ACCESS AND UTILIZATION OF AGRICULTURAL INFORMATION BY RESETTLER FARMING HOUSEHOLDS: THE CASE OF METEMA WOREDA, NORTH GONDAR, ETHIOPIA

M. Sc. Thesis

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Haramaya University

ACCESS AND UTILIZATION OF AGRICULTURAL INFORMATION BY RESETTLER FARMING HOUSEHOLDS: THE CASE OF METEMA WOREDA, NORTH GONDAR, ETHIOPIA

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As *Thesis* Research advisor, I here by certify that we have read and evaluated this thesis prepared, under my guidance, by *Daniel Tadesse,* entitled**: Access and Utilization of Agricultural Information by Resettler Farming Households: The Case of Metema Woreda, North Gondar, Ethiopia.** I recommend that it be submitted as fulfilling the *Thesis* requirement.

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DEDICATION

I dedicated this thesis to

My mother Mantegbosh Anberbir

My wife Banchamilak Mihret

and

My son Yonatan Daniel

STATEMENT OF AUTHOR

First, I declare that this thesis is the result of my own work and that all sources or materials used for this thesis have been duly acknowledged. This thesis is submitted in partial fulfillment of the requirements for an advanced M.Sc. degree at Haramaya University and to be made available at the University's Library under the rules of the Library. I confidently declare that this thesis has not been submitted to any other institutions anywhere for the award of any academic degree, diploma, or certificate.

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BIOGRAPHICAL SKETCH

The author was born in North Gondar Administrative Zone of the Amhara National Regional State in 1973. He completed his primary education in Meseret primary school. He attended his junior and high school education at Fasiledes Comprehensive High School (Gondar Town). He then joined Awassa Agricultural College in November 1994 and graduated with B.Sc. degree in Plant Production Dry Land Farming in July 1998.

After his graduation, he worked in the Agricultural Development Bureau of the Amhara National Regional State, North Gondar Administrative Zone, Adi Arkay District in the title of Crop Protection Expert from August 1998 up to 2002. He then shifted to Metema District from August 2002 within the same Organization and served as Extension Team Leader until he joined Haramaya University for his postgraduate study in July 2005. The author is married and has one son.

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ABBREVIATIONS AND ACRONYMS

ACSI	Amhara Credit and Saving Institution
ADLI	Agricultural Development Led Industrialization
AKI	Agricultural Knowledge and Information
ANOVA	Analysis of Variance
BFED	Bureau of Finance and Economic Development
BoANR	Bureau of Agricultural and Natural Resources
CSA	Central Statistics Authority
DAs	Development Agents
EIPRTP	Ethiopia Interim Poverty Reduction Strategy Paper
ETV	Ethiopia Television
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization
FHHs	Female headed households
HYV	High Yielding Varity
IFPRI	International Food Policy Research Institute
MHHs	Male headed households
MoA	Ministry of Agriculture
NBE	National Bank of Ethiopia
NRM	Natural Resource Management
PA	Peasant Association
PADETES	Participatory Demonstration and Training Extension System
S.D	Standard Deviation
UNICEF	United Nations International Children's Emergency Fund
WARDO	Woreda Agricultural and Rural Development Office

TABLE OF CONTENTS

TABLE OF CONTENTS (*Continued*)

TABLE OF CONTENTS (*Continued*)

LIST OF TABLES

Table **Page**

LIST OF TABLES (*Continued*)

LIST OF FIGURES

LIST OF APPENDICES

ACCESS AND UTILIZATION OF AGRICULTURAL INFORMATION BY RESETTLER FARMING HOUSEHOLDS: THE CASE OF METEMA WOREDA, NORTH GONDAR, ETHIOPIA

ABSTRACT

The Government of Ethiopia has been implementing a resettlement program in Metema woreda in Amhara region since 2003. Previously in the Derge Regime, another resettlement program has been implemented in 1985 and voluntary settlers were in-migrating even before that. Extension service is mandated to assist them in order to improve the production and productivity of the farmers, enabling them to achieve food security and income generation. This study is aimed at assessing the new and previous settler farmers' access to and utilization of agricultural information from the extension service and as well as to identify the influencing factors. A two stage random sampling technique was employed and in the first stage of sampling, three PAs were selected purposively and the respondents were stratified into new and previous settler categories. In the second stage, probability proportional to size sampling technique was applied to each stratum. Finally, 160 sample respondents were selected using simple random sampling technique and interviewed using pre-tested structured interview schedule. Fifteen percent of respondents were female headed households. Both primary and secondary data were collected and analyzed to understand various aspects of access and utilization of agricultural information of farmers. Qualitative data were used to supplement quantitative data. Data were analyzed using descriptive analysis and Tobit model. Except from seasonal extension orientation and mass media, in all cases there was significant difference between new and previous settlers' access to and utilization of agricultural information. In all extension methods, there were highly significant differences between male and female headed households in obtaining agricultural information, in the favor of males. The female headed respondents utilized the obtained information with comparable to male headed households. The agricultural information and support for utilization provided by the extension service were biased towards the previous settlers and males, and consequently the new settler farmers' and female headed households agricultural information access and utilization was very limited. The survey finding reveals that the current extension service has limited responsiveness, gender sensitivity and poor potential of addressing farmers' need. In the absence of responsive extension service that understands and addresses interests of various groups of farmers, the purpose of resettlement program would not be fulfilled. Result of the econometric model indicated that, settlement category, education level, settlement orientation, innovation proneness, production motivation, age of household head, frequency of market visiting and credit access had influence on the access to and utilization of agricultural information. The overall finding of the study underlined the importance of well organized agricultural information provision and supporting utilization of information through the delivery of credit and technologies based on the farmers' problem and need. Institutionalized and genuine resettlement program information provision in the highland also required. Therefore, policy and development interventions should give emphasis to improvement of such institutional support system so as to enhance the production and productivity of agriculture and to achieve the desired poverty reduction strategy in the resettlement program.

1. INTRODUCTION

1.1. Background

In most developing countries agriculture is the most important economic activity providing food, employment, foreign exchange and raw material for industries. In Ethiopia agriculture plays a major role in the country's economy. Agriculture accounts for about 45.5% of GDP, 85% of the employment and 94% of Ethiopia's exports (NBE, 2002 as cited in Endrias, 2003) and in the Amhara Region of Ethiopia, for instance, agriculture accounts for 63% of the regional GDP, and nearly 90% of the population derives its livelihoods from agriculture and related activities (BFED, 2004).

The agricultural production system in Ethiopia is highly dominated by traditional farming and the application of modern inputs has been extremely limited. As a result, yields of various crops are very low. In the absence of an efficient agricultural sector, countries like Ethiopia severely suffer from the inability to feed themselves and to depend on food imports and food aid (Tsegaye, 2003). A significant proportion of the population, particularly in the developing world has been suffering from hunger and malnutrition. Especially in Ethiopia, according to Samuel (2006), the number of people needing food aid has been increasing. Over a period of two and half decades, the proportion of the population deemed food insecure rose from 5% in the 1970s to over 20% in 2003. Workneh (2004) also explained that, about 22 % of Ethiopians were in need of food aid in 2003.

Rapid growth of population, environmental degradation and low agricultural production and productivity are major problems faced by the country. The Government of Ethiopia is currently giving attention to strategies of achieving food security and poverty reduction. According to EIPRTP (2000), regional Governments have identified various projects to tackle the problem of food insecurity which arise either from extremely small size of landholdings or drought proneness in dry-land agriculture. Beside these activities, the Government of Ethiopia planned resettlement program as one means of poverty reduction strategy.

Different political regimes in Ethiopia implemented resettlement program as a strategy of responding to the problems of highland vulnerable areas. Under this program, farmers living

in marginal highland areas of the country are being moved to more fertile and low population density lowland areas.

Agriculture in Ethiopia had not been open to outside information due to many factors and consequently, its technological progress has been restrained for a long time. It is a fact beyond dispute that technology can play an important role in increasing production, income and efficient use of resources for the economic development of the country (Tsegaye, 2003). As Habtemariam, (2004) stated a thriving agricultural economy is critical for reducing poverty, ensuring food security and managing natural resources, and to this effect, agricultural extension is expected to play an acceleratory role.

With the aim of increasing production efficiency and improving the livelihoods of the rural population, in 1995 the Federal Government of Ethiopia proposed the Participatory Demonstration and Training Extension System (PADETES) as a national extension intervention program. The aim of the Government was to reach as many smallholder farmers as possible in a relatively short time. PADETES, promotes diffusion and adoption of extension packages, which consist of four elements namely, technological package, credit, appropriate communication methods and provision of technologies with the aim of increasing productivity of resources, income and improving the life of rural people (Tsegaye, 2003). The Government considers that agricultural information will be provided through PADETES.

In most cases, farmers differ in their access to and utilization of agricultural information from extension service and other sources. Such diversity among farmers could be related to various personal, social, economical, or institutional factors. Understanding reasons behind such diversity and farmers current level of access and utilization of agricultural information is of paramount importance. To enhance the production and productivity of agriculture, farmers should have access to well organized and relevant information and proper and sufficient utilization of agricultural information requires good facilitation.

This study is designed to analyze in-depth the farmers' access and utilization of agricultural information in Metema woreda as well as to identify influencing factors to make useful policy

recommendations, to facilitate meaningful interventions in the areas of agricultural extension so that relevant information is provided in a timely manner.

1.2. Statement of the Problem

Starting from 2003, the Government of Ethiopia has been implementing a resettlement program in different parts of the country by mobilizing people from the drought-prone areas to the relatively unpopulated fertile low land areas.

In Amhara region, Metema woreda is one of the selected settlement areas and the settlement activity was taken up during 2003-2005. Previously in the Derge Regime, in the year 1985 another resettlement program has been implemented and voluntary settlers were in-migrating even before that. Consequently, the previous settlers and new settlers are living and practicing different agricultural activities such as crop production, livestock production and natural resource production and management in the settlement area to improve their livelihood.

For all settlers, particularly for new settlers having poor agricultural experience in the new agro ecology, the Woreda Agricultural and Rural Development office (WARDO), particularly the extension team, is expected to assist and provide agricultural information in order to improve the production and productivity of the farmers, enabling them to achieve food security and income generation.

The new settlers, previously living in high lands, are now living in low land areas. From the farming system point of view, these two areas are quite different, and especially the type of crop, type of livestock production and management, type of vegetation and management practices are not similar to those in highland.

The new settlers do not have enough know-how of the new farming system to produce agricultural products efficiently to be food secure. Their natural resource management and utilization, for generating income have always been criticized by previously settled farmers, due to the importance of vegetation cover in existing agro ecology. Moreover, the new settlers

have no access to credit from cooperatives for the purpose of agricultural technology utilization due to their instability and lack of collateral.

To alleviate these problems, the extension service is expected to play a significant role by providing adequate and relevant agricultural information. But, the woreda extension staff has not been able to adequately support them due to the limited number of extension staff during the resettlement program implementation and the new settlers have been highly unsatisfied with and critical of the extension team.

This study while understanding the access and utilization of agricultural information services in the settlement areas of the woreda. Also attempts to identify the constraints and factors that influence provision of agricultural information to make useful policy recommendations, to facilitate meaningful interventions.

1.3. General Objective of the Study

To assess the settler farmers' access to and utilization of relevant agricultural information, and to identify the demographic, socio-economic, psychological and institutional factors that affect access and utilization of agricultural information by settler farmers.

1.4. Specific objectives of the Study

The specific objectives of the study are:

1. to assess the previous and new settler farmers' access to relevant agricultural information,
2. to assess the previous and new settler farmers' utilization of relevant agricultural information,
3. to assess the responsiveness and potential of extension service in addressing new and previous settler farmers needs
4. to identify the factors influencing access and utilization of agricultural information by previous and new settler farming households in the study area.

Research Questions

1. What is the level of access to agricultural information of new and previous settler farmers?
2. What is the level of utilization of agricultural information of new and previous settler farmers?
3. How the extension service quickly responds and addressing farmers need.
4. What are the factors that influence access and utilization of agricultural information for both categories of settler farmers?

1.5. Scope and Limitation of the Study

The scope of the study was to examine the level of access to and utilization of agricultural information by previous and new resettler farming households, in three PAs of one woreda, namely Metema in North Gondar and focused on the contribution and constraints of existing information flows in the on-going resettlement program.

Even though 50% of the new settlement PAs were included in the sample, it may have a limitation of representing all the previous settlers' PAs relative to the total woreda coverage. One concern of the research was to know whether the new settler farmers are in a position to manage the new farming system efficiently or not. The mobility of new settler farm households to serve as hired labor in agricultural investment areas, off farm activities and to visit their family in their native area were the other limitations. These situations have contributed to reducing the probability of getting good representative sample households.

1.6. Significance of the Study

To bring about agricultural development, the provision of agricultural information plays a decisive role. Agricultural information can flow to different farm households from different sources. Currently beside the indigenous farm experience, Government designed programs contribute to provide agricultural information in order to improve the life of rural people.

Empirical studies on the settlers' access to and utilization of agricultural information have not been conducted in Metema Woreda so far, though successive settlers have come to inhabit the woreda.

The previously settled farmers who have been living in the area for more than 15 years, have enough know-how of their farming system. But the new settlers who came from the highland to lowland agro-ecology require tailored and intense provision of agricultural information compared to the previous settlers. However, both settlers have been provided with similar agricultural information while following the same extension approach.

All development actors like extension services, NGOs and other development agencies involved in agricultural development, especially in resettlement program, must be aware of the need to understand the constraints and factors influencing the level of the access to and utilization of agricultural information and understand the gaps to take remedial action. It is important for policy makers to understand whether the existing agricultural information services, beside the local knowledge flows, assures the desired resettlement based food security strategy and to make useful policy changes to facilitate meaningful interventions in the settlement areas during the transition period.

1.7. Organization of the Thesis

This thesis is organized into five chapters. Chapter one introduces the back ground and problem under the study area, and the research objectives. Chapter two deals with a review of the literature that includes conceptual explanation of agricultural knowledge and information, Role of agricultural extension service, empirical studies on factors affecting access and utilization of agricultural information, and Conceptual Framework of the study.

In chapter three, research methodology including description of the study area, sample size and method of sampling, data types and sources and methods of data collection, methods of data analysis and definition of variables and hypothesis are presented. The research findings are presented and discussed in chapter four. Finally chapter five presents the summary, conclusions and recommendations of the study.

2. LITERATURE REVIEW

2.1 Review of Agricultural Knowledge and Information

2.1.1 Operational definitions

'Access': is defined as receiving messages related to agricultural production activity from different sources and extension methods such as mass media, extension service (advisory service, orientation about seasonal activities information, training, field days, demonstration, visits), on-farm research, etc including its frequency.

'**Utilization'**: relates to the use or converting into action the accessed agricultural messages by the settler farm households to perform the agricultural production activity. The frequency of converting received messages into action is also considered.

'Agricultural information' : is operationally defined as the various sets of information and messages that are relevant to agricultural production activities of farmers such as crop production and protection, animal production and management, and natural resource production and conservation. In the context of this study, agricultural information does not include market information.

'New settlers': are those farmers who came from highland areas and settled after 2003, in the current Government resettlement program.

'Previous settlers': are those farmers living in the woreda and resettled before 2003, including those settled by the Derge Government resettlement program, returned from Sudan and voluntary settlers.

'Seasonal extension orientation about seasonal activities': is one method of extension service where the DAs disseminate various seasonal agricultural information to the mass of the farmers through different meetings and other social gatherings. The information mainly

focuses on awareness of pest assessment, introducing different agricultural technologies appropriate to the season, occurrence of unseasonal rain during harvest time etc.

2.1.2 Concept of agricultural knowledge and information

Some people use the words Information and Knowledge interchangeably. However, these are two different but linked concepts. Different people define the word knowledge in different ways. According to Wikipedia, the free encyclopedia dictionary:

- Knowledge is "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." (Davenport *et al.,* 1998).
- "Knowledge is the human expertise stored in a person's mind, gained through experience, and interaction with the person's environment."(Sunasee and Sewery, 2002).

Some other authors defined it as:

- Knowledge is a range of information gained from experience about technology, environment and farming related conditions (Hedja, 1999)
- Knowledge is information in the context to produce an actionable understanding (Ermias, 2004).

Regarding the definition of information:

- Samuel (2001) defined agricultural information as the data for decision-making and as a resource that must be acquired and used in order to make an informed decision. Umali, (1994) classified agricultural information into two broad groups: pure agricultural information and agricultural information inherently tied to new physical inventions. Pure agricultural information refers to any information which can be used without the acquisition of a specific physical technology. On the other hand, agricultural inventions or technologies are those that come in the form of agricultural inputs, management technologies facilitating farm management, and marketing and processing equipment.

Drawing on the various definitions, the researcher conceptualized agricultural information as both agricultural messages via extension and embodied in agricultural technologies and shared between the actors in the agricultural extension system. Also knowledge is a range of information gained from interaction and information combined with experience, and it is organized and interpreted by the human mind with confident understanding for the purpose of decisions and actions.

There are various types of knowledge depending on its functions and its carrier systems, for example, agricultural knowledge, management knowledge, manager knowledge etc. Knowledge varies depending on cultural, social, and economical factors. The type of knowledge people have depends on their age, sex, occupation, labor division within the family, enterprise or community, socio-economic status, experience, environment, history, etc.

Knowledge can also be seen from the view point of coverage and degree of understanding of certain things such as: common knowledge is held by most people in a community; e.g. almost everyone knows how to cook rice (or the local staple food); shared knowledge is held by many, but not all community members; e.g. villagers who raise livestock will know more about basic animal husbandry than those without livestock; specialized knowledge is held by a few people who might have had special training or an apprenticeship; e.g. only few villagers will become healers, midwives, or blacksmiths (FAO, 2004). Therefore knowledge can be categorized depending on our interest using various criteria.

2.1.3. The role of agricultural knowledge and information in agricultural development

In this dynamic world, the rural people's information requirement is increasing constantly. Agricultural knowledge is changing rapidly; it is obvious that the development of agriculture is highly dependant on the new knowledge and information. According to FAO (2002), rural communes need a wide variety of information such as availability of agricultural support services, Government regulations, crop production and managements, disease outbreaks, adaptation of technologies by other farmers, wages rates, and so on. The content of the information services needs to reflect their diverse circumstances and livelihoods. Therefore,

information can be seen as the basic element in any development activity and it must be available and accessible to all farmers in order to bring the desired development.

Literature reveals that investment in people is an attractive development option. Peasants' responses to price and profit incentives, the abilities of producers to cope with risk and manage new technology were enhanced by human resource investments in schooling. Relatively few studies have examined the payoff from primary education for persons engaged in agriculture. A review (World Bank 1980, as cited in Tweeten, 1997) found that four years of primary education raised farm output by 13 percent on average if complementary inputs (improved seed, irrigation, transport to market etc) were available and by 8 percent if complementary inputs were not available. Either directly or indirectly, knowledge and information has a significant role in agricultural development.

The contribution of agricultural information is not limited to surplus food production areas. Small scale farmers in marginal areas also require knowledge and information for better achievement of household food security and consequently national food security. Moreover, according to FAO (2002), improved household food security requires good decision making by rural women and men, for which better grassroots information availability is imperative.

2.1.4 Sources of agricultural knowledge and information

It is important to realize that knowledge and information is dynamic and continuously changing to respond to the changing environment. According to Samuel (2001), there are three major organizations, which generate agricultural information in Ethiopia. These are Government agricultural extension systems both at federal and regional levels, Central Statistical Authority (CSA) and research institutions. The CSA is responsible mainly for macro-level data and statistics, whereas the Federal Ministry of Agriculture (MOA) and Regional Agricultural Bureaus are also mandated by law to collect process and disseminate data with respect to the performance of agricultural projects and programs. Agricultural research centers generate and disseminate technical data on new findings and other

recommendations. Therefore, knowledge is produced in agricultural research either in conceptual form or embedded in material and disseminated through different channels.

According to Fekadu (1997), though knowledge is produced through agricultural research, it is not the only avenue for knowledge generation. Learning from experience, interaction and farmers' experimentation are other sources. Salomon and Engel (1997) indicated that farmers have been innovators for centuries, based on their own on-farm experimentation. Acknowledging farmers' expertise, involving them in setting the research agenda and/or as partners in research can lead to additional forms of learning and innovation.

Farming families, agricultural cooperatives, agri-businesses, agricultural press, and extension service can serve as source of AKI for the farmers. Especially extension services can be seen as a good source, because extension services can tap a wide variety of information and have several partners. Generally, there is a multitude of actors who can be considered as the sources of agricultural knowledge and information.

2.1.5. Knowledge sharing and communication network

Communication can be defined "the exchange of messages" between two or more partners, or establishing "commonness" between two or more parties through a particular medium, or an active, dynamic process in which ideas and information are exchanged leading to modification of people's knowledge, attitudes and practices (Burnett, 2003). The knowledge sharing and communication network of AKI is highly variable, very complex and dynamic. The presence of high diversity in the nature, attitudes and experience, leads to the existence of different communication networks.

To boost the economy, producers should have the right kind of knowledge and information. However, there are gaps between what certain individuals and what other individuals know in any society, even in a homogenous society such as farmers. The consequences of these gaps can often be serious, amid poverty. Not everyone in an economy could have the right kind of knowledge and information to produce output efficiently. People are poor not because of lazy,

they may be hard working people but lack of proper knowledge and information (Suhermanto, 2002).

To close this gap Suhermanto (2002), suggested that two ways of distribution of knowledge and information. First, public sector or government-facilitated efforts might close the gap through the distribution of knowledge and information to the needy. Such government-assisted programs includes, for examples, training, media, publications, leaflets, and the opening of educational institutions. The obtained information from this method also share through local information exchange system, according to Ejigu *et al.,* (1999), farmers participating in the PRA training reported that they had expanded their knowledge and understanding of local problems. Many farmers involved in training activities reported that they had shared information with other farmers, and a few trained farmers took on a training role themselves, motivated to defend new technologies and to demonstrate technologies to other farmers.

Secondly, communication among individuals can help knowledge and information to be transmitted from one individual to another. According to Katungi 2006, a household can participate in information exchange as an information receiver, information provider (sender) or both. There is a links among the households in form of clubs (associations) and/or private social networks. Associations describe finite closed groups with a common interest while private networks refer to a set of bilateral links the household is directly connected to. The linkages between these households are used in the exchange of resources based on norms of reciprocity. Let information be one of those resources that households exchange among themselves through their links. This allows us to model the social network as exogenous to information exchange. Each household can engage in information exchange with other households it has a direct link with, whether through associations or private networks. Thus, information from other households, indirectly linked to the household, is only accessed from direct contacts through the other established links (Katungi, 2006).

Social institutions and the underlying social norms within a village influence the extent to which rural households interact and hence the rate at which information is exchanged. Six social institutions were identified in the context of rural Uganda, where households meet and

interact: places of worship, market place, weddings or other related celebrations, school open days, village meetings. Places of worship are the most common social institutions in rural areas for both men and women. As a forum for the exchange of goods, markets are organized weekly, biweekly or monthly and constitute an important place where agricultural information is exchanged (ibid)

To strengthen these information exchanges, extension can serve as information source and information exchange facilitator. The learning opportunities in local market areas are the main (informal) means for information dissemination across a community. Therefore, agricultural extension service is expected to contribute the well functioning of the existing local information exchange, taking into account the diverse sources of information.

2.2. Role of Agricultural Extension Service

The scope and definition of extension service have changed over time. Moris (1991) defined extension as the mechanism for information and technology delivery to farmers. Purcell and Anderson (1997) define extension as a 'process that helps farmers become aware of improved technologies and adopt them in order to improve their efficiency, income and welfare'. Gradually the role and definition of extension became more and wider than the former view. According to Vanclay and Lawrence (1996), today extension has become a discipline in search of a paradigm, yet we continue to see changes in extension ideology away from the "linear model" of technology transfer (e.g. from one-to-one patronizing extension to group-based co-learning activities). Extension is evolving to be a co-learning process. It has recognized that multiple sources of knowledge and innovation exist, and that farmers should have more control over the information they need and over the way it is delivered. As a result, extension is becoming "demand-pull" rather than "science-push".

According to Berhanu et *al.*, (2006), extension service is a service of information, knowledge and skill development to enhance adoption of improved agricultural technologies and facilitation of linkages with other institutional support services (input supply, output marketing

and credit). Therefore, the role of extension service has been changed from technology transferring service to information and knowledge brokering and facilitator role.

Agricultural advisory services in developing countries today have assumed a much more holistic and facilitators role, and the field staff of an agricultural advisory service is not just a conduit of information, but an advisor, facilitator, and knowledge broker (Alex et al., 2002 cited in Birner et al., 2006). Today's understanding of advisory services goes beyond training and sending messages, and includes assisting farmers to organize and act collectively, addressing processing and marketing issues, and partnering with a broad range of service providers and rural institutions. Farmers are seen as partners in the technology generation process, rather than as simply recipients of technology (Birner *et al.*, 2006).

Extension systems are under pressure. Those involved such as a farmer, extension agent, a farmers' union and research institute are becoming more diverse. Current economic trends including liberalization and privatization are stimulating the development of new industries and the participation of new actors, such as NGOs and private firms, in rural development. All this means that the roles played by extension and research in agricultural development are changing very fast (Salomon and Engle 1997).

Kalaitzandonakes (1999) said that historically there have been strong arguments for public investment in knowledge generation and transfer activities. The basic argument is that knowledge is by nature a "public good" and, therefore, the private sector would be unwilling to invest in fundamental research. But in recent years, the traditional agricultural knowledge system has been undergoing significant change. Extension services have been privatized in many parts of the world or have become parts of technology packages offered by input suppliers, integrators, independent consultants, and other entrepreneurs. Similarly, private investments in research have continued to rise. Therefore, private investment in knowledge generation and transfer has increased because knowledge assets are gradually becoming less "public" in nature.

