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The Role of Women Headed Households in the Local Seed Business in Ethiopia: The Case of *Jabi Tehnan*, *Bure* and *Yilmana Densa* Districts

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The Role of Women Headed Households in the Local Seed Business in Ethiopia: The Case of *Jabi Tehnan*, *Bure* and *Yilmana Densa* Districts

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I. Introduction

Women, in most sub-Saharan African countries, are the backbone of the rural economy with about 80 percent of them are economically active and women being employed in agriculture are accounting for 70 percent of food production in Africa. Even though there is an increasing recognition of women's roles within Africa and the international community, not only in their households but also in the food production systems and national economies, this recognition has not yet interpreted into considerably better access to resources or improved decision making power (Manuh, 1998).

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Ethiopia's economy is characterized by small holder subsistence farming with more than 80 percent of the population relying on agriculture for their livelihood. Among the major hindrances faced by small holder farmers are shortage of modern inputs and access to markets. In the face of high transaction costs and market failures, the role of small holder farmers in the market and the extent to which they benefit from their contribution are very low (Bernard and Spielman, 2009). For this reason, gender equality should be taken as a major issue that needs to be considered in any development practices. This means that any development plan has to involve and assure that both men and women contribute and benefit equally from it. Nevertheless, in Ethiopia's case, even although women have significant contribution to the development efforts, their attempts are not entirely considered and they are found in deprived situations (MoARD, 2008). Rural women in Ethiopia represent a huge productive resource in the agricultural sector. They are major contributors to the agricultural workforce, either as family members or in their own right as women heading households. However, the division of work, the use of resources, and the sharing of the benefits of production between women and men are influenced by gender roles and relationships. Particularly, the introduction of new technologies and practices like supported by improved seed service provision, often disrespects the gendered-consequences of market-oriented growth and many benefits bypass women (Lemlem *et al*., 2010).

Seed system in Ethiopia represents the entire complex organizational, institutional and individual operations connected with the development, multiplication, processing, storage, distribution and marketing of seed in the country. Farmers, particularly smallholder ones, are involved in multiple kinds of seed systems, which can guarantee them in obtaining the quantity and quality of seeds they need and to market their produce (Abebe, 2010). A farming community's food security relies profoundly on its seed safety. Women's need to ensure good supplies of their preferred varieties of seed can be particularly acute, because women are often the main producers of food to feed the family. It is crucial to bear in mind that there are important socioeconomic and gender differences in

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seed security though both men and women farmers consider seed as a key resource for food and livelihood security (World Bank *et al*., 2008).

In Amhara region, there are Local Seed Business (LSB) projects within the Integrated Seed Sector Development (ISSD) programme - Ethiopia that aims to increase the availability of improved seed through supporting groups of farmers to become technically better equipped, more commercial, better organized and more autonomous in their seed entrepreneurship (Amhara ISSD, 2012). In ISSD phase I, Eight LSBs (seed producer cooperatives) have been organized in the region. ISSD Amhara works towards making the 8 LSBs to be professionally autonomous seed entrepreneurs serving as models references for LSB scaling up. Activities are undertaken at specific localities in both high and low potential areas with the focus on crops with high local seed demand. The ISSD Amhara is strategically collaborating with key partners to meet the LSB scaling up objective that aims to increase the number of the existing LSBs by a factor of 5-10 in the region (Amhara ISSD, 2012). Both consolidated and scaling up (totally 14) seed producer cooperatives (SPCs) in three districts namely, *Jabi Tehnan*, *Bure* and *Yilmana Densa* are included in this study. The majorities (12) of them are scaling-up and have been added collaborating with key partners.

Many studies focusing on seed production activities consider rural women as a homogenous unit. This study however gives prime focus to the women headed households (WHHs) role in the seed producer cooperatives (LSBs) to elicit objective realities on the ground and put forward arguments on gender issues in seed production. Though a number of positive steps have been taken to address gender gaps in different agricultural divisions in general and in the seed system in particular, much has not been done in the area of LSB particularly in the study districts. Moreover, most of the studies conducted so far seem to have overlooked the gender variations in general and women in particular in the process of seed production, marketing and the seed system. More specifically, previous researches conducted on LSB did not consider the role of WHH members in the seed producer cooperatives. The main purpose of this study was therefore to contribute knowledge on the implications of gender roles and responsibilities for the development of the agricultural sector, and it also to help policy makers to formulate enhanced polices and strategies in the LSB.

II. Review of the Literature

Households headed by women are far from homogeneous and have a tendency to fall into three categories: autonomous households recognized and accepted as headed by women, mostly single or widowed women; households headed *de facto* by wives during the male head's absence for different periods of time, the degree of autonomy and freedom of action of these female heads changing with ethnic traditions and personal conditions; and polygamous households, where co-wives head economic subunits within the family (Anderson *et al*., 1994).

