

**PRA Report of Participatory Gender Analysis of Sorghum Production,
Processing and Utilization in Selected Sorghum Growing Areas of Western
Oromia, Diga District**

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Acronyms

BARC: Bako Agricultural Research Center

FGD: Focus Group Discussion

FHH: Female-headed household

KII: Key Informant Interview

MHH: Male-headed household

PASDEP: Plan for Accelerated and Sustained Development to End Poverty

Executive Summary

A participatory rural appraisal (PRA) was carried out in Diga woreda, located in Eastern Wollega zone in Oromia Region. The study covered three rural kebeles, namely *Lalisa Dimitu*, *Bechbech* and *Arjo Qonan Bula*. The main objective was to assess the different roles and activities of women and men in sorghum production, to analyze the gender differences in decision-making and benefit-sharing of sorghum production activities, and to identify potential constraints affecting women and men farmers in sorghum production activities. Sample respondents were selected and focus group discussions were held with separate groups of female and male farmers. PRA tools such as matrix ranking, pair-wise ranking, focus group discussion, proportional piling, and key informant interviews were used.

Focus groups in each study kebele indicated that women played vital reproductive roles in communities, which consumed more of their time than men. Women also were found to have limited access to productive resources, decision-making power and control over resources. Access, power and control were maintained mostly by men in the community.

The study results also discovered constraints to sorghum production and prioritized them based on their importance using pair-wise ranking. These constraints included low/poor soil fertility, lack of improved seed, weak extension services, low price of sorghum produce, high price of fertilizer, bird attack, and lack of credit facilities. Despite the fact that women in the study area played key roles in sorghum production, decision-making power was left mostly in the hands of men. In spite of the many farming activities women performed, they were not perceived as farmers or agricultural decision-makers. This study also revealed that though there were changes occurring within some households (i.e., some men consulted with women about money from the sale of sorghum), men were still considered the heads of household and the principal decision-makers. It also was noted that men often were more involved in control over bulk sales of sorghum while women had control over small sales of sorghum grain.

Sorghum production in the area declined over the last 10 years, and consolidated efforts are required to solve the constraints on its production. In addition, it is essential to create awareness of women's roles in both productive and reproductive activities in the community, and women need more power in decision-making and control over productive resources.

1. Introduction

1.1. Sorghum Production in Western Oromia

Sorghum is one of the most widely cultivated and consumed cereals in Western Oromia. It ranks third after maize and teff in total production, second after maize in productivity and third after teff and maize in area harvested (CSA BoFED, 2016-17). Sorghum is also an important crop in east Wollega Zone, where it is the second ranked crop in terms of area coverage, after maize. Sorghum is primarily a resource crop for poor small-scale farmers and is grown predominantly under adverse conditions such as low-input use and marginal lands. In Diga woreda, sorghum plays a vital role in achieving food security, and the crop is one of the leading traditional food crops in the area.

Sorghum is also a multipurpose crop: the grain is used for making *injera* (large round pancake made from fermented dough) as well as *tella* and *areke* (local alcoholic beverages); it is consumed in both boiled and roasted forms; sorghum stalks are an essential source of livestock feed during the dry season; and sorghum stalks are used as firewood and fencing material (Reddy *et al.*, 2005). Despite the crop's importance for food, feed, fuel, income and construction, most sorghum-growing farmers grow local cultivars and lack awareness of improved sorghum farming technologies. There is a deficiency in popularizing and disseminating improved varieties to suitable agro-ecology: neither the adaptability of the varieties for all agro-ecologies nor farmers' specific preferences are considered. This has impacted the adoption of the technology.

1.2. Reflections on Gender Perspective in Agriculture

Rural women in western Oromia represent a tremendous productive resource in the agricultural sector. They are major contributors to the agricultural workforce, either as family members or in their own right as heads of household.

In the study area, there are a number of cultural practices or beliefs impacting gender roles in sorghum production and utilization. Socio-cultural factors (such as attitudes toward women's work and the culturally ascribed roles of women) are used to explain the levels and trends of women's participation in the labor force. In many parts of the county, including western Oromia, women play a subordinate role and there is a gender disparity in technology adoption (World Bank and IFPRI 2010); men believe that women's work is marginal or subsidiary to what men do: men consider the work of women as a wifely duty, rather than an

occupation. Similarly, both women and men consider that men are responsible for any “heavy” and “important” tasks while women are in charge of the household.

PRA results revealed that, because the work of women is perceived as ‘less important’, women enjoy less privilege within the community. Within a context of patriarchal values that measure work as “heavy” and “important”, women's work and economic contributions tend to be viewed as supplementary to men's work and breadwinning function. An implicit assumption is made that a woman acts as a mother and housewife; any productive work she carries out is considered an extension of her primary function and therefore socially secondary. This belief is amplified in the case of rural women. In Western Oromia, the norms, values and social structures created by these rigid patriarchal beliefs create mechanisms that hide rural women's contributions to production and utilization and maintain the image of female dependency on men.

Moreover, literature on gender and agricultural production focuses on women in female-headed households and treats them in relation to men in male-headed households. Almost all of the above facts about rural women apply to women in female-headed households. The situation of married women in male-headed households is not adequately addressed.

This study attempted to fill this gap by describing the different roles and activities women and men performed in sorghum production and analyzing the gender differences in decision-making and benefit sharing. It identified potential constraints affecting male farmers as well as women in MHHs and FHHs in the sorghum production activities in three selected rural kebeles of Diga woreda.

1.3. Objectives

The specific objectives of the study were to:

- assess the different roles and activities women and men perform in sorghum production;
- analyze gender differences in decision-making and benefit-sharing of sorghum production activities; and
- Identify potential constraints affecting female and male farmers in the area's sorghum production activities.

2. Methodology

2.1. Description of the Study Area

Geographically, the district is located in the western part of the zone extending between 8°56'40"- 9°18'15"N longitude and 36°07'50" - 36°32'50"E latitude. It has 21 rural kebeles and two rural towns, one of which, Nekemte, is 345 km west of Addis Ababa. Diga woreda is bordered in the south by Guto Gida and Leka Dulacha, in the west by Gimbi, in the northwest by Sasiga, and in the east by Guto Gida woredas (Figure 1). The woreda is divided into three agro-ecological zones. Three representative kebeles (Arjo Qonan Bula, Bechbech, and Lalisa Dimitu) were selected from the region based their potential for sorghum production and accessibility (Table 1).

Table 1. Description of Selected Kebeles

Kebele	Agro-climate	Average altitude (m)	Location	Respondents selected		
				FHH	Married Women	MHH
Lalisa Dimitu	Lowland	1300	E036.22221 ⁰ N09.07848 ⁰	9	16	22
Arjo Q/Bula	Midland	1342	E036.25925 ⁰ N09.04414	10	14	20
Bechbech	Lowland	1293	E036.19633 ⁰ N09.03019 ⁰	12	18	21

Source: 2017 Study Survey Results

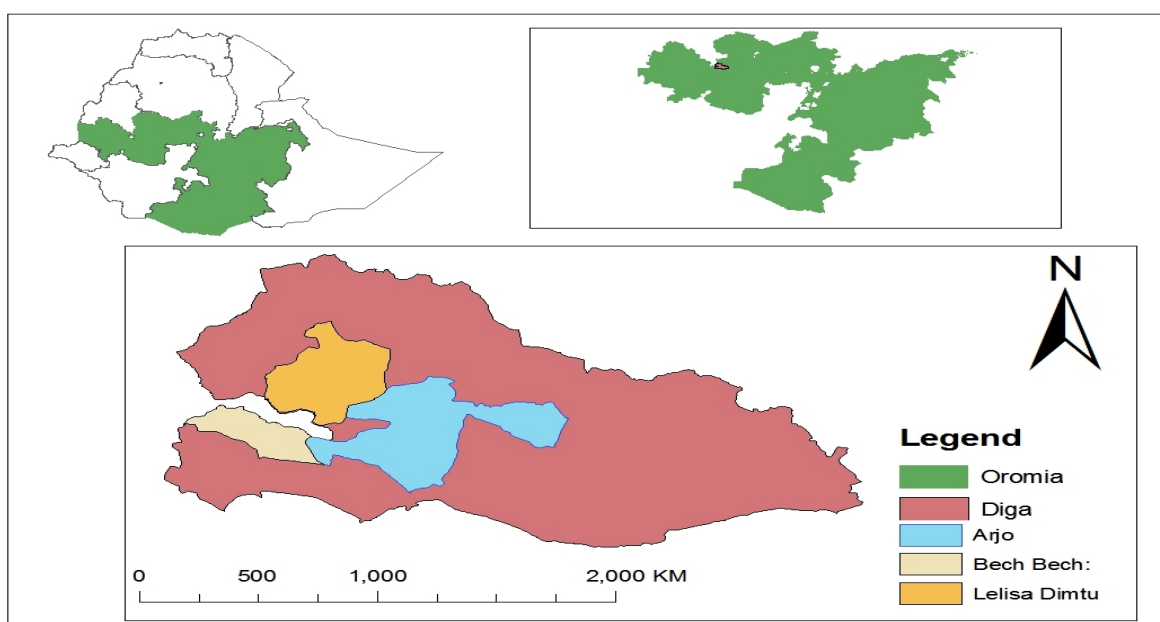


Figure 1. Location map of the study area.

2.2. Selection of Study Sites and Respondents

A multi-staged sampling procedure was used to select the district, kebeles and respondents.

For this PRA study survey, three study groups participated separately in FGDs: men from MHHs, married women from MHHs and women from FHHs. Study group selections were made using recommendations from kebele officials and woreda extension workers. A total of 31 women from FHHs, 48 married women from MHHs and 63 men from MHHs were interviewed. Participants represented different ages and socio-economic status. Key informants also were selected purposively from each study group category; they were farmers from FHHs, MHHs and married women. In the three study kebeles in Diga woreda, the research team conducted a total of nine FGDs and 12 key informant interviews (involving study groups, district experts, Development Agents and WARDO personnel).

2.3. Data Analysis Methods

Both qualitative and quantitative data were analyzed. Qualitative data were analyzed and summarized based on the results from specific PRA tools. Quantitative data were used to explain sorghum production patterns, household demographics and the agricultural potential of the targeted districts. In this regard, for quantitative analysis, descriptive statistics such as frequency, percentages, and graphs were used.

Note that some figures and other data refer to the Ethiopian calendar (E.C.). This calendar differs from the Gregorian calendar used in most countries around the world. A year in the E.C. is 13 months long: 12 months have 30 days each, and the last month of the year has five days in a common year (six days during a leap year). This results in a calendar that is seven to eight years behind the Gregorian calendar.

3. Results

3.1. Economic Overview of Diga Woreda

The majority of the population in Diga woreda lives in rural areas and works in agricultural production. According to CSA figures, 95% - 97% of the woreda's households engage in agricultural production, both crop and livestock (CSA, BoFED, 2008). The area predominantly grows food crops – the three most important are maize, sorghum and finger millet. Some kebeles also produce vegetables, fruits and coffee. According to data obtained from the woreda BoA, in the 2008-2009 production year, an estimated 31,491 hectares of land was planted with cash and food crops including vegetables, fruits and coffee.