Guided by market-led and demand-driven perspectives, national and international efforts to revitalize agricultural advisory services have resulted in a variety of institutional reforms (Rivera and Alex, 2005 cited in Birner *et al.,* 2006): Decentralization, deconcentration, contracting/outsourcing, public-private partnerships, and privatization have started to transform conventional models of public sector agricultural advisory services. Revitalizing public sector advisory services has also been an important reform strategy. In addition, new actors have entered the scene to provide and finance advisory services, including non-Governmental organizations (NGOs), farmer organizations and community-based organizations. Private sector companies provide embedded advisory services, which are integrated in commercial transactions such as sale of inputs or contract farming (Katz, 2006 cited in Birner *et al.,* 2006). In the case of Ethiopia, even if different NGOs partially engage in the provision of AKI to the rural people, it is highly dependent on the public extension service.

2.3. Information-Seeking Behavior

Information seeking behavior is a broad term encompassing the ways individuals articulate their information needs, seek, evaluate, select, and use information. In other words, information-seeking behavior is purposive in nature and is a consequence of a need to satisfy some goal. In the course of information seeking, the individual may interact with people, manual information systems, or with computer-oriented information systems. According to Pettigrew (1996), information-seeking behavior involves personal reasons for seeking information, the kinds of information which are being sought, and the ways and sources with which needed information is being sought. Barriers that prevent individuals from seeking and getting information are also of great importance in understanding the information-seeking behavior of individuals and organizations. Information use is a behavior that leads an individual to the use of information in order to meet his or her information needs. Information use is an indicator of information needs, but they are not identical.

2.4. Empirical Studies on Access to Different Extension Service and Mass Media

A major task in agricultural development is the transfer of improved technologies to farmers (Pipy, 2006). Farmer's access to different information sources helps them to get information about improved technologies and enhance the adoption of new innovations. Conducting various extension events plays an important role in the provision of different agricultural information and consequently enhances the utilization of the accessed information. Such events include contact with DAs, training, demonstration, and field days or visits etc.

Different findings reveal that participation in different extension events positively influences the utilization of different agricultural technologies. For instance, Tesfaye *et al.* (2001) reported that participation in on-farm demonstration and attendance of training contributed positively to farmers' adoption decision. In the same line, Yishak (2005), in his study of determinants of adoption of improved maize technology in Damote Gale wereda found that farmers' participation in demonstration had positive and significant relationship with adoption. Similarly, the relationship between farmers' access to extension services and adoption has been repeatedly reported as positive and significant by many authors. Nkonya *et al.* (1997) reported that visit by extension agents had positive influence on improved maize and fertilizer in Northern Tanzania. Many other authors such as Kansana *et al*. (1996) indicated that participation in training, access to communication sources and number of information sources had significant association with level of knowledge and adoption of improved wheat varieties. The implication is that emphasis has to be given to advising farmers, training, participation in demonstration, and field days to provide relevant agricultural information and to enhance the utilization of improved agricultural technologies.

Other sources of information such as mass media and neighbor farmers in the area are also important in diffusion of agricultural innovations. Particularly, interpersonal communication networks among farmers are important and reported in many studies to have significant influence on farmers' adoption decision. Mass media also play a great role in provision of information in shortest possible time over a large area. Yahaya (2002) explained that, trends in Nigeria's agricultural development scenario show that mass media have tremendous potentials

for agricultural information dissemination. Many studies reported the positive and significant relationship of mass media with adoption of agricultural technologies. In line with this, Yishak (2005), in his study on determinants of adoption of improved maize technology in Damote-Galewereda, Wolaita, Ethiopia indicated that ownership of radio and participation in demonstration had positive influence on adoption of improved maize technologies.

2.5. Empirical Studies on Factors Affecting Access and Utilization of Agricultural Information

A number of empirical studies have been conducted by different people and organizations on the adoption of different agricultural technologies both outside and within Ethiopia. On the other hand, there is limitation of empirical studies related to the factors influencing access to and utilization of agricultural information. Therefore, in this study partly utilization of different agricultural information is expressed interns of technology utilization, because agricultural knowledge and information can be accessed, shared and utilized through material embodied form. The literature review mainly based on different utilization of agricultural technologies such as cereals and horticultural crops. For simple presentation, the variables are categorized as household personal and demographic variables, socio-economic factors, psychological variables and institutional factors.

2.5.1. Household's personal and demographic variables

Household's personal and demographic variables are among the most common household characteristics which are mostly associated with farmers' access and utilization behavior. From this category of variables age, sex and education were reviewed in this study but there is a limitation of empirical study on other variables.

Age is also one of demographic character important to describe households and can provide a clue as to age structure of the sample and the population too. Young farmers are keen to get knowledge and information than older farmers. It may be also older farmers are more risk

averse and less likely to be flexible than younger farmers and thus have a lesser likelihood of information utilization and new technologies.

With regard to age, different studies report different results. Haba (2004), he assessed that the willingness to pay for agricultural information delivery technologies such as print, radio, farmer-to-farmer, expert visit, and television. He revealed that, as age increased, the willingness to pay for these agricultural information delivery technologies decreased, meaning that older farmers were less willing to get information than younger ones. On the other hand, study condacted by Katungi (2006), on social capital and information exchange in rural Uganda reveal that older men are less likely to engage in simultaneous receiving and providing of information, perhaps due to the low ability to communicate associated with old age. All this points assure that, as age increase the getting of agricultural information also decrease.

Regarding the utilization of agricultural information, a study conducted by Teklewold et al., (2006) on the adoption of poultry technology, in Debre Zeit, Ethiopia, indicated that farmers' decision on level of adoption of exotic poultry breed were negatively influenced by age of the household head. Mulugeta, (1994) in his study on smallholder wheat technology adoption in South Eastern high lands of Ethiopia reported that age had a negative effect on the adoption of wheat technologies. On the other hand, Kidane (2001) in the study he conducted on factors influencing adoption of improved wheat and maize varieties in Hawzien Wereda of Tigray found that age is negatively related with farmers' adoption of improved wheat variety. However, there are also others who reported positive relationship of age with adoption. For instance, Asante-Mensah and Seepersad (1992) conducted study on factors affecting adoption of recommended practices by cocoa farmers in Ghana and reported positive relationship of age with adoption. Therefore, from these result, getting of agricultural information and utilization resemble to the younger age.

Gender is another factor that limits access to and utilization of AKI. Due to the prevailing socio-cultural values and norms males have freedom of mobility, participate in different meetings and trainings consequently have greater access to information. A study conducted by

Katungi (2006), reveal that male-headed households tend to build and maintain larger network ties with relatives and friends than female-headed households.

Male-headed households are said to have better access to agricultural information than female-headed households, which is attributed to negative influence of cultural norms and traditions (Habtemariam, 2004). A study conducted by Pipy (2006) reveals that, their were significant difference between male and female in poultry production information source and utilization of information. Yahaya (2001) reported similar results in previous studies that sourcing of agricultural information and utilization is along gender lines. They had posited that women are less likely to participate because they have limited time to access or utilize available information due to pressure of household responsibilities. Married women in particular are by-passed in the transfer of improved agricultural technologies assuming that they will get the information through their husbands (EARO, 2000). But, Saito and Weidemann, (1990) reported that for most of the women, relatives and friends were the source of information; nearly one-third had acquired their knowledge from the extension service, and only 1% had heard of the technologies from their husbands.

Studies conducted by Ellis (1992) and Green and Ng'ong'Ola, (1993) indicated that female-headed households had less access to improved technologies, credit, and land and extension service. According to EARO (2000), female farmers are not considered and their agricultural activities and/or issues concerning them have been the last priorities in the country's agricultural research agenda, and so lacked improved extension packages and services that assist them to improve their productivity. This report explains that often it is observed that major emphasis in agriculture is given to men's activities while the role of women and children in the Ethiopian farming systems has been ignored (EARO, 2000).

Women play a critical role in agriculture and it is recognized that the Ethiopian agricultural extension system suffers from a number of weaknesses in its services for rural women. According to Habtemariam (1996), Policy makers and administrators typically still assume that men are the farmers and women play only "supportive role" as farmers' wives. This attitude by both planners and implementers has significant adverse effects on women's access

to agricultural extension services On the other hand, Dagnachew (2002), states that extension efforts and technological packages usually address men farmers. Extension agents are most likely to visit male farmers than female farmers. The low level of women's education and cultural barriers prevent them from the exposure to extension channels by their initiative. The male-dominated extension system also often restrains from contacting and working with women due to the strong taboos and value systems in the rural areas.

Habtemariam's (1996) study shows that, there is a gender bias against women and among extension workers. Extension services in Ethiopia are male- dominated and working mainly with male farmers, partly for cultural reasons and partly because the extension system itself has traditionally relied on the use of contact farmers, whose criteria for selection tended to exclude female farmers. The author stated that, the extension services were managed in a top-down fashion, which was reflected in extension program planning. This gives a very little opportunity for grass root extension staff to take the initiative and respond to local demands in any significant way. Similarly, the management and organization of the extension service did not allow for great deal of teamwork and there was little emphasis on multidisciplinary approaches to problem solving.

Generally, extension services frequently fail to provide adequate information to women farmers through failing to recognize their specific needs. In addition to their productive tasks they are frequently over burdened with household responsibilities which they cannot delegate, they are often less educated than men and have a more limited access to resources such as credit. If an extension program deals effectively with those constraints, it will be easier for women farmers to get involved in activities (FAO, 1996), and women have not benefited as much as men have from publicly provided extension services (World Bank, 1995).

According to FAO (2002), "Rural women and girls usually have less access than men to information and new technologies. Without equal access to information, they are at a disadvantage in making informed choices about what to produce and when to sell their products".

Finally the researcher concluded that, agricultural extension as an educational and communication tool makes a vital contribution to agricultural production and rural development. It is thus important to provide women farmers in both male and female-headed households with efficient, effective and appropriate technology, training and information. However, it is a mistake to view "rural women" as a homogeneous social classification or to drive policies and services for women in agriculture that are not based on empirical research which capture their diversity. The consequence is that extension service needs to be adapted to circumstances as there is no one-package extension model, which can work for all women in all places.

With regard to education, there is a general agreement that education is associated with receiving, absorbing, agricultural information and utilization of information. Because education is believed to increase farmers' ability to obtain, process and analyze information disseminated by different sources and helps him to make appropriate decision to utilize agricultural information through reading and analyzing in a better way.

A study conducted by Katungi (2006), on social capital and information exchange in rural Uganda reveal that, among women's; more educated women are more likely to engage in two-way information sharing, so that more educated farmers have more information access. Pipy, (2006), found that, significant difference between different educational level in poultry production sources of information and utilization of information.

Several studies conducted by Itana (1985); Chilot *et al* (1996); Kansana (1996); Mwanga *et al* (1998) and Tesfaye *et al* (2001) have reported that education had positive and significant relationship with adoption. Similarly, Nkonya *et al* (1997) reported positive relationship of education with adoption and intensity of adoption improved maize seed indicating that each additional year of education increases probability and intensity of adoption by 5%. In the same line several authors reported significant and positive relationships that exist between formal education and literacy level and adoption (Freeman *et al*, 1996; Haji, 2003; Habtemariam, 2004). Also Legesse, 1992; Teressa, 1997; Walday, 1999; Mulugeta, 2000 have reported that education has positive relation with adoption behavior.

On the other hand, study conducted by Tesfaye (2003), on soil and water conservation practices in Wello, Wolaita and Konso areas of Ethiopia revealed that there is no variation between literacy and illiteracy rates in terms of soil and water conservation practices.

Farming experience is another important household related variable that has relationship with the production process. Longer farming experience implies accumulated farming knowledge and skill which contributes to utilization of agricultural technologies. Many studies supported this argument. A study in Ghana on factors influencing adoption of recommended cocoa production practices by Asante and Seepersad (1992) indicated positive relationship of experience in cocoa farming with adoption of recommended cocoa production practices, and Endrias (2003) reported positive relationship of farming experience in sweet potato production with adoption of sweet potato varieties. Legesse (1992); Kidane (2001); Yishak (2005) and Melaku (2005) reported similar results. Contrary to this, Gockowski and Ndoumbe (2004) reported negative relationship of farming experience with adoption of intensive mono-crop, horticulture in southern Cameroon.

2.5.2. Household's socio-economic variables

Knowledge systems are dynamic, people adapt to changes in their environment and absorb and assimilate ideas from a variety of sources. However, knowledge and access to knowledge are not spread evenly throughout a community or between communities. People may have different objectives, interests, perceptions, beliefs and access to information and resources. Knowledge is generated and transmitted through interactions within specific social and agro-ecological contexts. It is linked to access and control over power. Differences in social status can affect perceptions, access to knowledge and, crucially, the importance and credibility attached to what someone knows. Often, the knowledge possessed by the rural poor, in particular women, is overlooked and ignored (FAO, 2004). Therefore, the access to information highly depends on the individual social and economic status.

Among different factors, annual farm income obtained from sale of crop and/or livestock are important income sources in the rural households. Off-farm activities are the other important

activities through which rural households get additional income. The households' income position is one of the important factors determining access to and utilization of agricultural information and different improved technologies.

Regarding annual farm income, almost all empirical studies reviewed show the effect of farm income on household's adoption decision to be positive and significant. For example, Kidane (2001); Degnet *et al* (2001) and Getahun (2004) reported positive influence of household's farm income on adoption of improved technologies. In the same line, Gockowski and Ndoumbe, 2004 found positive effect of cocoa revenue on intensive mono-crop horticulture.

The income obtained from off-farm activities helps farmers to purchase farm outputs. Review of some of the past empirical studies shows that, the influence of off-farm income on adoption varies from one study to the other. However, majority of the studies reported positive contribution of off-farm income to household's adoption of improved agricultural technologies. For instance, Birhanu(2002); Getahun (2004); Kidane (2001) and Mesfin (2005) have found positive significant relationship of off-farm income with adoption.

2.5.3. Institutional factors

In the context of this study, institutional factors include various formal and informal institutions, and organizations. These factors facilitating and enhancing the access and utilization of agricultural information such as credit, social participation, enhancing farmers' participation and joint planning, development agents' support, visiting market place and different formal and informal social organizations.

Credit has strong and significant influence in determining use of combined packages depending on the production type. It helps in alleviating current financial constraints enhancing the use of technology packages correspondingly. Survey results by Saito *et al.* (1994) in Nigeria showed that a major reason for smallholders not using fertilizer was lack of cash, highlighting the importance of short-term credit. Different studies have shown that access to credit plays a significant role in enhancing the use of improved varieties (Legesse,

1992; Chilot *et al.*, 1996; Teressa, 1997; Lelissa, 1998; Bezabih, 2000; Tesfaye *et al.*, 2001). All of them reported that access to credit, had a significant and positive influence on the adoption behavior of farmers regarding improved technologies. However, Jabbar and Alam (1993) found that access to credit was not significantly related with adoption.

Regarding the relationship between sex and credit, provision of credit is almost exclusively made to men, thereby ignoring the independent roles of women in dual (husband- wife) households, and the high proportion of female- headed farm steadies (Doyle *et a*l, 1985). The major reasons why credit is less available to women are (a) they have no land- title as collateral (land- titles are generally held in the men's name) and (b) the credit is frequently made available through cooperatives of which membership is mostly for male. Lack of credit prevents women from investing in equipment and inputs that could alleviate the drudgery of their daily tasks, improve their productivity, and/or provide additional sources of income with which to improve the welfare of the family (Carr, 1985).

In agricultural development, the importance of social capital (multidirectional social network) is perceived as a willingness and ability to work together. The very likely assumption on which the relationship between social capital and adoption is anchored is that neighboring agricultural households are, *de facto*, members of a social structure who exchange information about improved agricultural practices. Rogers (1995) concludes that: "The heart of the diffusion process consists of interpersonal network exchanges … between those individuals who have already adopted an innovation and those who are then influenced to do so". Similarly, the findings of Habtemariam (2004) also detected a positive relationship between social participation and adoption of all dairy practices.

Therefore, social participation has a role in information exchange. Other reports indicate that, membership and leadership in community organization assumes that farmers who have some position in PA and different cooperatives are more likely to be aware of new practices as they are easily exposed to information (Freeman *et al*, 1996; Chilot *et al,* 1996; Van den Ban and Hawkins, 1996; Asfew *et al*, 1997; Habtemariam, 2004). Asres (2005) reported that social

participation was statistically insignificant in access to and utilization of reproductive, productive and community role information of women.

Regarding the planning approach of extension service, a study in Tigray reveals, extension package program has been implemented in a top-down manner based on a quota system. Despite much resistance, DAs forced farmers to join the extension program because they are evaluated based on the number of farmers adopting new technologies (amount of fertilizer, seed etc distribution) (Mamusha, 2005). Within this situation the information provision of extension agent will bias towards the achievement of annual quota plan rather than addressing the farmers' problem and information needs. The consequences of this situation will affect the better functioning of extension system for farmer's agricultural development. To assure the need of farmers' agricultural information provision, the planning process should be bottom-top, based on the farmers' problem, aspirations, needs, resource, and environment.

Market distance and frequency of market visiting is also another factor in the dissemination of agricultural information and utilization. A study conducted in Uganda explained that, market serve as forum for the exchange of goods, and organized weekly, biweekly or monthly and constitute an important place where agricultural information is exchanged and men go to markets more often than women (Katungi E, 2006). Moreover farmers located near to a market will have a chance to get information from other farmers and input suppliers. The closer they are to the nearest market, the more likely it is that the farmer will receive valuable information (Abadi, 1999; Roy, 1999). Therefore, the frequency of market and distance from residence play important role in the access and utilization of agricultural information.

2.5.4. Psychological factors

Psychological factors also plays influential role in the access of agricultural information and technology utilization. In this study attitude towards improved farming, innovation proneness, production motivation and information seeking behavior were considered as important variable having influence on access and utilization of agricultural information.

Attitudes are usually defined as a disposition or tendency to respond positively or negatively towards a certain thing (idea, object, person, and situation). They encompass, or are closely related to, our opinions and beliefs and are based upon our experiences. Since attitudes often relate in some way to interaction with others, they represent an important link between cognitive and social psychology (Kearsley, 2008). . In this study, attitude towards improved farming is defined as the degree of positive or negative opinion of respondent farmers towards improved farming. Positive attitude towards improved farming is one of the factors the can speed up the farm change process. Attitude formation is also a prerequisite for behavioral change to occur. A study conducted in Adami Tulu District, Ebrahim (2006) reported that attitude towards change was statistically significant relation with dairy adoption.

Innovation proneness in this study was operationally defined as the receptivity of the individual to new ideas related to different agricultural information. A study conducted in Dire Dawa administrative council, eastern Ethiopia, Asres (2005) reported that innovation proneness was statistically significant relationship with access to productive role information and utilization of accessible development information of women.

Information seeking behavior was also one of the hypothesized variables that influence access and utilization of agricultural information. This variable is reflecting the degree at which the respondent was eager to get information from various sources on different agricultural activities. Information seeking behavior was assumed to have positive relationship with the access and utilization of agricultural information. From the previous study Deribe Kaske (2007), found that there was significant and positive relationship between information seeking behavior and knowledge of dairy farming. Also Asres (2005), found that similar finding between information seeking behavior and productive role of women, and utilization of development information. This indicated that as respondents' information seeking behavior increases, their utilization of accessible information also increases.

2.6. Conceptual Framework of the Study

To enhance the agricultural production and productivity in developing countries, access to and effective utilization of agricultural information by farmers play crucial roles. Due to different external and internal factors (such as high illiteracy level of farmers, limited application of modern inputs, poor provision of agricultural information, etc) Ethiopian agricultural sector remains under low production and productivity. To enhance the production and productivity, one of the options would be to increase farmers' access to and effective utilization of agricultural information through identifying and working on the problem that affects the extent of access and utilization of agricultural information. This can be done through analyzing the personal, socio- economical, institutional and psychological factors that might significantly influence information access and utilization.

This study assumes that the farmers in Ethiopia are embedded with a lot of complex roles and constraints in the agricultural production sector. But the existing traditional system persists from generations to generations. This is mainly due to the fact that the exposure to modern and scientific information on agricultural activities and utilization of agricultural information and technologies remain limited. Consequently, the development of agricultural sector constrained from progress though it is the backbone of the country economy.

In this study, efforts were made to identify factors affecting access and utilization of agricultural information from literature, practical experiences and field observations of the research.

The conceptual framework of this study is based on the assumption that the access and utilization of agricultural information are influenced by a number of personal, socio-economical, institutional and psychological factors of the farmers. The conceptual framework presented in Figure 1 presents the most important variables hypothesized to influence the access to and utilization of agricultural information by farmers in the study area.

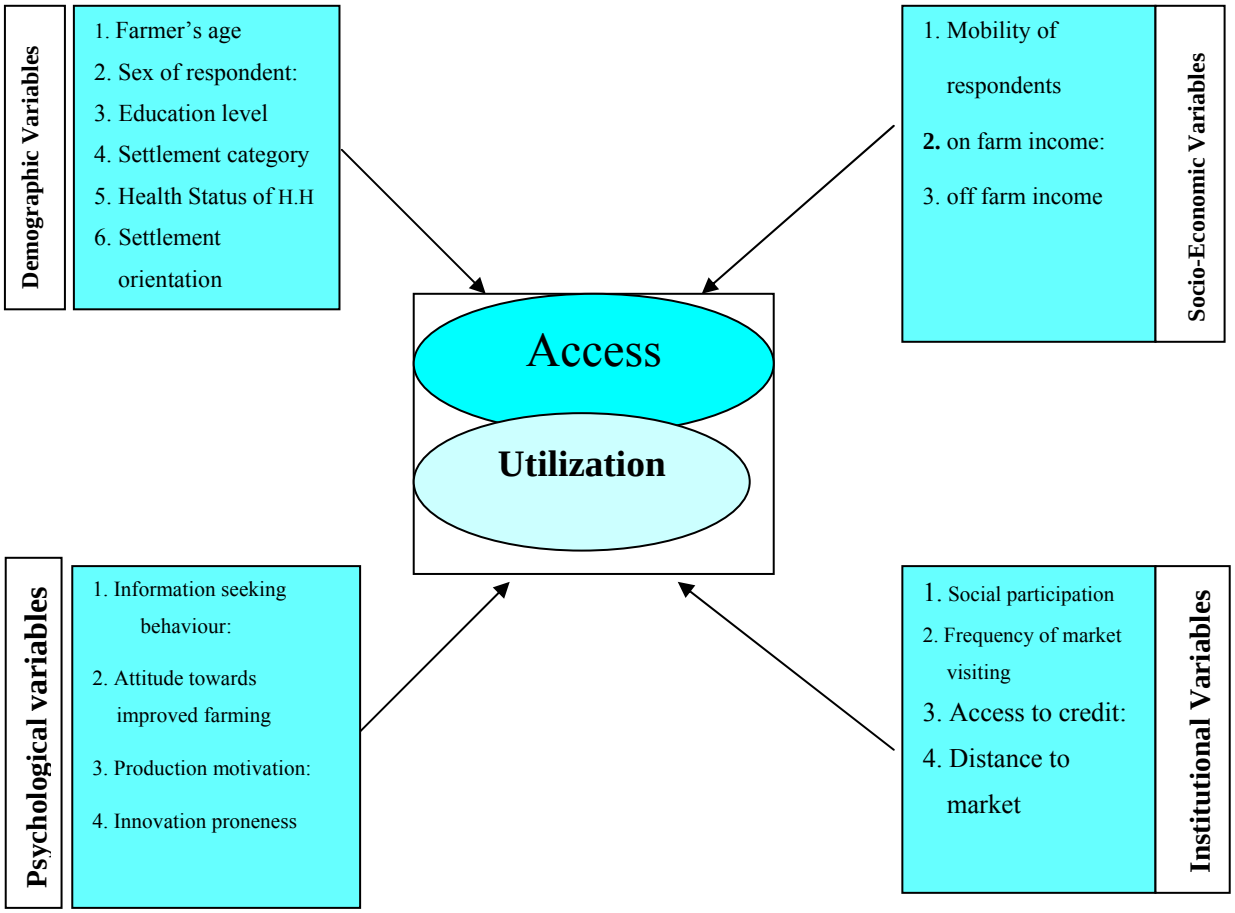

Figure 1. Conceptual Framework of the study

3. RESEARCH METHODOLOGY

The first section of this chapter describes some features of the study area. In section two sampling method and in section three data types, sources and collection methods are discussed. Methods of data analysis are discussed in section four. Finally, definition of variables and the hypothesized relations are presented in section five.

3.1. Description of the Study Area

Metema woreda is located in the North West part of Ethiopia and western part of Amhara Regional State; about 1405 km from Haramaya University, 900 km northwest of Addis Ababa and about 160 km west of Gondar town. Metema is found North of Quarra and Alefa, west of Chilga, south of Tach Arma-Choho woredas and east of Sudan border. It is one of the 18 woredas in North Gondar Zone and is subdivided into 18 PAs and 2 town kebels.

According to the WARD office Plan for 2006/07, 31691 households and 96,550 people living in the woreda. Out of the total households and total population, during data collection 4,907 households and 11,682 population were new settlers. The original number of new settlers was 19,420 households and 32,016 total population.

The original residents of the area are Gumuz. Until recently, they practiced slash and burn and hunting wild animals. They produce sorghum as the staple which is the major food crop in the area. Since the settlement programmes of the last and current Governments, the population of natives became smaller.

According to IPMS (2005), the altitude of Metema ranges from as low as 550 to 1608 meter (m asl) while the minimum annual temperature ranges between 22^{o}C and 28^{o}C. Daily temperature becomes very high during the months of March to May, where it may get to as high as 43^{o}C. The mean annual temperature is 31^{o}C. Nearly all of the land in the woreda is in the lowlands except some mountain tops. Metema is one of the woredas in the country where the climate is harsh and Government provides a 30% hardship allowance for employees.

According to the available data, the mean annual rainfall for the area ranges from about 850 to around 1100 mm to 90% of the woreda. Metema has a unimodal rainfall. The rainy months extend from June until the end of September. However, most of the rainfall is received during the months of July and August (IPMS, 2005).

The soils in the area are predominantly black and some are soils with vertic properties, having excessive cracks as deep as 0.75 m in some places during the dry seasons. According to the woreda Office of Agriculture, the total area of the woreda is about 440,000 ha. Much of the woreda is under *Acacia* dominated forest with grass under growth. Metema is one of the woredas where gum and incense are collected.