Anderson and his colleagues (1994) were carried out a study on women headed households in Sub Saharan Africa and found the main characteristics of these households. These include; women heading households are younger than men heading households, women heading rural households have lower educational level than men, and lower than other women headed by men, WHHs children's have more years of schooling than those of men headed households (MHHs), landholdings of WHHs are much smaller than of those MHHs, women heading households tend to be smaller in size and have fewer farming adults than MHH and WHHs are relatively undercapitalized. As a group WHHs are essential for agricultural policy makers because many of them are involved in farming and they share some of important characteristics. They are virtually always disadvantaged in terms of access to land, credit services and other productive possessions. Besides, they have less labor accessibility because they have fewer male members, which also helps clarify why they often support a higher dependency ratio, in particular of older family members (SOFA Team and Doss, 2011).

Women play a very important role in advancing agricultural development and food security. They take part in many aspects of rural life in paid employment, trade and marketing plus many unpaid activities, such as tending to crops and animals, collecting water and wood for fuel, and caring for family members. Women also manage household consumption and food preparation. However, women face many constraints in the multiple roles they play, such as less land ownership, access to credit, extension and other services, and ability to hire labor. These constraints and women's current potential contributions to agricultural production go unappreciated. Hence, increasing opportunities for women can have a dominant impact on productivity and agriculture-led growth. Women are just as efficient agricultural producers as men and can achieve similar yields when given equal access to resources (USDS, 2011).

According to Mugonozza (2001) seed is the most important agricultural input; it is the basic unit for distribution and maintenance of plant population. It carries the genetic potential of the crop plant. It thus dictate the ultimate productivity of other input such as fertilizer, pesticide irrigation water etc., which build the environments that enable the plant to perform. FAO (2006) also revealed that seed is a key input for improving crop production and productivity. Increasing

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the availability and quality of seeds can increase yield of crops by significant folds and thus, is one of the most economical and efficient inputs to agricultural development.

Informal seed supply is still the leading system in Ethiopia, like in many other developing countries in sub-Saharan Africa. In 2002, the area covered by improved varieties reached up to 3% of the total cultivated area in Ethiopia, and the formal seed system's share in this coverage is estimated to be about 10-20%. The informal seed supply is therefore common; it is embedded in cultural, traditional, social, economic and even administrative structures. Besides, the informal seed system plays a vital role in providing seed to poor farmers in rural communities. It enables the farmers to carry on developing and maintaining biodiversity and associated traditional knowledge, and transferring practices from generation to generation (Thijssen *et al.*, 2008). The Ethiopian seed industry is comprised of formal and informal sectors plus public and private organizations. The formal seed sector contains federal and regional agricultural research establishments, universities, Ethiopian Seed Enterprise (ESE) and a few private companies. The informal sector includes millions of farmers who maintain to practice seed selection and conservation as their predecessors did centuries ago. Today, the bulk of national seed demand is met through this informal system of local seed preservation and exchange (Regassa *et al.*, 1998).

Lemlem *et al.* (2011) revealed that women are often involved with activities that require agility and concentration to detail, such as raising seedlings in nurseries, transplanting and weeding. They are also engaged with activities directly related with their domestic responsibilities, such as storage, processing and adding value. Likewise, Chayal *et al.* (2010) noted that women play a significant and crucial role in agriculture and allied fields. They are highly involved in cutting, picking, cleaning of grains, drying of grains, storage, processing operations and major parts of cleaning of field, raising nursery for seedling, weeding, shifting production to threshing floor, winnowing and grading operations are also done by farm women. Women do least amount of work in case of leveling of field and fertilizer application, whereas there is no participation of farm women in ploughing of field, plant protection measures and marketing activities.

Labor for agricultural activities is based on household members as distinguished by age and sex during land preparation, planting, weeding, harvesting, transporting, threshing, winnowing, for grain storage and marketing. Participation of women during land preparation is while they have equal role during weeding. In general, women's role in decreasing order of contribution is in weeding, threshing, harvesting, planting, and land preparation. Women are also largely participated in vegetable production. Although men have an overall responsibility to all farm operations, the decision to grow and/or change a new variety is the decision of both men and women (EOSA, 2007).

Cooperatives are a pillar for agricultural development and food security. Agricultural cooperatives play an important role in supporting small agricultural producers and marginalized groups such as young people and women. Cooperatives make easy smallholder producers' participation in decision-making at all levels, support them in securing land-use rights, and negotiate better terms for engagement in contract farming and lower prices for agricultural inputs such as seeds, fertilizer and equipment (FAO *et al.*, 2012). However, accessing good quality seed is a problem faced by small scale farmers throughout Africa. One solution to this difficulty is developing local level seed enterprises. The purpose of a seed enterprise is to produce good quality seed for sale and to make money from providing this service to the community. No matter how much a seed producer is able to grow, without strong business skills; his or her business is bound to be weak and losing (David and Oliver, 2002).