3.2. Demographic Characteristics

According to figures obtained from the 2007 population and housing census, the estimated population breakdown within Diga woreda is 130,163 (50.44%) males and 127,873 (49.55%) females. Nineteen percent of the woreda's populations are urban dwellers, which is more than the Zone's average of 10.7%. The crude population density of the woreda in the year 2009 was 103.5 people/km². The average family size for the woreda is five people per family; families average seven people per family in rural areas, and three people per family in urban areas.

3.3. Agro-ecology of the Study Area

According to agro-ecological classifications, Diga woreda is divided into three agro-ecological zones: highlands (*Dega*, elevation 2001-2350 m), mid-altitude (*Woina Dega*, elevation 1451-2000 m) and lowlands (*Kolla*, elevation 200-1450 m). The larger proportion of the area (45%) is considered mid-altitude, while the highlands and lowlands constitute 20% and 35% of the area, respectively. Mountains and plains cover large parts of the woreda. The altitude ranges from 800-2400m above sea level (CSA, BoFED, 2007). Annual rainfall ranges from 891-1900 mm, and average temperatures vary from one agro-ecology to the other, ranging from 12-30° C. The district has a unimodal rainfall pattern with single rainy seasons.

3.4. Uses of Sorghum in Diga Woreda

FGDs were used with study groups to identify the importance of sorghum production in the study kebeles. According to participants in the study area, sorghum was used to prepare different food types and local beverages, animal feed, construction (housing and fencing), fuel, and as a source of family income. Local food prepared from sorghum included *injera*, *kita* (local bread), porridge and local alcoholic beverages (*tela*, *areke* and *keribo*); sorghum also was consumed as roasted and boiled grain. Sorghum stalks were used as a year-round source of fuel and as highly valuable housing and fencing materials. According to FGD participants, sorghum was a major source of animal feed; both stalks and threshed heads were stored and used as feed during the dry season.

3.5. Participation in Extension Services

The purpose of agricultural extension services (advice and training) is to enhance farm production and productivity and will improve household incomes. Extension services provided to woreda farmers included advice and training on crop production, livestock production and environmental protection. The advice and training on crop production in particular included the importance of repeated ploughing, sowing at the appropriate time and season, protecting crops from pests and using pesticides appropriately.

FGD results suggested that many of these formal extension services were oriented generally toward the head of household. Because most heads of household in the study area were male, women received limited extension and training services. During FGDs across the selected kebeles, married women identified reasons why they received limited accesses to extension services, including the fact that, because extension team leaders were predominantly male, they could not approach married women due to cultural barriers. As a result, women in MHHs across selected kebeles often did not access direct training on agronomic practices. Most of the interviewed women and men indicated that married women learned methods of row planting and improved weeding practices from their husbands.

Extension services are important for diffusing technology and good practices. These services are critical for both women and men, but female farmers in MHH and FHH tend to have less access to them because agricultural extension services were typically provided to male household heads. It was assumed that the head of household (usually male) communicated the extension messages to other family members. This traditional extension approach – where families are seen as a unit – failed to address intra-household dynamics. Gender specialists argue that the household is not a unit but a collective, where members have different needs

and interests which do not always match (Frank, 1999). The assumption that the needs of women will be addressed when their male counterparts receive agricultural extension services has proved to be unrealistic (Frank, 1999).

3.6. Access to Productive Resources

Farmers indicated several practical needs for agricultural production in the study area. These included, but were not limited to, access to agricultural inputs (e.g., fertilizers, selected seeds and pesticides), agricultural extension services, and credit. Farmers considered access to credit as means to fulfill their input requirements such as; purchasing fertilizer and seed for their farm, as well as to satisfy certain household needs.

Despite the fact that access to credit is one of the major needs for agricultural production and productivity, only a few households had access to it. The majority said they could not secure access to credit because in order to receive credit both husband and wife must apply and sign for the credit, even if only one of them takes the loan. Married spouses in the study area reported both wives and husbands had joint access to credit. In the case of women from FHHs, the household head applied for and received any credit on her own.

According to FGD findings, only a few households across selected kebeles had access to modern agricultural inputs like chemical fertilizers, improved varieties and pesticides. Small farm plots, lack of cash to buy inputs, and availability of traditional inputs were identified as major factors that hindered households from accessing modern agricultural inputs.

In the study area, spouses owned land jointly. In fact, no married man was found to own separate plots of land in the study district, and no married woman was found to have land registered in her name alone. This is exactly similar to the conclusion reached by Yigremew (2001) that, when women become heads of households, only then will they directly own their own lands.

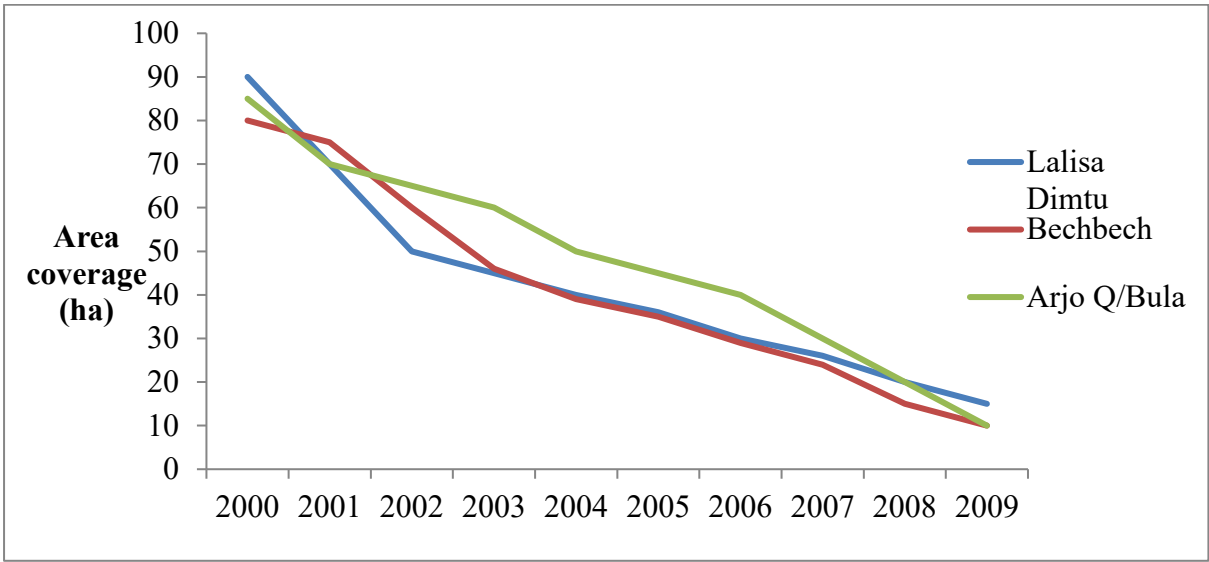
3.7. Trends of Sorghum Production in the Study Area

3.7.1. Sorghum trends: responses of wives and FHHs.

Female FGD participants said that sorghum production trends decreased in the last 10 years in both area coverage (Figure 2) and productivity due to shortages of improved varieties, oxen, and land. Generally, the downward trend in sorghum production not only was due to the issues listed above, but also because local farmers treated sorghum as an inferior crop. They planted sorghum on marginal land, considered sorghum low-input and

neglected it. The majority of farmers never applied pesticides or other chemicals to prevent insect infestations or disease; they said this was because they had limited access to these chemicals and lacked the capital to purchase them.

Because there was little access to improved varieties, farmers largely used local sorghum cultivars selected for yield potential, but these cultivars did not have strong insect resistance. Very few farmers destroyed sorghum residues after harvest. The majority of farmers grew sorghum using a single-cropping system rather than intercropping, mainly because they lacked knowledge regarding yield benefits under intercropping systems. Crop rotation in sorghum fields was not practiced widely in the kebele due to land shortages and lack of awareness of its benefits.



Source: 2017 FGD survey results

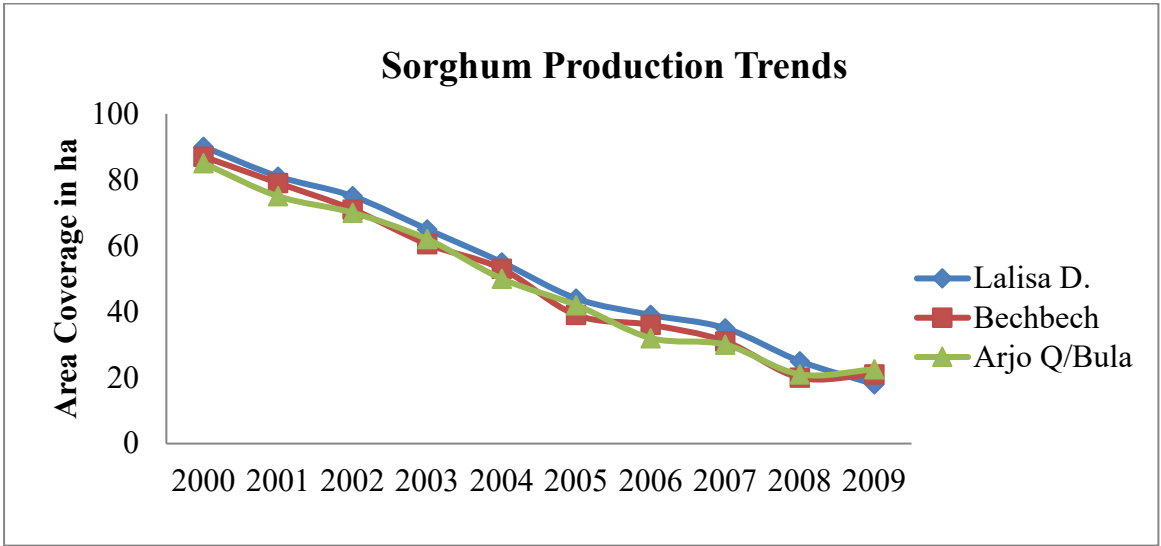
Figure 2. Trends of sorghum production analysis in last 10 years in the study area.

3.7.2. Sorghum trends: responses of MHHs.

According to MHH respondents, land in the study area has been cultivated mainly with major crops like maize, sorghum, finger millet, sesame and groundnut. Male farmers in all the three study kebeles said that sorghum production decreased during the last 10 years (Figure 3). This was due to various reasons, such as low sorghum prices, high fertilizer prices, serious bird attacks, low access to improved varieties and weak extension services.

According to male farmers, sorghum was produced traditionally with almost all local varieties, and no one interviewed as part of this study was aware of either improved agronomic practices or improved varieties; producing sorghum on marginal land without

any input (fertilizer) was common, unlike other major cereal crops. Also, farmers described low soil fertility, the replacement of sorghum by cash crops (i.e., ground nut), diseases (e.g., smut, grain mold and Anthracnose) and weeds (wild sorghum) as reasons for decreasing sorghum production (Figure 3).



Source: 2017 survey results

Figure 3. Sorghum production trends in the three study kebeles for the previous 10 years.

3.8. Cropping Calendar for Sorghum and Other Major Crops Produced in the Study Area

Farmers described a tight farming schedule from mid-April to August and from mid-November to mid-February. After that time, the schedule relaxed until the cycle began again in mid-April. Sorghum production started with land clearing in mid-February and plowing from March to mid-May. Sorghum planting began in early April and ended in May. Weeding started in June and continued into September for three rounds of weeding. Harvesting, threshing and winnowing activities were conducted from January to mid-March (Table 2).