According to the woreda Agricultural and Rural Development office 2005/2006 annual crop production plan, sesame, sorghum and cotton cover around 95% of the woreda cultivated area and other crops cover the remaining 5%. The yield of sorghum is between 18 and 20 qt/ha, while that of sesame is between 4 and 6 qt/ha and cotton yield about 8 qt/ha.

Livestock is an integral part of the farming system. The cattle population in the Woreda is quite high (average livestock holding per household is 6.7). Production of cattle (milk, meat), goat (meat) and poultry is a common practice. Cattle are exported to Sudan while goats are mainly produced for the local market.

Commercial farmers use tractors for ploughing. Oxen are used to plough fields for all crops and to thresh sorghum, while donkeys are used for transporting produce and water by the smallholder farmers. Despite the large population of livestock, especially cattle and goats, productivity is low as in many other parts of Ethiopia (IPMS, 2005).

Woreda office of agriculture experts believe that livestock feed is not a limiting resource in the woreda. However, the farmers in the woreda do not make hay and dry season feed remains a problem. This is especially because farmers burn grasses for eliminating ticks and initiating new grass growth during the rainy season.

The study woreda has two extension teams under Woreda Agricultural and Rural Development office. The first team covers half of the woreda and the other covers the remaining. Under the approved Government office structure both extension teams together have 16 experts (subject mater specialists) and 11 other technicians, but at the time of survey only 5 experts and 1 technician were deployed under the team. A total of 54 DAs in all 18 PAs (three DAs per PA) were deployed and they were accountable to the extension team.

Out of 18 PAs, only 8 PAs have local markets, and the rest use the nearest PA markets for sale and purchase of goods. In 2008, there were about 18 primary agricultural cooperatives, 4 irrigation cooperatives, one fattening cooperative and one union organized and serving the woreda farmers. The primary agricultural cooperatives, cooperative union and Amhara Credit and Saving Institution provide agricultural inputs and credit services.

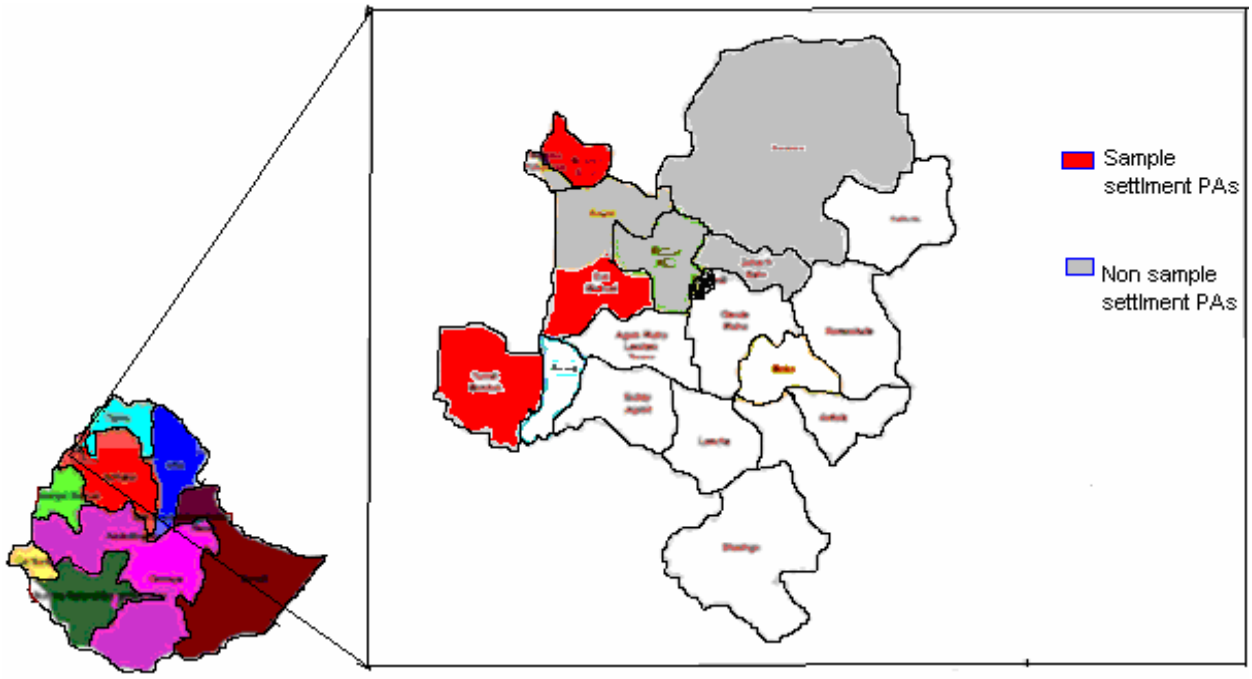

Figure 2. Map of Metema woreda (IPMS, 2005)

3.2. Sample Size and Method of Sampling

Sampling is a technique, which helps us in understanding the parameters or characteristics of the universe or population by examining only a small part of it. Therefore it is necessary that sampling technique be reliable (Chandan, 1998). Appropriate sample size depends on various factors relating to the subject under investigation like the time, cost, degree of accuracy desired etc. (Rangaswamy, 1995). But the sample size and the sample selection process procedure should assure the representative-ness of the population.

Sample size determination has its own scientific approach. But in this study to determine sample size, different factors such as research cost, time, human resource, environmental condition, accessibility and availability of transport facilities were taken into consideration. By taking these factors into account, 170 household heads were selected and out of these 10 of them were reserve from 3 PAs.

Two stage sampling was applied to select the sample households. The woreda has a total of 18 Peasant Association (PAs) and 2 town kebeles. Among these 18 PAs, resettlement program has been implemented only in six PAs during the past three years.

In the first stage of sampling from these six PAs (Kumer afitit, Kokit, Village 6 7 8, Das-gundo, Awassa and Tumet-mendoka), three PAs (Village 6 7 8, Das-gundo and Tumet-mendoka) were purposively selected on the basis of accessibility and high intensity of new settler population.

Due to the high mobility of new settlers as hired labor and to visit native area had affected the proportional balance of the two groups within the PA, and therefore it was impossible to apply probability proportional to size in each PA directly.

In the second stage of sampling, the settlers were stratified into new and previous settlers within the three sample PAs, including female headed households. 80 sample respondent for new settler category and 80 for previous settler category were allocated equally. These sample

respondents allocated for three PAs with their respective category using probability proportional to size sampling technique. Finally, the sample household farmers have been selected randomly from the two categories based on their proportions. A total of 160 sample households were selected from new and previous settler farmer's categories (80 new and 80 previous settlers). The woreda Rural and Agricultural Development office strives to address needs of at least 15% of female farmers, and therefore, 15% of the sample in each PA under each of the settlement categories were chosen to be Female Headed Households.

All the Development Agents in the sample PAs and all the woreda Extension staff members were included in the data collection to generate qualitative supplemental data.

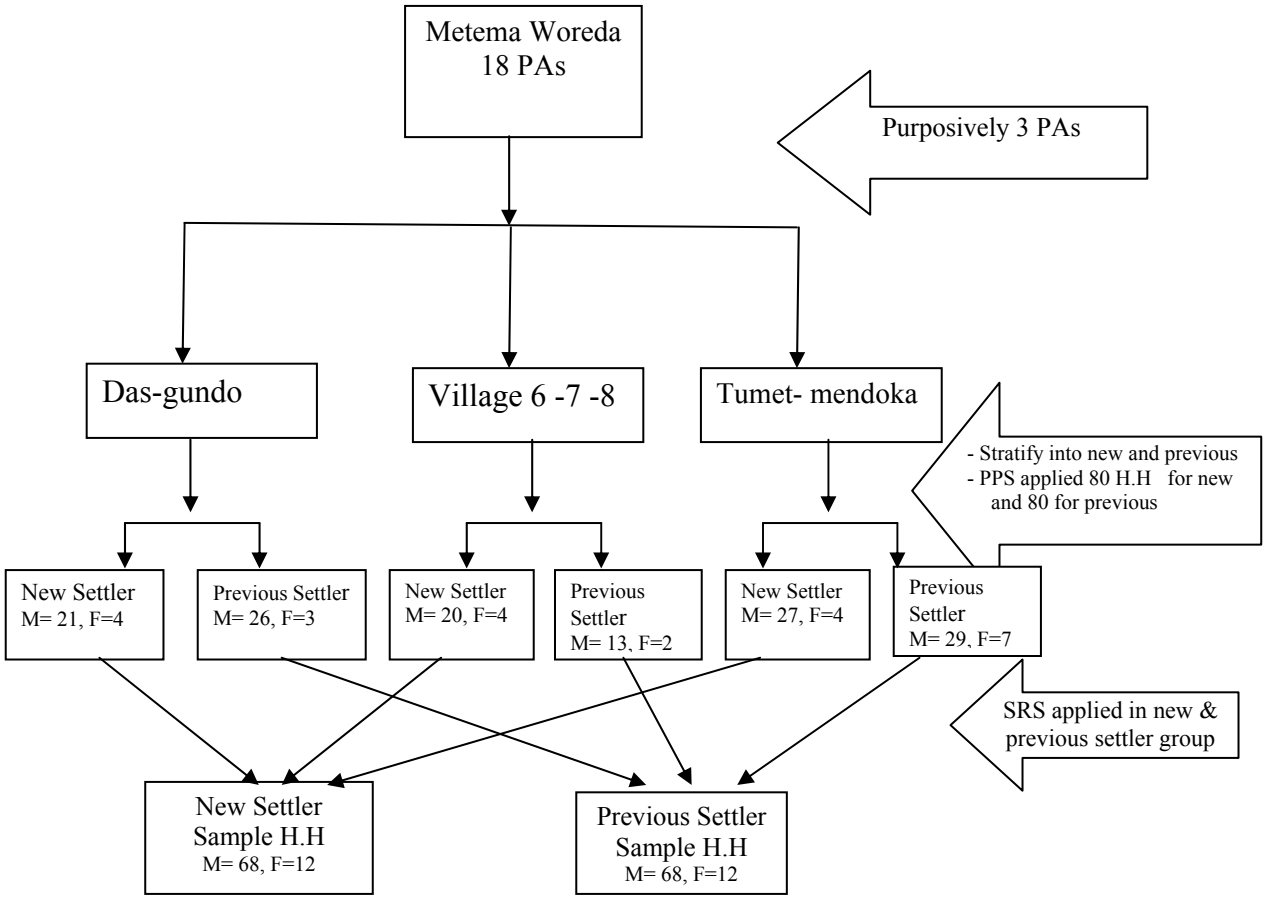

Figure 3. Sampling procedure

The details of final household sample selected is presented in Table 1.

Table 1. Distribution of sample respondents in sample PAs

Settlement category	Sample PAs	Total number of households *			Number of sample respondents **		
		MHHs	FHHs	Total	MHHs	FHHs	Total
Previous settlers	Das-gundo	561	42	603	26	3	29
	Village 6 7 8	281	28	309	13	2	15
	Tumet- mendoka	624	112	736	29	7	36
	Sub total	1466	182	1648	68	12	80
New settlers	Das-gundo	453	68	521	21	4	25
	Village 6 7 8	435	76	511	20	4	24
	Tumet- mendoka	583	75	658	27	4	31
	Sub total	1471	219	1690	68	12	80
	Grand total	2937	401	3338	136	24	160

Source: * Metema WARDO, ** Own survey results 2007

3.3. Data Type, Sources and Method of Data Collection

To elicit the necessary information for a given study, first we should determine the type of data that needs to be gathered and the source from which the data is to be collected. Both qualitative and quantitative, and primary and secondary data had been collected to answer the research questions, and objectives of the study. It includes; demographic, environmental, socio-economic, institutional, behavioral, as well as access and utilization of agricultural information services that had been provided to both categories of farmers. It had been gathered through formal survey, interview and through discussions and observations.

The primary data sources were both new and previous settler farmers, as well as DAs and subject matter specialists (as supplemental data) on various aspects of access and utilization of agricultural information by farmers. The primary quantitative data were collected from the respondents using a pre- tested, structured interview schedule by four bachelor degree holding and two diplomas holding well trained enumerators, closely supervised by the researcher.

Primary data collection method included structured interview schedule with open-ended and closed-ended questions. Restructuring has been done using sufficient number of non-sample respondents through pilot study in order to suitably modify the questionnaire and facilitate smooth administration.

Secondary quantitative data were collected through personal interviews and reviewing secondary data documents from sources such as reports, and documents from WARDO by enumerators and researcher and previous research results by researcher. Secondary data sources were documents, reports of DAs and woreda rural development and agricultural office, and other related institutions.

Qualitative data were collected through discussion with focus groups and key-informants, field visits, and observations, this served as a supplementary to quantitative data. Focus group discussion was held on in specific topics with small groups of people that consist of 8 farmers (4 new and 4 previous settler farmers) who have intimate knowledge about the topic under consideration. Checklist with key questions had been used to spark out the discussion to obtain qualitative data from focused-group members, Key-informants, the officials and other functionaries.

3.4. Methods of Data Analysis

3.4.1. Descriptive statistics

The quantitative data were analyzed using descriptive statistical tools including mean, percentage, ranking, standard deviation, T-test, $\chi 2$-test, Cramer's V, Gamma, Spearman Correlation Coefficient (rho), and Pearson's Product-Moment Correlation Coefficient (r) (Sarantakos, 1988) based on the level of measurement of the variables involved, i.e. the nominal, ordinal, and interval/ratio levels. Descriptive statistical tools were employed to see difference, strength, and direction of relationships in level of access and utilization of agricultural information by previous and new settlers in the study area.

The chi-square test was used to examine whether the obtained data and their differences were significant, or whether the variables in question were related to each other, However, Chi-squire values depend very much on the size of the sample, making it difficult for the researcher to determine whether differences in the results were due to the nature of the relationship between the variables or due to sample size. To determine the strength of the relationship as well as to see whether differences were due to sample size, two measures were commonly employed for nominal level of measurement the φ (read Phi) coefficient or Cramer's V, and Gamma and Spearman Correlation Coefficient indicate the significance, strength, and direction of the relationship between the row and column variables of a cross-tabulation, and appropriate when the variables are ordinal and categorical variables; whereas Pearson's Product-Moment Correlation Coefficient (r) for interval/ratio level variables (Sarantakos, 1988). The ranges of the values of Phi coefficient and Cramer's V are between 0 (no association) and 1(Perfect association). In general, if the value is close to 0 the strength of the relationship is fairly weak, if it is about 0.4 to 0.7 it is moderate; and if it is above 0.8 it is strong or very strong. Where as the value of the test statistics of Gamma, Spearman Correlation Coefficient, and Pearson's Product-Moment Correlation Coefficient range from –1 to 1. Phi (φ) coefficient is used for 2 x 2 tables of nominal variables. When it relates to tables larger than 2 x 2 tables, Cramer's V was used to nominal level variables.

3.4.2. The Tobit model

Discrete regression models are models in which the dependent variable assumes discrete values. The three most commonly used approaches to estimating such models are the linear probability models (LPM), the logit Model and the probit models (Amemiya, 1981; Gujarati, 1988). The linear probability model has an obvious defect in that the estimated probability values can lie out side the normal 0-1 range. The fundamental problem with the LPM is that it is not logically a very attractive model because it assumes that the marginal or incremental effect of explanatory variables remains constant, that is Pi= E (Y=1/X) increases linearly with X (Gujarati, 1988). Due to the defects of the linear probability model, Logit and probit Models are the convenient functional forms for models with binary endogenous variable (Amemiya

1981; Gujarati, 1988). The choice between the two is one of mathematical convenience and ready availability of computer programs (Gujarati, 1988).

There is also a broad class of models that have both discrete and continuous parts. One important model in this category is the Tobit. Tobit is an extension of the Probit Model and it is really one approach to dealing with the problem of censored data (Johnston and Dinardo, 1997). Some authors call such models Limited Dependent Variable Models because of the restriction put on the values taken by the regressand (Gujarati, 1995).

The use of Tobit models to study censored and limited dependent variables has become increasingly common in applied social science research for the past two decades (Smith and Brame, 2003).

The dependent variable of Tobit model has continuous value, which should be the intensity, the use and application of the technology. As observed in different empirical studies this variable can be expressed in terms of ratio, actual figure and log form depending on the purpose of the study. For example in their study of factors influencing adoption of fertilizer, Nkonya *et.al*, (1997) considered fertilizer applied per hectare as the dependent variable of the tobit model.

The study of farmers agricultural information access and utilization based up on dichotomous regression models have attempted to explain only the probability of gating and utilizing the agricultural information, but not the extent and intensity of accessing and utilizing, so that it may not provide much information about the farmers level of access and utilization. A strictly dichotomous variable often is not sufficient for examining the intensity of usage for such problems.

Consequently, in this study the ratio of actual gained farmers' agricultural information access from different sources to potential information access score was taken as a dependent variable of the tobit model. The same is true for utilization dependent variable.

Model specification

The econometric model applied for analyzing factors influencing access and utilization of agricultural information is the Tobit model shown in equation (1). This model was chosen because it has an advantage over other discrete models (LPM, Logistic, and Probit) in that; it reveals both the probability of access and utilization, and the intensity of access and utilization. Following Maddala (1992), Johnston and Dinardo (1997) and Green (2000), the Tobit model for the continuous variable (in this study access and utilization) can be defined as:

$AI_i^* = B_0 + B_iX_i + U_i$

$AI_i = AI_i^*$ if $B_0 + B_iX_i + U_i > 0$ ..... (1)

$= 0$ if $B_0 + B_iX_i + U_i \leq 0$

Where:

AI_i= is ratio of access (utilization) index for i^{th} farmer

AI_i^*= is the latent variable and the solution to utility maximization problem of intensity of access (utilization) subjected to a set of constraints per household and conditional on being above certain limit,

X_i= Vector of factors affecting access (utilization) and intensity of access (utilization),

B_i= Vector of unknown parameters, and

U_i= is the error term which is normally distributed with mean 0 and variance σ^2.

The model parameters are estimated by maximizing the Tobit likelihood function of the following from (Maddala, 1997 and Amemiya, 1985).

$$L = \prod_{AI_i^* > 0} \frac{1}{\sigma} f\left(\frac{AI_i - \beta_i X_i}{\sigma}\right) \prod_{AI_i^* \leq 0} F\left(\frac{-\beta_i X_i}{\sigma}\right) \qquad (2)$$

Where f and F are respectively, the density function and cumulative distribution function of AI_i^*. $\prod_{AI_i \leq 0}$ means the product over those i for which $AI_i^* \leq 0$, and $\prod_{AI_i > 0}$ means the product over those i for which $AI_i^* > 0$.

An econometric software known as "Limdep" was employed to run the Tobit model. It may not be sensible to interpret the coefficients of a Tobit in the same way as one interprets coefficients in an uncensored linear model (Johnston and Dinardo, 1997). Hence, one has to compute the derivatives of the estimated Tobit model to predict the effects of changes in the explanatory variables.

According to Johnston and Dinardo (1997) and Nkonya *et al*. (1997), McDonald and Moffit (1980) proposed the following techniques to decompose the effects of explanatory variables into access (utilization) and intensity effects. Thus; change in X_i (explanatory variables) has two effects. It affects the conditional mean of AI_i^* in the positive part of the distribution, and it affects the probability that the observation will fall in that part of the distribution. Similarly, in this study, the marginal effect of explanatory variables was estimated as follows.

1. The marginal effect of an explanatory variable on the expected value of the dependent variable is:

$$\frac{\partial \mathrm{E}(AI_i)}{\partial X_i} = F(\mathrm{z})\beta i \qquad (3)$$

Where, $\frac{\beta_i X_i}{\sigma}$ is denoted by z, following Maddala, (1997)

2. The Change in the probability of information access (utilization) of a technology as independent variable Xi changes is:

$$\frac{\partial F(Z)}{\partial X_i} = f\ (\mathrm{z})\frac{\beta_i}{\sigma} \qquad (4)$$

3. The change in the intensity of information access (utilization) with respect to a change in an explanatory variable among accessed (utilized) is:

$$\frac{\partial E(AI_i / AIi_i^* > 0)}{\partial X_i} = \beta_i \left[1 - Z\frac{f(\mathrm{z})}{F(\mathrm{z})} - \left(\frac{f(\mathrm{z})}{F(\mathrm{z})} \right)^2 \right] \qquad (5)$$

Where,

F (z) is the cumulative normal distribution of Z,

$f(z)$ is the value of the derivative of the normal curve at a given point (i.e., unit normal density),

Z is the z-score for the area under normal curve,

β is a vector of Tobit maximum likelihood estimates and σ is the standard error of the error term.

Before running the Tobit model all the hypothesized explanatory variables were checked for the existence of multi-collinearity problem. There are two measures that are often suggested to test the existence of mulit-collineality. These are: Variance Inflation Factor (VIF) for association among the continuous explanatory variables and contingency coefficients for dummy variables. In this study, variance inflation factor (VIF) and contingency coefficients were used to test multicollinearity problem for continuous and dummy variables respectively.

According to Maddala (1992), VIF can be defined as: VIF (X_i) = $\frac{1}{1-R_i^2}$,Where R_i^2 is the squared multiple correlation coefficient between X_i and the other explanatory variables. The larger the value of VIF, the more troublesome. As a rule of thumb, if the VIF of a variable exceeds 10 (this will happen if R_i^2 exceeds 0.95), that variable is said to be highly collinear (Gujarati, 1995).

Similarly, contingency coefficients were computed for dummy variables using the following formula.

$$C = \sqrt{\frac{\chi^2}{n+\chi^2}}$$

Where, C is contingency coefficient, $\chi 2$ is chi-square value and n = total sample size.

For dummy variables if the value of contingency coefficient is greater than 0.75, the variable is said to be collinear (Healy, 1984 as cited in Mesfin, 2005).

3.5. Definition of Variables and Hypothesis

3.5.1. Dependent variables

The dependent variables in this study are access to agricultural information and utilization of agricultural information by the settler farmers from different agricultural information sources. Both dependent variables were designed to measure the agricultural information access and utilization of new and previous settler farmers. In order to measure the farmers' access to agricultural information, 26 information requiring activities and seven agricultural information sources and methods were identified initially in collaboration with woreda extension staff. Then, the information access of respondents from each source was rated using properly designed frequencies. This gave a possible maximum score of 82 for access to agricultural information.

The same procedure was applied to agricultural information utilization from the accessed agricultural information. But the difference is that the information utilization of the 26 agricultural activities identified were rated using another set of utilization frequencies. This gave a possible maximum utilization score of 88.

3.5.2. Definition of independent variables and hypothesized relations

The following independent variables were hypothesized to influence the access and utilization of agricultural information in the study area. The 17 hypothesized explanatory variables are defined and explained here.

I. Demographic Variables

1. **Age of the household head (AGE):** It is measured in terms of the respondent's number of years of age at the time of data collection. Even though previous studies provide differential result, that young farmers are keen to get knowledge and information than older ones. Increase in age might lead to less utilization due to the elder farmers might be more or less risk averse to new technologies. However, it was expected that, increase in age would have an influence on level of access and utilization of agricultural information either negatively or positively.

2. Sex of respondent: Sex refers to biological differentiation of human being. It is nominal variable used as dummy (1 if male, 0 otherwise). Due to many socio-cultural values and norms males have freedom of mobility and participation in different meetings. Evidence in the literature indicates that female-headed households have less access to and utilization of agricultural information and improved technologies, credit, land, and extension service. Gender difference is found to be one of the factors influencing access to and utilization of agricultural information. So it is hypothesized that male household farmers would have more access to agricultural information and utilize it more effectively.

3. Education level - measured in terms of 1=illiterate, 2=functionally literate, 3=primary school, 4=secondary school and others. The educational level of the individual is one of the important factors capacitating the individual to receive, absorb and utilize new ideas to be more productive. Therefore it was assumed that the level of education attained by the household head would enhance the access to and utilization of agricultural information.

4. Health Status of the household head: - measured in number of days per year that the household head is sick (out of farming work in 2005-2006). To acquire and utilize agricultural information, physical wellbeing of the farmer is important. Sick household farmer will face the problem of getting information or a restricted access to and utilization of agricultural information than a healthy household head. Therefore, good health of a household head is expected to influence positively access to and utilization of agricultural information.

5. Settlement orientation: indicates whether respondents plan to live in the new settlement area permanently or not. This variable is measured based on the feeling of stay in the new settlement area. 1= I don't want to stay here, 2= I am not sure how for how long to stay, 3= Permanently as a farmer. When a settler farmer plans to live in the new settlement area permanently or for a prolonged time he/she will more likely devote to get and utilize agricultural information to enhance production and income, than farmers planning to stay for a short period of time to earn and save money to maintain their native area/ highland living. So it is hypothesized that farmers having an objective to live for longer period of

time in the settlement area would have more access to and utilization of agricultural information.

6. Settlement category: is nominal variable used as dummy (1 if previous settler, 0 new settler). 'Previous settlers': are those farmers living in the woreda and settled before 2003 including those settled by the Derge Government resettlement program and voluntary settlers. 'New settlers' are those farmers who came from highland areas and settled after 2003 in the current Government's resettlement program. The previous settlers are more familiar with the agro ecology, have good communication with the DAs, access to credit; and are relatively resource rich. Consequently, they have high access to agricultural information and utilization than the new settlers.

II. Socio-Economic Variables

7. On farm income: is a continuous variable and measured in birr. This refers to annual farm income obtained from sale of crop and livestock. The amount of income left from consumption could be used for purchase of farm inputs. High income earned from the agricultural activities increases the farmers' financial capacity and increases the probability of investing in new agricultural technologies, and owning radio and television that leads to more information access. Therefore, farm income expected to positively influence access to and utilization of agricultural information.

8. Off-farm income: is a continuous variable and measured in birr. This refers to annual income obtained from different agricultural activities as hired labor. To earn this income, settler farmers may move out of village for prolonged time and/or may spent more time out of their farm, and hence may not be able to access agricultural information being provided at PA level and consequently lack information and knowledge for utilization. Therefore, off-farm income is expected to influence negatively access to and utilization of agricultural information.