Seed businesses are a rapidly emerging form of entrepreneurship in Africa. The seed sector in Africa has seen the rise and, at times, failure of national and international seed companies and community-based seed schemes. In recent years, there has been a surge of entrepreneurs entering the seed sector all over Africa, as they have recognized a market opportunity of supplying farmers with quality seed of improved varieties. This has been stimulated by a number of factors such as: the increase in seed distribution schemes by governments and non-governmental organizations, the activities of agencies that have worked at encouraging seed sector development and economic forces that have highlighted opportunities in crop production and hence seed provision (MacRobert, 2009). LSBs are responsible for flows of seed of traditional as well as modern varieties, which enter the system through different processes. Local knowledge of men and women farmers is important because they manage different crop species and varieties and may participate in different seed systems for different purposes. In most cases, women headed farmers could not grow such a wide range of crops if they did not have the seeds in their hands (World Bank *et al.*, 2008).

The LSBs produce seed of cereals, vegetables and pulses, for which a market exists within their vicinity. They produce seed of a few particular varieties for which farmers do not buy seed every year. If in addition high transport costs are involved, the formal seed sector is not interested in seed production of these crops and varieties for these locations. The target area and market potential are too small to justify private investment. This lack of interest creates a niche for the LSBs which can

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evolve to small and medium scale seed enterprises that cover a wider diversity of crops with quality seed of local or improved varieties (Tadesse *et al*., 2011).

III. Methodology

a) Research Approach

Objectives of this research have demanded generating both quantitative and qualitative data and taking in to account this rationale, the study has applied a mixed research approach. Principally, women headed households in the seed producer cooperatives have diverse experiences and practices. For instance, women play a great role in seed technology components, such as seed processing, seed handling, seed marketing, seed production, seed harvesting, etc. Besides, rural women headed households' are influenced by different factors when they take part in the LSB. Therefore, to examine these issues quantitative research method as part of mixed research approach was relevant to produce statistical results. There were also issues that required qualitative research method in which data were collected using key informant interviews and focus group discussions. In this approach, various information on what inspired women headed households to participate in the seed producer cooperatives were the prime issues used for qualitative analysis. Many researchers believed that mixed research approach is a good way of approaching research as it enables to counteract the weaknesses in both qualitative and quantitative research (Dawson, 2002). Creswell (2003) also stated that a mixed method approach is one in which the researcher tends to base knowledge claims on pragmatic grounds. It employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problem. The data collection also involves gathering both numeric information (on questionnaires) as well as text information (on interviews) so that the final database represents both quantitative and qualitative information. Thus, it minimizes some of the limitations of using single method.

Taking note of these and considering that quantitative or qualitative research methods are not sufficient to address the role of WHHs in the LSB when they are treated independently, and the mixed research approach was opted as an appropriate intervention. As a further elaboration, it is worth noting that qualitative methods suffer from the limitations of generalizing the results beyond the specific research area and go through subjectivity during data collection and analysis; while the quantitative methods fail to capture an in-depth understanding of women headed households when they want to express the issue in detail. On the contrary, when quantitative and qualitative research methods are used in combination in one study, they compliment to each other and allow for a more complete analysis of the research problem.

b) Research Design

This study has been aimed to explain what determinant household and institutional factors that influence WHHs benefit in the SPCs and also identify factors that have motivated WHHs to get involved in seed production and ultimately indicate sustainable strategies that enable women benefit from their efforts. To this effect, major variables related to household demographic characteristics and socio-economic conditions and external agency support were analyzed in the context of the research objectives.

To enhance acquisition of valid data for analysis the research design must be complemented by appropriate research methods for data generation and collection (Bryman, 2001; Oppenhiem, 1992). Taking this into account and considering the nature of this research, broad base information is required to address the stated objectives. To this end multiple sources of evidence, such as survey questionnaires, semi-structured interviews (group discussions and in-depth interviews with key informants) and a survey of literature were used. For this reason, *explanatory research design* (predominantly quantitative method followed by a qualitative method to support the data that were not addressed by quantitative data so as to give detail explanation with a few cases or individuals) was employed.

c) Selection of the Study Sites and Subjects of the Study

The rationale for the choice of *Jabi Tehnan*, *Bure* and *Yilmana Densa* districts for this study was the relatively good experiences established on LSB and presence of WHHs involved in the seed business. The study areas, *Jabi Tehnan*, *Bure* and *Yilmana Densa* districts, were purposively selected because it was assumed that that these districts have a relatively good experience on LSB and a significant number of WHHs are involved in the LSB. Agro ecology, ease of accessibility and market access were also considered as additional criteria's to select the districts. The specific study sites or *Kebele*s were selected following the reconnaissance survey of *Kebele*s where the LSB has been started and those *Kebele*s with different years of experience were included. This was done because differences in the duration of the intervention provides better data on women involvement and factors influencing their participation in the LSB.