Table 2. Major Cereals Production Calendar

Crop type	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Sorghum												
Land clearing		xxx	x									
1 st Cultivation		x	xx									
2 nd Cultivation		x	xx									
3 rd Cultivation				xx	x							
Planting				x	xx							
1 st Weeding						xx						
2 nd Weeding						x	xx					
3 rd Weeding								xxx	x			
Harvesting	xx											x
Threshing	x	xx	x									
Winnowing	x	xx	x									
Marketing		xx	xxx	xxx	x	x	x	x	x	x	x	x

3.9. Importance of Sorghum as Compared to Other Cereal Crops

3.9.1. Importance of sorghum: Married women and FHH responses.

A matrix score ranking identified and ranked sorghum preferences in comparison to other cereal crops in the study kebeles. Female FGD participants identified and listed their preferred trait (Table 4): five categories of preferences were listed for Bechbech and Arjo Qonan Bula kebeles, and six categories were listed for Lalisa Dimitu. Farmers in each kebele were guided to prioritize their preferred traits under each category.

The most preferred trait from each category was selected to create separate matrix ranking each kebele. During FGDs, similar preferences among kebeles were identified, namely, disease resistance, productivity, marketability and *injera*-making quality. Female farmers in Bechbech and Arjo Qonan Bula shared a preference for low input requirements. Females FGD participants in Bechbech were unique in listing drought resistance as a preference, and female FGD participants in Lalisa Dimitu listed a preference for weevil resistance. Kebeles that had similar priorities and rankings in their matrix ranking comparisons were merged and presented in pairs (Table 3).

Sorghum was ranked first across the three kebeles in terms of disease resistance, marketability and *injera*-making quality over maize and finger millet. Maize was ranked first in productivity, followed by sorghum and finger millet, respectively. During FGDs,

participants from Arjo Qonan Bula and Lalisa Dimitu kebeles said sorghum required minimum input, while participants from Bechbech said sorghum was the most drought-tolerant of the cereal crops (Table 3).

Table 3. Sorghum Preference Matrix Ranking Related to Other Major Cereal Crops

PAs	Preference	Crops	1	2	3	Total score	Rank
Lalisa Dimitu	Disease resistance	Sorghum	x	1	1	2	1
		Maize		x	3	0	3
		Finger millet			x	1	1
	Productivity	Sorghum	x	2	1	1	2
		Maize		x	2	2	1
		Finger millet			x	0	3
	Marketability	Sorghum	x	1	3	1	1
		Maize		x	2	1	1
		Finger millet			x	1	1
	Injera quality	Sorghum	x	1	1	2	1
		Maize		x	2	1	2
		Finger millet			x	0	3
	Weevil resistance	Sorghum	x	1	3	1	2
		Maize		x	3	0	3
		Finger millet			x	2	1
Bechbech	Disease resistance	Sorghum	x	1	1	2	1
		Maize		x	3	0	3
		Finger millet			x	1	2
	Marketability /Demand	Sorghum	x	1	1	2	1
		Maize		x	2	1	2
		Finger millet			x	0	3
	Productivity	Sorghum	x	2	1	1	2
		Maize		x	2	2	1
		Finger millet			x	0	3
	Drought resistance	Sorghum	x	1	1	2	1
		Maize		x	3	0	3
		Finger millet			x	1	2
	Low input requirement	Sorghum	x	1	1	2	1
		Maize		x	3	0	3
		Finger millet			x	1	2
	Injera quality	Sorghum	x	1	1	2	1
		Maize		x	2	1	2
		Finger millet			x	0	3
Arjo Qonan Bula	Disease resistance	Sorghum	x	1	1	2	1
		Maize		x	3	0	3
		Finger millet			x	1	2
	Productivity	Sorghum	x	2	1	1	2
		Maize		x	2	2	1
		Finger millet			x	0	3
	Marketability/Demand	Sorghum	x	1	1	2	1
		Maize		x	2	1	2
		Finger millet			x	0	3
	Low input requirement	Sorghum	x	1	1	2	1
		Maize		x	3	0	3
		Finger millet			x	1	2
	Injera quality	Sorghum	x	1	1	2	1
		Maize		x	2	1	2
		Finger millet			x	0	3

Source: FGD survey results, 2017

3.9.2. Importance of sorghum: MHH responses.

A matrix score ranking was employed to identify how MHHs compared sorghum to other cereal crops in the study area. Farmers listed six categories of preferences and then ranked how sorghum compared to other cereal crops in these categories. During the

discussions, farmers generally indicated that sorghum was a major source of food, feed, fuel, construction material and income for households. Participants from MHHs said that sorghum was the most important crop in the study area.

First, male participants said sorghum was preferred for family consumption and used for different food purposes; they especially preferred sorghum for *injera* making by mixing it with teff or finger millet. Aside from food use, sorghum was also the first choice for its use as fuel, and for housing, fencing and other construction purposes. Sorghum was farmers' second preference (after finger millet) for preparation of local beverages (e.g., *tela*, *areke*, *keribo*) and second preference after maize for market earnings because while farmers produced maize in surplus quantity, sorghum received a better unit price. Sorghum's market price was higher than maize and equivalent to teff, but farmers used sorghum for household consumption rather than for sale, preferring to sell the majority of maize produced (Table 4).

Table 4. MHH Farmers Preferences Matrix Ranking Importance of Major Cereal Crops

PAs	Preferences	Major Cereals	1	2	3	Total	Rank
Arjo Qonan Bula	Food	1.Sorghum	x	1	1	2	1
		2.Maize		x	3	0	3
		3.Finger millet			x	1	2
		Total				3	
Bechbech		1.Sorghum	x	1	1	2	1
		2.Maize		x	2	1	2
		3.Finger millet			x	0	3
		Total				3	
Lalisa Dimitu		1.Sorghum	x	1	1	2	1
		2.Maize		x	2	1	2
		3.Finger millet			x	0	3
		Total				3	
Arjo Qonan Bula	Feed	1.Sorghum	x	2	3	0	3
		2.Maize		x	3	1	2
		3.Finger millet			x	2	1
		Total				3	
Bechbech		1.Sorghum	x	2	1	1	2
		2.Maize		x	2	2	1
		3.Finger millet			x	0	3
		Total				3	
Lalisa Dimitu		1.Sorghum	x	2	3	0	3
		2.Maize		x	3	1	2
		3.Finger millet			x	2	1
		Total				3	
Arjo Qonan Bula	Fuel	1.Sorghum	x	1	1	2	1
		2.Maize		x	2	1	2
		3.Finger millet				0	3
		Total				3	
Bechbech		1.Sorghum	x	1	1	2	1
		2.Maize		x	2	1	2
		3.Finger millet			x	0	3
		Total				3	
Lalisa Dimitu		1.Sorghum	x	1	1	2	1
		2.Maize		x	2	1	2
		3.Finger millet			x	0	3
		Total				3	
Arjo Qonan Bula	Construction	1.Sorghum	x	1	1	2	1
		2.Maize		x	3	0	3
		3.Finger millet			x	1	2
		Total				3	
Bechbech		1.Sorghum	x	1	1	2	1
		2.Maize		x	3	0	3
		3.Finger millet			x	1	2
		Total				3	
Lalisa Dimitu		1.Sorghum	x	1	1	2	1
		2.Maize		x	3	0	3
		3.Finger millet			x	1	2
		Total				3	
Arjo Qonan Bula	Local Beverages	1.Sorghum	x	1	3	1	2
		2.Maize		x	3	0	3
		3.Finger millet			x	2	1
		Total				3	
1.Sorghum		x	1	3	1	2	
2.Maize			x	3	0	3	
3.Finger millet				x	2	1	

Lalisa Dimitu		Total			3	
		1.Sorghum	x	1	3	1
		2.Maize		x	3	0
		3.Finger millet			x	2
		Total				3
Arjo Qonan Bula		1.Sorghum	x	2	3	0
		2.Maize		x	2	2
		3.Finger millet			x	1
		Total				3
Bechbech	For Market	1.Sorghum	x	2	1	1
		2.Maize		x	2	2
		3.Finger millet			x	0
		Total				3
Lalisa Dimitu		1.Sorghum	x	2	1	1
		2.Maize		x	2	2
		3.Finger millet			x	0
		Total				3

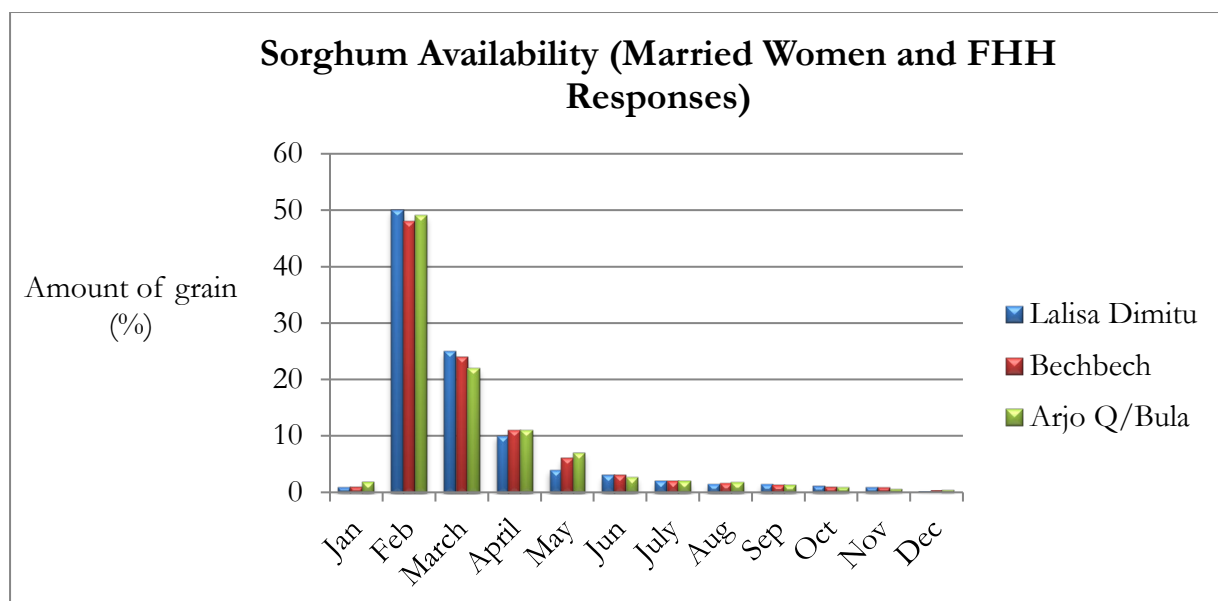
Source: 2017 survey results

3.10. Availability of Sorghum Produce to Households Throughout the Year

3.10.1. Availability of sorghum produce: married women and FHH responses.

Trend analysis was employed to identify the months when sorghum was sufficiently available in study area households and months when sorghum availability was low, causing residents to employ various coping mechanisms. Sorghum production for food was the primary objective of farmers. Maintaining year-round sorghum production was impossible in the region, however, resulting in periods of sorghum shortages.

Although there were slight differences in female responses among the kebeles, harvesting season was the period when households could expect the most sorghum availability (Figure 4). According to female participants, the highest percentage of sorghum was available in February, declining by half in the month of March, then declining by half again in April. From this point, availability trends declined gradually due to home consumption and continuous marketing to cover various household expenses. Female participants said sorghum availability was at its lowest during November and December, when a critical sorghum produce shortage was reported in all kebeles. Farmers said they employed some coping strategies to help with sorghum shortages. These included planting early-maturing varieties, using credit services from relatives (in-cash or in-kind), using credit services from Oromia credit and saving share companies, and finding employment as daily laborers in nearby villages. Farmers also sold livestock to purchase food grain during sorghum produce shortages.