9. Mobility of respondents: measured in number of days spent per year out of village to visit their native area and out of village to be hired. Settler farmers moving to visit family in

their homeland and to generate income as hired labour in off-farm activities and in agricultural investment areas might not participate in agricultural training at the kebele level. So it is hypothesized that more mobile farmers will have limited access to and utilization of agricultural information and than those who remain in their home.

III. Institutional Variables

10. **Access to credit:** is measured in amount of birr that respondents received in the form of credit over the last two years (2005-2006) from Governmental or non-governmental organizations. Credit provision from formal institutions mostly supported by agricultural production and protection training and awareness creation in order to achieve the desired purpose of credit. It is expected that those who have better access to credit will be more inclined to seek agricultural information and utilize agricultural technology packages. Therefore, this variable is expected to influence the dependent variables positively.

11. **Frequency of market visits**: is the number of times the farmers visit local markets in a certain period (1= Some times, 2= Once per week, 3= More than once in a week). Farmers who visit markets more often have opportunity to obtain information from other farmers and agricultural input suppliers and this variable was expected to influence positively the access to and utilization of agricultural information.

12. **Market distance**: will be measured based on distance of market in Km from the residence of respondent. Farmers residing near the market will have a chance to get information from other farmers. This variable is expected to positively influence the access to and utilization of agricultural information.

13. **Social Participation**: is measured in terms of degree (1= member, 2= committee member, 3= leader) and frequency of participation (0= never, 1= sometimes, 2= whenever conducted) in different social organizations. The sum of both frequencies was used to arrive at a social participation score. Affiliation and involvement in social activities or in any formal (such as market cooperative, School council etc) or non formal organization (*Iqub*, Religious club etc) will give higher exposure to new information and consequently

encourage utilization. Therefore this variable is expected to influence access to and utilization of agricultural information positively.

IV. Psychological variables

14. **Attitude towards improved farming:** is operationally defined as the degree of positive or negative opinion of respondent farmers towards improved farming. Positive attitude towards improved farming is one of the factors that can speed up the farm change process. Attitude formation is a prerequisite for behavioral change to occur. It was hypothesized that positive attitude towards improved farming influences access to and utilization of agricultural information.

15. **Innovation proneness:** will be measured based on rapidity of accepting new idea relative to others (3 = whenever I come across a new idea, 2 = after consulting others who are more knowledgeable, 1= after most of the people accept it, 0= never) and is based on the receptivity of the individual to new ideas. Farmers having quickly accepting behaviour will have higher probability of utilizing agricultural information. So this variable is expected to influence positively access to and utilization of agricultural information.

16. **Production motivation**: will be measured based on the number of agricultural technologies that farmers' plan to use in next year's cropping season to increase production. Farmers having such behaviour will search for information and technology to produce more. Therefore, this variable is expected to influence access to and utilization of agricultural information positively.

17. **Information seeking behaviour:** will be measured based on the farmer's effort to get a range of information; and frequency and range of sources considered. When the person is eager to get information from various sources, he/she will have be motivated to access and consequently utilize the agricultural information. So this variable would have positive influence on access to and utilization of agricultural information.

4. RESULTS AND DISCUSSION

The first section of this chapter discusses the findings of the study including access to and utilization of agricultural information from different sources and methods. The second and third sections discuss the level of access to and utilization of agricultural information, and responsiveness and potential of extension service in addressing farmers' problems. The forth section includes household characteristics, socioeconomic, psychological and institutional variables related to access and utilization agricultural information. The fifth section summarizes the relationship between dependent and independent variables. All the above sections analyzed and presented using descriptive statistical tools to compare and contrast different characteristics of the sample households, and to measure the difference, strength, direction and relationships between mean of compared groups. Sixth section of this research presents the influence of independent variable on dependent variable using Tobit model. Finally, the constraints of access to and utilization of agricultural information are presented in section seven.

4.1. Access to and Utilization of Accessible Agricultural Information

In the study area, agricultural extension services serve as the major source of agricultural knowledge and information, and few others such as non-governmental organizations and on-farm research activities are partly involved in the process of agricultural knowledge and information provision. Generally, the provision of agricultural information to the rural people in the study area highly depends on the public extension service.

To analyze the agricultural information access of the respondent farmers, discussion was held with the experts and DAs to identify the major information provision methods in the study area. Other information sources from literature review such as mass media were added. The major information provision methods considered included advisory service, extension orientation about seasonal activities, training, visits, demonstration, field days and mass media access. In addition to the information dissemination methods, it is important to investigate what relevant agricultural information was provided by the WARDO. The most important and

relevant 26 agricultural activities in crop, animal and natural resource production and protection were identified (Appendix Table 1).

Obtaining agricultural information from these methods by itself is not enough to ensure agricultural development, unless it is utilized effectively. Therefore, the information utilization of those earlier identified 26 activities were rated with properly designed frequencies from the above seven methods (Appendix Table 1 and 2). Finally, information was gathered through interview to assess the level of information accessed and utilized. The survey results are presented under three main extension methods (Group Extension Methods, Individual Extension Methods and Mass Media) and local information exchange.

4.1.1 Access to and utilization of knowledge and information from group extension methods

Development Agents at the Woreda and PA levels strive to bring agricultural development through change in knowledge, skills and attitude among the farmers. To achieve these, they have been following different extension methods, group extension method being the predominant. These group extension methods include training, extension orientation about seasonal activities, farmers' field day, demonstrations and visits out of the woreda. The survey findings with regard to settler farmers access to and utilization of agricultural information through these methods are presented here.

4.1.1.1. Access to and utilization of agricultural information from training

Data was collected on the training conducted in crop, livestock and natural resource conservation and management in the last two years (2005-2006) and utilization of the information obtained. In this survey, the composition (different agricultural technologies and improved practices) and frequency of training and information utilization were taken into account.

4.1.1.1.1. Access to and utilization of information from crop production training

The study area has low crop diversification compared to other woredas in Amhara region due to the nature of agro ecology. According to IPMS (2005), three crops (cotton, sesame and sorghum) cover around 90% of the woreda's cultivated area. This research focuses on the newly expanded fruit and vegetable crops in addition to the three major crops produced in the woreda.

In this survey, the access and utilization of agricultural information from trainings on crop production such as cotton, sesame, sorghum, fruit and vegetable were addressed separately and different activities in each crop were considered. In the case of cotton, sesame and sorghum production, trained farmers were asked about the utilization level of high yielding variety, seed rate and line sowing, fertilizer application, time and frequency of weeding, herbicide and pesticide application, and time of picking /shattering/threshing based on the information they obtained and depending on the crop type.

In the case of fruit and vegetable production; irrigation management and production practices were considered. Finally, the average information access and utilization frequencies of that crop were taken to be the access and utilization levels for the respondent. Tables 2 and 3 present access to and utilization of agricultural information in crop production training for cotton, sesame, sorghum, fruit and vegetable based on settlement and sex categories respectively.

As indicated in Table 2, more number of previous settlers had a higher opportunity to participate in trainings related to cotton, fruit and vegetable production, while only previous settlers participated in sesame and sorghum trainings. Generally the training activities were very limited and the limited participation of new settlers' participation was very pronounced.

Table 2. Participation in crop production training and utilization of information by settlement category

Type of training	Responses	Number of participants in training						Utilization of information						
		New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		Frequency of utilization	New settlers		Previous settlers		Total	
		№	%	№	%	№	%		№	%	№	%	№	%
Cotton production	Yes	1	1.3	17	21.3	18	11.3	Rarely	1	100	1	5.88	2	11.8
	No	79	98.7	63	78.7	142	88.7	Occasionally	0	.0	3	17.65	3	11.8
								Often	0	.0	13	76.47	13	76.5
								Total	1	100	17	100	18	100
Sesame production	Yes	0	0	11	13.7	11	6.9	Often	0	.0	10	100	10	100
	No	80	100	69	86.3	149	93.1	Total	0	.0	10	100	10	100
Sorghum production	Yes	0	0	13	16.3	13	8.1	Occasionally	0	.0	1	7.7	1	7.7
	No	80	100	67	83.7	147	91.9	Often	0	.0	12	92.3	12	92.3
								Total	0	.0	13	100	13	100
Fruit and vegetable	Yes	1	1.3	7	8.7	8	5.0	Whenever needed	1	100	6	100	7	100
	No	79	98.7	73	91.3	152	95.0	Total	1	100	6	100	7	100
At lest one crop training	Yes	1	1.3	21	26.3	22	13.8	Yes	1	100	20	95.2	21	95.5
	No	79	98.7	59	73.7	138	86.2	No	0	0	1	4.8	1	4.5

Source: Own survey data, 2007;

Table 3. Participation in crop production training and utilization of information by sex

Type of training	Responses	Number of participants in training						Utilization of information					
		Female (N=24)		Male (N=136)		Total (N=160)		Female		Male		Total	
		№	%	№	%	№	%	№	%	№	%	№	%
Cotton production	Yes	1	4.2	17	12.5	18	11.3	1	100.0	17	100.0	18	100.0
	No	23	95.8	119	87.5	142	88.8	0	.0	0	.0	0	.0
Sesame production	Yes	0	0	11	8.1	11	6.9	0	0	10	90.9	10	90.9
	No	24	100	125	91.9	149	93.1	0	0	1	9.0	1	9.0
Sorghum production	Yes	2	8.3	11	8.1	13	8.1	2	100	11	100	13	100
	No	22	91.7	125	91.9	147	91.9	0	0	0	0	0	0
Fruit and vegetable	Yes	0	0	8	5.9	8	5.0	0	0	7	87.5	7	87.5
	No	24	100	128	94.1	152	95.0	0	0	1	12.5	1	12.5
At lest one crop training	Yes	2	8.3	20	14.7	22	13.8	2	100.0	19	95.0	21	95.5
	No	22	91.7	116	85.3	138	86.3	0	.0	1	5.0	1	4.5

Source: Own survey data, 2007;

Even though statistically chi-square test may not be valid to analyze the difference between the two groups as more than 20% of cells have less than 5 respondents, the survey data clearly indicate the highly significant difference between training participation of new and previous settlers categories. This limited training provision is not adequate for the new settlers to become familiar with the new agro-ecology and crops they have to cultivate. The survey results reveal that few farmers were invited repeatedly for training programs. During group discussion, it was mentioned that participation in training is biased towards the resource rich farmers and those having good relations with the DAs. The DAs justified this on the grounds that these were model farmers, who are assumed to play an important role in the dissemination of new agricultural information.

Only one and two of the female headed households (FHHs) participated in cotton and sorghum trainings respectively, while none of them participated in sesame, fruit and vegetable training (Table 3). This clearly demonstrates that extension training provision is biased towards male headed household heads (MHHs). Such situations restrict the role of women in agricultural development.

Almost all the settler farmers who attended cotton and sorghum training utilized the information, though with different degrees of utilization. Only two previous settler farmers who participated in sesame, fruit and vegetable production training did not utilize the information (Table 2), but all the women farmers who were trained utilized the information obtained (Table 3). Lack of input supply and labour were cited as the major reasons for not utilizating the information.

4.1.1.1.2. Access to and utilization of information from livestock production training

Livestock production is one of the major farming activities in the study area, especially goat production, cattle fattening and honey production. In addition to these activities, this survey tried to assess the access to and utilization of information on other related issues such as animal feed collection and preservation methods. The survey results are presented in Tables 4 and 5.

Table 4. Participation in livestock production training and utilization of information by settlement category

Type of training	Responses	Number of participants in training						Utilization of information					
		New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		New settlers		Previous settlers		Total	
		№	%	№	%	№	%	№	%	№	%	№	%
Goat production and handling	Yes	2	2.5	9	11.3	11	6.9	1	50	6	66.7	7	63.6
	No	78	97.5	71	88.7	149	93.1	1	50	3	33.3	4	36.4
Modern honey production	Yes	3	3.7	9	11.3	12	7.5	2	66.7	6	66.7	8	66.7
	No	77	96.3	71	88.7	148	92.5	1	33.3	3	33.3	4	33.3
Cattle fattening	Yes	0	.0	5	6.3	5	3.1	0	.0	4	80	4	80
	No	80	100.0	75	93.7	155	96.9	0	0	1	20	1	20
Animal feed collection and preservation	Yes	2	2.5	6	7.5	8	5	2	100	4	66.7	6	75
	No	78	97.5	74	92.5	152	95	0	0	2	33.3	2	25
Total respondents who participated in training	Yes	4	5.0	10	12.5	14	8.7	3	75.0	7	70.0	10	71.4
	No	76	95.0	70	87.5	146	91.3	1	25.0	3	30.0	4	28.6

Source: Own survey data, 2007;

Table 5. Participation in livestock production training and utilization of information by sex category

Type of training	Responses	Number of participants in training						Utilization of information					
		Female (N=24)		Male (N=136)		Total (N=160)		Female		Male		Total	
		№	%	№	%	№	%	№	%	№	%	№	%
Goat production and handling	Yes	2	8.3	9	6.6	11	6.9	1	50	6	66.7	7	63.6
	No	22	91.7	127	93.4	149	93.1	1	50	3	33.3	4	36.4
Modern honey production	Yes	2	8.3	10	7.4	12	7.5	1	50	7	70	8	66.7
	No	22	91.7	126	92.6	148	92.5	1	50	3	30	4	33.3
Cattle fattening	Yes	1	4.2	4	2.9	5	3.1	1	100	3	75	4	80
	No	23	95.8	132	97.1	155	96.9	0	0	1	25	1	20
Animal feed collection and preservation	Yes	2	8.3	6	4.4	8	5.0	1	50	5	83.3	6	75
	No	22	91.7	130	95.6	152	95.0	1	50	1	16.7	2	25
Total respondents who participated in training	Yes	2	8.3	12	8.8	14	8.8	1	50	9	75	10	71.4
	No	22	91.7	124	91.2	146	91.3	1	50	3	25	4	28.6

Source: Own survey data, 2007;

Only 2.5% (2) of the new settlers and 11.3% (9) of the previous settlers participated in training related to goat production focusing on the extension package components and management. Among them, 50% of new settlers and 33.3% of previous settlers were not utilizing the obtained information. Lack of labour and theft of goats were the major reasons cited for non-utilization.

7.5% (12) of the respondents have been trained in modern honey production, and of these 3.7% (3) were new settlers and 11.3% (9) were previous settlers. 66.7% and 66.7% of new and previous settlers respectively utilized the information with different degrees. The remaining did not and cited unsuitability of the technology to the existing agro ecology as the main reason.

3.1% (5) of respondents were trained in cattle fattening, and all of them were previous settlers. Mainly resource rich farmers are invited to trainings as it is assumed that they will have the resources to build and sustain an enterprise. The new settlers are generally resource poor and have a high mobility and are assumed not to be able to manage such enterprises. Among the trained farmers, 20% respondents did not utilize the information due to labour scarcity, while the remaining utilized the information as and when needed.

In the study area, there is surplus animal feed during wet season and there is serious scarcity in dry season; so that animal feed collection and preservation method training were provided for the farmers for own cattle feed utilization and marketing purpose. Based on this idea, training was delivered for a total of 5% (8) respondent farmers and among them, 2.5% (2) and 7.5% (6) were among the new settlers and previous settlers respectively. Among the trained farmers, 75% of respondent farmers have utilized the accessible information but not 25% of respondent. As the respondents farmers explained, animal feed scarcity is not their major problem, so they do not have interest to carry out this activity. This result indicates that, invitation of farmers for training had its own limitation.

Regarding the distribution of trained farmers based on sex (Table 5), two FHHs were obtained information in various livestock production and management aspect. The proportions of women participation in goat production and handling, modern honey production, cattle fattening, Animal feed collection and preservation training were higher than male headed, but their proportion is lower from the total female respondents', due to repeated participation of two females. Among them, 50% of FHHs utilized the accessible information. In the study area women are more responsible for animal production and management aspects, so that the participation of women in training has great role in the agricultural development.

Overall, 4 new settlers and 10 previous settlers were trained in different livestock production and management aspects. This survey result reveals that the training opportunities for both settlers were very limited, and relatively the new settlers access to training was limited than the previous settlers.

4.1.1.1.3. Access to and utilization of information from natural resource conservation and management training

In the study area, the majority of the land is covered by natural forest and the coverage of planted forest is very low or almost none. The previous and new settler farmers' demands of wood depend for this resource. According to WARDO, the rate of depletion of this natural resource is accelerating at an arming rate, especially due to the current resettlement program. The new settlers are utilizing trees for house constriction, fencing, cooking and to earn income by selling for small town peoples for house constriction. Demand of cultivable land also the other factor that enhances forest clearing. Based on this, currently the WARDO is providing agricultural information related to natural resource production and conservation. Therefore, this information was considered as relevant information.

Under natural resource production and conservation such as importance of tree plantation, forest firebreak line establishment, community forest utilization and management, soil fertility maintenance, and utilization of fuel saving stoves were addressed separately. Tables 6 and 7

present access to and utilization of agricultural information in natural resource production and management activities based on settlement and sex categories respectively.

From the total respondents, 11.9% (19) farmers were trained in natural resource management (NRM) and conservation in the last two years (2005 - 2006). Among them, 3.8% (3) were within new settlers and 20% (16) within previous settlers (Table 6). The proportion of participant women in this training is nearly equal to males. This survey result indicates that, like other trainings the participation of both categories of settlers was limited, and especially that of the new settlers.

Except one previous settler farmer almost all of the settler farmers who attended natural resource management and conservation training utilized the information, though with different degrees of utilization (Table 6). Similarly, all the women farmers who were trained utilized the information obtained (Table 7).

Table 6. Participation in NRM training and utilization of information obtained by settlement category

Type of training accessed and utilized	Responses	Number of participants in training						Utilization of information					
		New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		New settlers		Previous settlers		Total	
		№	%	№	%	№	%	№	%	№	%	№	%
Importance of tree plantation	Yes	1	1.3	11	13.8	12	7.5	1	100	11	100	12	100
	No	79	98.8	69	86.3	148	92.5	0	0	0	0	0	0
Forest firebreak line establishment	Yes	1	1.3	7	8.8	8	5.0	1	100	7	100	8	100
	No	79	98.8	73	91.3	152	95.0	0	0	0	0	0	0
Community forest utilization and manag.	Yes	1	1.3	11	13.8	12	7.5	1	100	11	100	12	100
	No	79	98.8	69	86.3	148	92.5	0	0	0	0	0	0
Soil fertility maintenance	Yes	1	1.3	11	13.8	12	7.5	0	0	11	100	11	91.7
	No	79	98.8	69	86.3	148	92.5	1	100	0	0	1	8.3
Fuel saving stoves	Yes	3	3.8	15	18.8	18	11.3	3	100	14	93.3	17	94.4
	No	77	96.3	65	81.3	142	88.8	0	0	1	6.7	1	5.6
Total respondents participation in NRM training	Yes	3	3.8	16	20.0	19	11.9	3	100	15	93.8	18	94.7
	No	77	96.3	64	80.0	141	88.1	0	0	1	6.3	1	5.3

Table 7. Participation in NRM training and utilization of information by sex category

Type of training accessed and utilized	Responses	Number of participants in training						Utilization of information					
		Female (N=24)		Male (N=136)		Total (N=160)		Female		Male		Total	
		№	%	№	%	№	%	№	%	№	%	№	%
Importance of tree plantation	Yes	1	4.2	11	8.1	12	7.5	1	100	11	100	12	100
	No	23	95.8	125	91.9	148	92.5	0	0	0	0	0	0
Forest firebreak line establishment	Yes	0	0	8	5.9	8	5.0	0	0	8	100	8	100
	No	24	100.0	128	94.1	152	95.0	0	0	0	0	0	0
Community forest utilization and manag.	Yes	1	4.2	11	8.1	12	7.5	1	100	11	100	12	100
	No	23	95.8	125	91.9	148	92.5	0	0	0	0	0	0
Soil fertility maintenance	Yes	1	4.2	11	8.1	12	7.5	1	100	10	90.9	11	91.7
	No	23	95.8	125	91.9	148	92.5	0	0	1	9.1	1	8.3
Fuel saving stoves	Yes	3	12.5	15	11.0	18	11.3	3	100	14	93.3	17	94.4
	No	21	87.5	121	89.0	142	88.8	0	0	1	6.7	1	5.6
Total respondents participation in NRM training	Yes	3	12.5	16	11.8	19	11.9	3	100	15	93.8	18	94.7
	No	21	87.5	120	88.2	141	88.1	0	0	1	6.3	1	5.3

Source: Own survey data, 2007

To examine the over all information utilization level of NRM, average utilization level of obtained information (average utilization of various activities such as importance of tree plantation, forest firebreak line establishment, community forest utilization and management, soil fertility maintenance, and utilization of fuel saving stoves) were analyzed and the result presented in Table 8.

Table 8. Utilization level of natural resource production and conservation training

Settlement category	Average utilization of natural resource training							
	Never		Rarely		Whenever needed		Total	
	№	%	№	%	№	%	№	%
New settlers	0	0	2	66.7	1	33.3	3	100.0
Previous settlers	1	6.3	0	0	15	93.8	16	100.0
Total	1	5.3	2	10.5	16	84.2	19	100.0

Source: Own survey data, 2007

More proportion of the previous settlers utilized the obtained NRM information in a better level than the new settlers. This is because the previous settlers living in a stable situation than the new settlers, and relatively feel as co-exist with natural resources. As indicated in the survey, the number of farmers who participated in training, especially the new settlers was very low and it is difficult to expect behavioral change with this limited information provision.

4.1.1.2. Access to and utilization of information from seasonal activity orientation

Among group extension methods, extension orientation about seasonal activities was used by DAs as the major mechanism for disseminating agricultural information in the study area, to group of farmers during different meeting and or other social gatherings. The information shared through this channel may not have in-depth content. Mainly focuses on current situation of pest incidence, different agricultural technologies appropriate to the season, occurrence of unseasonal rain during harvest time etc and the survey result is presented as follows.

Table 9. Participation in seasonal extension orientation

Responses	Settlement category						Chi-square test
	New settlers (N=80)		Previous settlers (N=80)		Total		
	№	%	№	%	№	%	
Yes	44	55.0	41	51.3	85	53.1	
No	36	45.0	39	48.8	75	46.9	0.226 N.S

	Sex category						
	Female (N=24)		Male (N=136)		Total (N=160)		
Yes	8	33.3	77	56.6	85	53.1	
No	16	66.7	59	43.4	75	46.9	4.441**

Source: Own survey data, 2007; **, N.S = Significant at 5% and not significant

In this group extension method, only 53.1% (85) of respondents received current and seasonal agricultural information from DAs. Among them 55% (44) of the new settlers and 51.3% (41) of the previous settlers were received agricultural information through this extension method. Mostly the new settlers are invited for meeting by kebele and woreda administrators to solve different conflicts within them; for relief distribution; to discuss social institution support problems; such as maintenance of drinking water pump, health treatments etc. The new settlers also having a habit of participation in any meeting which is developed in highland before came to new settlement area. So the occurrence of these situations contributes for dissemination of agricultural information. Chi-square test (X^2 – 0.226, p- 0.635) indicates that there was no significant difference in agricultural information access from this method between settlement categories.

Concerning female and male respondents 33.3 % and 56.6% of respondents respectively obtain information from this extension method. Chi-square test indicates that there was significant difference in agricultural information access from this method between MHHs and FHHs. This due to the frequent participation of males in various meeting and social gathering than females.

Table 10. Place of seasonal extension orientation provision

Settlement category	Place of information provision									
	Church/ mosque		In the market		Meetings for other purpose		Meetings held for extension		Personal contacts	
	№	%	№	%	№	%	№	%	№	%
New settlers	5	11.4	1	2.3	29	65.8	9	20.5	44	100
Previous settlers	3	7.3	0	0	29	70.7	9	22	41	100
Total	8	6.4	1	1.2	58	68.2	18	21.2	85	100

Source: Own survey data, 2007

DAs use different meetings and social gathering of farmers to disseminate information. Table 10 shows that, 6.4%, 1.2%, 68.2% and 21.2% of respondents were getting seasonal agricultural information in the church/ mosque, in the market; meeting held for other purpose and meeting held for extension purpose respectively. Among farmers who access information on this method, more than half stated that the information provision was during a meeting held for other purpose (such as meeting held for security issue, committee election, to discuss and resolve different social conflict etc). As the result the time allocated for agricultural information sharing is usually not more than half an hour, so it is difficult to obtain enough and detailed information about different agricultural issues within this short period of time. However, this extension method plays the major role in disseminating agricultural information for most of the respondents in the study area.

Table 11. Utilization level of agricultural information from seasonal extension orientation

Settler category	Frequency of utilization								Chi-square test
	Rarely		Sometimes		Always		Total		
	№	%	№	%	№	%	№	%	
New settlers	13	29.5	9	20.5	22	50.0	44	100.0	
Previous settlers	9	22.0	7	17.1	25	61.0	41	100.0	
Total	22	25.9	16	18.8	47	55.3	85	100.0	1.064 N.S
Female	1	12.5	1	12.5	6	75.0	8	100.0	
Male	21	27.3	15	19.5	41	53.2	77	100.0	
Total	22	25.9	16	18.8	47	55.3	85	100.0	

Source: Own survey data, 2007; N.S = not significant

As indicated in Table 11, among respondents who obtain information from this method, all of them utilized the information in different degree of utilization. From this extension method, both new and previous settlers accessed and utilized with nearly equal proportion. Regarding male and female, slightly more utilization level of information resembled to female headed respondents. In this extension method some of the messages may not be difficult for implementation. Chi-square test indicates that, there was no significant difference in extension orientation about different seasonal activities information utilization between settlement categories.

4.1.1.3. Access to and utilization of information from farmer's field day

A field day is one of the important group extension methods, because it allows individuals to reinforce their interest by viewing tangible evidence. Within this group extension method, exchange of farmers' idea has an important role in the transmission of information and knowledge sharing. Also farmers easily understand the information provided in such a method. The respondent farmers were asked their participation in field days and utilization of information over the last two years (2005-2006) and the results is presented in as follows.

