the following variables are among those that are hypothesized to affect the levels of decision making by women in the households.

Level of education of woman and a husband: These are two separate variables both hypothesized to positively influence the level of decision making by the women (Henrik *et al.*, 2012; Gupta and Yesudian, 2006; Allendorf, 2007). The variables are measured as dummies taking a value of one for literate and zero for illiterate.

Age of woman and a husband: These are two separate variables both hypothesized to positively affect the level of decision making by the women (Alkire *et al.*, 2013; Gupta and Yesudian, 2006; Allendorf, 2007). The variables are measured in years.

Family size: This is measured by size (number) of members in the household. Positive attitudes towards women's right is positively related with family size in some Sub-Saharan African countries, and negatively related with family size in others (Upahyay and Karasek, 2012). As a result, the direction of effect of family size on decision making power is indeterminate.

Participation in credit program (borrowing): Credit eases financial constraints of farm households. If households have less financial constraints, it is probable that decision making will spread over the members of the households (Garikipati, 2008). As a result, it is hypothesized to affect the levels of decision making by women member of the household positively. The variable is measured as a dummy variable taking a value of 1 if the household received formal credit within the last two years and zero otherwise.

Distance to the nearest market: It is measured in kilometers. Access to market is hypothesized to adversely affect the level of decision making by a woman in the household.

Access to irrigation: Irrigation benefits the poor through higher production, higher yields, lower risk of crop failure, and higher and year-round farm and nonfarm employment. It also enables smallholders to adopt more diversified cropping patterns, and to switch from low-value subsistence production to high-value market-oriented production. Owing to these, access to irrigation helps to improve decision-making processes (Hussain and Hanjira, 2004). Hence, it is hypothesized to affect women's empowerment positively.

Land holding: Land size is an indicator of the available economic resources and the willingness to adopt a new technology. Furthermore, increased land size favors enterprise diversification where farm households get chances of growing diverse crops and rearing various livestock

species (Ashok *et al.*, 2000). This would create to have ‘women managed’ enterprises like vegetable and poultry activities where women’s decision power, in most of the cases, is high. Hence, land holding is hypothesized to influence empowerment positively.

Home-farm distance: Average home-farm distance is hypothesized to affect women’s empowerment negatively. This is related to the fact that average farm distances affect farmers choice of crops and input use (Tewodros *et al.*, 2016). As a result, those farmers who have farmlands at a distant location are expected to have less economic empowerment that could also affect women’s empowerment adversely.

Livestock holding: It is measured in Tropical Livestock Units (TLU). Apart from serving as a draft power, source of income, and source of manure, livestock are also indicators of wealth and prestige in rural communities. As a result, livestock holding is hypothesized to affect women’s empowerment positively.

Spouse’s (wife’s) membership to cooperatives: Women’s membership to cooperatives exposes the members to better information besides other economic benefits. A study by Aregawi and Hailelassie (2013) also indicated that membership to cooperatives enable women to make autonomous decisions. As a result, the variable is hypothesized to affect women’s empowerment positively.

Progressiveness (model vs non-model farmers): Farmers have been categorized in to model farmers and non-model farmers by considering progressiveness. Farmers that are considered as progressive are those who are very quick in adopting new technologies for boosting agricultural productivity. Owing to this, progressiveness is hypothesized to affect women’s empowerment positively. This is because progressive farmers are also expected to have better knowledge on the roles and rights of women as they are exposed to better information (Tewodros *et al.*, 2016).

Table 2: Definition and measurement of variables and working hypotheses

Variable	Measurement	Expected effect
Level of education of the woman	Year of schooling	+
Level of education of the husband	Year of schooling	+
Age of the woman	Years	+
Age of the husband	Years	+
Family size	Discrete variable measured in number (counts)	+/-
Participation in credit program	Dummy, with a value of 1 if formal credit is received within the last two years; and zero otherwise	+
Distance to the nearest market	Measured in kilometers	-
Access to irrigation	Dummy, with a value of 1 if access is there; and zero otherwise	+
Land holding	Hectares	+
Home-farm distance	Kilometers	-
Livestock holding	In Tropical Livestock Unit (TLU)	+
Spouse's (wife's) membership to cooperatives	Dummy, with a value of 1 if member; and zero otherwise	+
Progressiveness (model vs non-model farmers)	Dummy, with a value of 1 if model; and zero otherwise (as classified by agricultural development offices)	+

4. RESULTS AND DISCUSSION

The major findings of this study are broadly categorized into descriptive and econometric parts. These results are presented under this section.

4.1. Descriptive Results

The major descriptive results are presented under various categories, which includes household characteristics, farm characteristics, institutional factors, farm decision making, gender and farm household decisions, and women's empowerment and the 5DE.

4.1.1. Household characteristics

As already discussed under Methodology part, this study is based on a cross-sectional data collected from male-headed households where the survey covered both the household head (husband) and the spouse (wife). The survey result shows that the average age of the household heads is about 38 years while that of the spouses is 36 years. Average family size is about seven persons per household with dependency ratio of 1.34 indicating that every economically active person in a household had to support more than one economically inactive persons (Table 3).