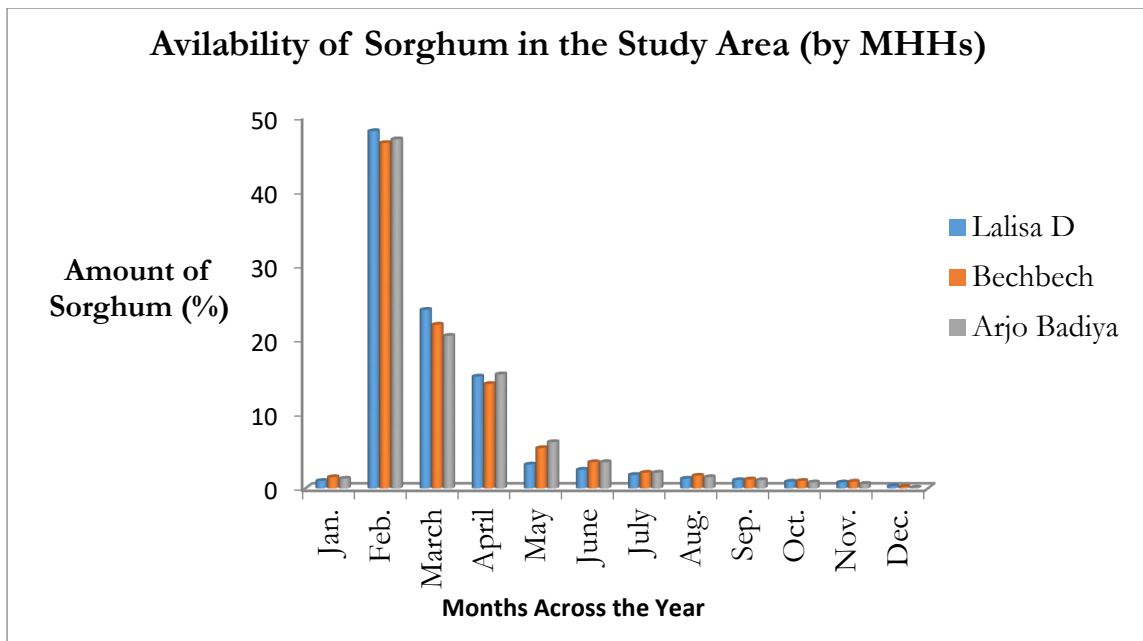
Source: Married Women and FHH Survey results, 2017

Figure 4. Annual availability of sorghum produced in Diga District (FHH and married women responses).

3.10.2. Availability of sorghum produce: MHH responses.

Trend analysis was employed to identify the months when sorghum was sufficiently available in households in the study area and months when sorghum availability was low, which caused residents to use various coping mechanisms. All male heads of household in the study areas worked to produce sufficient sorghum for their family’s consumption. However, it was not possible for farmers to grow enough sorghum for their annual household requirements. As a result, there were times during the year when households experienced a surplus or a deficit of sorghum grain.

Though there were slight differences among responses from the kebeles, harvesting season was the time of highest sorghum availability. Trends of sorghum grain availability began to decline from the point of highest availability (February) until June. There was low sorghum availability in July, and critical sorghum shortages were reported in three kebeles from August to through January (Figure 5).



Source: 2017 survey results

Figure 5. Annual availability of sorghum produced for household consumption (MHH responses).

3.11. Participation of Women and Men in Sorghum Production and Value Chain (Productive Roles)

3.11.1. Participation of married women in sorghum production.

During FGDs, married women from the three kebeles identified 12 farm activities in sorghum crop production. These were: land preparation (land cleaning, hand tilling, ploughing), sowing, weeding, applying pesticide, harvesting/cutting, preparing the threshing ground (*Hogidii*), threshing, transporting, storing, and marketing (value chain) (Table 5).

Table 5. Engagement in Sorghum Production Activities, by Gender (Married Women Responses)

		Engagement in Productive Activities (%)			
		Men	Women	Boys	Girls
Productive Activities					
1	Land clearing	80	10	10	0
2	Hand tilling	30	25	20	25
3	Ploughing (oxen)	80	0	20	0
4	Sowing/planting	80	0	20	0
5	Weeding	30	30	20	20
6	Pesticide application	55	10	25	10
7	Harvesting/cutting	60	20	10	10
8	Preparation of threshing ground	30	30	20	20
9	Threshing	50	20	15	15
10	Transporting	0	50	20	30
11	Storage	0	60	20	20
12	Marketing (value chain)	60	40	0	0

PRA survey results indicated some production activities were considered specifically male responsibilities, particularly land clearance, oxen ploughing, harvesting and marketing (Table 5). However, married women indicated that a number of activities were shared, in particular hand tilling, weeding and preparing the threshing ground.

Results revealed that land preparation (including land clearance and oxen ploughing) was mainly the responsibility of men (80%), but when farmers used hand tillage all family members were involved. Married women from all study kebeles reported that they never assisted with oxen ploughing, indicating a rigid gender-based division of labor in this task. Oxen ploughing was considered the most labor-intensive farm activity. Like ploughing with oxen, married women said that sowing was a responsibility shared between men (80%) and boys (20%). Although sowing is not physically demanding, a cultural taboo exists in the study area against women farmers participating in this activity.

Married women said that weeding was a shared responsibility among all family members. This was because weeding demanded more labor. The preparation of the threshing ground (called *Hogidii*) also was indicated by married women as a shared responsibility for all family members (Table 5). This task required smoothing and mudding the threshing field. Smoothing was considered the males' job while mudding was the females' job.

During harvesting, another labor-intensive activity, most rural households in the study area used group labor or/and hired laborers to collect the produce on time. As shown in Table 5, this task was mainly the responsibility of males (70%). Women's participation in harvesting was found to be minimal in all selected kebeles. Married women respondents revealed that their major role during cutting was preparing and serving food for those working in the fields. Moreover, married women said that females also worked to collect and pile the grain that the men had cut to ready it for threshing. Although all family members participated in threshing because of its high labor demand, women's participation was small. Married women participants said that, like during harvesting, they prepared and served food and drinks for those threshing the sorghum grain.

On the other hand, women were overwhelmingly responsible for transporting and storing the sorghum harvest (Table 5). Selling sorghum in local markets was a shared responsibility between women and men. According to married women participants, men from MHHs sold crops in bulk on an intermittent basis and sometimes traveled to more distant markets to secure higher prices.

3.11.2. Participation in sorghum production: FHH responses.

As shown in Table 6, farmers from FHHs identified and listed sorghum crop production activities (from land preparation to marketing). The participation of men was crucial for different production activities: male labor either was hired or obtained in the form of cultural support for FHHs as *debo* in groups or individually. Unlike their counterparts in MHHs, women from FHHs were responsible for land clearing, sometimes receiving support from male children after their school day. Farmers from FHHs did not participate in oxen ploughing activities, which were mainly undertaken by active male children. FHHs might either hire labor or *debo* to plow their land whenever they faced a shortage of labor. Like ploughing, women from FHHs said sowing was a male responsibility, due to the area's cultural taboos against women's participation in sowing. For FHHs, sowing mainly was undertaken by male children with assistance from hired labor or *debo*.

Participants from FHHs indicated that weeding was a productive activity shared among all family members (Table 6), due to its higher labor demand. Like weeding, harvesting called for group labor or/and hired laborers in order to get the farm produce collected on time. In FHHs, threshing ground (*Hogidii*) preparation was a shared responsibility among all family members. This task required smoothing and mudding the threshing field. According to FHH respondents, smoothing was the boys' job while mudding was the job

of women and girls. As shown in Table 6, all family members participated in threshing to some degree. However, the level of participation of women in threshing was reported at 45%. Part of this work included the time that women prepared and served food and drinks for the participants who were completing this task.

The transportation distance between the *Hogidii* (where the yield is harvested) to the home varied from one household to another. According to FHH respondents, females were responsible for this responsibility 60% of the time and from hired labor for the remaining 40%. FHH farmers stored the sorghum harvest within the home for sale or/and household consumption. The division of labor in this task was flexible, indicating that it was a shared responsibility among family members in all selected kebeles. Transporting sorghum and selling it in the local market was the sole responsibility of women in FHHs.

Table 6. Engagement in Sorghum Production Activities, by Gender (FHH Responses)

		Engagement in Productive Activities (%)			
		Men	Women	Boys	Girls
Productive Activities					
1	Land clearing	30	50	20	0
2	Hand tilling	20	60	10	10
3	Oxen ploughing	50	0	50	0
4	Sowing/planting	90	0	10	0
5	Weeding	25	35	20	20
6	Pesticide application	60	10	20	10
7	Harvesting/cutting	55	35	5	5
8	Preparing threshing ground	35	25	20	20
9	Threshing	35	25	20	20
10	Transporting	20	40	20	20
11	Storing	40	40	10	10
12	Marketing (value chain)	0	65	35	0

3.11.3. Participation in sorghum production: MHH responses

Although land clearing was considered an overwhelmingly male responsibility, hand tilling was a task shared among household members, regardless of gender. Farmers from MHHs agreed with female FGD participants about plowing using oxen: in the selected kebeles, this was a task reserved for men (Table 7).

MHH respondents also confirmed that sowing was reserved for men due to the area's cultural taboos against women's participation in sowing. As shown in Table 7, sowing was undertaken by men and boys.

Results from MHHs indicated that, aside from oxen ploughing and sowing, females were involved in most activities. Activities like harvesting and threshing were equally shared between women and men, while MHHs said that women's engagement in weeding, transporting and storage was more significant than reported by female participants (Table 7).

Table 7. Engagement in Sorghum Production Activities, by Gender (MHH Responses)

		Engagement in Productive Activities (%)			
		Men	Women	Boys	Girls
1	Land clearing	80	10	5	5
2	Hand tilling	40	40	10	10
3	Oxen ploughing	80	0	20	0
4	Sowing/planting	80	0	20	0
5	Weeding	30	50	10	10
6	Pesticide application	50	30	10	10
7	Harvesting/cutting	40	40	15	5
8	Preparation of threshing ground	40	30	15	15
9	Threshing	40	40	10	10
10	Transporting	10	60	10	20
11	Storage	10	60	10	20
12	Marketing (value chain)	60	40	0	0

Respondents from MHHs described a shared gender division of labor in cutting. However, during FGDs with farmers, it was revealed that the major role of wives during cutting was preparing and serving food for the laborers who were cutting. Women also participated by collecting and pilling what the men had cut to make it ready for threshing.

MHH participants also said that all family members participated in threshing, which was a task with a higher labor demand. As during cutting, male farmers from MHHs said that

women prepared and served food and drinks for the participants who worked on this task. According to the men in MHHs, women were mostly responsible for transporting the harvest from the field and for storage. Women did share responsibility with men for marketing the sorghum (Table 7).

3.12. Participation in Domestic and Community Activities

Reproductive and household maintenance tasks which did not result in a direct economic return still supported the economic life of the family in particular and the society in general. In study area kebeles, nearly all domestic and community activities were exclusively the responsibility of women. In fact, most of the male FGD respondents said that domestic activities were women's jobs, although men admitted they sometimes assisted women with this work in case the wife were sick or unavailable, and children were unavailable to take over the job.