Table 12. Respondents' participation in field day in the last two years (2005-2006)

Responses	Settlement category						Chi-square test
	New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		
	№	%	№	%	№	%	
Yes	4	5.0	11	13.8	15	9.4	
No	76	95.0	69	86.2	145	90.6	3.605*
	Sex category						
	Female (N=24)		Male (N=136)		Total (N=160)		
Yes	1	4.2	14	10.3	15	9.4	
No	23	95.8	122	89.7	145	90.6	

Source: Own survey data, 2007, *= significant at less than 10% probability level

Among the total respondents, only 9.4% (15) farmers have participated in field days, from these 5% (4) and 13.8% (11) were among new and previous settlers respectively. Field day participation of the respondent farmers was very low in number; especially the new settlers' participation. Chi-square test (X2 – 3.605, p= 0.058) and Cramer's V (0.150, p= 0.058) indicate that, there was significant difference in field day participation between settlement categories at 10% probability level, with the previous settlers having higher participation than the new settlers. The reason of this issue is that, the previous settlers are resource rich and having capacity to utilize agricultural technology, so that the invitation of field day biased towards the previous settlers. Regarding the frequency of participation, all of the participants were involved once per year.

In female and MHHs, 4.2% and 10.3% have participated in field day respectively. In this extension method the participation of FHHs is lower than males. In the study area mostly the majority of males are involved in various agricultural activities in the field than females. In addition to this, due to the usual social system the development agents biased towards males.

Table 13. Utilization level of different agricultural information from field day

Settler category	Frequency of utilization							
	Rarely		Sometimes		Always		Total	
	№	%	№	%	№	%	№	%
New settlers	0	.0	3	75.0	1	25.0	4	100.0
Previous settlers	0	.0	0	.0	11	100	11	100.0
Total	0	.0	3	20.0	12	80.0	15	100.0
Female	0	0	0	0	1	100	1	100.0
Male	0	.0	3	21.4	11	78.6	14	100.0
Total	0	.0	3	20.0	12	80.0	15	100.0

Source: Own survey data, 2007

From the new settlers, 75% farmers have utilized the accessed information sometimes, and from the new settlers and previous settlers 25% and 100% utilized the accessible information always respectively. From this extension method, the new settlers' utilization level was lower than the previous settlers' utilization level. The reason is probably most of the previous settlers spending more time in their agricultural activities and has resource, but the new settler partly spent their time in other income generating activities out of their farm in order to survive and lack resource for technology implementation. As shown in Table 13, the FHHs more utilized the obtained information from this method, than MHHs. But only one female respondent examined due to limited number of women's participation in field day.

4.1.1.4. Access to and utilization of information from demonstration

Among group extension methods, demonstrations can play an important role to illustrate and explain a new production method, a new tool or to show results. This method is very important like field days. The participation and utilization of obtained information from demonstration is presented in Table 14 and 15.

Table 14. Respondents' participation in demonstration (2005 – 2006)

Responses	Settlement category						Chi-square test
	New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		
	№	%	№	%	№	%	
Yes	4	5.0	15	18.8	19	11.9	
No	76	95.0	65	81.3	141	88.1	7.227***

	Sex category					
	Female (N=24)		Male (N=136)		Total (N=160)	
Yes	1	4.2	18	13.2	19	11.9
No	23	95.8	118	86.8	141	88.1

Source: Own survey data, 2007, ***= significant at less than 1% probability level

Table 14 shows that, out of the total respondents 11.9% (19) have participated in different demonstrations and among these 5% (4) and 18.8% (15) were new and previous settlers respectively. Like field day, the participation of the respondent farmers was very low in number, especially that of the new settlers' participation. Chi-square test (X2 – 7.227, p= 0.007) and Cramer's V (0.0.213, p= 0.007) indicate that, there was significant difference participation in demonstration between new and previous settlement categories at 1% probability level, and that the previous settlers' participation was higher than the new settlers. The reason of this issue is similar to like that of field day. All of the participants were involved once per year.

Among the total respondent, 4.2% and 13.2% of female and male households have participated in demonstration respectively. The participation of MHHs is higher than females. The reason of this difference is similar to like that of field day

Table 15. Utilization level of different agricultural information from demonstration

Settler category	Frequency of utilization							
	Rarely		Sometimes		Always		Total	
	№	%	№	%	№	%	№	%
New settlers	0	.0	4	100	0	.0	4	100.0
Previous settlers	0	.0	1	6.7	14	93.3	15	100.0
Total	0	.0	5	26.3	14	73.7	19	100.0
Female	0	.0	0	.0	1	100	1	100.0
Male	0	.0	5	27.8	13	72.2	18	100.0
Total	0	.0	5	26.3	14	73.7	19	100.0

Source: Own survey data, 2007

Regarding the utilization of information obtained from demonstration, 100% and 6.7% of new and previous settlers' respondent respectively have utilized the information sometimes, and from the previous settlers 93.3% utilized the accessible information always. In this extension method, the new settlers' utilization level also lower than the previous settlers. The low utilization of demonstration information of new settlers is like that of field day reason. The information utilization of FHHs from this method is higher than MHHs. As mentioned in field day, examining only one respondent for comparison is difficult due to limited women's participation in field day.

4.1.1.5 Information acquisition from visits and utilization of information

Visiting successful agricultural production activities outside the woreda is also an important group extension method, because it allows individuals to see what they have been hearing about, thus providing the opportunity for building the desired attitude towards the innovation. This has great contribution in information and knowledge sharing. In the study woreda, some farmers were invited to visit areas where successful agricultural activities are practiced such as modern apiculture production, application of broad bed maker (BBM), irrigation management etc. These situations give opportunity to the farmers to see how a new technology has been

tried, tested, adopted or adapted by other farmers and to see technologies developed by other farmers.

Table 16. Respondents' participation in extension visits (2005 – 2006)

Responses	Settlement category					
	New settlers (N=80)		Previous settlers (N=80)		Total (N=160)	
	№	%	№	%	№	%
Yes	1	1.3	8	10.0	9	5.6
No	79	98.8	72	90.0	151	94.4
	Sex category					
	Female (N=24)		Male (N=136)		Total (N=160)	
Yes	0	0	9	6.6	9	5.6
No	24	100.0	127	93.4	151	94.4

Source: Own survey data, 2007,

Table 16 shows that out of the total respondents 5.6% (9) have participated in different visits and among these 1.3% (1) and 10% (8) were new and previous settlers respectively. In the case of visits out of the woreda, like field day and demonstration the participation of the respondent farmers was very low, especially that of the new settlers'. All the participants have participated once per year. In this extension method all of participants are male headed household. The reason of this difference is similar to like that of field day. The utilization level of information obtained from visits presented in Table 17.

Table 17. Utilization level of different agricultural information from extension visits

Settler category	Frequency of utilization							
	Rarely		Sometimes		Always		Total	
	№	%	№	%	№	%	№	%
New settlers	0	.0	1	100.0	0	.0	1	100.0
Previous settlers	0	.0	0	.0	8	100.0	8	100.0
Total	0	.0	1	11.1	8	88.9	9	100.0

Source: Own survey data, 2007

From this method, one new settler and eight previous settlers have accessed different agricultural information and utilized at different levels. From the new settlers one farmer utilized the information sometimes, and from the previous settlers all of them utilized always the accessible information. Similar to other information utilization, the previous settlers' agricultural information utilization was better than the new settlers' utilization level like that of field day and demonstration..

4.1.2. Access to and utilization of information from individual extension method

In addition to group extension method, the DAs provide formal extension advisory service to the farmers. Under this service, development agent and individual farmers will communicate about different agricultural issues. This individual communication method helps to identify and analyze the main problems facing an individual farmer or household and to provide advice on the best actions to overcome them. Besides this, it serves as one means of introducing new agricultural information to the farmers. Table 18 and 19 presents the information provision and utilization of formal extension advisory service.

Table 18. Agricultural information provision through formal extension advisory service

Responses	Settlement category						
	New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		Chi-square test
	№	%	№	%	№	%	
Yes	12	15.0	33	41.3	45	27.5	
No	68	85.0	47	58.8	115	72.5	13.635***
	Sex category						
	Female (N=24)		Male (N=136)		Total (N=160)		
Yes	3	12.5	42	30.9	45	28.1	
No	21	87.5	94	69.1	115	71.9	3.410*

Source: Own survey data, 2007, ***, * = significant at 1% m and 10% probability level

From the total respondents 27.5% (45) farmers have accessed formal extension advice from the DAs, and out of these, 15% (12) and 41.3% (33) were among new and previous settlers respectively. The formal extension advice service was provided to limited numbers of respondent farmers, especially the new settlers'. Chi-square test (X2 – 13.635, p= 0.000) and Cramer's V (0.292, p= 0.000) indicates that, there was significant difference in formal extension advice service provision between settlement categories at less than 1% probability level.

Based on sex category, 12.5% of female and 30.9% of MHHs obtain information from DAs. Generally the survey results indicate that MHHs had more agricultural information access than FHHs. Mostly this service provided through DAs and because of top to bottom annual quota planning approach DAs' frequently focus on those having resource rich and MHHs than female to secure their evaluation efficiency.

Table 19. Utilization of agricultural information from formal extension advisory service

Settler category	Frequency of utilization							
	Rarely		Sometimes		Always		Total	
	№	%	№	%	№	%	№	%
New settlers	5	41.7	3	25.0	4	33.3	12	100.0
Previous settlers	9	27.3	14	42.4	10	30.3	33	100.0
Total	14	31.1	17	37.8	14	31.1	45	100.0
Female	1	33.3	0	.0	2	66.7	3	100.0
Male	13	31.0	17	40.5	12	28.6	42	100.0
Total	14	31.1	17	37.8	14	31.1	45	100.0

Source: Own survey data, 2007;

In this extension service, 41.7%, 25% and 33.3% of new settler farmers have utilized in rarely, sometimes and always frequencies respectively. From previous settlers, 27.3%, 42.4% and 30.3% have utilized rarely, sometimes and always respectively.

From this extension method the proportion of new settlers was higher at rarely utilization level. But the previous settlers' proportions were higher in sometimes utilization level and both of them utilized with nearly equal proportion at always utilization rate. Generally, the survey result indicates that, except slight variation, there was similar utilization in formal extension advisory service information utilization between settlement categories. The demand of advisory service mostly focuses on the farmers' problem. Therefore, the new settlers can utilize the accessible agricultural information from formal extension advice, if the service provider gives attention to them.

Regarding utilization of the accessible information based on sex, female headed respondents slightly more utilized the obtained information than males. The proportions of female in utilization analysis were lower than males due to the limited participation of in this extension method. The survey result indicates that; female farmer can utilize agricultural information, once appropriate information is provided to them.

4.1.3. Mass media exposure of settler farmers and utilization of agricultural information

Mass media play a great role in provision of information and creating awareness in shortest time possible over large area of coverage. As far as awareness is a prerequisite for behavioral change, its role cannot be underestimated. Furthermore, its influence can be expressed through other effects like enhancing favorable attitude and overall good perception about new innovations.

In the study area, almost all the respondents produce high value crops such as sesame and cotton, so that some of the framers can afford to purchase radio and television. In all three sample PAs, some farmers provide television show service at the center of the kebele around the residence of the farmers. By considering this, amongst different mass media, radio, television, leaflets and newsletter (reading material), and posters contribute to the dissemination of agricultural information with different degrees. The information access of settler farmers from mass media is presented in Table 20.

Table 20. Agricultural information access from mass media based on settlement category

Mass media type	Responses	Settlement category						χ2-value
		New settlers (N=80)		Previous settlers (N=80)		Total (N=160)		
		№	%	№	%	№	%	
From Radio	Yes	41	51.3	37	46.3	78	48.8	
	No	39	48.8	43	53.8	82	51.3	0.400 N.S
From Television	Yes	20	25.0	24	30.0	44	27.5	
	No	60	75.0	56	70.0	116	72.5	0.502 N.S
From leaflet and news letter	Yes	12	15.0	8	10.0	20	12.5	
	No	68	85.0	72	90.0	140	87.5	0.914 N.S
From posters	Yes	5	6.3	3	3.8	8	5.0	
	No	75	93.8	77	96.3	152	95.0	0.468 N.S
At lest one mass medium	Yes	46	49.5	47	50.5	93	100	
	No	34	50.7	33	49.3	67	100	0.026 N.S

Source: Own survey data, 2007; N.S = not significant difference

Out of the total respondents, 48.8%, 27.5%, 12.5% and 5% of farmers obtained information from radio, television, leaflet and news letter, and posters respectively. As the result reveals, most of respondents obtain information from radio, due to the high number of radio owner ship. Regarding the information obtain from leaflet and posters were lower proportion, due to the poor availability and high illiteracy level. Statistically there was no significant difference in mass media access between settlement categories. The same was true for frequency of mass media access.

Table 21. Agricultural information utilization level from mass media

Type of mass media utilized	Frequency of information utility from mass media							
	Never		Sometimes		Always when there is need		Total	
	№	%	№	%	№	%	№	%
Radio	3	3.8	48	61.6	27	34.6	78	100.0
Television	18	40.9	21	47.7	5	11.4	44	100.0
Reading material	4	20.0	14	70.0	2	10	20	100.0
Posters	1	12.5	7	87.5	0	.0	8	100

Source: Own survey data, 2007;

Among radio program information accessed respondents, 61.6% and 34.6% of respondents have utilized in the frequency of sometimes and always when there is need, respectively. But the remaining 3.8% did not utilize the accessible information. Unsuitability of information to the prevailing agro-ecological condition and inability to consider the farmers experience were the major reasons explained by respondents.

Regarding the utilization of agricultural information from television program, 47.7% and 11.4% of respondents utilized in the frequency of sometimes and always when there is need respectively. The remaining 40.9% did not utilize the accessible information. The major reasons for not utilizing the accessible television program are it is not timely provided, it is ideal (difficult to implement), information unsuitability of information to the prevailing agro-ecological condition, unsuitability to the farmers economic status and inability to consider the farmers experience.

From the accessible reading material information, 20% did not utilize the accessible information but the remaining 70% and 10% of respondents utilized in the frequency of sometimes and always when there is need respectively. Reasons for utilization are the information is ideal and unsuitability of information to the prevailing agro-ecological condition. Even though the farmers explain these issues, their reading and understanding level also determine the information utilization.

Among picture message (poster) information accessed respondents, 12.5% did not utilize the accessible information but the remaining 87.5% respondents utilized the information in sometimes frequency. Farmers explained that, information from posters are difficult for implementation.

4.1.4. Information access and sharing by local information network

In the preceding section of the survey result reveals that, all respondents particularly the new settlers have limited agricultural information access from different methods of agricultural extension methods and other sources. But these settlers are more or less practicing and producing different agricultural products. Therefore, in this section the respondents' agricultural information access from the local information exchange were addressed with regard to three major crops and the result presented as follow.

Table 22. New settlers' major agricultural information sources in major crops

Information sources	Production activities requiring agricultural information					
	Cotton		Sesame		Sorghum	
The previous settler	67	83.8	68	85.0	70	87.5
Development Agents	13	16.3	12	15.0	10	12.5
Own experience	0	.0	0	.0	0	.0
Total	80	100.0	80	100.0	80	100.0

Source: Own survey data, 2007

As indicated in Table 22, the new settler respondents were asked to evaluate their major agricultural information sources in the production process after arriving in the study area. Among the new settlers, 87.5% and 12.5% of respondents explained that the previous settler and the development agents were their agricultural information sources, respectively. Therefore, this result assures that, the new settlers are highly depending on the local information exchange system than the information provision of extension service.

Table 23. Participation of all respondents in local information exchange

Participation in local information exchange	New settlers (N=80)		Previous settlers (N=80)		Total (N=160)	
Yes	69	86.3	71	88.8	140	87.5
No	11	13.8	9	11.3	20	12.5
Total	80	100.0	80	100.0	160	100.0

Source: Own survey data, 2007

To examine the participation of individuals in information communication among the community, all respondents were asked to explain their involvement in the dissemination of the obtained information to other farmer, neighbors, friends etc (Table 23). The result shown that, 87.5% of respondents were participated in local information exchange during different meeting, social gathering time and religious issues such as in market places, *edir, senbete,* committee meetings, public meetings etc. Therefore, these results assure that, the local information exchange network plays important role in the dissemination of agricultural information.

Summery Of Access to and Utilization of Agricultural Information

The survey result of access to agricultural information indicate that, among different extension methods/sources, relatively more number of respondents have obtained information from mass media, seasonal extension orientation and extension advisory service in rank order. Even if these methods play a great role in the disseminating agricultural information and contributing to awareness creation to the majority of respondents in shortest period of time, but the information shared through this channel may not have in-depth content to build the farmers implementation skill. In both settlement categories the rank to these methods is similar, but their proportion of participation is different. The proportion of respondent's participation in training, field day, demonstration and visits out of the woreda were very low. But these methods are very important in the exchange of farmers' idea, knowledge sharing and illustration, and to explain new production methods. The knowledge gained from these methods also improves the farmers' skill and encourage the utilization of information.

Moreover, the new settlers agricultural information access from local information were more dominant than the support of extension service.

Regarding the utilization of the obtained information, the more accessible information dissemination methods are found as low utilizable and the less accessible one are more utilizable information. More utilization of agricultural information were observed from visit, training, field day and demonstration. But the utilization level of advisory service, seasonal extension orientation and mass media were very low compared to others. This true to the overall information accessed respondents and previous settler category view. But, from the new settlers' side the information obtained from seasonal extension orientation, advisory service, training and field day methods were more utilized than others.

All these results tell us the previous settlers need more tangible and observable extension methods such as visit, demonstration, field day and training. But the new settlers utilize the information obtained from any sources. The probable reason of this issue is that, the previous settlers are lack trust the benefits of the extension service support due to the previous quota and forced extension participation.

4.2. Level of Agricultural Information Access and Utilization

4.2.1. Level of agricultural information access

In 1995 the Federal Government of Ethiopia proposed the PADETES as a national extension intervention program. PADETES combines technology transfer and human resource development, and promotes the participation of farmers in the research process (Percy, 1997 cited in Ejigu *et al.,* 1999). Therefore, the Government considers agricultural information will be provided through this channel for the purpose of human resource development and in Ethiopian condition the provision of agricultural information to the rural people highly depends on the public extension service.

Based on this fact, the respondents' overall level of agricultural information access from extension service was addressed in detail. As discussed in section 4.1 and 3.5.1, early identified 82 maximum potential score of access to agricultural information were categorized into three groups known as low access, medium access and high access. The respondent farmers' category was identified based on the sum of frequencies of their access to agricultural information. Those 29 farmers having zero agricultural information access were categorized as 'no access' farmers. Finally, the survey result reveals the following different level of agricultural information access and for simple observation, the categorization of different level of agricultural information access values are presented in graph as follows in Fig 4. (Detail data presented in Appendix Table 3.)

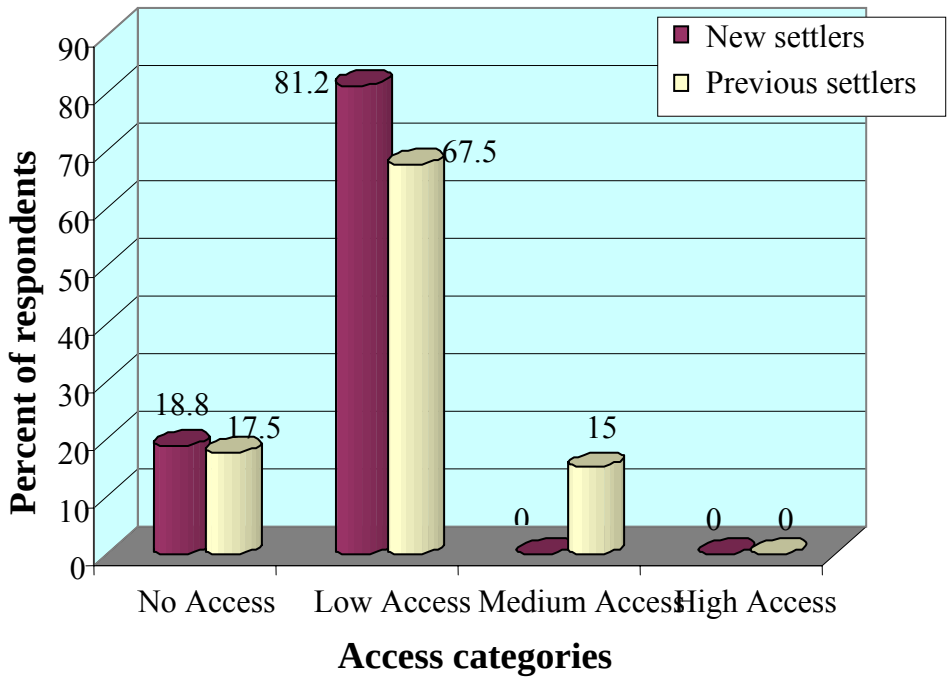

Figure 4. Distribution of respondents based on access to agricultural information categories

From total sample households (160), 0 (0%) were with high access, 12 (7.5%) were in medium access, 119 (74.4%) were in low access, and 29 (18.1%) had no access (Appendix 3). The levels of agricultural production information access of new and previous settlers were also found in different level.

Nearly equal proportion of new and previous settlers found without agricultural information access from extension service. The remaining new settlers were found at low information access level. But the previous settlers were found towards the low and medium information access level. However, both of the settler categories did not have 'High accesses' to agricultural information. Generally the agricultural information access of both settlers were limited, and especially the new settlers agricultural information access was extremely limited than the previous settlers. This finding reveals that, for all farmers particularly for new settlers the contribution of agricultural extension in information provision and human resource development is not attractive.

4.2.2. Level of agricultural information utilization

The same procedure was applied to utilization of agricultural information. From 160 sample respondents 29 farmers were not access to agricultural information from all sources and methods. Based on the operational definition of agricultural information utilization, these farmers are excluded from utilization analysis and the remaining 131 farmers are considered through out this section. The respondent farmers' categories were identified based on the sum of frequencies of utilization from their accessible agricultural information. Those farmers having zero utilization of agricultural information were categorized as 'Not utilized' farmers. Finally the respondent households categorized into high utilization, medium utilization, low utilization and no utilization level. Based on this method the survey result reveals the following different level of utilizations. For simple observation, the categorizations of different levels of agricultural information utilization values are presented in graph as follows in Fig 5. (Detail data are presented in Appendix Table 4.)

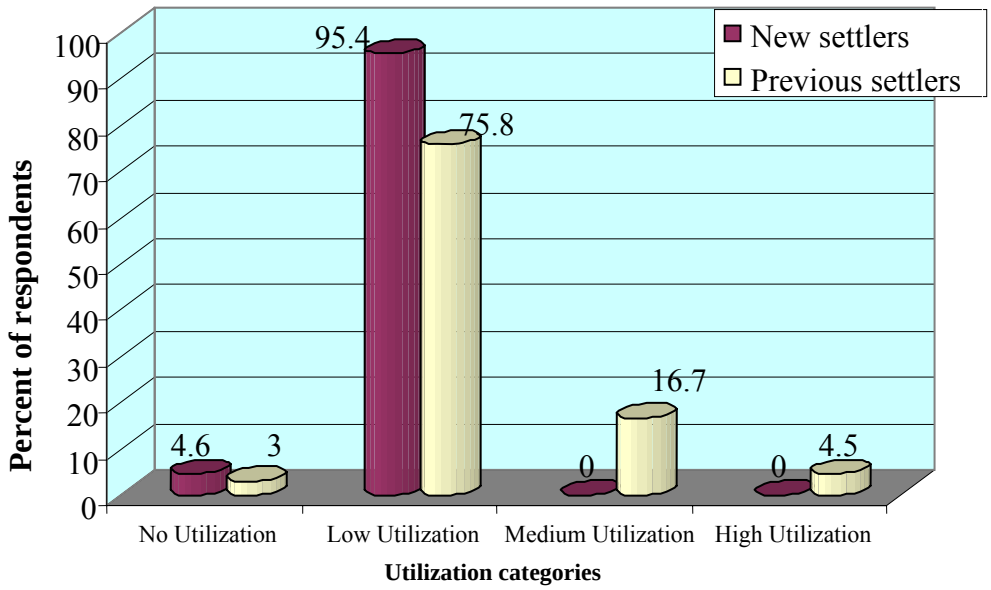

Figure 5. Distribution of respondents based on agricultural information utilization categories

In the case of utilization of the obtained information, among the total sample respondents (131), 3 (2.3%) were in high utilization, 11 (8.4%) were in medium utilization, 112 (85.5%) were in low utilization, and 5 (3.8%) were in no utilization categories of HHs (Appendix 4.). The utilization levels of agricultural production information in new and previous settlers were also found in different level. The new settlers did not achieve both medium and high level of agricultural information utilization. The maximum information utilization score of new and previous settlers were 18 and 61 with mean 3.78 and 14.65, and standard deviation of 3.02 and 19.19 out of 88 scores.

More proportion of previous settlers are found in low and medium level of utilization, but the new settlers' proportions were higher in 'no utilization' and 'low utilization' categories. From this result we can understand that both settlement categories, especially most of the new settlers had limited utilization of agricultural information. In the group discussions, participant of new settler farmers clarified that "the provision of credit from formal institution was biased to the previous settlers and they are resource poor to utilize different agricultural technologies".

To analyze the extension service and farmers' attachment in depth, the respondent farmers were asked to evaluate the responsiveness and potential of extension service in addressing their problems and the survey findings are presented in the next section.

4.3. Responsiveness and Potential of extension service in addressing farmers problems

4.3.1. Responsiveness of extension service

Responsiveness of the extension service is operationally defined as the ability of the extension service to respond as fast as possible based on the farmers needs regarding technical support and request of different agricultural technologies related to crop production (cotton, sesame, sorghum, fruit and vegetable), livestock production and management (goat production and handling, modern honey production, fattening and other related issues such as animal feed collection and preservation), and natural resource production and conservation. More responsive extension service will solve the farmers' problems, by seeking solution from wherever it is available, even if they do not have information on their hand. Such situations enhance the farmers to utilize the delivered agricultural information. In this study, respondents were interviewed to get their opinion about the responsiveness of extension service and the survey result is presented as follows in Table 24.