Table 3. Descriptive results of some household characteristics

Variable	Mean	SD
Age of the household head (male) (years)	38.32	10.56
Age of the spouse (female) (years)	35.81	7.75
Family size (counts)	6.92	2.58
Dependency ratio	1.34	0.86

Source: Own survey result (2015)

In terms of educational status, about 56% of the household heads (males) are literate while only about 24% of the spouses (females) are literate (Table 4).

Table 4. Frequency results of some household characteristics

Variable		Frequency	Percent
Male's (head's) education status	Literate	78	56.1
	Illiterate	61	43.9
Female's (spouse's) education status	Literate	33	23.7
	Illiterate	106	76.3

Source: Own survey result (2015)

4.1.2. Farm characteristics

Land is one of the scarce factors of production in East Hararghe zone in general and in the study *Woredas* in particular. Average land holding is about 0.6ha, which is fragmented into about 3 plots on average. Farm households are, on average, at a distance of less than one kilometer from the farm and more than 3 kilometers from the market. Average livestock holding in the study areas is about four standardized tropical livestock units and households annually earn about 21 thousand birr on average (Table 5).

Table 5. Description of some farm characteristics

Variable	Mean	SD
Total land holding (ha)	0.59	0.57
Number of plots	2.8	1.0
Average home-farm distance (km)	0.69	0.72
Average home-market distance (km)	3.27	2.14
Annual income (in '000 Birr)	20.94	18.46
Livestock holding (TLU)	4.09	2.56

Source: Own survey result (2015)

4.1.3. Institutional characteristics

The survey result revealed that about 31% of the households contacted extension agents every week while 7.5% had no contact at all. As extension agents are assumed to be the major source of farm information, the exiting contact would enable households to adopt new agricultural

technologies and practices. As to the credit access, only 13.3% of the households had access to credit. The difference between the household heads and the spouses in terms of membership to cooperatives is also indicated in Table 6 below.

Table 6. Distribution of households by some institutional variables

Variable		Number	Percent
Frequency of extension contact	No contact at all	10	7.5
	Every day	7	5.3
	Every week	41	30.8
	Every fortnight	27	20.3
	Every month	48	36.1
Accessed credit in the year	No	117	86.7
	Yes	18	13.3
Head's (husband's) membership to cooperatives	No	56	40.6
	Yes	82	59.4
Spouse's (wife's) membership to cooperatives	No	63	45.3
	Yes	76	54.7

Source: Own survey result (2015)

4.1.4. Gender and Farm Household Decisions

4.1.4.1. Decisions on procurement and utilization of farm inputs

As it is difficult to undertake production activities without farm inputs, decision on procurement and utilization of these inputs is very important. In this regard, the survey result revealed that the majority of these decisions are primarily made by male either alone or jointly with female while male is dominating (Table 7). Women's decision is relatively better in decisions related to hiring labor for livestock production, seeking veterinary services, and procuring and using livestock inputs where at least more than 20% of the women make independent decisions.

Table 7. Distribution of households with decisions on procurement and utilization of inputs

Decisions	Male alone		Joint but male dominating		Joint with equal contribution		Joint but female dominating		Female alone	
	No.	%	No.	%	No.	%	No.	%	No.	%
Share/rent land	28	20.1	58	41.7	47	33.8	6	4.3	0	0
Where and how much inputs to use and to purchase	30	21.6	63	45.3	15	10.8	28	20.1	3	2.2
Purchase of agricultural implements	91	65.5	43	30.9	1	0.7	3	2.2	1	0.7
Hiring labor for crop production	27	19.4	60	43.2	41	29.5	8	5.8	3	2.2
Hiring labor for livestock production	4	2.9	30	21.6	52	37.4	13	9.4	40	28.8
Seeking veterinary services	23	16.5	47	33.8	26	18.7	15	10.8	28	20.1
Procuring and using inputs for livestock production	16	11.5	59	42.4	24	17.3	12	8.6	28	20.1
Whether to borrow or not	18	12.9	39	28.1	63	45.3	18	12.9	1	0.7
Amount of money to borrow	13	9.4	43	30.9	68	48.9	11	7.9	4	2.9
Seeking extension advice	67	48.2	46	33.1	20	14.4	4	2.9	2	1.4

Source: Own survey result (2015)

4.1.4.2. Decisions on crop and livestock production

As depicted in Table 8 below, spouses' (women's) decision-making power is better for activities related to livestock production while all activities related to crop production are dominated by their men counterparts. For instance, cleaning barn, milking, and taking care of calves are primarily decided by women alone with proportion of 64%, 98.5%, and 84.2% of the households in that order. On the other hand, decisions related to land preparation, planting, harvesting, and fertilizer application are primarily decided by the household heads (male) alone with proportions of 67%, 46%, 39% and 36% in that order.