Rural WHHs involved in the seed system were used as the primary unit of analysis. According to House (2001) argument whether conducting a sample survey or a census, a core component of methodology is the sampling frame. The frame usually consists of a listing of population units, but alternatively it might be a

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structure from which clusters of units can be delineated. In this study the list of WHHs involved in SPCs in the *Kebeles* served as a sampling frame. However, owing to the low number of WHHs in one *Kebele* all women heads in the selected *Kebeles* and involved in the LSB were made subject of the study. In this regard, Kothari (2004) emphasizes that when the population is a small one, it is no use resorting to a sample survey. Accordingly, a total of 92 WHHs involved in the seed system and organized in SPCs were used as respondents to gather relevant information regarding their role in the seed production process and seed marketing process.

d) Data Sources and Data Collection Instruments

The study used both primary and secondary data sources to obtain the necessary information for this study. Primary data sources were respondents, discussants and key informants. With regards to secondary data sources, books, documents, reports, publications, different studies, etc. were included.

Questionnaire, FGDs and key informant interviews were used to gather primary data, where as document review was used to collect secondary data. Primary data were collected from all WHH members in the study areas through structured questionnaire. Structured questionnaire was prepared and used to collect primary data through household survey. The questionnaire was designed in such a way that it could help the investigator to dig out information on household demographic characteristics, socio-economic situations of women members in the seed producer cooperatives. In this study, FGD was one of the research tools for data collection. The Focus Group Discussions were included to supplement and confirm information that was generated in questionnaire and in-depth interviews with key informants and also to check the validity of data generated through the survey questionnaire. Gillham (2000) states that Focus Group Discussion (FGD) using semi structured questions allows researchers to look into more deeply into the research issues and develop new lines of inquiry that arise during interviews. Likewise, Krueger (1994) argues that group discussion compared with formal questionnaire interviews allow sensitive issues to be more freely discussed in groups when individual would not wish to discuss them alone with a stranger. Finally, three FGDs were carried out involving eight WHHs in each study districts using a checklist of semi structured questions. In addition, an attempt to explore facts on the ground makes it a rational approach to include key informant interviews by involving selected group of individuals who are likely to provide needed information, ideas, and insights on the proposed research. Accordingly, interviews were conducted among key informants that allowed the researcher collecting data on relevant and well-informed sources about WHH members of SPCs.

e) Data Summarizing and Analysis Techniques

In this research both primary (quantitative and qualitative) data were generated and a combination of data analysis methods were required and carried out for this study. Both descriptive and inferential statistics were used to analyze the quantitative data. Most of the variables that were collected in the questionnaire and used in the analysis were nominal or categorical and ordinal. For that reason, non parametric test (Pearson Chi Square) was used in the analysis in most parts to show whether or not there is a relationship between two categorical variables (sets of household characteristics and institutional variables) that are likely to influence rural women's involvement in the LSB. An association level of 0.05 was chosen as the minimum significance level. A Binary Logistic Regression (BLR) analysis was employed to identify the most important factors influencing women's benefit in the seed business because it is a powerful statistical tool as it allows us to determine the effect of independent variables on the dependent variable while holding any number of other independent variables constant.

The extent of WHHs participation in seed producer cooperatives were measured by using a four point continuum namely always, often, occasionally and never, which were assigned scores of 3,2,1 and 0 respectively. The ranking of activities was done on the basis of their total value (Minilek *et al*., 2012; Javed, 2006). Data collected from interviews and group discussions were immediately summarized through discussion with an assistant note taker. Outstanding and prominent issues were screened by checking how many of the speakers have reiterated the same issue in the process of the interview and discussion. Both diverging and converging issues on particular issues were identified and used for analysis, in the context of the research objectives. Finally, triangulation was made between the quantitative and qualitative data in order to make the analysis more comprehensive and valuable. The latest SPSS version statistical software was used for quantitative data analysis.

f) Description of Variables and Working Hypothesis

Dependent variable: As observed in different empirical studies, this variable can be expressed in terms of nominal/categorical, ratio, actual figure and logarithmic form depending on the purpose of the study. The Binary Logistic Regression model uses censored values as dependent variable. In this study the benefit of WHHs from the LSB project was used as dependant variable. It is a dummy variable, which takes the value of 0 if a WHH was not benefited and 1 benefited. It was measured based on criteria including the prevalence of sufficient and balanced diet, saving, motivation to start other business and feasibility of SPCs to households as reliable income sources.

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Independent variables: The independent variables are hypothesized to influence the role of WHH in the LSB project positively and negatively. This includes both discreet and continuous variables such as: household characteristics, socioeconomic characteristics and institutional characteristics in which women headed farmers operate.

Based on the review of diverse literatures, past research findings and the researcher's piece of information on seed production and marketing in the seed producer cooperatives, amongst abundant factors which were expected to be connected with WHHs role in the LSBs, 15 potential explanatory variables were considered in this study and examined for their effect on WHH role and their benefit from LSB Projects as a member. Each variable are described in detail regarding their attributes with the dependent variable.