There was not much recognition for women's active role in agricultural production. During FGDs, the majority of men considered their productive work as "real" work, while tasks such as fetching water and firewood, or taking care of poultry was not mentioned. Instead, men mentioned domestic tasks only after specific questioning by interviewers. This was a perception reflected by most of the male respondents.

3.12.1. Participation in domestic and community activities: married women responses.

When it came to domestic and community activities, married women said that the majority of responsibilities belonged to women (Table 8). During FGDs with married women in MHHs, more than a dozen domestic and management activities were identified as major responsibilities for women in all the selected kebeles. These were: food preparation, washing utensils, washing clothes, childbearing and child rearing, housecleaning, fetching water and collecting fuel. In many rural areas, preparing food was found to be the most tiresome and time-consuming activity. In all selected kebeles, this responsibility – along with washing utensils – was shouldered predominantly by wives, sometimes assisted by their daughters and sometimes by others like hired laborers. Bearing and nurturing children also was listed as a key reproductive role for women. Although child bearing is a sex role, the nurturing of children is not limited by gender; however, in the study kebeles, taking care of children was assigned mainly to wives, with some assistance from their daughters. Fetching water, also a time-consuming activity, was a task carried out mainly by women, with some help from children.

As shown in Table 8, married women explained that community activities were more balanced between the genders, with women taking a larger role in the care for sick or elderly. Although men had a larger share of responsibility for other community activities, the women were by no means excluded.

Table 8. Domestic and Community Management Responsibilities by Gender (Married Women)

No	Responsibilities	Engagement in domestic and community activities (%)			
		Men	Women	Boys	Girls
1	Reproductive roles				
1.1	Food preparation	0	90	0	10
1.2	Washing utensils	0	80	0	20
1.3	Washing clothes	10	75	5	10
1.4	Childbearing and child rearing	0	80	0	20
1.5	Cleaning house	0	90	0	10
1.6	Building and maintaining houses and fences	85	0	15	0
1.7	Fetching water	0	80	5	15
1.8	Collecting fuel	0	70	10	20
2	Community activities				
2.1	Management/maintenance of water sources	45	35	10	10
2.2	Water committee membership/meeting	55	45	0	0
2.3	Clearing water sources	55	45	0	0
2.4	Care for sick person or elderly	30	60	5	5
2.5	Involvement in political affairs/activities	60	40	0	0
2.6	Membership in community organization	50	50	0	0

Moreover, wives said they occasionally took responsibility for chores such as management of water sources, water committee membership, cleaning water sources and involvement in political affairs. Even though there was some female involvement in those activities, married women perceived that these tasks were the responsibility of their husbands. Membership in community organizations was equally split between genders.

3.12.2. Participation in domestic and community activities: FHH responses.

Farmers from FHHs did not identify the same domestic and community responsibilities during FGDs as those identified by married women. For the activities listed in Table 9, women from FHHs said they were responsible for nearly all, although they received some assistance from children. During FGDs with farmers from FHHs, the following major responsibilities were identified: food preparation, washing utensils, washing clothes,

childcare, house cleaning, fetching water and collecting fuel. Women and girls spent considerably more time than boys on household work and continued to bear the major responsibility for the household chores; overall, few children participated in housecleaning, childcare, fetching water, collecting firewood and cleaning house.

Table 9. Gender Roles in Specific Domestic and Community Management Activities (FHHs)

No	Types of work	Engagement in domestic and community activities (%)			
		Men	Women	Boys	Girls
1	Domestic activities				
1.1	Food preparation	x	80	x	20
1.2	Washing utensils	x	80	x	20
1.3	Washing clothes	10	70	10	10
1.4	Childcare	x	85	x	15
1.5	Housecleaning	x	85	x	15
1.6	Fetching water	x	70	10	20
1.7	Collecting fuel	x	80	5	15
2	Community activities				
2.1	Management/maintenance of water sources	61	39	x	x
2.2	Water committee membership	45	55	x	x
2.3	Clearing water sources	55	45		
2.4	Involvement in political affairs/activities	50	40	5	5
2.5	Membership in community organizations	60	40	x	x

Remark: X indicates no participation

In general, there were some daily maintenance tasks in FHHs, such as cooking food, fetching water, cleaning, etc. Other tasks might be occasional, such as management of water sources, water committee membership, involvement in political affairs and membership in community organizations.

3.12.3. Participation in domestic and community activities: MHH responses.

MHH respondents indicated that tasks such as food preparation, washing utensils, washing clothes, childbearing and child rearing, housecleaning, fetching water and collecting fuel wood were nearly the sole responsibility of females (Table 10). This was due to a cultural taboo against husbands preparing and processing food, preparing local drinks, cleaning the house and washing food utensils. Most household maintenance tasks were undertaken in the kitchen, considered to be the territory of wives. According to the male respondents, men worked outside the home, taking responsibility for building and maintaining houses and fences.

The involvement of women in this community role was not insignificant. Women and men participated equally (50%) in activities such as weddings and funeral ceremonies, and shared involvement in public meetings and involvement in public/organizational works (Table 10). From the different activities listed, women were involved at least 40% of the time, except in the case of community leadership positions when their participation dropped to 35%. Men had the most responsibility for leadership positions in community organizations.

Table 10. Gender Roles with Respect to Specific Domestic and Community Management Activities (MHH)

No	Reproductive work	Engagement in domestic and community activities (%)			
		Women	Girls	Men	Boys
1.1	Food preparation	90	10	x	x
1.2	Washing utensils	80	20	x	x
1.3	Washing clothes	70	10	10	10
1.4	Childbearing and child rearing	70	25	x	5
1.5	Housecleaning	85	15		
1.6	Building and maintenance of houses/fences	x	x	85	15
1.8	Fetching water	70	15	x	15
1.9	Collecting fuel				
	Collecting fuel wood	60	25	x	15
	Collecting animal dung	60	25	x	15
2	Community Activities				
2.1	Management/maintenance of water sources				
	Water committee meetings	50	x	50	x
	Cleaning water sources	60	x	40	x
2.2	Care for old/sick persons	70	x	30	x
2.3	Working/participating in events such as:				
	Weddings	40	10	40	10
	Funerals	40	10	40	10
2.4	Involvement in village meetings	50		50	
2.5	Involvement in public works (government)	40	x	60	x
2.6	Involvement in NGO projects	40	x	60	x
2.7	Involvement in political activities	40	x	60	x
2.8	Membership in community organizations	45	x	55	x
2.9	Involvement in leadership of community organizations	35	x	65	x

Remark: X indicates no participation

3.13. Participation in Households' Decision Making

Resources (land, credit, inputs) are key production factors in agrarian societies like Ethiopia. Historically, access to this resource, particularly for rural households, has been very

important for its political, economic and social significance. However, the existing literature indicates that all rural people do not have equal access to these resources, especially land (Fong and Bhushan 1996).

There were traditions or norms in the study area restricting women from decision-making and, as a result, women have had to act as a subordinate family member. For instance, there exist local proverbs such as *“Dubartiin fi Gundoonhulaagaditti”* or *“Dubartiin beekaa hin qabdu beekaa deessi malee”* which mean that women have no capacity to make decisions or to manage resources; women are considered as unfit both physically and mentally.

It was apparent from discussions with participants from MHHs that rural women in particular shared abundant responsibilities and performed a wide spectrum of duties in running the family, maintaining the household, and attending the farm operations. Despite their role, women’s position in decision-making was discovered to be minimal (Tables 11 and 12). Women’s participation in the farm household must be seen in relation to issues such as how men and women farmers decide on how much land to plant, what crops to plant, to either sharecrop or rent the farm land, whether to use fertilizers and other farm technologies, and whether and when to hire labor.

3.13.1. Decision-making: married women and FHH responses.

The study examined the differences by gender in decision-making power over productive resources, focusing on decisions in the management of end-products such as the harvested sorghum crop. During the FGD surveys, participating farmers indicated that the whole family had access to resources like extension services, improved technology (input), use of income from sorghum sold at market, and credit services. However, the “power to make decisions” was positioned in the hands of men, where it has belonged traditionally.

Results revealed that in all selected kebeles the general trend appeared to be male-dominated decision-making in MHHs (Table 11). Only in FHHs do women control the decisions, but this still tended to be in consultation with their male relatives. Participants noted that even though men controlled much of the decision-making, they usually consulted their wives as part of the process, and women had a strong influence on the outcome.

Table 11. Participation in Decision-Making Over Resources (Married Women in MHHs and FHHs)

Types of resources	Participation in decision making (%)	
	Women	Men
Extension services	10	90
Improved sorghum varieties	20	80
Fertilizer	30	70
Income from sorghum	40	60
Credit	40	60
Livestock sale income	20	80
Land for different uses	20	80

Source: 2017 survey results

3.13.2. Decision-making: MHH responses.

According to the views of farmers from MHHs, benefits from resources and associated decision-making were largely the domain of men (Table 12). Decisions made over land (allocation and utilization) and input utilization was left predominantly to men. The one aspect where male respondents said women played a larger role was with respect to credit, but even then, men controlled the decision-making 60% of the time (Table 12). Women could sell sorghum products and give advice about how to use the money that resulted from the sales, but decisions over the profits were made by men.

As most households were male-headed, it was the men who were members of local PAs; membership was a precondition to receive access to agricultural extension services and inputs like training on the use of improved varieties, fertilizer, pesticides, herbicides, etc. In general, women who did not have access to extension services also were unlikely to receive access to these inputs.

Table 12. Participation in Decision-Making Over Resources (MHH)

Types of resources	Level of participation in decision making (%)	
	Women	Men
Extension services	20	80
Improved Sorghum varieties	10	90
Fertilizer	10	90
Income from sorghum	10	90
Credit	40	60
Livestock sale income	10	90
Land for different use	15	85

Source: 2017 survey results

3.14. Control over Resources and Sorghum Income

The allocation of resources between women and men is better understood by differentiating between access to resources and control over resources. *Control over* is the power to decide how a resource is used and who has access to it. *Control* is about who has the final decision-making power over resources and has the opportunity to impose their choice on others.

3.14.1. Control over resources and sorghum income: married women and FHHs responses.

As shown in Table 13, women in the study area had very little control over resources, whether those were educational resources, production inputs (such as improved varieties or fertilizer) or outputs (such as income generated from sales of sorghum crops). In all cases, female respondents said that men control 70-100% of the resources.

Table 13. Control over Resources by Different Household Members (Married Women and FHHs)

Types of resources	Control Over Resources (%)	
	Women	Men
Extension education	10	90
Improved sorghum varieties	10	90
Fertilizer	20	80
Income from sorghum	20	80
Credit	30	70
Livestock sale income	20	80
Land for different use	20	80

Women had control over the sorghum left at home for consumption, but any benefit from the income of sorghum production was realized through marketing. The volume of sorghum sold by husbands and wives varied between households, and control over the income differed with production levels. For example, when the volume of crop production per household was small, wives controlled the income. In the study area, women could sell small amounts of sorghum (by kg) per season when cash was needed at home, while men could sell large amounts (quintals), and the men controlled the income from these large sales. Even though women in MHHs were key to the sorghum crop production, they benefitted little from it in terms of control over the income generated through the sale of produce.

3.14.2. Control over resources and sorghum income: MHH responses.

Men benefit from the resources for improved production and also had control over/access to them. The result of this was a further limitation of women's overall decision-making power and participation. The PRA conducted in the study kebeles showed similar results. As shown in Table 14, decisions made about access to and control over resources such as land (allocation and utilization), credit, and input utilization was mainly left to men.