Table 24. Responsiveness of extension service for the farmers' problems

Responsiveness of extension service related to	Response of respondent farmers							
	Yes		No		I didn't ask support		Total	
	№	%	№	%	№	%	№	%
Cotton production	42	26.3	43	26.9	75	46.8	160	100.0
Sesame production	33	20.6	32	20.0	95	59.4	160	100.0
Sorghum production	52	32.5	55	34.4	53	33.1	160	100.0
Fruit and vegetable	14	8.8	23	14.4	123	76.8	160	100.0
Livestock	24	15.0	28	17.5	108	67.5	160	100.0
Natural resource	71	44.4	37	23.1	52	32.5	160	100.0

Source: Own survey data, 2007

As indicated in Table 24, among the total respondents, 26.3% (42) of the respondent farmers said the current extension service provide technical support and awareness creation in different cotton related agricultural technology issues based on their request quickly. Almost equivalent proportion of farmers 26.9% (43) of the respondents said the current extension service did not give technical support and awareness creation in different cotton related agricultural technology issues based on their request as they required. But 46.8% (75) of the respondent farmers didn't ask support related to cotton crop production. But, almost all of the respondent farmers are participated in cotton production. Cotton production has a lot of production problems such as flee beetle and bollworm pests, and market problem etc. Due to these reasons, its productivity and area coverage is decreasing from year to year. Still the development agents did not offer solution to these problems, especially during pest occurrence.

Regarding sesame crop, 20.6% (33) of the respondent farmers said the current extension service provides technical support and awareness creation in different sesame related agricultural technology issues based on their request. Almost equivalent proportion of farmers 20% (32) of the respondents said the current extension service did not give technical support and awareness creation in different sesame related agricultural technology issues based on their request. But 59.4% (95) of the respondent farmers didn't ask support related to sesame crop production. Similarly sesame production covers large area prior to cotton. But huge amount of production reduces due to sesame bug storage pest. Also the farmers are producing this crop in a traditional way, due to the unavailability of agricultural technologies such as high yielding Varity seeds. But the extension service did not respond to their problems.

In the case of sorghum crop technical support and awareness creation of different technologies 32.5% (52) and 34.4% (55) of the respondents said the current extension service is 'yes it is responsive' and 'not responsive' respectively. But, 33.1% (53) of the respondent farmers didn't ask for support related to sorghum crop production. This crop serves as staple food in the study area. Currently the production of this crop follows traditional production system. Except the application of 2-4D herbicide from black market, there is no specially intervention of extension service in this crop.

In fruit and vegetable production 8.8% (14) and 14.4% (23) of the respondent farmers said the current extension service provides technical support and awareness creation related agricultural technology issues based on their questions and not responsive respectively. But 76.8% (123) of the respondent farmers didn't ask support related to this activity. Among the respondent farmers only 11.25% (18) of them are participated in fruit and vegetable production using irrigation, but part of the remaining farmers also producing vegetables using rain during summer time. As the group discussion participants raised "repeatedly we were asked support to protect pest occurrence in fruits and vegetables, particularly in pepper crop, but no one did not solve our problem"

In the case of livestock production and management, among the total respondents 15% (24) and 17.5% (28) of the respondent farmers said the current extension service is 'yes it is responsive' and 'not responsive' respectively in technical support and awareness creation in different livestock related agricultural technology issues based on their question. But the majority 67.5% (108) of the respondent farmers didn't ask for support related to livestock production and management. High population of cattle, goat and poultry is found in the study area and livestock can be taken as one of the major production activity. The occurrence of repeated animal disease caused large losses in production, so that repeatedly the farmers needed support. But the farmers reveal that, "during the occurrence of different disease repeatedly the woreda agricultural office can not able to respond timely, so that we are losing large number of goats every year.

Concerning natural resource production and conservation issues 44.4% (71) and 23.1% (37) of the respondent farmers indicated that the current extension service is 'responsive' and 'not responsive' respectively, and 32.5% (52) of the respondent farmers didn't ask for support related to natural resource production and conservation issues.

This survey result indicates that the majority of respondents indicated 'no responsive' and 'I didn't ask support' responses. This tells that the current extension system has poor, responsiveness and linkage with the farmers and the farmers didn't have interest to work with the service provider. As raised in farmers' group discussion, before developing this attitude, the farmers were asking support repeatedly. As result most of the farmers are using the

previously introduced knowledge and their traditional knowledge in the production process. Currently, the farmers are treating and injecting own cattle and goats them selves. Therefore, in the absence of responsive extension service, providing different relevant and utilizable agricultural information to the farmers will not be as expected. At the same time the farmers will not be encouraged to get and utilize agricultural information from the extension service.

4.3.2. Potential of extension service in addressing farmers' problem

Potential of the extension service in addressing farmers' interest was operationally defined as the ability of the extension service providing agricultural information through technical support and different agricultural technologies related to cotton, sesame, sorghum, maize, fruit, vegetable, livestock, natural resource production, management, handling, conservation and management based on the farmers problems and interests. If the extension service is demand driven, the farmers will be eager to communicate with DAs and the utilization rate of agricultural information and technologies will increase, and then the service will solve farmers' problems.

According to FAO (2002), rural community needs a wide variety of information. The content of the information services needs to reflect their diverse circumstances and livelihoods. So in this study, the farmers were asked to evaluate the provision of agricultural information and agricultural technologies in relation to their problems and interests. Based on this idea, the farmers' responses are organized as follows in Table 25.

Table 25. Potential of extension service in addressing the farmers' problems

Potential of extension service addressing farmers problem related to	Response of respondent farmers							
	Yes		No		No opinion		Total	
	№	%	№	%	№	%	№	%
Cotton crop	67	41.9	16	10.0	77	48.1	160	100.0
Sesame crop	50	31.2	15	9.4	95	59.4	160	100.0
Sorghum crop	82	51.3	21	13.1	57	35.6	160	100.0
Fruit and vegetables	37	23.1	0	.0	123	76.9	160	100.0
Livestock	53	33.1	0	.0	107	66.9	160	100.0
Natural resource	101	63.1	4	2.5	55	34.4	160	100.0

Source: Own survey data, 2007

This survey result indicates that, the majority of respondents (except sorghum production and natural resource technologies) explained 'not addressing our interest' and 'no opinion to evaluate this issue'. This tells us the current extension system didn't work based on the farmers' problems and the farmers did not build confidence on the extension service as agricultural solution provider. In the group discussions, participant farmers clarified that "they are not involved in the problem identification and planning process. The DAs and PA administrator will force us to receive the agricultural technology through quota system. As well, we are not benefited from the new technologies. Because of these reasons we are not interested to establish close contact with the DAs".

As discussion held with the woreda experts and DAs revealed that, "The regional Government prepares annual plan and sends to the woredas. The woreda offices are expected to implement the plan accordingly. This shows that, the current planning approach is top down. The success of such approach is negligible and mostly leads to failure. Now the farmers think of the extension service as the enemy of the farmer, instead of a supporter". Therefore, in the absence of addressing farmers' interests and demand driven extension service, the farmers may not be interested to search and receive agricultural information from the extension service and consequently utilization agricultural information and technology can not be expected.

4.4. Description of Independent Variables

In this section, descriptions of personal, socio-economic, institutional and psychological characteristics are presented and discussed in detail. These are the hypothesized variables that may influence the dependent variables, access and utilization of agricultural information.

4.4.1. Description of personal characteristics of the sample respondents

Personal characteristics include the variables such as age, sex, education level, health status of the household head, settlement category and settlement orientation. The survey results are presented in detail as follows:

4.4.1.1. Age of the household head

The mean age of total sample households was 37.47 years with standard deviation of 9.35. The maximum age for the sample farmers was 70 years while the minimum was 20 years. The mean age of respondents based on settlement category is shown below in Table 26.

Table 26. Mean age difference of respondents based on settlement category

Settlement category	N	Mean	Std. Deviation	T= value
New settlers	80	34.90	8.534	
Previous settlers	80	40.04	9.471	3.604***

Source: Own survey data, 2007; *** Significant at 1%

The average ages of the new settlers and previous settlers were 34.90 and 40.04 with standard deviation of 8.53 and 9.47 respectively. There is significant mean difference between both categories (t= -3.604) at 1% probability level. Therefore, it can be concluded that the new settlers are younger than the previous settlers.

4.4.1.2. Education status of sample household heads

The survey result reveals that the education status of farmers in the study area is considerably low. The majority of the respondent farmers, 73.8% (118), did not have formal education, and out of this 27 settlers are functionally literate. The education status of sample respondents is presented in Table 27.

Table 27. Education level of the respondents by settlement and sex categories

Education category	Settlement category						χ2-value	Gamma
	New settlers		Previous settlers		Total			
	№	%	№	%	№	%		
Illiterate	39	48.7	52	65.0	91	56.8		
Functionally literate	18	22.5	9	11.2	27	16.9		
Elementary school	22	27.5	12	15.0	34	21.3		
Secondary school	1	1.3	7	8.8	8	5.0		
Total	80	100	80	100	160	100	12.298***	-.194 N.S
Sex of respondent:								
	Female		Male		Total			
Illiterate	22	91.7	69	50.7	91	56.9		
Functionally literate	1	4.2	26	19.1	27	16.9		
Elementary school	1	4.2	33	24.3	34	21.3		
Secondary school	0	.0	8	5.9	8	5.0		
Total	24	100	136	100	160	100		

Source: Own survey data, 2007; N.S, *** = not significant at 10% and significant at 1%

As indicated in Table 27, among the total respondents, 56.8% of the sample household heads were illiterate, 16.8% were functionally literate, 21.3% were at elementary school education level, and 5% had attended high school education.

The illiteracy level of previous settlers was higher than the new settlers, and functionally literate and elementary school level of the respondents were higher in the new settlement category. But at secondary school level the previous settlers' category was higher. Result of Chi-Square test ($\chi 2=12.298$) indicated that there was a significant education level difference

between new and previous settlement categories at less than 1% probability level. The value of Gamma and its sign (-.194) indicates that the relationship between educational level and settlement category is weak and better educational level towards the new settler side.

Table 27 shows that, functionally literate, elementary school and secondary school level of females' proportion were lower than that of the male respondents. Moreover, the illiteracy level of female is higher than that of the male farmers.

4.4.1.3. Sex of respondents

In Table 28, with regard to sex category, mean agricultural information access score of female and male respondents were 3.25 and 7.88 score respectively. Based on the survey result, agricultural information access of females were very low. Result of independent sample t-test indicated that there was significant mean agricultural information access score difference (t= -3.539, P= 0.001) among different sex categories at 1% significance level. Generally, MHHs had more agricultural information access than FHHs.

Mean agricultural information utilization score of female and male respondents were 6.71 and 9.56 score respectively. Even though the mean score of agricultural information utilization shows difference between male and female respondents, the result of mean test using independent t- test indicated that there was no significant mean agricultural information utilization score difference (t= -0.681, P= 0.497) between male and female categories at 10% significance level.

Table 28. Mean agricultural information access and utilization of respondents based on sex

Sex categories	Information access			Information utilization		
	N	Mean score	S.D	N	Mean score	S.D
Female	24	3.25	4.06	8	6.71	8.56
Male	136	7.88	11.82	123	9.56	15.35
Total	160			131		
T= value	-3.539***			0.681 N.S		

Source: Own survey data, 2007; ***, N.S = significant at 1% and not significant

4.4.1.4. Health status of household

To accomplish the agricultural activities as required, the farmers need to be healthy. As well to get and utilize agricultural information, physical well being of the farmer is needed. A sick household farmer will face problem in getting information about the management aspect of the farm or will have a restricted access and utilization of agricultural information than a healthy household head. Hence, this study has tried to assess the household heads' health situation and the survey results are presented in Table 29.

Table 29. Respondents facing Health problems in 2005 and 2006

	Settlement category					
	New settlers		Previous settlers		Total	
	№	%	№	%	№	%
No	31	38.8	50	62.5	81	50.6
Yes	49	61.3	30	37.5	79	49.4
Total	80	100	80	100.0	160	100
χ2-value	9.026 ***					

Source: Own survey data, 2007; *** significant at 1%

During 2005-2006, among the new settlers 61.3% and among previous settlers 37.5% farmers were sick and their farm activities were affected. To check the relationship of the health problem of the respondents and settlement category, a chi-square test was conducted and the result showed that there was significant difference in health problems between settlement categories, and it was significant (χ2-9.026), at 1% probability level. This indicates that, the new settlers are facing health problem than the previous settlers. However, between male and female, there was no statistically significant difference in health problem.

Regarding the type of disease (Appendix Table 5), 77.6% and 53.3% of new and previous settler respondents, respectively, were affected by malaria. Even though both new and previous settlers live around similar village, as indicated in Table 35, the majority of the new settlers were involved in out of village hired labor in agricultural investment areas and the

malaria protection facilities were poorer than farmers living in their home. Moreover, as the results of the group discussion participants indicated, relatively new settlers had poorer economical and nutritional status.

To examine the influence of this issue on farming activity, the number of days the farmers were sick was considered. Finally, the number of average days per year was analyzed using t-tests to see the mean difference between the two settlement groups. The findings of the survey of the two are presented in Table 30.

Table 30. Mean number of days the respondents sick per year' 2005/2006

Settlement category	N	Mean	Std. Deviation	T= value
New settlers	80	19.43	25.610	2.815***
Previous settlers	80	9.68	17.423	

Source: Own survey data, 2007; *** = significant at 1%

The range of days the farmers sick was between 0-130 days per year. The mean sickness days of the new settlers per year were higher (19.43 days) than that of previous settlers (9.68 days) per year. There was significant mean difference between both settlers categories (t= 2.815) at 1% probability level. These days were exactly the critical land plowing, weeding and crop harvesting periods. The numbers of sickness day's female and male-headed respondents were 13.29 and 14.77, respectively. There was not significant difference between male and female headed sample respondents in mean sickness days.

4.4.1.5. Settlement orientation

Previously the population density of Metema woreda was very low, but it is gradually increasing due to the high rate of in-migration. The survey result indicates that among respondent farmers 3.8%, 50%, 42.4% and 3.8% were settled during Derge Government

settlement program, current Government settlement program, voluntary settlers and those returned from Sudan /*Lagin*/, respectively.

In the study area, resettlement program have been done for the last three years (2003-2005). But as indicated in Appendix Table 7, majority of new settlers went back to their homeland. From the original number of 19,420 H.Hs and 32,016 total populations of new settlers, only 4,907 households and 11,672 total populations remain in the area, i.e. 25% and 36% of the new settlers H.H and family, respectively remain in the area. Based on this issue, the researcher has tried to assess from the remaining settlers whether they have plan to live in the new settlement area permanently or not.

Based on the survey result, 92.5% of new and 95%previous settler farmers were having information about the new settlement area. However, 7.5% and 5% of new and previous settler respondents, respectively, did not have clear information about the new area. Statistically there was no significant difference between new and previous settlers. But the realness of the information varies between them.

During group discussion the new settlers explained that, "We expect benefited from the participation of resettlement program such as land, one year relief, constructed house, bones of 4,000 E.T birr, gift of oxen for traction etc. However, we did not get the benefits as they have promised earlier. The propaganda provided by the current local Government responsible bodies in highland areas regarding resettlement program was very much exaggerated. It was wrong and it was simply done to fulfill their settlement quota". The participants stated the main reason for going back to 74.73% of the new settlers H.H and 63.54% of population to be this reason (Appendix Table 7).

Therefore, farmers having such type of feeling can not be expected to have a plan to live in the new settlement area permanently or for a prolonged time and consequently they will not search to get and utilize agricultural information to get more production and income, to have food security than farmers having comfortable psychological feeling. Regarding the interest of staying in settlement program, the survey result is presented as follows in Table 31.

Table 31. Interest of staying in settlement program

Interest of staying	Settlement category					
	New settlers		Previous settlers		Total	
	№	%	№	%	№	%
I don't want to stay here	13	16.2	4	5.0	17	10.6
I am not sure for how long to stay	14	17.5	12	15.0	26	16.3
Will stay permanently as a farmer	53	66.3	64	80.0	117	73.1
Total	80	100.0	80	100.0	160	100.0
Chi-square value	5.953*					

Source: Own survey data, 2007; * = significant at 10%

As indicated in Table 31, from the remaining settlers, 33.7% and 20% of the new and previous settlers, respectively (the first two group of farmers) did not have interest or they are not confident in feeling to stay in the settlement area, but the remaining 66.3% of new settlers and 80% of previous settlers had feeling to stay permanently in the settlement area. Statistical test (χ2- 5.953, p= 0.51) indicates that there was significant difference in their feeling to stay in the new area between settlement categories at 10% probability level.

4.4.1.6. Settlement category:

To analyze the mean agricultural information access scores difference between new and previous settler categories, t- test was conducted and the following result was obtained. For the total sample the maximum score was 55 and the lowest was zero with mean 7.19 and standard deviation of 11.13 out of 82 total score. As indicated in Table 32, mean agricultural information access score of new and previous settlers were 3.76 and 10.61 score respectively. Based on the survey result, mean agricultural information access scores of new settlers were lower than the previous settlers. Result of t-test indicated that there was significant mean agricultural information access score difference (t= -4.080, P= 0.000) between new and previous settlement categories at 1% significance level. From this survey result, we can understand that both settlement categories, especially most of the new settlers have limited access to agricultural information.

Table 32. Mean agricultural information access and utilization score of respondents based on settlement category

Settlement category	Information access			Information utilization		
	N	mean	S.D	N	mean	S.D
New settlers	80	3.76	3.85	65	3.78	3.02
Previous settlers	80	10.61	14.51	66	14.65	19.19
Total	160	7.19	11.13	131	9.26	14.78
T= value	-4.080***			-4.544***		

Source: Own survey data, 2007; ***, Significant at 1%

Regarding the utilization of accessed agricultural information for the total sample, the maximum score was 61 and the lowest was zero with mean 9.26, and standard deviation of 14.78 out of 88 total score. The score distributions of the respondent farmers were highly dispersed. As indicated in Table 32, mean agricultural information utilization score of new and previous respondents were 3.78 and 14.65 with standard deviation of 3.02 and 19.19 score, respectively. Based on the survey result, mean agricultural information utilization score of new settlers were very lower than the previous settlers. Result of t-test indicated that there was significant mean agricultural information utilization score difference (t= -4.544, P= 0.000) between the settlement categories at 1% significance level. From this survey result we can understand that both settlement categories, especially most of the new settlers had limited utilization of agricultural information.

4.4.2. Description of socio-economic characteristics of the sample respondents

Socio-economic factors are related to the position of the respondent farmers in society, which is determined by various social and economic variables such as on farm income, off farm income and mobility of respondents. The survey results are presented in detail as follows.

4.4.2.1. On-farm income

On-farm income refers to annual farm income obtained from sale of crop, livestock and livestock products. The amount of income left from consumption could be used to purchase new agricultural inputs and machineries, and increase the probability of owning radio, television etc.

The survey result reveals that the on-farm income of total sampled households from crop and livestock were 4560.99 and 1335.26 ETB, respectively. From this data, we can observe that cash crop production was the highest income source of the respondent farmers. Generally, the maximum total annual on-farm income was 39300.00 ET birr while the minimum was zero, and mean annual on-farm income of total sample respondents was 5896.26 with standard deviation of 6731.11 ETB and the relative on-farm income distributions of the sample household were highly dispersed. The mean on-farm income based on settlement and sex category is presented as follows in Table 33.

Table 33. Mean annual on-farm income difference between settlement and sex categories

Settlement category	N	Mean	Std. Deviation	t- value
New settlers	80	3215.50	2715.83	
Previous settlers	80	8577.00	8322.18	t= -5.478***
Sex category				
Female	24	3685.63	3146.27	
Male	136	6286.36	7117.16	t = -1.757*

Source: Own survey data, 2007; *** significant at 1%

The new and previous settlers' on-farm mean annual income was 3215.50 and 8577.00 respectively. The previous settlers mean annual on-farm income was greater and there was highly significant income difference between both settlers categories (t= -5.478) at less than

1% probability level. Regarding female and male sample household respondents, the mean annual on-farm income were 3685.63 ETB. Males mean annual on-farm income was greater and there was significant mean difference between both sex categories (t= -1.757) at 10% probability level (Table 33).

4.4.2.2. Off-farm income

The maximum total annual off-farm income was 7200.00 ET birr while the minimum was zero and mean annual off-farm income of total sample respondents were 425.44 with standard deviation of 1036.79 ET birr and the relative off-farm income distributions of the sample household were highly dispersed. The mean off-farm income based on settlement and sex category is presented as follows.

Table 34. Mean off-farm income difference between settlement and sex categories

Settlement category	N	Mean	Std. Deviation	t- value
New settlers	80	484.46	949.76	
Previous settlers	80	366.43	1119.98	t= 719N.S
Sex category				
Female	24	281.25	545.30	
Male	136	450.88	1100.46	t = 0.738 N.S

Source: Own survey data, 2007; N.S = not significant difference

Mean annual off-farm incomes of the new and previous settler were 484.46 and 366.43 ET birr respectively. Regarding female and male sample households respondents, mean annual off-farm incomes were 281.25 and 450.88 ET birr respectively. As shown in Table 34, statistically there was no significant difference between new and previous settlers' categories. Similarly, there was no significant difference in mean annual off-farm income between female and male respondents.

4.4.2.3. Mobility of respondents

There is a mobility of new settler farmers out side their village to visit their native area and to generate income as hired labour in different off-farm activities. Regarding this issue the agricultural development agents mostly criticize the mobility of the new settlers for prolonged time out their village, as they miss participating in different agricultural trainings and capacity building activities at kebele and woreda level. So, this variable was hypothesized as more mobile farmers would have limited access and utilization of agricultural information than others remaining in their home. Based on this idea the survey result is presented in Table 35 as follows.

Table 35. Movement of settler out of village to generate income and to visit native area

Type of movement	Response	Settlement category						χ2-value	Cramer's V
		New settlers		Previous settlers		Total			
		№	%	№	%	№	%		
To generate income	Yes	17	21.3	5	6.3	22	13.8		
	No	63	78.8	75	93.8	138	86.3		
	Total	80	100.0	80	100.0	160	100.0	7.589***	0.218***
To visit native area	Yes	42	52.5	28	35.0	70	43.8		
	No	38	47.5	52	65.0	90	56.3		
	Total	80	100	80	100	160	100	4.978**	0.176**

Source: Own survey data, 2007; ***, ** = Significant at 1% and 5%

As indicated in Table 35, 21.3% of new and 6.3% of previous settlers involved in out of village income generating activities (in 2005/2006). Settler farmers were working as a hired labor in '*Delello*', '*Mertrad*' and even in Sudan agricultural investment area (around the border of Ethiopia and Sudan) for prolonged time. Chi-square test ($\chi 2 = 7.589$) and Cramer's V (0.218) indicate that there is significantly difference between settlement categories in movement of farmers out of village to generate income at 1% probability level. Therefore,

more number of new settlers were not accessing different extension interventions because they were not available around their home.

Out of the total respondents, 52.5% of new and 35% previous settlers have moved out of village to visit their native area in the year 2005/2006. The proportions of new settlers were higher than that of the previous settlers. As the survey result reveals, reasons of visiting were to visit relatives, for recreation, to bring family, to mobilize other people for settlement and to get cultural medicines. Moreover, during group discussion, the participant farmers indicated that some of the new settler farmers had a fear of loosing land ownership in their native area based on Government resettlement strategy. At the same time these farmers are involved in crop production simultaneously in their native area and settlement area. This tells us mobility of new settler farmers occur during the production season. Therefore, the farmers will lack important agricultural information provided by extension service and technical support during critical time of production. This makes them generally unstable and inefficient in accessing and utilizing agricultural information. Chi-square test ($\chi 2$= 4.978) and Cramer's V (0.176) indicated that there is significant difference in movement of farmers to visit native area between settlement categories at 1% probability level. The number of days spent out of village is presented as follows in Table 36.

Table 36. Days spent out of village to generate income and to visit native area in 2005/06

Reasons	Settlement category	N	Mean	Days spent		Std. Deviation	t- value
				Min	Max		
to generate income	New settlers	80	8.93	0	78	19.12	
	Previous settlers	80	2.86	0	62	12.27	2.388**
To visit native area	New settlers	80	21.91	0	150	30.92	
	Previous settlers	80	7.63	0	60	12.68	3.824***
Total days	New settlers	80	30.84	0	150	34.03	
	Previous settlers	80	10.49	0	92	18.84	4.680***

Source: Own survey data, 2007; **, *** significant at 5% and significant at 1%

As indicated in Table 36, the average days spent out of village to generate income of the new settlers and previous settlers were 8.93 and 2.86, respectively. Range of days spent for new and previous settlers were 0 - 78 and 0 - 62 days, respectively. There is significant mean difference between both categories (t= 2.388) at 5% probability level. The new settlers spent more time out of village than the previous settlers. The average number of days spent to visit native area by the new settlers and previous settlers were 21.96 and 7.63, respectively. Range of days spent for new and previous settlers were 0-150 and 0-60 days, respectively. There is significant mean difference between both categories (t= 3.824) at 1% probability level.

Generally the total average days spent out of village to generate income and to visit native area of the new settlers and previous settlers were 30.84 and 10.49 with standard deviation of 34.03 and 18.84 respectively. There is significant mean difference between both categories (t= 4.680) at 1% probability level. Therefore, the new settlers spent more time out of village than the previous settlers. This implies that the new settlers were not stable in the new settlement area. Within this instability it was difficult to access recent agricultural information and utilizes technologies in the settlement area.

4.4.3. Description of institutional characteristics of the sample respondents

Institutional characteristics include the variables that may influence respondent farmers' access to and utilization of agricultural information, such as access to credit, frequency of market visiting, distance of market, and social participation.

4.4.3.1. Access to credit

In the selected all sample PAs credit institutions such as Amhara credit and saving institution and rural farmers' cooperatives provide credit service for farmers. In this study getting credit for utilization of different agricultural production issues is considered as a proxy of 'credit accesses'.

The availability of financial resource has a decisive role in the agricultural production process. Access to credit can address the financial constraints of farmers. Mostly the provision of

agricultural credit from formal institution is supported by awareness creation and training in order to achieve the credit desired goals. Farmers having credit access, also have good communication with DAs. Moreover, those farmers having access to credit will have a tendency to search agricultural information and utilize agricultural technologies than farmers who do not have an access. Based on this the variable was hypothesized as influencing positively the access and utilization of agricultural information.