1. *Age of the household:* the age of WHHs was considered because in rural society decisions and activities are mostly done by a household head. This variable was hypothesized that the household with an older head will have higher family size and access to land acquisition, and would have a capacity to accomplish seed production activities. Therefore, age of WHHs affect seed production and marketing as well as the benefits from SPCs positively.
2. *Marital status:* constitutes three marital status categories and stipulates whether respondents are unmarried, divorced, or widowed. However, women headed households with all marriage categories have limited land access, especially divorced women; a negative relationship was expected between marital status and the benefit status of WHHs.
3. *Family size:* it is a continuous variable which indicate the number of person living in the house of the farmers. It is expected that as the size of the household increases the benefit from LSBs increases. It was assumed that a family with large household member can involve more in seed production and marketing as the nature and the complexity of seed production roles need more labor and continuous follow up. Therefore, it was expected that there is a positive relationship between the benefits gained from LSB projects and family size.
4. *Education level:* education is a categorical variable in grades and number of years in school or colleges. Farmers' level of education positively and significantly affects the farmer's probability of adopting new technologies. A one year increase in education of male and female farmers, for instance, increases the probability of male farmers using fertilizer by 3 percent and female farmers by 4 percent (Anderson *et al.*, 1994). WHH with more education are mostly aware of adoption of agricultural technologies and agricultural extension services in their seed production processes. Therefore, it was hypothesized that WHH members of seed producer cooperative with greater levels of education tend to have higher incomes from seed production and are more likely to be benefited from LSBs.
5. *Farmland size*: this variable corresponds to the total area owned and cultivated by household. WHH farmers who have relatively large farm size would be more initiated to involve in seed production and marketing systems, and vice versa. Hence, it was assumed that farmland size has a positive relationship with the dependant variable.
6. *Number of plots:* it is a continuous variable and refers to the total number of plots a household has. It is a determinant factor that affects land cluster formation in seed producer cooperatives. Those WHHs who have more number of plots would be benefited in SPCs more than those who have less number of plots of land. Therefore, it was hypothesized that the number plots has positive relationship with the dependent variable.
7. *Land used for LSB:* this variable refers to the amount of farmland used by respondents (WHHs) in the seed producer cooperatives. It is a continuous variable measured in hectares. It is assumed to be negatively associated with the magnitude of benefits expected to be gained from seed production. It is to mean that those WHHs who have small farmland size will be benefited less from SPC than those who have more.
8. *Soil fertility:* soil fertility is a very important factor that affects the capacity of farmland to produce high production. Those WHH who have farmland with low soil fertility could not obtain high seed production, whereas those WHH who have farmland with high soil fertility could achieve high seed production. For this reason, it was hypothesized that soil fertility has a negative relationship with benefits gained in the LSB project.
9. *Seed production experience:* WHH with higher experience in seed production appear to have often full information and better knowledge and are able to evaluate the advantage of seed producer cooperatives. Thus, it was hypothesized seed production experience affects the benefits gained from the LSB project.
10. *Access to Market:* once seed is produced efficiently, adequate market access is crucial to achieve the end goal of seed producer cooperatives. Adefris *et al.* (2012) indicated that the greatest business challenge farmers face is not producing a crop, but

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marketing it. Selling seeds grown on contract to a seed company is the standard model for most conventional seed growers. The response of respondents was measured as a dummy variable either there is sufficient market accessibility or not. Accordingly, it was supposed to affect the benefits of SPCs positively.

11. *Availability of labor:* this variable refers to the required labor for the accomplishment of seed production and marketing activities in the LSBs. However, it is very difficult to accomplish all seed production activities by WHH because there are activities done by their counterparts. As a result, women are expected to seek labor to carry out activities from their surrounding areas. Anderson *et al.* (1994) asserted that family labor on both male and female managed plots contributed positively and significantly to the gross value of output. Interestingly, female family labor has a greater effect on output than male labor irrespective of whether the plot is managed by a man or a woman. Therefore, the availability of labor was assumed to have a positive impact on WHHs participation in seed producer cooperatives.
12. *Ox ownership:* ox is one of the most important means of production in agriculture and Oxen ownership and seed production are expected to relate negatively. As the number of oxen owned by farmers' decreases, seed production is expected to decrease. This assures those WHH who have no paired oxen or one ox for ploughing are not likely to engage in seed multiplication and would bring higher production and benefit. Hence, a negative relationship between ownership of oxen and better seed production was expected.
13. *Access to credit services:* It is a dummy variable, which takes a value of 1 if WHH had access to credit and 0 otherwise. Adoption of technologies among poorer households, including women headed, is also inhibited by an inability to afford the technology coupled with limited availability of credit or savings, and low levels of awareness (Lemlem *et al.,* 2011). Those farmers who have access to agricultural credit are believed to more from seed production. That is they will have higher income and higher quality seed for next sowing more than those who have no access to credit. This indicates smallholder farmers cannot finance these inputs for seed production unless they get alternative means.
14. *Agricultural extension service:* In this study this variable was treated as a dummy variable. That is if the farmers gets extension service it is coded as 1 and 0, otherwise. Extension services can increase agricultural productivity and rural incomes by bridging the gap between technical knowledge and farmer's practices. Several studies show that extension is generally cost-effective, and has a significant and positive impact on farmers' knowledge and adoption of new technologies and hence on farm productivity (Anderson *et al.*, 1994). Therefore, if farmers get better extension services, they are expected to adopt seed production technologies and get better yield than others.
15. *Access to training:* It is dummy variable measured as 1 if farmers got specific training on seed multiplication and 0 otherwise. Farmers may obtain information from different source and may learn also from DA through extension program. However, unless they can obtain required skill through training, they may face problem to understand and apply seed production technology. So, those farmers who got training on specific seed production technology are more willing than those who didn't get training. Therefore, a positive relationship was assumed between benefits of WHHs from SPCs and availability of training.