Although women had a minority share in the control over resources, male responses (Table 14) showed that women had 5% to 20% greater control over resources than the female responses (Table 13). Notwithstanding this, male respondents indicated that they had greater access to services and resources like extension education, credit services, use of improved sorghum varieties, and so on. For instance, although using credit services was contingent on an agreement between husbands and wives, the results almost always were controlled by men.

Table 14. MHH Response on Control over Resources by Different Household Members using Proportional Piling

Types of Resources	Control over Resources (%)	
	Women	Men
Extension education	23	77
Improved Sorghum variety	30	70
Fertilizer	30	70
Income from sorghum	15	85
Credit	20	80
Livestock sale incomes	15	85
Land	20	80

3.15. Major Sorghum Production Constraints

3.15.1. Major sorghum production constraints: married women and FHH responses.

Matrix score rankings were used to identify and rank the major sorghum production constraints in the study kebeles. Married women and FHH respondents in Lalisa Dimitu identified and listed the major constraints in seven categories: inaccessibility of improved sorghum varieties, disease, weeds, high fertilizer prices, insects, weevils and low prices for sorghum produce. In Bechbech and Arjo Qonan Bula kebeles, similar constraints were listed and categorized: inaccessibility of improved varieties, shortage of credit for input purchases, low soil fertility, low prices for sorghum produce, shortage of oxen and shortage of land. Participant female farmers prioritized the constraints under each category for each kebele which, in turn, established the single most important constraint from each of the categories; pair-wise comparisons among the selected constraints were made independently for each kebele (Table 15).

Overall, there were similarities between Bechbech and Arjo Qonan Bula kebeles in their prioritization of constraints. Kebeles having similar priorities and rankings in their pair-wise comparisons were merged and presented together. The most important commonly indicated sorghum production constraint was the inaccessibility of improved varieties. The second-ranked constraints in Bechbech and Arjo Qonan Bula kebeles were shortage of credit for fertilizer and purchasing other inputs. In the case of Lalisa Dimitu, high fertilizer prices were the second-ranked constraint (Table 15).

Table 15. Pair-wise Comparisons of Major Constraints to Sorghum Production (Married Women and FHHs)

PAs	Constraints	1	2	3	4	5	6	7	Total score	Rank
Lalisa Dimitu	Lack of improved varieties	*	1	1	1	1	1	1	6	1
	Diseases		*	2	4	2	2	2	4	3
	Weeds			*	4	5	3	3	2	5
	Fertilizer prices				*	4	4	4	5	2
	Insects					*	5	5	3	4
	Weevils						*	6	1	6
	Price variation for sorghum produce							*	0	7
	Total								21	
Bechbech	Lack of improved varieties	*	1	1	1	1	1		5	1
	Shortage of credit for fertilizer purchasing		*	2	2	2	2		4	2
	Low soil productivity			*	3	3	3		3	3
	Low price for sorghum				*	5	6		0	6
	Shortage of oxen for ploughing					*	6		1	5
	Shortage of land						*		2	4
	Total								15	
Arjo Qonan Bula	Lack of improved varieties	*	1	1	1	1	1		5	1
	Shortage of credit for fertilizer purchasing		*	2	2	2	2		4	2
	Low soil productivity			*	3	3	3		3	3
	Low price for sorghum produce				*	5	6		0	6
	Shortage of oxen for ploughing					*	5		2	4
	Shortage of land						*		1	5
	Total								15	
Source:		2017 survey							results	

3.15.2. Major sorghum production constraints: MHH responses.

The same method was used to identify and rank the major sorghum production constraints using responses from MHHs (Table 16). There were similarities among the kebeles in their prioritization of constraints; the two most important production constraints in the study areas were inaccessibility of improved production technologies (including improved variety seed) and low soil fertility.

As shown in Table 16, low soil fertility, inability to access improved seed/weak extension services and disease (e.g., anthracnose, smut) were the critical production problems ranked one to three respectively in Arjo Qonan Bula kebele. Inaccessibility of improved seed, low soil fertility and invasive weeds were the top three constraints in Lalisa Dimitu kebele. In Bechbech kebele, the male FGD group listed a greater number of constraints and ranked bird attack as the first, followed by weak extension services and termites (Table 16).

Table 16. Pair-wise Comparisons of Major Constraints to Sorghum Production (MHHs)

PA	Constraints	1	2	3	4	5	6	Score	Rank				
Arjo Badiya	1.Soil fertility decline	x	1	1	1	1	1	5	1				
	2.Land shortage		x	2	2	5	6	2	4				
	3.Weeds			x	3	5	6	1	5				
	4.Dominated by cash crops				x	5	6	0	6				
	5.Lack of improved seed (weak extension services)					x	5	4	2				
	6.Disease (smut, anthracnose)						X	3	3				
	Total							15					
Lalisa Dimitu	Constraints		1	2	3	4	5	Score	Rank				
	1. Soil fertility decline		x	2	1	1	1	3	2				
	2. Lack of improved seed			x	2	2	2	4	1				
	3. Disease (smut, anthracnose)				x	3	4	1	4				
	4. Invasive weeds (parthniem)					x	4	2	3				
	5. Low/cheap grain price						X	0	5				
	Total							11					
Bechbech	Constraints	1	2	3	4	5	6	7	8	9	10	Score	Rank
	1. Lack of improved seed	x	2	3	1	5	1	7	8	1	10	3	
	2. Soil fertility problems		x	2	4	5	6	7	8	9	10	2	
	3. Insects			x	3	5	3	7	3	9	3	5	4
	4. Land shortage				x	5	4	7	4	9	4	4	5
	5. Weak extension					x	5	7	5	9	5	7	2
	6. Weeds						x	7	6	9	10	2	
	7. Bird attack							x	7	9	7	8	1
	8. Low-priced/cheap grain								x	8	8	2	
	9. Termites									x	9	6	3
	10. Wild animals										X	3	
	Total											32	

Source: 2017 survey results

3.16. Types of and Preference for Sorghum Cultivars Grown in the Area

3.16.1. Types of and preference for sorghum cultivars: married women and FHH responses.

Matrix score rankings were employed to identify farmer preferences for sorghum varieties grown in the study kebeles. The female groups within the three kebeles identified and listed the most important traits to rank local cultivars of sorghum. A few sorghum cultivars were known to most farmers but were grown only in small quantities; the majority of the farmers produced only cultivars, namely *Adi* and *Dima* varieties.

Participants said no improved varieties were used in the area except for a few planted as demonstrations, sourced by Bako Agricultural Research Center.

Female FGD participants listed five categories of preferred traits for sorghum. These preferences were: yield, disease resistance, marketability, *injera*-making quality and early-maturing varieties. As shown in Table 17, married women from MHHs and women from FHHs ranked different cultivars according to their performance for each preferred trait. There were three cultivars in all: white-seeded (loose head), white-seeded (compact head) and red-seeded (loose head).

Table 17. Direct Matrix Ranking of Sorghum Local Cultivars in Three Kebeles (Married Women and FHHs)

PAs	Criteria	Cultivars	1	2	3	4	Total score	Rank
Lalisa Dimitu	Yield	Sorghum white seeded loose head	*	1	1	1	3	1
		Sorghum white seeded compact head		*	3	3	0	2
		Sorghum red seeded loose head			*	3	3	1
		Sorghum red seeded compact head				*	0	2
	Disease resistance	Sorghum white seeded loose head	*	1	3	4	1	3
		Sorghum white seeded compact head		*	3	4	0	4
		Sorghum red seeded loose head			*	4	2	2
		Sorghum red seeded compact head				*	3	1
	Marketability	Sorghum white seeded loose head	*	1	1	1	3	1
		Sorghum white seeded compact head		*	2	2	2	2
		Sorghum red seeded loose head			*	3	1	3
		Sorghum red seeded compact head				*	0	4
	<i>Injera</i> quality	Sorghum white seeded loose head	*	1	1	1	3	1
		Sorghum white seeded compact head		*	2	2	2	2
		Sorghum red seeded loose head			*	3	1	3
		Sorghum red seeded compact head				*	0	4
	Earliness in maturity	Sorghum white seeded loose head	*	1	3	4	1	3
		Sorghum white seeded compact head		*	3	4	0	4
		Sorghum red seeded loose head			*	3	3	1
		Sorghum red seeded compact head				*	2	2
Bechbech	Yield	Sorghum white seeded loose head	*	1	1	1	3	1
		Sorghum white seeded compact head		*	3	3	0	2
		Sorghum red seeded loose head			*	3	3	1
		Sorghum red seeded compact head				*	0	2
	Disease resistance	Sorghum white seeded loose head	*	1	3	4	1	3
		Sorghum white seeded compact head		*	3	4	0	4
		Sorghum red seeded loose head			*	4	2	2
		Sorghum red seeded compact head				*	3	1

Arjo Q/ Bula	Marketability	Sorghum white seeded loose head	*	1	1	1	3	1
		Sorghum white seeded compact head		*	2	2	2	2
		Sorghum red seeded loose head			*	3	1	3
		Sorghum red seeded compact head				*	0	4
	Injera quality	Sorghum white seeded loose head	*	1	1	1	3	1
		Sorghum white seeded compact head		*	2	2	2	2
		Sorghum red seeded loose head			*	3	1	3
		Sorghum red seeded compact head				*	0	4
	Earliness in maturity	Sorghum white seeded loose head	*	1	3	4	1	3
		Sorghum white seeded compact head		*	3	4	0	4
		Sorghum red seeded loose head			*	3	3	1
		Sorghum red seeded compact head				*	2	2
Yield	Sorghum white seeded loose head	*	1	1	1	3	1	
	Sorghum white seeded compact head		*	3	3	0	2	
	Sorghum red seeded loose head			*	3	3	1	
	Sorghum red seeded compact head				*	0	2	
Disease resistance	Sorghum white seeded loose head	*	1	3	4	1	3	
	Sorghum white seeded compact head		*	3	4	0	4	
	Sorghum red seeded loose head			*	4	2	2	
	Sorghum red seeded compact head				*	3	1	
Marketability	Sorghum white seeded loose head	*	1	1	1	3	1	
	Sorghum white seeded compact head		*	2	2	2	2	
	Sorghum red seeded loose head			*	3	1	3	
	Sorghum red seeded compact head				*	0	4	
Injera quality	Sorghum white seeded loose head	*	1	1	1	3	1	
	Sorghum white seeded compact head		*	2	2	2	2	
	Sorghum red seeded loose head			*	3	1	3	
	Sorghum red seeded compact head				*	0	4	
Earliness in maturity	Sorghum white seeded loose head	*	1	3	4	1	3	
	Sorghum white seeded compact head		*	3	4	0	4	
	Sorghum red seeded loose head			*	3	3	1	
	Sorghum red seeded compact head				*	2	2	

Source: 2017 Survey Results

3.16.2. Response of MHHs on types and preference of sorghum cultivars grown in the area.

According to MHH participants, all farmers in the study area grew local varieties, except for a few improved varieties from Bako Agricultural Research Center, which were planted as demonstrations. White sorghum (*Boke adi*) and brown sorghum (*Boke dima*) varieties with different names, depending on their head/panicle shape, were the only

cultivars grown in the all study areas. Male farmers strongly preferred *Adi* local cultivars for food/baking quality and for marketability. The local variety *Dima* was preferred as more productive than the *Adi* variety and more preferred for disease resistance, insect-resistance and bird attack. It was preferred also for the preparation of local alcoholic beverages.