Table 8. Distribution of households in terms of decisions on crop and livestock production

Decisions	Male alone		Joint but male dominating		Joint with equal contribution		Joint but female dominating		Female alone	
	No.	%	No.	%	No.	%	No.	%	No.	%
Crop choice	31	22.3	78	56.1	28	20.1	2	1.4	0	0
When and where to plant	39	28.1	85	61.2	13	9.4	2	1.4	0	0
Land preparation	93	66.9	43	30.9	3	2.2	0	0	0	0
Planting	64	46	66	47.5	6	4.3	2	1.4	1	0.7
Fertilizer application	50	36	69	49.6	19	13.7	1	0.7	0	0
Weeding	43	30.9	70	50.4	22	15.8	4	2.9	0	0
Harvesting	54	38.8	48	34.5	35	25.2	1	0.7	1	0.7
Storing	35	25.2	66	47.5	33	23.7	5	3.6	0	0
When to feed animals	6	4.3	32	23	17	12.2	39	28.1	45	32.4
When, where, and how often to allow grazing	5	3.6	32	23	6	4.3	17	12.2	79	56.8
Cleaning stable/barn	0	0	0	0	11	7.9	39	28.1	89	64
Milking	0	0	0	0	2	1.4	0	0	137	98.5
Taking care of calves	2	1.4	0	0	2	1.4	18	12.9	117	84.2

Source: Own survey result (2015)

4.1.4.3. Decisions on utilization of outputs

In terms of decisions on farm products utilization, women alone are found to have the major power to decide while men are more powerful on decisions related to crop outputs. In this line, 88.5% and 87.1% of the women are making independent decisions on milk processing and how much, where, and at what price to sale dairy products. On the other hand, decisions on how much, where, and at what price to sale crop are made by male alone in 8.6% of the households and by jointly with female while male is dominating in 33.1% of the households (Table 9).

Table 9. Distribution of households in terms of utilization of outputs

Decisions	How much and where to sell and at what price (crop products)		How much milk to process		How much, where, and at what price to sale dairy products	
	No.	%	No.	%	No.	%
Male alone	12	8.6	0	0	0	0
Joint but male dominating	46	33.1	0	0	1	0.7
Joint with equal contribution	40	28.8	3	2.2	2	1.4
Joint but female dominating	30	21.6	13	9.4	15	10.8
Female alone	9	6.5	123	88.5	121	87.1

Source: Own survey result (2015)

4.1.4.4. Decisions on revenues generated

Just like input and production decisions, females primarily dominate decisions on what to do with the revenues generated from livestock production. In this line, females independently decide on livestock revenue in 63.3% of the responds. When we look into the decisions on what to do with the revenue generated from crop, decisions are primarily made jointly with equal contribution of male and female in about 42.4% of the households (Table 10).

Table 10. Distribution of households with decisions on revenues generated

Decisions	What to do with the revenue generated from crop		What to do with the revenue generated from livestock	
	No.	%	No.	%
Male alone	7	5	0	0
Joint but male dominating	27	19.4	1	0.7
Joint with equal contribution	59	42.4	9	6.5
Joint but female dominating	16	11.5	41	29.5
Female alone	29	20.9	88	63.3

Source: Own survey result (2015)

4.1.4.5. Decisions on soil and water conservation measures

East Hararghe zone is known for its soil and water conservation practices. Its implementation requires proper decision in committing the required resources in order to put in place these conservation structures, be it biological or physical structures. The major physical measure of soil and water conservation in the study area is soil/stone bund construction while the major biological measure is tree planting. In this regard, the survey result revealed that the decisions are male dominated where the role of women is minimal. In 87.8% of the respondent households, the decision on physical soil conservation practice is solely made by the male household head alone. Likewise, 79.1% of the respondents reported that implementation of biological conservation measures is solely decided by the male head alone (Table 11).

Table 11. Distribution of respondents by the type of soil and water conservation measures

Decisions	Physical measures		Biological measures	
	No.	%	No.	%
Male alone	122	87.8	110	79.1
Joint but male dominating	14	10.1	27	19.4
Joint with equal contribution	2	1.4	1	0.7
Joint but female dominating	1	0.7	1	0.7
Female alone	0	0	0	0

Source: Own survey result (2015)

4.1.4.6. Levels of involvement and workloads

Women in general and in the study area in particular participate on three major roles: productive role, reproductive role, and community engagement role. Involvement in these roles basically consumes a lot of time leaving little or no time for leisure. In this regard, the women respondents (spouses) were asked the level of their satisfaction in terms of the workload they have in different farm household activities and in terms of extra leisure time. They have also been asked whether they are involving in community level decisions in terms of their roles in publicly speaking representing their household. The result revealed that more than one-third of the respondents have low or very low level of satisfaction in the workload they have in productive activities and more than two-third have low or very low level of satisfaction in reproductive activities (Table 12). This means, women members of the households are shouldering heavy workload as they involve in both reproductive and productive activities. They perform various farm activities in addition to their home duties. As a result, more than 71% of the women respondents have very low or low level of satisfaction in terms of leisure time they have for visiting their relatives and friends, listening to radio and TV programs, and other information providing services. In terms of airing their concerns by speaking in public, about 44% of them have low or very low level of satisfaction.