IV. Results and Discussion

a) Socio-Demographic Characteristics

This study was carried out on 92 WHHs involved in the LSB and organized in seed producer cooperatives. Of the total women heads 33 (35.9%) were from *Jabi Tehnan*, 32 (34.8%) from *Bure* and 27 (29.3%) from *Yilmana Densa* districts. As it is indicated in Table 4.1, there were three age groups of WHHs. Of the total respondents about 46.7% were between 36-50 years, 38% were between 20-35 years, and 15.2% were over 50 years. Age of WHHs ranges from 20 to 65 years. It was however, reported in the key informants that WHHs greater than 50 years of age experienced difficulties in accomplishing seed production activities efficiently and effectively. With regard to marital status, more than half of WHHs (54.3%) were widowed; the remaining 33.7% were divorced and 12.0% unmarried. Family size of the respondent households indicated that about 54.3% of respondents had 1-4 persons while 45.7% had greater than 4 persons. The family size however ranged from 1 to 9 persons. Focus group discussants of this study reported that WHHs can produce seed equal with their counterparts if they have sufficient productive labor force. The survey result in Table 4.1 also revealed that the majorities (60.87%) of the respondents were illiterate, whereas about 19.57%, 10.87% and 8.7% of the respondents can read and write and had primary and secondary school ages respectively. Focus group discussants reported that women's capacity to adopt technologies was constrained by their low literacy level implying the need for promoting functional literacy for women farmers. Better literacy seems to have helped the respondents to wisely allocate the existing farm resources and benefit from being member of the SPCs.

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Table 4.1: Distribution of Respondents by Age, Marital Status, Family Size and educational level (N=92)

Household characteristics	Category	Frequency	Percentage (%)
Age	20-35	35	38.0
	36-50	43	46.7
	>50	14	15.2
	Total	92	100.0
Marital status	Unmarried	11	12.0
	Widowed	50	54.3
	Divorced	31	33.7
	Total	92	100.0
Family size	1-4	50	54.3
	>4	42	45.7
	Total	92	100.0
Educational level	Illiterate	56	60.87
	Read and write	18	19.57
	Primary	10	10.87
	Secondary	8	8.7

b) *Motivating Factors to Get Involved in Seed Production*

Once WHHs were well informed about the presence and importance of SPCs in their localities, they decided to join SPCs owing to motivating factors related to presence of benefited framers, exposure to extensive training, and agitation of the *Kebele* administration, the district agricultural development office and nongovernmental organizations. The degree of inspiration imposed on WHHs by these factors is of varying magnitude degree as indicated in Table 4.2.

Table 4.2: Response of WHHs on Motivating Factors to Join SPCs in terms of Their Importance/Ranking

Factors	Sum Result (SR)	Rank
Benefited Farmers	368	1st
Extensive training	239	2nd
Kebele Administration	216	3rd
District agricultural office	210	4th
NGOs	203	5th

Scale: 5=1point (pt), 4=2pt, 3=3pt, 2=4pt, and 1=5pt

The data collected in the focus group discussions showed other motivating factors including the desire to use irrigation facilities, recognizing the value of working together for better change, expectation for better agricultural extension services (advisory service and technical support) and opportunities to better market accessibility.

c) *Seed Production Activities*

The data presented in Table 4.3 illustrates that among seed production activities, women headed household's participation in weeding account the first rank followed by harvesting of seeds, storage of seeds, chemical fertilizer application, sowing of seeds, transporting inputs to farmland area, crop protection, marketing of seeds, threshing, participation in meetings, organic fertilizer preparation, participation in trainings, applying pesticides and leadership participation. A similar result was found by Dawit *et al.* (2012) and Minilek *et al.* (2012) that rural women are more involved in seed production activities besides their major responsibility of household care. Almost all rural women were participated in weeding, harvesting and fertilizer application activities indicating their significant contribution, while their position in leadership, decision making and their participation in trainings is still not appreciated and considered. In the study areas, women's participation in leadership activities ranks lowest level. In most seed producer cooperatives, leadership positions are exclusively occupied by MHHs.