3.17. Coping Strategies During Food Shortages

Critical sorghum shortages were reported in all the study kebeles during the *Ganna* season (August to November). Farmers in the study area exercised some coping strategies to deal with these shortages, such as: selling livestock, earning extra income through daily labor, selling cash crops such as groundnut and sesame, earning income from off-farm activities (selling charcoal and local alcoholic beverages), and using credit services (in-cash or in-kind) obtained from relatives or local lenders for food grains.

3.18. Different Uses for Sorghum in the Study Area

3.18.1. Sorghum uses: married women and FHH responses.

FGDs with married women from MHHs and farmers from FHHs identified main uses of sorghum in the study kebeles. Female respondents identified the main uses for sorghum as: food, livestock feed, construction (fences and houses), and fuel. They also said that households used sorghum as a cash crop to generate income for purchasing different inputs and household utensils. Locally, farmers made different types of food from sorghum. *Kolo* and *nifro*, were made from sorghum in rural areas, but foods like *injera*, bread and *Genfo* were made from a mixture of sorghum and other cereal crops. Beverages such as *tela* and *areke* also were made of sorghum in the locality.

3.18.2. Sorghum uses: MHH responses.

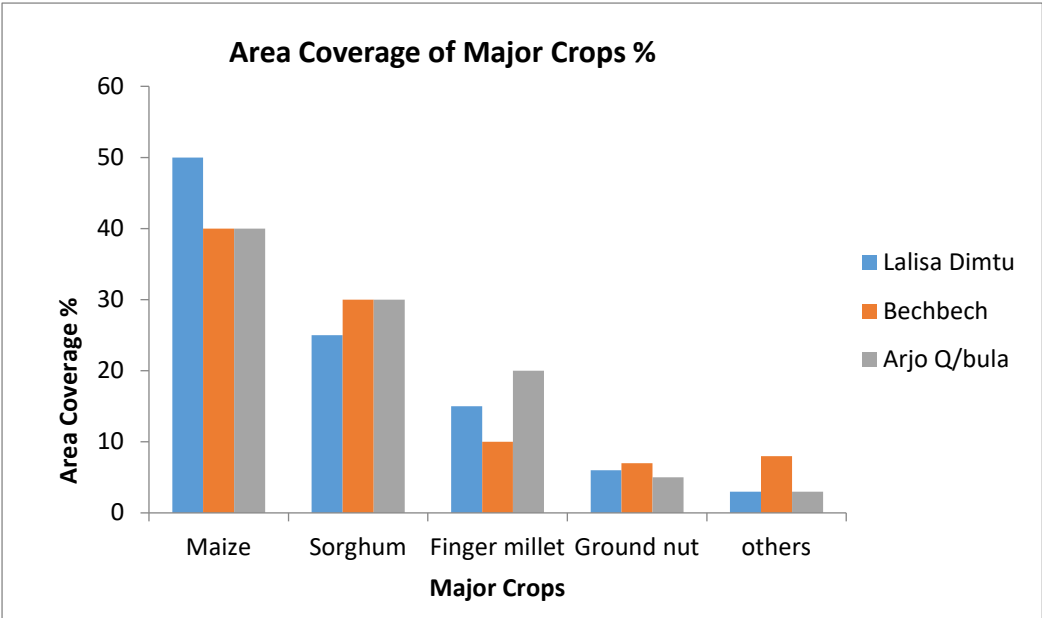
FGDs with farmers from MHHs identified important uses of sorghum production in the study kebeles. Male respondents listed main uses for sorghum as: food and beverage preparation, animal feed, construction (housing and fencing), fuel, and family income generation. Male respondents listed similar local foods prepared from sorghum, but also included *kita* (local bread), porridge and *keribo* (local alcoholic beverage). Specifically, male participants said that sorghum stalks were used as a major source of animal feed; both stalk and its threshed heads were stored and used as feed during the dry season.

Sorghum stalks also were listed as source of fire wood: farmers cut and stored it at harvesting time and used it throughout the year.

3.19. Major Crops Grown in the Study Kebeles in Terms of Area Coverage

3.19.1. Area coverage of major crops: married women and FHH responses.

There were five major crops identified by farmers in the study kebeles. These were maize, sorghum, groundnut, finger millet and sesame. As shown in Figure 6, female participants said maize had the greatest area coverage, followed by sorghum and groundnut. Secondary data from the Woreda Agricultural Office and socio-economic profile data indicated similar results. Farmers in Bechbech and Arjo Qonan Bula said sorghum area coverage was similar in their kebeles, while those in Lalisa Dimitu reported slightly lower figures (Figure 6). Generally, maize and sorghum (cereal), and groundnut and sesame (oil) crops were the most dominant crops in the study kebeles. Since married women in MHHs and FHHs in all kebeles responded similarly, their results were merged together.



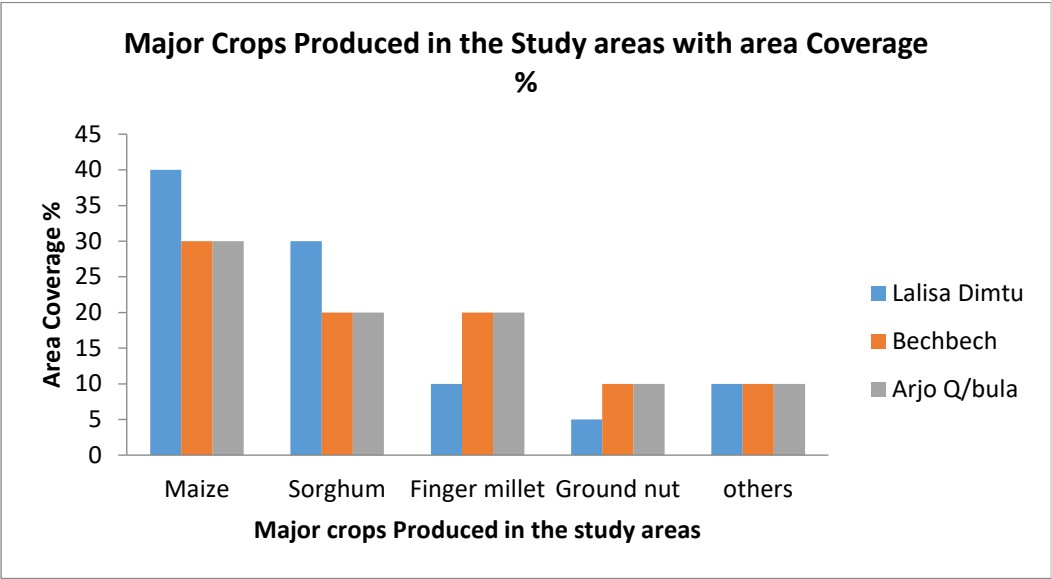
Source: 2017 survey results

Figure 6. Major crops grown in the study area in terms of area coverage (married women and FHHs).

3.19.2. Area coverage of major crops: MHH responses.

Male FGD participants identified the same five major crops grown in the study area. Male respondents said most farmers allotted a large portion of their lands for maize production. Maize covered about 30% of the total area, followed by sorghum and finger

millet which covered about 20% each. Groundnut and sesame ranked third in terms of area coverage (Figure 7).



Source: 2017 survey results

Figure 7. Major crops grown in the study area in terms of area coverage (MHH)

3.20. Extension Services and other Main Sources of Information for Farmers on Sorghum Production

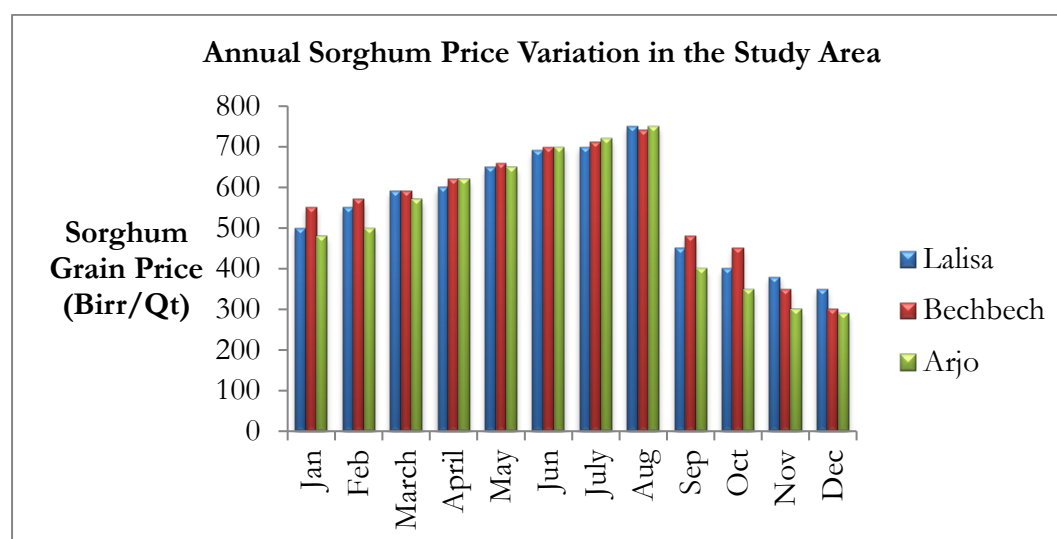
Farmers, regardless of gender, explained that they had few information sources about improved sorghum production practices and improved seed. Farmers received some information about these topics from mass media and field days, and only a few farmers received training from research centers and DAs. They also reported that the study area lacked business and community advisory services.

As a part of this study, farmers listed the types of extension services they required for sorghum production. Those requirements were: training, field visits, field days or other awareness programs on improved sorghum production technologies and practices, additional attention on sorghum from government or other agencies, support from the government against birds or other pests, and market awareness creation. Farmers also wanted access to improved seed as well as more organized community-based seed production.

3.21. Sorghum Grain Price Variation in the Study Area

3.21.1. Sorghum grain price variation: married women and FHH responses.

In an open market, price variation mainly depends on demand and supply. However, growing seasons and other social and cultural factors influence prices. According to farmers who participated in this study, sorghum prices were very high during seasons of poor crop performance, when compared to good cropping seasons. During holy days and planting times, the price of sorghum grain also increased. Selection criteria used during purchasing also affected prices for sorghum grain. According to respondents, white-colored sorghum grain was preferred more at the market than red-colored sorghum, because red-colored sorghum had low backing and *injera* quality in comparison. As shown in Figure 8, the price of sorghum grain started to rise in January until it reached its maximum price in August. Prices declined from September to December.