Table 12. Distribution of women respondents by level of satisfaction on workload and leisure time

Description	Very low		Low		Medium		High		Very high	
	No.	%	No.	%	No.	%	No.	%	No.	%
Workload in productive activities	30	21.6	20	14.4	50	36	37	26.5	2	1.4
Workload in reproductive activities	57	41	36	25.9	35	25.2	10	7.2	1	0.7
Speaking in public	19	13.7	42	30.2	31	22.3	15	10.8	9	6.5
Leisure time	48	34.5	51	36.7	29	20.9	9	6.5	2	1.4

Source: Own survey result (2015)

4.1.5. Women's Empowerment and the Five Domain Empowerment (5DE) Index

The major indicators of women empowerment which are taken as components of the Five Domain Empowerment (5DE) are five, as also explained under methodology part. These are production, resources, income, leadership, and time allocation decisions. These are further divided in to ten sub-components. These components are evaluated using different variables under this study as follows:

Production

1. **Input in productive decision:** Here, decisions on the type of crops to produce, where and when to plant the crops, when and where to take animals for grazing, and the likes.
2. **Autonomy in production:** Under this, decisions on use of inputs, purchase of agricultural tools and implements, hiring labor for crop and livestock activities, land preparation, planting, fertilizer application, weeding, harvesting, storing, cleaning stable, milking, taking care of calves, seeking extension advice, seeking veterinary cares, use of inputs (forage supplements and AI) for livestock, and how much milk to process.

Resources

3. **Ownership of assets:** Under this sub-indicator, ownership of assets like agricultural land, livestock, farm equipment, house, and household durables are considered.
4. **Purchase, sale, or transfer of assets:** Under this sub-indicator, decisions on how much, when, and at what price to sell crop output and how much, when, and at what price to sale dairy products are considered.
5. **Access to and decision on credit:** Here, decisions on whether to borrow or not and amount of money to borrow are considered.

Income

6. **Control over use of income:** Here, decisions on what to do with the revenues generated from crops and animal/dairy products are considered.

Leadership

7. **Group member:** Under this sub-indicator, decisions on membership to cooperatives and to other women groups are considered.
8. **Speaking in public:** This is based on decisions about speaking in public on behalf of the household on various community related issues.

Time decisions

9. **Workload:** This is related to the level of satisfaction of women in terms of workload in productive and reproductive activities.
10. **Leisure:** This is based on the level of satisfaction on getting extra leisure time for visiting relatives/neighborhood, listening to a radio and TV programs, and socializing events.

These ten sub-indicators are then converted into score indices based on Equation 1 indicated under methodology section, and then aggregated into one index/score using the weights given to this sub-indicators as explained under Conceptual Framework of the Literature Review chapter (Table 1). Descriptive results of these indices are indicated in Figure 3 below.