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Table 4.3: Ranking of WHHs Participation in Seed Production Activities (N= 92)

Seed production activities	Participation Index (PI)	Rank
Weeding	240	1st
Seed harvesting	216	2nd
Storage of seeds	213	3rd
Chemical fertilizer application	211	4th
Sowing of seeds	200	5th
Transporting inputs	197	6th
Crop protection	166	7th
Seed marketing	160	8th
Threshing	152	9th
Participation in meetings	132	10th
Organic fertilizer preparation	123	11th
Participation in trainings	98	12th
Applying pesticides	52	13th
Leadership participation	29	14th

Scale: 0= Never, 1= Occasionally, 2= Often, 3= Always

Group discussion participants and key informants revealed that WHHs in the seed producer cooperatives accomplish various activities such as land clearing, application of fertilizer, weeding, pest inspection, harvesting, threshing and cleaning, marketing, etc. However, WHH were not actively involved in operations such as, ploughing, applying herbicides and crop protection during the night.

Most key informants reported that, in most cases, there is no special support and monitoring of effectiveness of WHHs in their efforts to increase productivity their farm and also their participation especially in leadership positions. In principle, women like men headed households have equal rights to get member of cooperatives, but they have assumed little or no position in the leadership.

d) Relationship between Benefits Status of WHHs in SPCs and Independent Variables

This part of analysis discusses findings on the relationship between dependent and independent variables to examine whether there is an association or not between the two. The dependent variable is benefit status of WHHs which is a dummy/dichotomous variable: 0= if WHH is not benefited and 1= if WHH is benefited. Chi-Square (nonparametric) test was carried out to make sure that the existence of association between the predicted and predictor variables (Table 4.4).

Table 4.4 Test of Association between Benefit Status of WHHs and independent variables

Variables	Pearson Chi Square (χ^2)	*df*	*P* Value
Age	.592	2	.744
Marital status	.661	2	.718
Family size	7.281	1	.007
Educational level	1.185	3	.757
Farm land size	6.179	1	.013
Farm plots size	4.051	1	.044
Land use in LSBs	10.848	1	.001
Soil fertility	10.555	1	.001
Oxen ownership	12.443	1	.000
Labor availability	7.011	1	.008
Seed production experience	.027	1	.869
Access to market	13.365	1	.000
Access to credit service	5.973	1	.015
Extension service	2.692	1	.101
Availability of training	.493	1	.482

e) Determinant Variables of WHHs benefit in SPCs

The binary logistic regression model was employed to establish the relationships between benefit status and a set of explanatory variables. A total of 10 important explanatory variables were selected to explain the predicted variable. Accordingly, out of the total explanatory variables seven independent variables were determinant factors, influencing the dependent variable (benefit status of WHHs in SPCs), that made statistically significant to the model (Table 4.5)

Table 4.5 shows the Binary Logistic Regression coefficient, standard error, Wald test, degrees of

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freedom and odds ratio of 10 predictor variables. Employing a 0.05 and 0.01 criterion of statistical significance, farm plots size, land used in LSBs, soil fertility, oxen ownership, access to market, access to credit services and access to extension services variables had significant effects on benefits of WHHs from SPCs.

Table 4.5: Determinant Variables of WHHs Benefit in the SPCs

Predictors	β	S.E.	Wald	Sig.	Odds Ratio
Family size	-.546	.772	.499	.480 ^{ns}	.580
Farm land size	-1.543	1.028	2.254	.133 ^{ns}	.214
Farm plots size	2.738	1.347	4.130	.042*	15.456
Land used in LSB	-4.221	1.189	12.606	.000**	.015
Soil fertility	-3.186	1.083	8.663	.003**	.041
Oxen ownership	-2.849	.969	8.638	.003**	.058
Labor availability	-.497	.804	.381	.537 ^{ns}	.609
Access to market	2.438	.902	7.309	.007**	11.453
Credit access	2.222	.923	5.799	.016*	9.226
Extension service	-2.016	.950	4.499	.034*	.133
Constant	3.391	1.759	3.717	054	.054

**Significant at 0.05, **significant at 0.01, ^{ns} = not significant*

The binary logistic regression result indicated that as farmland plot size increased by one unit, the odds of WHHs being benefited from SPCs increased by a factor of 15.456, which is significant at $p < 0.05$. Hence, those WHHs who have large number of plots are more likely benefited from SPCs. Therefore, the size of farm plots has positive relationship as it was previously hypothesized. A study conducted by Villabon (2012) also found that the increase in the size of the operational plot area also increases agricultural productivity.

Land used in the SPCs was a determinant factor for women heads benefit. The odds ratio for land used in LSB indicates that when holding all other variables constant, those who have used land ≤ 0.25 are 0.015 (decrease of 98%) times less likely benefited from SPCs than those who have used > 0.25 (significant at $p < 0.01$). Hence, there was strong negative relationship in which the use of small land size for LSB results for meager share of income from SPCs. Tagel (2008) noted that land holding is the contributing factors for the spatial clustering and high crop production.