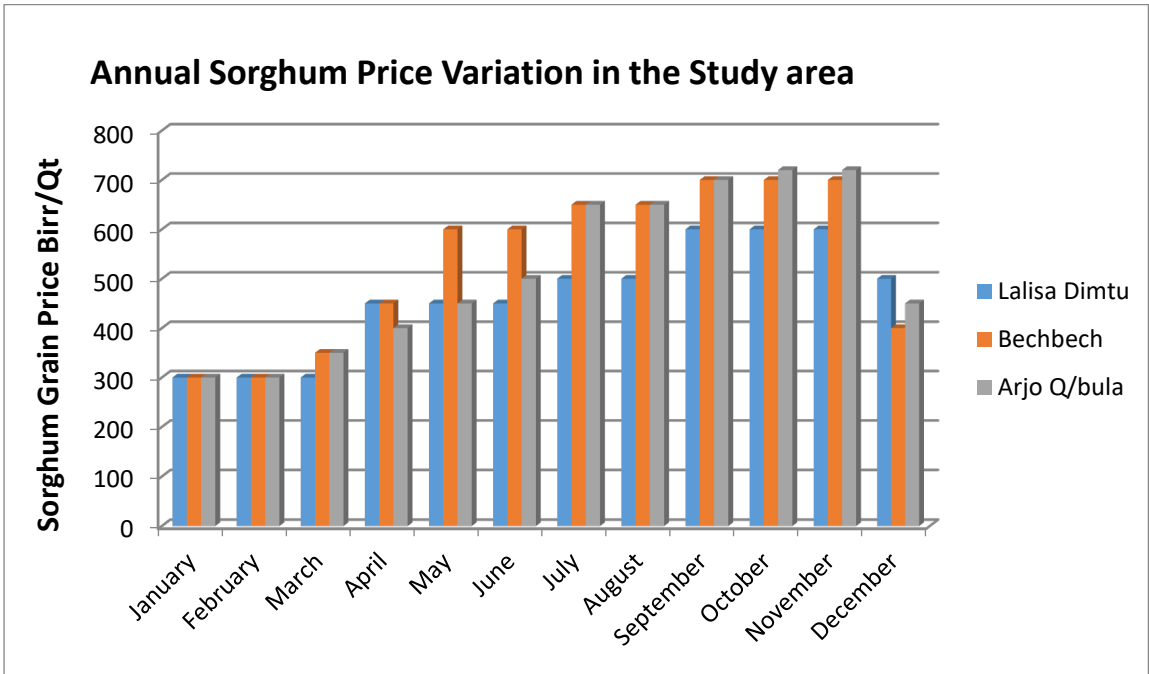
Source: 2017 survey results

Figure 8. Sorghum grain price variation in three kebeles of Diga District (responses of married women and FHHs).

3.21.2. Sorghum grain price variation: MHH responses.

Respondents from MHHs provided a different perspective on annual sorghum price variation. As shown in Figure 9, male participants said that sorghum prices were at their minimum in January and February, after which prices rose through the month of November. December saw a sharp drop in prices for sorghum. This cheap price for sorghum grain coincided with the grain's surplus availability in households and high

supplies to the market. Another difference between the male and female responses was that, while female respondents described prices in all three kebeles as relatively similar, especially during the months of highest prices, male respondents from Lalisa Dimitu said that prices were significantly lower than respondents from the other two kebeles. During some months, sorghum prices in Lalisa Dimitu were priced 100-200 birr/Qt less than sorghum in either Bechbech or Arjo Qonan Bula.



Source: 2017 survey results

Figure 9. Variation of annual sorghum grain prices in three study kebeles (MHHs).

4. Discussion

Both women and men play significant roles in Diga woreda's crop production in general and sorghum production specifically. Farmers' efforts are crucial for the provision of adequate food supply and income for their households.

Farmers from the study groups described six reasons explaining sorghum's importance in comparison to other major cereal crops produced in their area. First, farmers used sorghum for different food purposes, such as making *injera*, and it was residents' first preference for family consumption. After finger millet, sorghum also was preferred for preparing local beverages (*tela*, *areke*, *keribo*). Although sorghum prices were higher than those for maize and equivalent to those for teff, farmers used sorghum mostly for household consumption rather than for sale. Sorghum stalks were also farmers' first choice for firewood (fuel), housing, fencing and other construction purposes (Reddy *et al.*, 2005).

Gender division in rural Ethiopia differs across locations and situations, and is based on various factors, including the types of farming systems, local socioeconomic realities and cultural settings (Abera *et al.* 2006; Mollel and Mtenga 2000); female farmers participate in all aspects of agricultural production, except for ploughing (Hanna, 1990). Women also perform numerous labor-intensive tasks such as land preparation, weeding, harvesting, threshing and storing (Frank E., 1999).

This study has shown that these gender roles in sorghum crop production in Diga woreda do reflect the historical gender roles for the country as a whole. Even though the extent of participation in sorghum production activities varied, female farmers in all study kebeles performed various labor-intensive tasks such as planting, weeding, watering, harvesting, threshing and storing. Unsurprisingly, men played greater roles in farming activities, but male farmers were the only ones responsible for threshing and land preparation (ploughing). A study by FAO (1997) confirms that, countrywide, ploughing and threshing not tasks given to women.

Despite women's key roles in agricultural production, decision-making power has been traditionally placed in men's hands. In spite of the many farming activities women perform, they are not perceived as farmers and agricultural decision-makers (EEA/EEPRI, 2006; Kassa, 2008). This study revealed that although some changes have occurred within households (i.e., consultations with women, particularly regarding money from sorghum

sales), men were still considered the heads of household and, therefore, the principal decision-makers.

All of the groups from this study described decreasing sorghum production trends for the last 10 years due to low productivity and shortages of improved varieties, oxen and land. Generally, the downward trends for sorghum production were due not only to these problems, but also because locally grown sorghum was planted on marginal land, was considered a low-input crop and was neglected by farmers. The majority of farmers either could not afford or had no access to chemical inputs for their sorghum crop, and so they never applied pesticides or other chemicals to combat insect infestation or diseases.

There were major constraints to sorghum production in the study area. These were identified and listed by farmers from the three study kebeles during focus group discussions. The most commonly indicated sorghum production constraint was lack of improved varieties. Other constraints included shortage of credit for fertilizer purchasing and high fertilizer prices.

5. Summary and Recommendations

5.1. Summary of Results

A participatory rural appraisal (PRA) survey was conducted by the Bako Agricultural Research Center team in Diga woreda with financial support from SMIL. The survey covered three rural kebeles, namely Lelisa Dimitu, Bechbech and Arjo Qonan Bula. Main study objectives were: to gain an in-depth understanding of the study area's major crops and socioeconomic condition; to assess gender contributions in sorghum production, processing and utilization; to assess the different gender roles and activities in sorghum production; to analyze the gender differences in decision-making and benefit sharing of sorghum production activities; and to identify potential constraints affecting female and male farmers in sorghum production activities. To meet these objectives, the study was conducted using three respondent groups: married women in MHHs, women from FHHs and men from MHHs.

Various PRA tools were employed to collect primary data. Pairwise matrix score rankings, seasonal calendars, trend lines, gender analysis, key informant interviews, proportional pilling and focus group discussions were among the PRA tools used for this study. Secondary data were collected through reviews of various reports, published papers, and documents related to the field of study.

Results showed that the study district utilized a mixed crop and livestock production system, where crop and animal production were managed together. However, crop production was the most dominant agricultural practice. It was discovered that the study kebeles grow highly diversified types and varieties of cereal and pulse crops due to the geographical setting and the diversified weather conditions in the area. The three selected kebeles' administrations were similar in terms of agro-ecology and crop production practices. Sorghum production in terms of area coverage in Lalisa Dimitu, Bechbech and Arjo Qonan Bula were 25%, 30% and 30%, respectively.

Results of this study showed a general division of labor between genders in the study areas. Female farmers in all kebeles performed different labor-intensive tasks such as planting, weeding, watering, harvesting, threshing and storing. Likewise, men were involved in all activities, but sowing and land preparation (ploughing) was dominated by men.

Despite the fact that women in the study area played key roles in sorghum production, decision-making power was left mostly in the hands of men. In spite of the many farming activities women performed, they were not perceived as farmers or agricultural decision-makers. This study also revealed that though there were changes occurring within some households (i.e., some men consulted with women about money from the sale of sorghum), men were still considered the heads of household and the principal decision-makers. It also was noted that men often were more involved in control over bulk sales of sorghum while women have control over small sales of sorghum grain.

Extension services are important for diffusing technology and good practices. The services are critical regardless of gender, but women farmers in MHHs and FHHs tended to have less access to them. Previously, there were two types of extension services in Ethiopia: agricultural extension and home/health extension. Agricultural extension services typically were provided to the household head. It has been assumed that the male head of household then communicated extension messages to other family members. On the other hand, home extension was generally provided to women and addressed family issues such as family planning, nutrition and health care. This traditional extension approach where families are seen as a unit failed to address intra-household dynamics.

FGD results revealed also major constraints of sorghum production in the study area and prioritized these constraints based on their importance using pair-wise ranking. Lack of improved seed, low/poor soil fertility, low sorghum prices at market, high prices for fertilizer, weak extension services, bird attack and lack of credit facility to purchase inputs were identified as the primary sorghum production constraints. Similarly, farmers believed sorghum did not require fertilizer and planted the crop on marginal land with low management believing that sorghum could provide adequate yields, unlike other cereal crops. These misunderstandings represent a major bottleneck in the study area's improved production and productivity of sorghum.

5.2. Recommendations

Based on the survey results the research team recommends the following:

- **Increase awareness on the importance of including women in extension services.**
This can be done through training among main partners (especially extension agents).

Training should take women's needs and views into account, especially when introducing and testing technologies.

- **Improve women's access to extension services.** This includes providing access to “normal” agronomic trainings, especially for those agricultural activities where women have nearly equal responsibilities. This study found that women who do not have access to and control over extension services were not liable to get access to agricultural inputs. Greater access to extension services is a way of investing in women and empowering them.
- **Identify and validate labor-saving technologies that can reduce the work burden.**
- **Provide intra-household orientation for extension services.** One implication resulting from this study is that the formal extension system should enrich its traditional household-oriented approaches by integrating intra-household orientation. If technology endeavors are to generate better outcomes, the extension system needs to address individuals, rather than just households. This will help to actively engage men and women in every stage of technology activities by attending to their specific needs.
- **Employ female extension workers and instructors for awareness and training sessions for female farmers.** This will foster greater participation among women. Trainers must be sensitive to the culture of the community and use examples from their female trainees' daily lives. For this purpose, it is best that trainers come from the surrounding area, be familiar with the culture of the community and, if possible, already have contacts with the women in the community.
- **Provide information on sources of credit and its uses.** Most households in general and wives in particular did not have access to this critical resource. Credit institutions should help create awareness for farmers in general and for women in particular on how to use credit and benefits from credit. This also can help improve women's socio-economic and political status and enhance women's decision-making power; these will lead to greater gender equality. This can act as a potent force for accelerating poverty reduction.
- **Empower women in decision-making and encourage them to play larger roles in community-related activities.** As women in the study area are more engaged in time-consuming productive and reproductive activities and since their control over

productive resources is marginalized, empowering women in decision making and encouraging them to play vital roles in community-related activities is necessary.

- **Implement use of improved sorghum technologies.** To improve sorghum production and productivity in the study area, the use of improved sorghum production technologies (improved varieties, recommended agronomic practices, recommended fertilizer rate, type and application method and land preparation) should be implemented by farmers.
- **Development agencies and non-governmental organizations can make an impact.** NGOs and other DAs should focus on encouraging a basic understanding of women's roles in society and identifying women's needs at the grassroot level; this can be in terms of household, productive or reproductive activities. NGOs should determine short- and long-term options to relieve identified constraints in appropriate and effective ways by devising innovative approaches that integrate gender issues.
- **Recognize women's roles and contributions.** Planners and decision-makers who recognize women's roles and contributions to social and economic development in general and to agricultural development in particular will help to enhance women's status and increase food security at the household and national level.

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