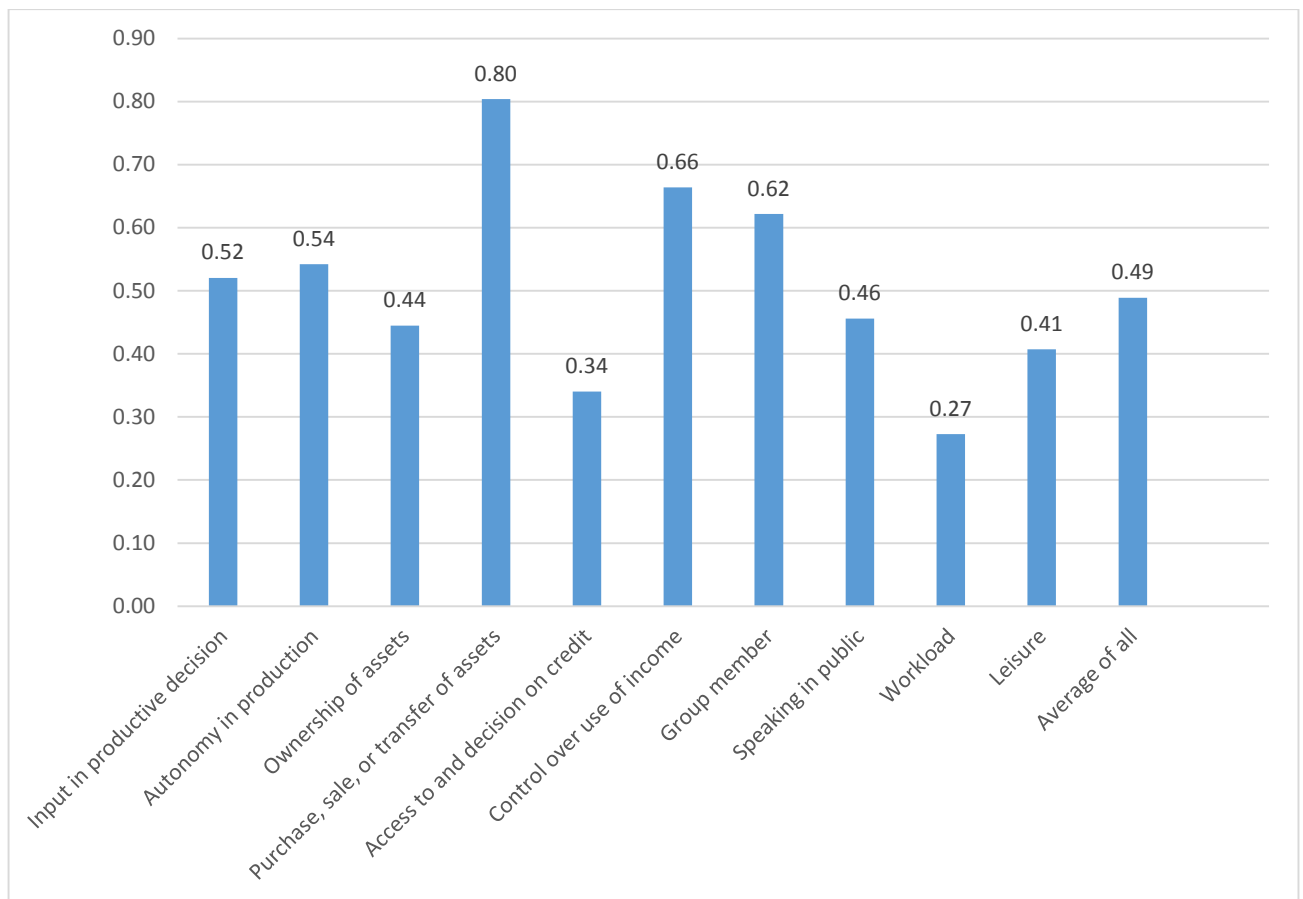


Figure 3. Average score of the ten sub-indicators of empowerment

The level of empowerment of women is good in terms of decisions on purchase, sale, or transfer of assets. It is also better in terms of decisions on control over use of income and group membership. However, the level of satisfaction of women in terms of the workload they shoulder is very less. This implies that women are burdened with activities other than reproductive work at home. They involve in farming as well. Furthermore, the result also revealed that they have very short leisure time and hence less level of satisfaction on it. Women's empowerment based on the other indicators are as indicated in Figure 2 above.

After considering the weights assigned for each indicators, the 5DE is computed using Equation 2 under Methodology part. Higher values indicate greater empowerment. An individual who has achieved 'adequacy' in 80% or more of the weighted indicators is considered to be empowered. The computation takes into account the percentage of women that are empowered

(He), percentage of women who are not empowered (Hn), and percentage of dimensions in which disempowered women have adequate achievements (Aa) as in Alkire *et al.* (2013).

Table 13. The Five-Domain Empowerment (5DE) Index Computation

Indices	Values
Disempowered head count (Hn)	91.2%
Empowered head count (He)	8.8%
Average Inadequacy score (An)	0.34
Average adequacy score (Aa)	0.66
5DE index = [He + (Hn x Aa)]	0.70

Source: Own survey result (2015)

The 5DE value is 0.7. Overall, only about 8.8% of women have achieved adequate empowerment. This implies that a lot has to be done to improve women's empowerment. Those who have not yet empowered (i.e. with score less than 0.8) have no adequate achievement in 34% of the dimensions. On the other hand, those who are disempowered have adequate achievements in 66% of the domains.

4.2. Econometric Results

It is indicated that the level of women's empowerment is very low. It is, therefore, necessary to assess the factors that are affecting the empowerment level. The dependent variable here is the average score of the 10 indicators where the mean value is 0.49 (Figure 3). As the values for the dependent variable are continuous, multiple linear regression model is applied to assess the factors. The model output from this model is indicated in Table 13 below.

Multicollinearity was checked using VIF and the result indicated that there is no serious problem of collinearity among the explanatory variables as individual VIF values are all less than 2 with mean value of 1.36.

Breusch-Pagan/Cook-Weisberg test for heteroscedasticity also resulted in acceptance of a null hypothesis that says variance of the disturbance term is constant (Chi-square value of 1.22;

Probability of chi-square of 0.2701). This means that there is no problem of heteroscedasticity. Furthermore, the insignificant F-value of 1.31 under the Ramsey' RESET test indicated that there is no problem of omitted variables.

The model's F-value is found to be significant indicating that the independent variables reliably predict the level of decision making by women (the dependent variable). The model R-square also indicated that 63.3% of the variation in the dependent variable is explained by the independent variables. These are indications that the model fits the data and it is worth interpreting the regression coefficients (Table 14).

Table 14. Output of the multiple linear regression model of empowerment

Variables	Coefficient.	Std. Err.
Progressiveness (model as compared to non-model farmers)	-1.995	1.729
Age of the household head	0.063	0.117
Level of education of the household head	1.237***	0.461
Family size	0.172	0.325
Access to irrigation	2.485*	1.425
Land holding	-3.702**	1.843
Participation in credit (borrowing)	-3.767**	1.565
Average home-farm distance	-0.998	0.904
Market distance	0.996**	0.393
Livestock holding (TLU)	0.083	0.289
Age of the spouse (wife)	0.232**	0.105
Level of education of the spouse (wife)	0.543	0.361
Cooperative membership of the spouse (wife)	-1.431	1.492
Constant	40.859***	4.151
Observations		
F-value	5.91***	
R-squared	0.633	
Mean VIF	1.36	
Breusch-Pagan test for heteroscedasticity, chi2	1.22	
Ramsey RESET test for omitted variables, F (3, 107)	1.31	

Note: *, **, and *** indicate significance at 10%, 5%, and 1% levels.

Source: Own survey result (2015)

Level of education of the household head (male) positively affected decision-making power of the spouse (women). As level of education of the head increases by one year of schooling, decision index increases by 1.2 percent. This implies that besides women's education, husband's education improves women's empowerment. This is in line with a study by Becker *et al.* (2016). As the heads get educated, they have the chance to be exposed to various information and to understand that women's involvement in households' activities is very decisive.