The odds ratio for soil fertility status reveals that WHHs who have low soil fertility are 0.041(decrease of 96%) times less likely to benefit from SPCs than those who have moderate farmland soil fertility (significant at $p < 0.01$). Thus, WHHs are not benefited if there farm plots soil fertility is low that shows a negative relationship between the two variables in table 4.5. However, previous study by Fikru (2009) found the determinant factors that affect soil conservation practices to increase the soil fertility.

Another influencing factor to women's benefit from SPCs is the issue of access to markets. The model result shows, as access to market increases by one unit, the odds of being benefited from SPCs increased by a factor of 11.453, which is significant at $p < 0.01$. Thus, WHHs who have access to market more likely benefited than from those who have no access to market in the SPCs. The existence of access to market increases WHHs income and therefore, there was a positive relationship between market accessibility and the benefits gained from SPCs.

The odds ratio for oxen ownership indicates that those WHHs who have no oxen are 0.058 (decrease of 94%) times less likely to benefit in the SPCs than those who have oxen (significant at $p < 0.01$). This implies that absence of oxen in seed production negatively influenced the seed production yield for WHHs. According to Gezahegn (2008) revealed that increase in ox ownership increases the probability of participation and land allocation for wheat seed multiplication.

The coefficient of access to credit services is significant and positive, implying that WHHs obtaining credit services are more likely to increase seed production than the households without any credit services. The odds ratio for access to credit services reveals that WHHs who have access to credit services are 9.226 times more likely to benefit from SPCs compared to those who have no credit accessibility. Gezahegn (2008) also found that those farmers who have access to credit from formal organization are more likely to participate in seedling multiplication than those who have not. This finding is also complement with Villabon (2012) found that increase in access to credit led to an increase in the value of production per hectare. Similarly, according to Legesse (1992) cited in Yeshi (2000) found that credit is an important factor affecting the probability of adoption of improved seed.

With regard to extension services the odds a WHH with access to extension services will be benefited from SPCs is 0.133 (decrease of 86%) times the odds that a WHH of no access to extension services will. Therefore, the nonexistence of extension services like

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technical support, training and advisory services are negatively influencing WHHs to acquire the expected benefits from SPCs. In this regard, Addis *et al.* (2000) cited in Yeshi (2000) reported that similar findings that extension contacts significantly affected gross value of output of WHHs in central highlands of Ethiopia.

On the other hand, the regression results indicate that there is no real effect of family size on benefit status of women headed farmers. This is probably due to the possession and utilization of small land size by WHHs hidden the significant contribution of family size on benefit status. Similarly, farm land size of women heads has no significant effect on their benefit from LSBs. Even though land holding size has a vital importance in this context, women with large land holding size may not be benefited from seed producer cooperatives. It is perhaps due to the type of land occupied and unsuitability nature of land cluster formation, and thereby limiting their participation in the LSB. Furthermore, there is no valid effect of labor availability on women heads benefit from SPCs probably due to other factors like land used in the LSBs and family size.

V. Conclusion and Policy Implication

WHHs play immense roles both in agricultural and non-agricultural activities. Likewise, women headed members of seed producer cooperatives have played roles in many activities of seed production and marketing process. WHHs level of participation in seed production and marketing processes has shown disparities in various activities. According to the survey result, WHH are highly participated in weeding, harvesting of seeds and storage of seeds, chemical fertilizer application and sowing of seeds, whereas WHH are poorly involved in leadership, applying pesticides, experience sharing and training. These limitations are severe impediments for sustainable seed production and livelihood improvement of WHHs. Access to clear information on LSB has a positive impact to attract many more WHHs to participate in seed production. The reality on the ground however indicates information flow from DAs, neighbors, *Kebele* administration, NGOs, cooperative facilitators and district agricultural and cooperative offices are far from being adequate.

Hence, it has paramount importance to coordinate the information flows from the different actors or stakeholders so that many more WHHs could be attracted to the local seed business. The binary logistic regression model confirmed that the size of farm plots size, land used in LSB, soil fertility, access to market, oxen ownership, access to credit services and extension services have statistically significant effects on benefit status of WHHs in LSBs. The results also indicate there are no real effects of family size, farmland size and labor availability on the benefit status of WHHs from seed producer cooperatives. This signals the need for giving due attention to the key variables as they have a vital role and contribution to women headed farmers to be benefited more from local seed businesses. Although there was no statistically different income generation from the local seed business between women and male headed households, the fact that women headed households are less benefited from the seed business shows the need for working more to empower women in the seed sector. As a result, remarkable market structures and systems should be set to realize the benefits of WHHs from seed producer cooperatives. To scale up the benefits of WHHs from SPCs it is also recommended that GOs and NGOs should offer continuous capacity building trainings and technical supports. Furthermore, emphasis should be given by GOs and NGOs on integration, mobilization and participation of women headed farmers in the LSBs.

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