In addition to the information from WARDO, during group discussion, farmers were asked to identify the credit source institutions. Accordingly, most of the respondents use Amhara Credit and Saving Institution (ACSI), cooperatives, and local moneylenders as sources of credit in the study area. Based on the source of credit, ACSI and Cooperatives are categorized as formal institutions and local moneylenders as informal one. For deeper analysis of the respondent farmers' access to credit from formal and informal credit institutions, data was separately presented in Table 37.

Table 37. Financial form of Credit access from formal and informal institutions (2005/06)

Responses	Formal institutions			Informal money lender		
	New settlers	Previous settlers	Total	New settlers	Previous settlers	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
No	80 (100)	40(50)	120 (75)	43 (53.8)	53 (66.3)	96 (60)
Yes	0 (0)	40 (50)	40 (25)	37(46.2)	27 (33.7)	64 (40)
Total	80 (100)	80 (100)	160 (100)	80 (100)	80 (100)	160 (100)
Chi-Square		53.333***			2.604 N.S	
Cramer's V		0.577***			0.128 N.S	

Source: Own survey data, 2007; N.S, *** = not significant at 10% and significant at 1%

The result of the above table shows that, among the total 160 respondents 75% of the respondents had no access to credit from formal institutions in (two years) 2005-2006 production year. Among those (n =40) who have access to credit, all 100% respondents were

previous settlers. But the new settlers did not have credit access from formal institutions in the specified two years. Chi-square test ($\chi 2$= 53.373) and Cramer's V (0.577) indicate that there is significant, but with moderately strong relationship between credit access from formal institution and settlement categories at 1% probability level. Therefore, from formal institution, new settlers had not credit access.

Among the total of 160 respondents, 40% had access to credit from informal institutions (local money lenders) in 2005-2006 production year. Among these farmers, 46.2% were new settlers and 33.7% previous settlers. Statistically chi-square test ($\chi 2$= 2.604) and Cramer's V (0.128) have indicated that there was no significance difference between credit access from informal institution and settlement categories. Therefore, both settlers' categories had equal accesses to credit from informal institution.

Table 38. Credit access in both cash and kind from formal institutions (2005/06)

Responses	Formal institutions			$\chi 2$= test	Cramer's V
	New settlers	Previous settlers	Total		
	N (%)	N (%)	N (%)		
No	74 (92.5)	37 (46.25)	111(69.4)		
Yes	6 (7.5)	43 (53.75)	49 (30.6)		
Total	80 (100)	80 (100)	160(100)	40.272***	0.502***

Source: Own survey data, 2007; *** significant at 1%

Among the total of 160 respondents, 69.4% of the respondents had neither cash nor kind form (credit in the form of technology) of credit access from formal institutions in 2005-2006 production year, but 30.6% had access to credit (Table 38). Among those (n =49) who have access to credit, 7.5% were among new and 53.75% were among previous settlers. Statistically chi-square test ($\chi 2$= 40.272) indicate that there is significant difference between new and previous settlement categories in access to cash and kind form of credit from formal institution at 1% probability level. Therefore, the credit access of new settlers in the form of financial and kind form credit, from formal institution were very limited.

Not being accessed to credit from formal and informal institutions in the study area had various reasons. From the respondents, view the major three reasons of new settlers for not getting credit from formal institution in cash form were credit providers lack trust on stability, credit not allowed for settlers, and lack of credit provision in their rank order respectively. Formal institutions particularly cooperative leaders explain that they were trying to provide credit for new settlers before, but some of the new settlers went back to their homeland without repaying the loan, and therefore, they restrict to provide credit for such settlers. From this result we can observe that the financial limitation of the new settlers in rural areas was one of the common problems facing, but credit providers still did not strive to alleviate the new settlers' problem. Within this situation, the new settlers will be affected to obtain agricultural information and to utilize different modern agricultural technologies.

From respondents view, the major reasons for not getting credit from informal lender in cash form were credit rate is high, lack of interest to take credit from informal lender, interest and religion conflict, lack of interest to borrow, credit providers not thrusting them, and collateral problem in their rank order respectively. The major two reasons of both settlers' categories were similar i.e credit rate is high and lack of interest to take credit from informal lenders.

During group discussion, the farmers explained that the interest rate to informal loans was 50% for 3-4 months. Even if informal lending was the only credit option of the new settlers, but within this credit rate it is difficult to take risk and invest in agricultural technologies, so that the new settlers were restricted in utilizing different modern agricultural technologies and also discouraged to search agricultural information.

In the group discussion and responses of respondents reveal that the major activities utilizing credit are labor cost for weeding, oxen rent or purchase /traction purpose/, goat production package, labor cost for crop harvest, home consumptions, H.Y.V and Herbicides (in Appendix Table 6). Therefore, almost all of the credits were aimed at agricultural activities.

Average amount of loan obtained from formal institutions (including kind credit), informal institutions and total credit access were 1075.73, 514.88 and 1590.61 ETB, respectively. From

this data, we can observe that the respondent farmers obtain highest amount of credit from formal institutions. The relative credit distributions of the sample household were highly dispersed. The new and previous settlers' average of two years credit access was presented in Table 39.

Table 39. Average amount of credit obtained by settlement categories in 2005/06

Institutions	Settlement category	N	Mean	Std. Deviation	t-Value
Formal institution	New	80	59.96	242.94	
	previous	80	2091.50	2881.40	-6.284***
Informal lenders	New	80	436.25	824.40	
	previous	80	593.50	1741.80	-0.730N.S
Total credit	New	80	496.21	840.50	
	previous	80	2685.00	3526.49	-5.400***

Source: Own survey data, 2007; N.S, *** = not significant at 10% and significant at 1%

The average amount of new and previous settlers' loan from formal institutions was 59.96 and 2091.50 ETB, and loan from informal lender were 436.25 and 593.50, respectively. As indicated in Table 39, in both cases the previous settlers' access to credit was greater than the new settlers. From formal institutions, the new settlers did not have cash credit access, but they had limited credit access in the kind form. There was highly significant mean difference between both settlers' categories (t= -6.284) at less than 1% probability level. Regarding the amount of money borrowed from informal lender there was no significant difference between both categories of settlers.

In general, the average annual total credit access of new and previous settler categories were 496.21 and 2685.00 with standard deviation of 840.50 and 3526.49 ETB respectively and there was highly significant difference in mean annual total credit access between both settlers' categories (t= -5.400) at less than 1% probability level. Therefore, the average annual credit access of the previous settlers was higher than the new settler farmers. But the new

settler's credit access from the informal lender was comparatively and statistically similar to the previous settlers.

Table 40.Average amount of credit obtained by sex of respondents in 2005/06

Institutions	Sex of respondent	N	Mean	Std. Deviation	t-Value
From formal institution	Female	24	1058.33	1533.09	-0.040 N.S
	Male	136	1078.80	2390.69	
From informal lenders	Female	24	100.00	258.76	-3.591***
	Male	136	588.09	1460.48	
Total credit	Female	24	1158.33	1513.97	-0.825 N.S
	Male	136	1666.90	2946.31	

Source: Own survey data, 2007; N.S, *** = not significant at 10% and significant at 1%

There was no significant mean difference between male and female respondents in the case of credit access from formal institutions. This is because of formal credit institutions have gender disaggregated annual plan in their credit system. From informal lenders, the females credit access was limited than males. This is because the informal lenders usually give special attention regarding the efficiency of the farmers in the farming activities to repay the loan, and such evaluation will be taken as guarantee of the loan in addition to the collateral. Therefore, in such cases the FHHs will not be the best options for lenders. From informal institutions there was highly significant credit access mean difference between both sex categories (t= -3.591) at less than 1% probability level. In general, the annual total mean credit access of females and males were 1158.33 and 1666.90 ETB, respectively, and there was no significant difference in mean annual total credit access between males and females.

4.4.3.2. Frequency of market visits

Access to market was measured based on the frequency of market visiting. Farmers having more frequency of visiting market will have a chance to get information from other farmers,

agricultural input suppliers etc. This variable was expected to influence the access and utilization of agricultural information positively. The survey results are presented in Table 41.

Table 41. Frequency of visiting the nearby market based on settlement categories

Frequency	Settlement category					
	New settlers		Previous settlers		Total	
	№	%	№	%	№	%
Not at all	5	6.2	9	11.2	14	8.8
Some times	63	78.8	47	58.8	110	68.8
Once per week	12	15.0	19	23.8	31	19.4
more than once in a week	0	.0	5	6.2	5	3.1
Total	80	100.0	80	100.0	160	100.0
Chi-Square	10.051**					

Source: Own survey data, 2007; ** significant at 5%

Among the new settlers, 15.0 8% and 78.8% of respondents were visiting the market once in a week and some times**,** respectively, but among the previous settlers 6.2%, 23.8%, and 58.8% were visiting more than once in a week, once per week and ,some times**,** respectively. However 6.2% of the new and 11.2% of the previous settlers were not visiting market through out the year. Therefore, regarding the absence of visiting and more frequent visiting, the proportion of previous settlers were higher than the new settlers, but the new settlers had slightly lower visiting frequency. Chi-Square test indicates that there was a difference in frequency of market visiting between settlement categories ($\chi 2$= 10.051, p= 0.018) at 5% probability level.

4.4.3.3. Distance from market

Farmers having nearness to market will have a chance to get information from other farmers and input suppliers in the market place. Moreover, the nearness of market increase access to and utilization of agricultural inputs due to advantage of minimum transportation cost. The survey result is presented in Table 42.

Table 42. Distance of market in KM from the respondent residence

Settlement categories	N	Mean	S.D	t-Value
New settlers	80	19.96	9.166	
Previous settlers	80	16.91	4.798	
Total	160			2.637***

Source: Own survey data, 2007; *** = significant at 1%

When the sample households considered independently into new and previous settlers, the mean distance of market from the residence were 19.96 and 16.91 km, respectively. From this data we can observe that the previous settlers were living slightly nearer to the market than the new settlers. Even if the Government plan to settle the new and previous settlers in a mixed way (around the same village) to share the utilization of different infrastructure and institutions, the entire new settlers village did not follow this pattern and part of the new settlers village were established in a dispersed manner, and especially this problem appear in *Tumet –Mendoka* PA. Standard deviation value of the new settlers from mean distance market describes this issue (table 42). T-test indicates that there was significant mean market distance difference between both settlers' categories (t= 2.637, p= 0.009) at 1% probability level. Therefore, the new settlers are not benefited from the market distance to exchange of agricultural information, utilization of agricultural information and technologies.

4.4.3.4. Social Participation

The person's affiliation and involvement in social activities or the involvement of a person in any formal (such as market cooperative, School council etc) or non formal organization (Iqub, Religious club etc) will provide opportunities for higher exposure to various kinds of information exchange, and consequently enhance utilization of information. The survey result for this is presented in Table 43.

Table 43. Respondents' participation in formal and informal organizations based on settlement and sex category

Reponses	Settlement category						χ2-value
	New settlers		Previous settlers		Total		
	№	%	№	%	№	%	
Yes	42	52.5	53	66.3	95	59.4	
No	38	47.5	27	33.7	65	40.6	
Total	80	100.0	80	100.0	160	100.0	3.135*
Reponses	Sex of respondent:						χ2-value
	Female		Male		Total		
Yes	8	33.3	87	64.0	95	59.4	
No	16	66.7	49	36.0	65	40.6	
Total	24	100.0	136	100.0	160	100.0	7.938***

Source: Own survey data, 2007; ***, * = Significant at 1% and 10% probability level

Regarding the new and previous settlers' participation in different formal and informal social organizations, as presented in Table 43, among 160 respondent farmers, more than half (59.4%) were having involvement in different formal and informal organizations. Among this, the participation of previous settler in formal and informal institutions is higher than the new settlers' participation. Chi-square test ($\chi 2$= 3.135) indicates that there is significant difference between settlement categories in social participation at 10% probability level. Therefore, more number of previous settlers were participating in different formal and informal organizations. Even if the number of previous settlers' involvement in different social organizations was higher, the survey detailed result shows that there was no significant difference in mean degree of social participation, frequency of social participation and mean total participation score between them.

Regarding the females and males participation in different formal and informal social institutions, as presented in Table 43, only 33.3% of females were involved in any formal and informal institutions. Chi-square test indicates that there is significant difference in social participation between sex categories ($\chi 2$= 7.938, p= 0.005) at 1% probability level of

significance. Therefore, the participation of females in different formal and informal institutions is lower than males' participation. Regarding the participation score, the survey result is presented as follows in Table 44.

Table 44. Mean social participation score difference based on sex category

Types of participation	Sex category	N	Mean	S.D	t- value
Degree of social participation	Female	24	0.63	1.173	
	Male	136	1.53	1.870	-3.139***
Frequency of social participation	Female	24	0.83	1.465	
	Male	136	2.17	2.529	-2.511**
Total score of social participation	Female	24	1.46	2.62	
	Male	136	3.70	4.37	-2.433**

Source: Own survey data, 2007; **, ***, Significant at 5% and 1%

As indicated in Table 44, the mean degree of social participation, frequency of social participation, and total social participation score of female household is lower than the males. In all cases the results assure that the participation of male settlers in formal and informal organization was higher than the female settlers. An independent sample t- test indicated that there was significant mean degree, frequency, and total social participation score differences between female and male categories (t= -3.139, P= 0.003) (t= -2.511, P= 0.013) (t= -2.433, P= 0.016) at 1%, 5% and 5% significance level respectively. This implies, MHHs had more affiliation and involvement in social activities and their involvement in any formal or informal organization will have a higher exposure for different information.

4.4.4. Description of psychological characteristics of sample respondents

Psychological characteristics include the variables of psychological dimension of individual respondent such as attitude towards improved farming, innovation proneness, production motivation and information seeking behavior are addressed in this study.

4.4.4.1. Attitude towards improved farming

Farmers' attitude as measured by the Likert Scale (3 point scale) which is designed to analyze the influence of attitude towards improved farming on access and utilization of agricultural information. Accordingly, different attitude statements were presented to the sampled households. Hence, a total of 4 attitude statements (two positive and two negative statements) were developed and all four statements were presented to all respondents. The response for each question was coded with numbers (3= Agree, 2= Neutral and 1= Disagree for positive statements and (1= Agree, 2= Neutral and 3= Disagree for negative statements). Finally, by summing up the value of each statement, and divided by the number of sentences were taken as the mean value of the respondent as negative, neutral, and positive attitude values in attitude towards improved farming.

Reliability analysis was undertaken for all statements to see the degree of scale reliability of each attitude statement and to determine potential items which influences respondents' attitude towards improved farming. The alpha (α) level of all statements is 0.616. In all items there was no value of greater than 0.616, so that all sentences are reliable to estimate respondents' attitude.

According to the result of the study, respondents were categorized into three categories 6.3%, 30.6% and 63.1%, distributed in negative attitude, neutral ,and positive attitude, respectively based on their score (Table 45). Therefore, the majority of interviewed farmers in the study area show neutral and positive attitude towards improved farming.

Table 45. Level of attitude towards improved farming based on settlement and sex categories

Level of attitude	Settlement category						χ2-value	Gamma
	New settlers		Previous settlers		Total			
	№	%	№	%	№	%		
Negative attitude	3	3.8	7	8.8	10	6.3		
Neutral	26	32.5	23	28.8	49	30.6		
Positive attitude	51	63.7	50	62.4	101	63.1		
Total	80	100.0	80	100.0	160	100.0	1.794 N. S	
Sex of respondent:								
	Female		Male		Total			
Negative attitude	4	16.7	6	4.4	10	6.25		
Neutral	11	45.8	38	27.9	49	30.63		
Positive attitude	9	37.5	92	67.7	101	63.12		
Total	24	100.0	136	100.0	160	100	9.972***	0.537***

Source: Own survey data, 2007; ***, N.S = Significant at 1% and not significant difference

Even though the previous settler farmers had slightly greater negative attitude towards improved farming, almost nearly equal proportion of both settlers have positive attitude towards improved farming. Chi-Square tests ($\chi 2$= 1.794, p= 0.408) indicate that there was no significant difference between settlement categories in attitude towards improved farming.

The proportions of female respondents were higher in negative attitude and neutral attitude towards improved farming. But more proportion of male farmers have positive attitudes towards improved farming. Chi-Square tests ($\chi 2$=9.972, p= 0.007) indicated a significant difference between male and female categories at less than 1% probability level, and Gamma (= 0.537, p= 0.008) indicates there was significant, strong and positive relation towards male at less than 1% probability level. Therefore, males have more positive attitude towards improved farming than females. The possible reason of this difference is mostly the farming activity and information provision was biased to the male side, so females may not have awareness about the relative advantage of agricultural technologies and improved farming to develop positive attitude.

4.4.4.2. Innovation proneness

In the first stage, the respondent farmers were asked about the type of agricultural technologies utilized and measured how quickly accepting these technologies based on pre-specified measurements. The more frequent of accepting level were taken as the behavior of the farmers. The survey result reveals the following finding in Table 46.

Table 46. Degree of innovation proneness based on settlement and sex categories

Quickness of accepting new idea	Settlement category						χ2-value	Gamma
	New settlers		Previous settlers		Total			
	№	%	№	%	№	%		
Slowly accepting	28	35.0	26	32.5	54	33.8		
Medium	48	60.0	38	47.5	86	53.8		
Quickly accepting	4	5.0	16	20.0	20	12.5		
Total	80	100.0	80	100.0	160	100.0	8.437**	
Sex of respondent:								
	Female		Male		Total			
Slowly accepting	13	54.2	41	30.1	54	33.8		
Medium	8	33.3	78	57.4	86	53.8		
Quickly accepting	3	12.5	17	12.5	20	12.4		
Total	24	100.0	136	100.0	160	100	5.677***	0.334***

Source: Own survey data, 2007; **, *** = Significant at 1% and 5% level

According to the result, 12.5% of the respondents were accepting and utilizing new ideas immediately after getting information or training, and others 53.8% of respondents were accepting after consulting others who are more knowledgeable and having some experience in using the information. The remaining 33.8% of the respondents accept and utilize new idea after most of the people have accepted or adopted it. Therefore, it can be concluded that the majority of the interviewed farmers in the study area needed certain type of demonstration before accepting new agricultural technologies.

Almost equal number and proportion of previous and new settlers show the behavior of accepting new idea slowly and more proportion of previous settlers resemble towards the behavior of quickly accepting new idea than the new settlers. Chi-Square tests ($\chi 2$= 8.437, p= 0.015) indicated that there was significant difference between new and previous settler categories in innovation proneness at 5% probability level. Therefore, the previous settlers have slightly faster behavior of accepting new ideas than the new settlers.

Regarding the females and males, equal proportions of both sex accept new ideas quickly and larger proportion of females were accepting new information very slowly than males. But the proportion of males accepting new idea in medium speed was greater than that of females. Chi-Square tests ($\chi 2$=5.677) indicate that there is a significant difference in quickly accepting new agricultural technologies between sex categories at 1% probability level. Therefore, behavior of males was quicker than females in accepting new agricultural technologies. The possible reason of this difference is that mostly the male farmers are focusing in different farming activities and considering the farm activities as their major duty, but most of the female farmers rent their land for other farmers; as a result not involved directly like male farmers in the farming activities. The other possible reason might be females are not fully addressed in the process of new agricultural information provision, and that the absence of newly repeated information and training may not fully express the innovation proneness of females.

4.4.4.3. Production motivation

Production motivation was operationally defined as the desire of the farmer to produce more and more in the production process. Hence, the respondent farmers were asked about his/her wish or plan at what level he/she needs to increase the production (4 point scale), methods followed to improve the production (4 point scale), and number of agricultural technologies that farmers' plan to use in next year annual cropping season (maximum six number of technologies taken from the survey result). A total of 14 points score were considered to determine this variable. Finally, by assumption of normal distribution the scores were (minimum = 0, maximum=14, mean =6.5 and Std. deviation = 4.7) divided into low, medium,

and high production motivation. Finally, the survey result reveals the following finding in Table 47.

Table 47. Level of production motivation based on settlement and sex categories

Level of production motivation	Settlement category						χ2-value
	New settlers		Previous settlers		Total		
	№	%	№	%	№	%	
Low	26	32.5	18	22.4	44	27.5	
Medium	50	62.5	39	48.8	89	55.6	
High	4	5.0	23	28.8	27	16.9	
Total	80	100.0	80	100.0	160	100.0	16.184***
	Sex of respondent:						
	Female		Male		Total		
Low	11	45.8	33	24.3	44	27.5	
Medium	11	45.8	78	57.4	89	55.6	
High	2	8.2	25	18.3	27	16.9	
Total	24	100.0	136	100.0	160	100.0	5.158*

Source: Own survey data, 2007; ***, * = Significant at 1% and 10%

Based on normal distribution result, respondents were categorized into three, and 27.5%, 55.6% and 16.9% were low, medium, and high production motivation, respectively based on their scores. The majority of the respondents were found in medium production motivation.

The production motivation of previous settlers was 22.4%, 48.8% and 28.8% in low, medium and high production motivation, respectively. Relatively the majority of the new settlers (95%) proportion was found in low and medium production motivation, but the majority of the previous settlers (77.6%) were found in medium and high level of production motivation. Chi-Square tests ($\chi 2 = 16.184$) indicate that there was significant difference between new and previous settlers in production motivation behavior at 1% probability level. Therefore, the previous settlers have more motives to produce more than the new settlers.

Relatively the majority of females (91.8%) were found in low and medium production motivation, but the majority of males (75.7%) were found in medium and high level of production motivation. Chi-Square tests ($\chi 2$= 5.158) indicate that there was significant difference between sex categories in production motivation at 10% probability level. Therefore, the male respondents have more production motivation behavior than female respondents. The possible reason for this difference is that mostly the majority of male-headed farmers have a full time involvement in different farming activities than FHHs; as a result the male farmers may think and plan for more agricultural production, but most of the time female headed farmers rent their land instead of actively involving themselves and planning to use different agricultural technologies.

4.4.4.4. Information seeking behavior

In this section, first six major agricultural information sources (office of agriculture, radio/television, input dealers, market place, friends/neighbors and other farmers) and 13 major agricultural activities in the study area were identified in consultation with woreda experts. The information needs of these agricultural activities were rated in 3 level frequency (0 = Never, 1 = Some times, 2 =Always), and depending on the need to get new information, each respondent was evaluated out of 26 scores. Totally this variable have 32 scores value.

Hence, the respondent farmers were asked the number of their agricultural information source (out of six) and frequency of need to get new information to increases the production (out of 26). Finally, by assumption of normal distribution the scores were (minimum = 0, maximum= 31, mean = 16.9 and Std. deviation = 7.4) divide to low, medium and high information seeking behavior. The survey result reveals the following finding in Table 48.

Table 48. Degree of information seeking behavior based on settlement categories

Level of information seeking behavior	Settlement category						Chi-Square
	New settlers		Previous settlers		Total		
	№	%	№	%	№	%	
Low	13	16.3	11	13.7	24	15.0	
Medium	62	77.4	48	60.0	110	68.7	
High	5	6.3	21	26.3	26	16.3	
Total	80	100.0	80	100.0	160	100.0	11.795***

Source: Own survey data, 2007; *** Significant at 1%

Based on normal distribution result (Table 48), the respondents were categorized into three categories with 15.5%, 68.7% and 16.3% in low, medium and high information seeking behavior, respectively. The majority of the respondents were found in medium information seeking behavior.

The majority of new settlers were found in low and medium level of information seeking behavior, but the majority of previous settlers are found in medium and high level of information seeking behavior. Chi-Square tests ($\chi 2$= 11.795) indicate that there was significant difference between new and previous settler in level of information seeking behavior at 1% probability level. Therefore, the previous settlers had more information seeking behavior than the new settlers. Regarding the information seeking behavior of male and female respondents, chi-Square test ($\chi 2$= 4.468) indicates that there was no significant difference between them.

4.5. Relationship between dependent and independent variables

Before passing to the Tobit econometric model analysis part, it is probably important to summarize the degree of association between dependent and independent variables, so that this section covers the findings on relationship between dependent and independent variables (11 continuous and 6 dummy/discrete). To analysis the relationship between dependent and independent variables Pearson's Product-Moment Correlation and Spearman's rho were employed for continuous and for discrete/dummy variables respectively. The summarized results are presented in Table 49 and 50.

Table 49. Relationship between dependent and discrete/dummy independent variables

Variables	Access		Utilization	
	rho	p	rho	p
Demographic variables				
1 Sex of respondent	0.185**	0.019	0.038 N.S	0.668
2 Education level	0.306***	0.000	0.156*	0.074
3 Settlement category	0.216***	0.006	0.284***	0.001
4 Settlement orientation	0.012 N.S	0.876	0.009 N.S	0.916
Institutional variables				
1 Frequency of market visiting	0.339***	0.000	0.205**	0.019
Psychological variables				
1 Innovation proneness	0.631***	0.000	0.602***	0.000

***, **, *, N.S = significant at 1%, 5%, 10% level and not significant at 10% ; rho = Spearman's rho

Source: survey data analysis result

Table 50. Relationship between dependent and continuous independent variables

Variables	Access		Utilization	
	r	p	r	p
Demographic variables				
1 Age of respondents	-0.163**	0.039	-0.100 N.S	0.254
2 Health status of H.H	-0.202**	0.011	-0.235***	0.007
Socio-economic variables				
1 On farm income	0.163**	0.040	0.179**	0.041
2 Off farm income	0.008 N.S	0.921	0.017 N.S	0.848
3 Mobility of H.H	-0163**	0.039	-0.085 N.S	0.332
Institutional variables				
1 Social participation	0.310***	0.000	0.232***	0.008
2 Credit Access	0.318***	0.000	0.324***	0.000
3 Distance of market	-0.261***	0.001	-0.236***	0.007
Psychological variables				
1 Attitude towards improved farming	0.294***	0.000	0.226***	0.009
2 Production motivation	0.615***	0.000	0.573***	0.000
3 Information seeking behavior	0440***	0.000	0.360***	0.000

***, **, N.S = significant at 1%, 5% level and not significant at 10% ; rho = Spearman's rho

Source: survey data analysis result

The result of the correlation analyses shown that, among seventeen (17) explanatory variables fifty of (15) of them had shown significant relationship with access to agricultural information. Accordingly, education level, settlement category, frequency of market visiting, social participation, distance of market, credit Access, attitude towards improved farming, production motivation, innovation proneness and information seeking behavior at 1% significant level; and sex of respondent, age of respondents, health status of H.H, on farm income and mobility of H.H at 5% significant level. Among these significant variables age, health status, mobility of H.H and distance of market had shown negative relationship. But settlement orientation and off farm income did not have significant relation with agricultural information access.