Similarly, access to irrigation positively affected women's empowerment. The level of decision making of women in a household with access to irrigation is 2.5 percent higher than those without irrigation access. This is related to the multiple uses and functions of irrigation for health and nutrition, for which women are key actors (Domènech, 2015). This is particularly true in Hararghe highlands where irrigated farms are usually used for intensive cultivation of nutritionally rich vegetables. As a positive effect of income on women's empowerment is verified by other studies (Kabeer, 1999; Katz, 1997), poorer households who take credit for securing farm inputs had lesser women's empowerment for women.

Land is key to a life with dignity and a basis for entitlements and hence empowerment. The result, however, indicates that it negatively affected women's empowerment. As land holding increases by one hectare, the level of decision making of women decreases by 3.7 percent. This might be related to the fact that the decision to purchase, sale, or transfer land is usually made by male members (Alkire *et al.*, 2013). In this case, households having bigger land are expected to involve in sharing out and renting out of farmlands. This gives more weight of decisions to male as compared to that for the female.

Participation in credit negatively affected women's empowerment. Level of decision making of households who participated in credit is less than those who do not participate in credit by 3.7 percentage points. This might have happened because there may be no effective control by women over income going into the household and no material benefits for women. Men may control the income even from women's economic activities and/or may expect women to use all their income for pre-determined household expenditure (Kato and Kratzer, 2013). Furthermore, households who usually participate in credit are those with lesser income as rich farmers can get farm inputs from own income without taking credits.

Market distance is found to affect women's empowerment positively. This is against our expectations. The possible reason could be related to the fact that as distance increases, the purpose of production changes from market to consumption. Households at a distance produces more for consumption as compared to producing to market (Buckmaster *et al.*, 2014). In this regard, if women were more empowered on decisions related to consumption leaving more power for men to decide on market, the positive effect of distance on empowerment would be justifiable.

Age of the women positively and significantly affected her empowerment. As age increases, experience and exposure to various gender-related rights and responsibilities increases, ultimately increasing women's empowerment in farm household decisions.

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. Summary and Conclusions

In order to assess women's role and contribution to farm household decision making, and to assess factors influencing women's level of participation in household decision-making process, data were collected from 140 male-headed farm households from three *Woredas* in East Hararghe zone. Data were collected from both the household head (male) and the spouse (female) using structured survey questionnaires.

Both descriptive and econometric analytical tools were applied to analyze the data. Women empowerment index (WEI) was computed based on the 5-domain indicators (5DEs) which are measured in a five-level Likert scale method. Multiple linear regression model was applied to analyze factors affecting women's empowerment taking the empowerment, which is indicated as a percentage, as a dependent variable.

The survey result shows that the average age of the household heads is about 38 years while that of the spouses is 36 years; average family size is about seven persons with dependency ratio of 1.34; about 56% and 24% of the household heads and spouses are literate, respectively; average land holding is about 0.6ha fragmented into about 3 plots on average; average land holding is 4 TLU; households annually earn about 21 thousand birr on average; about 31% of the households contacted extension agents every week while 7.5% had no contact at all; and only 13.3% of the households had access to credit.

Women's decision-making power is better for activities related to livestock production while all activities related to crop production are dominated by their men counterparts. In terms of decisions on farm products utilization, women alone are found to have the major power to decide while men are more powerful on decisions related to crop outputs. Just like input and production decisions, females primarily dominate decisions on what to do with the revenues generated from livestock production. When we look into the decisions on what to do with the revenue generated from crop, decisions are primarily made jointly with equal contribution of male and female in about 42.4% of the households.

The major physical measure of soil and water conservation in the study area is soil/stone bund construction while the major biological measure is tree planting. In this regard, the survey result revealed that the decisions are male dominated where the role of women is minimal.

The level of empowerment of women is good in terms of decisions on purchase, sale, or transfer of assets. It is also better in terms of decisions on control over use of income and group membership. However, the level of satisfaction of women in terms of the workload they shoulder is very less. This implies that women are burdened with activities other than reproductive work at home. They involve in farming as well. Furthermore, the result also revealed that they have very short leisure time and hence less level of satisfaction on it. Overall, only about 8.8% of women have achieved adequate empowerment. This implies that a lot has to be done to improve women's empowerment.

The multiple linear regression model result indicated that level of education of the household head (male), access to irrigation, market distance, and age of the women positively affected decision-making power of the women while land size and access to credit negatively affected women's empowerment.

5.2. Recommendations

The result of the women empowerment index showed that women are not adequately included in farm households' decision-making. In a situation where there is lack of women's equitable access to assets and decisions, it is very difficult to attain a nation's economic development goals. Women's economic empowerment is a prerequisite for sustainable development. Achieving women's economic empowerment, therefore, requires sound public policies that recognize the roles of women in the community. These may include designing infrastructure programs that benefit both men and women especially by recognizing women's vast unpaid work.

Level of education of male has positively affected women's empowerment. It is, therefore, necessary to strengthen adult education both for male and female members of the community to create awareness on gender roles and responsibilities. It is also necessary to offer trainings to

broaden understanding of the community on the positive roles played by women members in farm household activities.

Access to irrigation has positively affected women's empowerment. It is, therefore, necessary to encourage use of irrigation and to support farmers in terms of constructing small-scale irrigation facilities where water resources are available. This would improve economic empowerment of the households in general and women's empowerment in particular.

It is necessary to devise strategies to decrease workload of women in rural households. This could be done by introducing labor saving technologies, among others, for performing household activities. Intervention strategies in rural households should also consider how to address the needs of women, besides considering that of men. In addition, it is necessary to pay attention to lack of control over resources and lack of control over income as these are the major contributors to disempowerment.

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7. APPENDICES

Appendix Table 1. Conversion factors used for computing tropical livestock units (TLU)

Animal Category	TLU
Calf	0.25
Weaned calf	0.34
Heifer	0.75
Cow or ox	1.00
Horse	1.10
Donkey (adult)	0.70
Donkey (young)	0.35
Sheep or goat	0.13
Chicken	0.013

Source: Storch *et al.* (1991)

Appendix Table 2. Conversion factors used for computing adult equivalent (AE)

Age group (years)	Adult equivalent	
	Male	Female
Less than 10	0.60	0.60
10-13	0.90	0.80
14-16	1.00	0.75
17-50	1.00	0.75
Greater than 50	1.00	0.75

Source: Storch *et al.* (1991)

Appendix Table 3. VIF for checking severity of multicollinearity

Variable	VIF	1/VIF
Age of the spouse (wife)	1.83	0.546410
Livestock holding (TLU)	1.57	0.636227
Progressiveness (model vs non-model farmers)	1.56	0.641266
Age of the household head	1.55	0.643816
Level of education of the spouse (wife)	1.38	0.725995
Land holding	1.29	0.775068
Family size	1.28	0.783153
Cooperative membership of the spouse (wife)	1.27	0.785272
Market distance	1.23	0.811556
Access to irrigation	1.22	0.819888
Level of education of the household head	1.19	0.838100
Average home-farm distance	1.17	0.855303
Participation in credit (borrowing)	1.09	0.918837
Mean VIF	1.36	

Appendix 4. Survey Questionnaire

To be filled by the enumerator

1. Name of the household head _____
2. Woreda _____
3. Kebele _____

I. Household characteristics

Name of the respondent /HH head/	What type of farmer are you? 1=Model 2=Follower	Sex of HHH Male=1 Female = 2	Age ---years		Education Level		Are there educated household members who influence HH agri. Production decision?		Family size				
			Of HH H	Of Spouse	HHH	Spouse	yes=1 no=2	His/her Education level?					

Household head experience in farming? (record in number of years) _____

II. Resource endowment

1. Number of animals _____ number of animals in TLU _____
2. Number of oxen _____
3. Perennial crops 1. _____ 2. _____ 3. _____
4. House type 1. Corrugated iron sheet _____ 2. Thatched roof _____ 3. Cement/concrete roof _____ 4. Others _____
5. Access to irrigation 1. Yes 2. No

6. plot **level information**

Land size in timad _____

Number of plots _____

	Description	Size in timad	Ownership	Distance from home	Slope	land use	Rain fed /Irrigated
1							
2							
3							
4							
			1=own 2=rented in 3=rented out 4=share cropped in 5=share cropped in	In km	In percentage	1=crop land 2=grazing 3=backyard 4=others	1=rain fed 2=irrigated

III. Access to services

Access to services		If yes, what kind?	(more than one response can be recorded)
Extension service	yes=1 no=2	1. technical advice 2. inputs	

		3. training 4. credits	
Credit	yes=1 no=2	1. In kind (fertilizer and seeds) 2. Cash	
Input supply	yes=1 no=2	1. Improved seeds 2. Fertilizer 3. Herbicide and pesticide 4. Farm implements	

7. How far is, on average, your farm from your home _____ km
8. Distance to nearest plot _____ km distance to furthest plot _____ km
9. How far is your home from the nearest all weather road _____ km
10. How far is your home to the nearest market _____ km
11. How far is your home to the nearest woreda market _____ km
12. How far is your home to farmers training centre (FTC) _____ km
13. How far is your home to the nearest cooperative centre _____ km
14. Are you members of cooperatives 1.yes 2.no
15. What benefits do you get from cooperatives membership 1. Market to my products 2.credit 3. Inputs 4. Education 5. I don't know 6. Others _____
16. How often do you have contact with the extension agents 1=every day 2=every week 3=every fortnight 4=every month 5=no contact at all

IV. Improved technology application

17. Have you ever used any improved technology or practice? 1.yes 2.no

If yes list down the improved technology you used for the last five years (it could be in crop, livestock and natural resource management)

Time					Amount of land covered or number of improved breed		
------	--	--	--	--	--	--	--

	type of technology or practice used		Technology/p practice used		owned conservation measures or		Modification on technology or practice (yes=1 no=2)	if yes, specify modifications made
					local	improved		
	crop production							
	livestock production							
	natural resource							
	others(specify)							

Technology or practice used

- Varieties _____1
- Recommended chemical fertilizer _____2
- Sowing methods _____3
- Post harvest technology _____4
- Improved animal Breeds _____5
- Feeds _____6
- Management _____7
- Conservation practices _____8
- Crop rotations _____9
- Fallowing _____10
- Agro-forestry _____11
- others (specify) _____12

V. Attitudes and perception

Indicate your level of agreement or disagreement for the issues raised in the following table

	1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. strongly disagree
The extension service you received helped you to use improved technology	
The use of Improved technology gives me a better income	
Access to credit helped you to use improved technology	
Your farming problem is solved by your indigenous knowledge	
The use of technology supplied by the various institutions is waste of time and money.	

VI. Technological attributes

18. When you decided to use a new technology what of its attribute is important? rank the following from 5 to 1, give highest the one which you think is the most important

S. No	List the technology the household	Technological attributes				
		1. Easy to implement and apply 2. Cheap initial investment 3. Provide high economical gain (yield, income, taste) 4. Technical compatibility to previously used techniques 5. Fit the farming system (environmentally sound)				
		Give rank for the five attributes (1-5)				
		1	2	3	4	5
1	Crop					

2	Livestock					
3	Natural resource					

1= very poor

2=poor 3=fair

4=good 5=very good

VII. Social capital

19. Are you or someone in your household a member of any formal or informal groups, organizations or associations? [Probe: Who in the household belongs to which group? Are there any other groups or informal associations that you or someone in your household belongs to?]
20. Do you consider yourself/household member to be active in the group, such as by attending meetings or volunteering your time in other ways, or are you relatively inactive? Are you/household member a leader in the group?

Household member	Type of organization/ association or group	Degree of participation
	<i>Type of organization</i>	<i>Degrees of participation</i>
		Leader.....01
	Farmers development group.....1	Very active.....02

	Cooperative/cooperative Union.....2	Somewhat active...03
	Credit/finance group (Eg. Equb.....3	Not active.....04
	Religious group or spiritual group (e.g. church, mosque, temple, informal.....4	Only member.....05
	Mutual support association (Edir).....5	
	Political group(Cabinee/ Mlitia)6	
	Labor exchange group(Debo, Wonfel).....7	
	Women's group(women's Edir).....8	
	Ethnic-based community group.....9	
	Others10	

II. General (for Women respondent)

1. Name of the respondent (female member of the household): _____
2. Age: _____ years.
3. Level of education: _____ grades or years of schooling (put 'o' for illiterate)
4. Membership to association/cooperatives 1 = Yes 0 = No
5. If yes, what type of association/cooperatives? _____
6. Marriage structure 1 = Monogamous 2 = Polygamous

II. Involvement in decision making

Put a tick (✓) mark where appropriate based on the level of involvement in decision making.

s/n	Areas of decision making	Male alone	Joint but male dominating	Joint with equal contribution	Joint but female dominating	Female alone
A	Decisions in crop production					
1	Who decides to share or rent land?					

2	Who decides what crops to produce?					
3	Who decides where and when to plant which crops?					
4	Who decides on use of inputs (e.g., whether to use fertilizer, pesticides or herbicides; or where and how much to purchase)?					
5	Who decides on purchase of agricultural tools and equipment?					
6	Who decides on irrigation and which crops to be irrigated?					
7	Who decides on hired labor?					
8	Who decides on how much and where to market the produce/crop and at what price?					
9	Who decides on what to do with the revenue generated from sales?					
B	Decisions in livestock operation					
1	Who decides when to feed animals?					
2	Who decides to take animals for grazing (i.e., when, how often and where)?					
3	Who decides on veterinary care for animals?					
4	Who decides on use of inputs (e.g., whether to use forage supplements, artificial insemination)?					
5	Who decides on hired labor?					
6	Who decides how much milk to process?					
7	Who decides on how much and where to market the dairy products and at what price?					

8	Who decides on what to do with the revenue generated from animal or dairy products sales?					
C	Decisions in natural resource conservation activities					
1	Who decides on physical measures of SWC (eg. Soil or stone bund construction)?					
2	Who decides on biological measures of SWC (eg. Tree planting)?					
D	Others					
1	Who decides on whether to borrow or not?					
2	Who decides on the amount of money to borrow?					
3	Who decides on seeking extension advice for farm activities?					

III. Involvement in labor contribution

Put a tick (✓) mark where appropriate based on the level of labor contribution by male and female members of a household.

s/n	Activities requiring labor	Male alone	Joint but male dominating	Joint with equal contribution	Joint but female dominating	Female alone
A	Labor contribution in crop production activities					
1	Land preparation					
2	Planting					
3	Fertilizer application					
4	Weeding (manual)					
5	Irrigation					

6	Spraying (e.g., pesticides)					
7	Harvesting					
8	Storing					
9	Marketing					
10	Processing					
B	Labor contribution in livestock production activities					
1	Marketing					
2	Feeding (hand feeding)					
3	Feeding (grazing)					
4	Cleaning stable					
5	Veterinary care/services					
6	Selling of produce					
7	Processing – milk, cheese					
8	Milking					
9	Taking care of new born					
C	Labor contribution in natural resource conservation activities					
1	Soil/stone bund construction					
2	Tree planting					

IV. Decisions Related to Other Indicators

s/n	Indicators	1 (low)	2	3	4	5 (High)
1	Speaking in public to help decide on infrastructure to be built					
2	Speaking in public on behave of the household or the community					

3	Workload in productive activities					
4	Workload in reproductive activities					
5	Level of satisfaction for using leisure time for visiting relatives or neighbors, listening to a radio, etc.					
6	Overall confidence on whatever decisions you make					