On the other hand, among these seventeen (17) explanatory variables, twelve (12) of them had shown significant relationship with utilization of agricultural information. Accordingly, settlement category, innovation proneness, health status of H.H, social participation, credit access, distance of market, attitude towards improved farming, production motivation and information seeking behavior at 1% significant level; frequency of market visiting and on farm income at 5% significant level and education level at 10% significant level. Among these significant variables health status and distance of market had shown negative relationship. But the remaining five variables sex of respondent, settlement orientation, age of respondents, off farm income and mobility of H.H did not have significant relationship with the utilization of agricultural information.

In the case of settlement orientation variable, correlation analysis shows that there was no significant relationship with access and utilization of agricultural information. But the result of Tobit model reveal that (section 4.6.1), this variable have strong influence on access to and utilization of agricultural information. This difference exhibits the absence of linear relation ship with the dependent variable.

4.6. Results of the Tobit Econometric Model

In the preceding parts of this thesis, the descriptive analysis and bivariate analysis of important independent variables, which are expected to have influence on access to and utilization of agricultural information have been presented. Identification of these factors alone is however not enough to stimulate policy actions unless the relative influence of each factor is known for priority based intervention.

In this section, the econometric model known as Tobit model was used to see the relative influence of different demographic, socio-economic, institutional and psychological variables on access and intensity of access, and utilization and intensity of agricultural information utilization. List of variables to be included in the model are presented in Appendix 8. Prior to the estimation of the model parameters, it is crucial to look into the problem of multicollinearity among the potential candidate variables

Test for Multicollinearity

Before running the Tobit model all the hypothesized explanatory variables were checked for the existence of multi-collinearity problem. There are two measures that are often suggested to test the existence of mulit-collineality. These are: Variance Inflation Factor (VIF) for association among the continuous explanatory variables and contingency coefficients for dummy/discrete variables.

According to Maddala (1992), VIF can be defined as: VIF (X_i) = $\frac{1}{1-R_i^2}$, Where R_i^2 is the squared multiple correlation coefficient between X_i and the other explanatory variables. A statistical package known as SPSS was employed to compute the VIF values. Once VIF values were obtained the R^2 values can be computed using the formula. To this end, the variance inflation factor (VIF) and contingency coefficient test was computed for separately for the two dependent variables (Table 51 and 52).

Table 51. Variance inflation factor for the continuous explanatory variables for both dependent variables

Variables	Access to		Utilization of	
	Tolerance	VIF	Tolerance	VIF
AGERESP	.843	1.186	.851	1.175
HEALTHHH	.936	1.069	.900	1.111
ONFARINC	.703	1.423	.706	1.416
OFFINCO	.957	1.044	.937	1.067
MOBILITY	.779	1.284	.804	1.244
SOCIALPA	.778	1.285	.838	1.193
CREDIT	.670	1.492	.681	1.468
MARKTDIS	.757	1.321	.725	1.379
ATTCIMFA	.721	1.386	.820	1.220
PROMOTIV	.442	2.260	.599	1.668
INFOSEEK	.590	1.695	.618	1.619

Source: Computation from field survey data, 2007.

Table 52. Contingency coefficient for dummy and discrete independent variables

	Variables	Access to					Utilization of				
		1	2	3	4	5	1	2	3	4	5
1	SEXRESP	1					1				
2	EDULEVEL	0.284	1				0.272	1			
3	SETLMEOR	0.031	0.188	1			0.078	0.202	1		
4	MARKTFRE	0.188	0.212	0.163	1		0.068	0.224	0.241	1	
5	SETTLCAT	0	0.267	0.189	0.243	1	0.047	0.258	0.186	0.169	1
6	INNOPRON	0.185	0.361	0.129	0.308	0.224	0.060	0.371	0.173	0.277	0.246

Source: Computation from field survey data, 2007.

The values of VIF for continuous variables were found to be less than 10. To avoid serious problem of multicollinearity, it is quite essential to omit the variables with VIF value greater than or equal to 10 from Tobit analysis. Based on VIF result, the data have no serious problem of multicollinearity in access to agricultural information dependent variable. But one independent variable information seeking behavior VIF value on the dependent variable utilization of agricultural information shows greater than 10 values, so that this value should be dropped from the Tobit model analysis.

Similarly the contingency coefficient result indicates that the data have no serious problem of multicollinearity. The variable access to agricultural information and utilization of agricultural information was used as a continuous dependent variable. Eventually, 11 continuous and 6 discrete, a total of 17 independent variables for access dependent variable were used in the Tobit model. Similarly 10 continuous and 6 dummy/discrete, a total of 16 independent variables for utilization dependent variable were used in the Tobit model (Information seeing behavior dropped from the Tobit model analysis).

4.6.1. Determinants of agricultural information access and intensity of access and utilization and intensity of utilization

Estimates of the parameters of the variables expected to determine the access and intensity of agricultural information access of respondents are presented in Table 53. A total of 17 explanatory variables were considered to be included into the econometric model out of which eight variables were found to be significantly influence access and intensity of agricultural information access. These include settlement category, education level, settlement orientation, innovation proneness and production motivation at 1% significance level; and age of household head, frequency of market visiting and credit access at 5% significance level.

A total of 16 explanatory variables were considered to be included into the econometric model out of which eight variables were found to significantly influence agricultural information utilization and intensity of agricultural information utilization. These include, education level, settlement category, innovation proneness and production motivation at 1% significance level;

age of household head and settlement orientation at 5% significance level; and frequency of market visiting and credit utilization at 10% significance level (Table 53).

Age: The result of the study has shown that age of household head was negatively influenced access and intensity of agricultural information access at 5% significance level. The probable reason of this result is that the young farmers are eager and need information, but the older farmers are not. The study conducted by Haba (2004) in Rwanda reveals that, older farmers were less willing to get information than younger ones. Similarly, Katungi (2006), on his social capital and information exchange study in rural Uganda reveal that older men are less likely to engage in simultaneous receiving and providing of information, perhaps due to the low ability to communicate associated with old age. As indicted in Table 54, a unit increase in age of the household head would decrease the probability of agricultural information access and intensity of access by 0.026% and 0.001% respectively.

This variable also negatively influences agricultural information utilization and intensity of agricultural information utilization at 5% significance level. One of the possible reasons for negative relationship is that, elder people are usually reluctant to utilize different new information or agricultural technologies due to their risk aversive behavior. But young farmers are sensitive to get and consequently utilize information and agricultural technologies. As indicted in Table 54, a unit increase in age of the household head would decrease the probability of agricultural information utilization and intensity of utilization by 0.070% and 0.020% respectively.

Regarding the utilization of agricultural information, a study conducted by Teklewold et al., (2006) on the adoption of poultry technology, in Debre Zeit, Ethiopia, indicated that farmers' decision on level of adoption of exotic poultry breed were negatively influenced by age of the household head. Mulugeta, (1994), in his study also reported that, age had a negative effect on the adoption of wheat technologies in South Eastern high lands of Ethiopia. In the same line, Kidane, (2001) on the study he conducted on factors influencing adoption of improved wheat and maize varieties in Hawzien Wereda of Tigray found that age was negatively related with farmers' adoption of improved wheat variety.

Education level: It has a positive influence on agricultural information access and intensity of access at 1% significance level and accounted for about 5.5% of the variation (Table 53). This result indicates that, encouraging the rural people's education will enhance the interest of getting, understanding of scientific agricultural information. As indicted in Table 54, an increase in household's education level by one unit results in an increase in the probability of agricultural information access and intensity of access by 0.47% and 0.12% respectively.

This variable has also a positive influence on utilization of agricultural information and intensity of utilization at 1% significance level and accounted about 4.7% of the variation (Table 53). This result shows that improvement in the rural people's education program will enhance the utilization of agricultural information and technology. As indicted in Table 54, an increase in household's education level by one unit results in an increase in the probability of agricultural information utilization and intensity of utilization by 0.92% and 0.67% respectively.

One of the possible reasons for this relation is, as the farmers' education level increase the ability to obtain information, process, understand and consequently utilization of agricultural information also increase. Also such farmers had good communication with the DAS and served as model farmers, so that they will have more exposure for agricultural information, information utilization and technology utilization.

The finding of this study is in agreement with many of the previously conducted studies. A study conducted by Katungi (2006), reveal that, educated farmers have more information access. Pipy, (2006), also found that, significant difference between different educational level in poultry production sources of information and utilization of information. Others like (World Bank 1980, 48 as cited in Tweeten, 1997) found that, as the level of education increase, the utilization of agricultural input also increase. Similarly, Itana (1985); Chilot *et al*. (1996); Kansana (1996); and Tesfaye (2001) have reported positive and significant relationship of education with adoption. Therefore either directly or indirectly understanding levels of farmers have role in agricultural development.

Settlement category: As indicated in Table 53, this variable has positively influenced access and intensity of agricultural information access at 1% significance level. This variable accounted about 9.9% of the variation in access and intensity of agricultural information access. As indicted in Table 54, a household's head being previous settler, results in an increase in the probability of agricultural information access and intensity of access by 0.70% and 0.20% respectively

Utilization of agricultural information and intensity of utilization also influenced by settlement category at 1% significance level. This variable accounted about 11.9% of the variation in agricultural information utilization and intensity of utilization. The descriptive statistics result of this variable clearly indicated that agricultural information utilization inclines towards the previous settler side. Therefore, attention should be give for new settlers in agricultural information provision and other facilities for utilization. As indicted in Table 54, a household's head being previous settler, results in an increase in the probability of agricultural information utilization and intensity of utilization by 2.1% and 1.3% respectively.

The descriptive analysis result clearly indicated that, agricultural information provision generally biased towards the previous settler side. The new settlers are being ignored in the provision of agricultural information and not considered as one development actor. Also previous settlers have more familiarity with the existing agro ecology, good communication with the DAs, they are resource rich etc, so that they are suited to agricultural information access than the new settlers, especially these situations have attractive future for quota extension system.

Settlement orientation: From the currently resettlement program only 25.27% of H.H remain in the new settlement area, but the remaining 74.73% of H.H returned to their original place.
From the remaining settlers, those having poor feeling of staying in the settlement area were found with poor agricultural information access than having good interest of staying. The model result indicates that, this variable positively and significantly influenced access and intensity of agricultural information access of respondents at 1% significant level and accounted for 6.5% of the variation. As indicted in Table 54, a unit increase in household's

feeling of staying in the new settlement area would increase in the probability of agricultural information access and intensity of access by 0.52% and 0.15% respectively.

Those farmers having good interest of staying in the new settlement area, also shown progressive utilization of agricultural information than having poor feeling of staying in the settlement area. This variable positively and significantly influenced agricultural information utilization and intensity of utilization of respondents at 5% significant level and accounted for 4.7% of the variation. As indicted in Table 54, a unit increase in household's feeling of staying in the new settlement area would increase in the probability of agricultural information utilization and intensity of utilization by 0.99% and 0.69% respectively. Therefore, to achieve successful resettlement program, attention should be given during the provision of resettlement program information in the highland areas, with clear idea about the new settlement area, activities and resettlement program.

Access to credit: it has positive and significant influence on agricultural information access and intensity of access at 5% significance level and accounted for 0.01% of the variation. The provision of agricultural credit access from formal institution is usually supported by agricultural information from DAs and cooperatives, depending on the purpose of credit addressing agricultural technologies. Probably also those farmers having access to credit will be enhanced to search agricultural information in order to utilize different agricultural technologies. Farmers having credit access also will have good communication with DAs. These entire situations lead them to obtain and utilize agricultural information than those who have no access to formal credit. As indicated in the descriptive statistics part, the credit accesses of new settlers especially from the formal institutions were extremely limited. Therefore, the new settlers were not benefited from this advantage. A unit increase in household's credit would increase in the probability of agricultural information access and intensity of access by 0.001% and 0.001% respectively.

Access to credit had positive and significant influence on the likelihood of agricultural information utilization and intensity of utilization at 10% significance level and accounted for 0.01% of the variation. From this result it can be stated that those farmers who have access to

formal credit for production packages are more probable to utilize agricultural information and technologies than those who have no access to formal credit. As indicted in Table 54, a unit increase in household's credit would increase in the probability of agricultural information utilization and intensity of utilization by 0.001% and 0.001% respectively. As indicated in the descriptive statistics part, the credit accesses of new settlers especially from the formal institution were extremely limited. Therefore the new settlers were not benefited from the utilization of cash requiring agricultural information and technology utilization.

As indicated in Appendix Table 6, the major purpose utilizing the credit service was related to agricultural activities. Therefore, those farmers having more credit access invested on different agricultural technologies. That implies the accessible information was changed into practice. Especially those farmers having credit access from formal institution would be closely supported and supervised by DAs, so that they will be directly engaged to utilize the accessible agricultural information. Similar to this research finding, different studies had shown that access to credit plays a significant role in enhancing the use of improved varieties. (Legesse, 1992; Chilot *et al.*, 1996; Teressa, 1997; Lelissa, 1998; Bezabih, 2000; Tesfaye *et al.*, 2001) they reported that access to credit had a significant and positive influence on the adoption behavior of farmers regarding improved technologies. Therefore, the access of credit had important role in the utilization of agricultural information.

Frequency of visiting nearby market: It is one of the important events that play a role by serving as the source of agricultural information for farmers. The result of the study has shown it has a positive influence on access and intensity of access at 5% significance level and accounted for about 6.1% of the variation. During group discussion, the participants explained that the market area and the office of DAs were found around the same site at the center of PA; hence, the farmers were using that market day to visit DA's concerning different issue of agricultural problems. Farmers also indicated the presence of agricultural information exchange with the neighbor PA farmers during that day through their social communication network. Moreover, almost all interviewed DA's explained that market day is the best day to communicate with the farmers and incorporate in their plan to use that day as one way of disseminating current agricultural issues. As indicted in Table 54, an increase in household's

market visiting frequency by one unit results in an increase in the probability of agricultural information access and intensity of access by 0.50% and 0.14% respectively

Frequency of market visiting by household head has also positively influenced agricultural information utilization and intensity of utilization at 10% significance level and accounted about 4.9% of the variation. As indicted in Table 54, an increase in household's market visiting frequency by one unit results in an increase in the probability of agricultural information utilization and intensity of utilization by 0.80% and 0.34% respectively. Probably repeated local market visiting helps them to buy different agricultural input available in the shop such as insecticides, herbicides. Input distributions are also carried out around this area. Therefore, more frequent visiting of market have important role in the sharing and utilization of agricultural information. In line with this research, study conducted by Katungi (2006) in Uganda reveals that, meetings in market places play important role for the exchange of agricultural information.

Innovation proneness: has positively influenced access and intensity of agricultural information access at 1% significance level. This variable accounted about 16% of the variation in access and intensity of agricultural information access. As indicted in Table 54, an increase in household's level of innovation proneness by one unit results in an increase in the probability of agricultural information access and intensity of access by 1.51% and 0.53% respectively

The model result shown that, utilization and intensity of utilization of agricultural information positively influenced by this variable at 1% significance level. Those farmers having the behavior of quickly accept or adopt new idea will be utilizing different agricultural information than those slowly accept. This variable accounted for about 1.5% of the variation in agricultural information utilization and intensity of agricultural information utilization. As indicted in Table 54, an increase in household's level of innovation proneness by one unit results in an increase in the probability of agricultural information utilization and intensity of utilization by 3.46% and 1.10% respectively.

The presence of such behavior enhances the farmers to get agricultural information due to their behavior of quickly accept or adopt new idea and consequently utilize the accessible agricultural information than other farmers. Farmers having such type of behavior will be seen as a model farmer in the rural area; especially DAs had good communication with such type of farmers. Similar to this research finding, a study conducted in Dire Dawa administrative council, eastern Ethiopia, Asres (2005) reported that innovation proneness was statistically significant relationship with access to reproductive, productive and community role information of women.

Production motivation: It is one of the important variables that explain the motivation behavior of individual. It influenced access and intensity of agricultural information access positively at 1% significance level and accounted about 1.8% of variation. As indicted in Table 54, a unit increase in household's level of production motivation would increase in the probability of agricultural information access and intensity of access by 0.15% and 0.02% respectively.

Production motivation has a positive influence on agricultural information utilization and intensity of utilization at 1% significance level and accounted about 1.6% of variation (Table 53). The probable reason of this is, farmer having strong desire to produce more and more in the production process, will seek and utilize more information and agricultural technologies. As indicted in Table 54, a unit increase in household's level of production motivation would increase in the probability of agricultural information utilization and intensity of utilization by 0.33% and 0.12% respectively.

Table 53. Maximum Likelihood Estimates of Tobit model for access and utilization dependent variables

Explanatory Variables	Access to				Utilization of			
	Estimated Coefficients	Standard Error	t-ratio	P-value	Estimated Coefficients	Standard Error	t-ratio	P-value
Constant	-1.209	0.156	-7.758***	.0000	-1.005	0.162	-6.212***	0.000
AGERESP	-0.003	0.002	-2.075**	.0380	-0.003	0.002	-2.092**	0.036
SEXRESP	0.047	0.045	1.042	.2973	0.006	0.047	0.159	0.873
EDULEVEL	0.055	0.015	3.672***	.0002	0.047	0.015	3.053***	0.002
SETTLCAT	0.099	0.033	2.98***	.0029	0.119	0.034	3.470***	0.000
HEALTHHH	-0.001	0.001	-1.364	.1727	-0.002	0.002	-1.268	0.204
SETLMEOR	0.065	0.02	3.176***	.0015	0.047	0.020	2.277**	0.022
ONFARINC	0.001	0.001	1.619	.1055	0.002	0.001	1.330	0.183
OFFINCOM	-0.001	-0.001	-0.413	.6797	-0.001	0.001	-0.650	0.515
MOBILITY	-0.001	0.001	-0.193	.8466	-0.002	0.001	-0.971	0.331
CREDIT	0.001	0.001	2.034**	.0420	0.001	0.001	1.771*	0.076
MARKTFRE	0.061	0.024	2.54**	.0111	0.049	0.026	1.900*	0.057
MARKTDIS	-0.001	0.002	-0.267	.7897	-0.001	0.002	-0.131	0.895
SOCIALPA	0.003	0.003	1.004	.3156	0.002	0.003	0.538	0.590
ATTCIMFA	0.013	0.008	1.533	.1252	0.010	0.009	1.141	0.254
INNOPRON	0.160	0.026	6.225***	.0000	0.15	0.028	5.718***	0.000
PROMOTIV	0.018	0.004	4.232***	.0000	0.016	0.004	3.780***	0.000
INFOSEEK	0	0.002	0.139	.8895	--	--	--	--
Sigma	0.15	0.009	16.346***	.0000	0.149	0.009	15.907***	0.000
Log likelihood function = 55.06819					Log likelihood function = 59.28520			
ANOVA based fit measure(R^2) =0.493797					ANOVA based fit measure (R^2) = 0. 413066			
p= 0.000					P= 0.000			

Source: survey data model output (2007

***, ** = Significance at 1% and at 5% probability level respectively

Table 54. Marginal Effects of agricultural information access and utilization determinant variables

Variables	Access			Utilization		
	Change in the probability of agricultural information access	Change in intensity of agricultural information access	Total change	Change in the probability of agricultural information utilize	Change in intensity of agricultural information utilize	Total change
ONE	-.09491	-.00011	-1.10848	-.19674	-.00735	-.94077
SECANEPR	.00704	.00201	.08227	.02133	.01321	.10199
EDULEVEL	.00474	.00121	.05531	.00923	.00671	.04414
SETLMEOR	.00529	.00151	.06181	.00991	.00691	.04738
MARKTFRE	.00506	.00141	.05910	.00806	.00345	.03856
AGERESP	-.00026	-.00001	-.00305	-.00070	-.00020	-.00333
CREDIT	.00001	.00001	.00001	.00001	.00001	.00002
INNOPRON	.01510	.00532	.17633	.03463	.01102	.16560
PROMOTIV	.00158	.00021	.01848	.00335	.00120	.01603

Source: survey data model output.

4.7. Constraints of Access to and Utilization of Agricultural Information

The study also tried to identify different constraints that hinder the effectiveness of agricultural information access and utilization. To identify constraints in accessing and utilization of agricultural information, experts' suggestion and literature review were considered ahead of data collection. In the next stage, further refining and adjustment were taken during the pilot study. Respondents were asked to evaluate as 'not a constraint', 'somewhat important constraint' and 'very important constraint' for each of the listed items based on his/her feeling. For each problem 0, 1 and 2 values were given corresponding to the degree of the constraints. Finally, the sums of each constraint, values were taken as the scores of that problem. The highest score was taken as the major constraint and the least score was taken as the minor problem of access to and utilization of agricultural information.

4.7.1. Constraints that Inhibit settler farmers from Access to agricultural information

The rank constraint to all respondents and separately based on settlement categories are presented as follows.

Table 55. Rank order of information access constraints given by sample respondents (n= 160).

No	Constraint of Access	New settlers		Previous settlers		Total	
		Score	Rank	Score	Rank	Score	Rank
1	Lack of DAs appropriate support	109	1	102	1	211	1
2	Lack of money (earlier thinking that unable to implement)	105	2	76	3	181	2
3	Low educational level	89	4	91	2	180	3
4	Development agent's bias	90	3	75	4	165	4
5	Long distance of institutions	67	5	64	5	131	5
6	Cultural influence	42	6	52	6	94	6
7	Information not address my interest	32	7	44	7	76	7

Source: own survey data, 2007

As indicated in Table 55, poor support of DAs was the first rank of agricultural information access constraint as revealed by the total respondents. This problem was the first rank for new and previous settlers. During group discussion as the farmers said, "even if enough number of DAs assigned at PA level, but all of them are living at the center of PA without visiting and supporting the farmers' agricultural activities". In public extension system, the provision of agricultural information highly depends on the Government employed DAs. In the absence of appropriate support of DAs, the provision of agricultural information could not be successful.

The second constraint described by all respondents was isolation of farmers from the contact of development agents by considering themselves as extremely poor, (thinking ahead that unable to implement if I get information). This was the second rank constraint for new settlers and third rank for previous settlers. These farmers believe that, the issue of modern agricultural information finally requires money and not considering as their issue, due to their poor finical capacity. Therefore these farmers are isolated from development agents and discourage to search or give attention to modern agricultural information.

The third constraint indicated by all respondents was their low educational level. This problem was in forth rank for new settlers and second rank for previous settlers. As described in the group' discussion, their low educational level limited them from many things. This constraint described by the respondents as, 'we are illiterate; mostly we could not understand easily the modern agricultural technologies. If we were educated, we can read written material and accept the new idea as the DAs want'. The respondent farmers strongly believed that educated farmers can understand and search for the modern agricultural information.

The fourth constraint revealed by total respondents was development agent's bias. A development agent bias was the third rank problem for new settlers and forth ranks for previous settlers. Most of the new settler farmers believed that, DAs had frequent contact with the previous settler farmers and gave less attention to the new settlers. On the other hand, some of the previous settlers also believed that invitation of training and good communication of DAs were biased towards the resource rich farmers. Therefore, in the absence of fair development agent communication, the agricultural information access will be limited and the

farmers will be developing extreme dislike for agricultural institutions. But, the DAs also justify that those farmers they contacted were the model farmers and plays important role in the dissemination of new agricultural information

The fifth constraint revealed by the respondents was long distance of institutions (development agents' and PA administration office). This problem was the fifth rank for both settlers category. The detail concept of this problem was partly related to the first problem. The DAs' office found at the center of peasant association. Some of the farmers' residence found far from the PA center (18 km) and the DAs did not visit those farmers frequently. These farmers are expected to travel long distance to get agricultural assistance from the DAs. Especially, the newly established new settlers' villages are far away from the DAs office which exposes them for this problem.

The sixth constraint revealed by the respondents was cultural influence and it has similar rank for both settlers' category. As the respondent farmers explained that, cultural/religious issues influence on their contact with the development agents. For example, "Our religion (Muslim) does not allow taking credit with annual interest rate but creating good communication with DAs has an influence to take input with credit,". Therefore, in order to alleviate this problem, they were limiting communication with the DAs.

The seventh constraint revealed by the respondents was information not required to me (not addressing my interest). This problem was the seventh rank for both settlers. As the group discussion participant farmers clarify that, "the development agent efforts do not address our immediate problems while they will force us to take different agricultural inputs without our interest through quota system. And also we are not benefited from the new technologies. In order to alleviate this problem, we were limiting communication with the DAs". Therefore, they are not interested to create close contact with the development agents.

4.7.2. Constraints that Inhibit settler farmers from Utilization of the accessible agricultural information

The study of identifying constraint that inhibit utilization of agricultural information is one of important factor that helps to make some amendments in the information provider side and to create good enabling situation for utilization of information.

Reasons for not utilizing the accessible information for each method/sources were presented in access to and utilization of agricultural section (section 4.1). In this section, all the respondents were asked to reveal the constraints of agricultural information utilization. The major constraints are presented in the following Table.

Table 56 Rank order of constraints to utilize the agricultural information

No	Constraint of utilization	New settler		Previous settler		Total	
		Score	Rank	Score	Rank	score	Rank
1	Lack of credit for technology input purchase	149	1	66	4	215	1
2	Not suitable to the agro-ecological con	73	4	95	1	168	2
3	Not suitable to my economic status	111	3	55	6	166	3
4	It is not timely /season relevant	68	5	88	2	156	4
5	Lack of land	131	2	15	7	146	5
6	Thief problem	62	6	78	3	140	6
7	The information is for ideal conditions only	60	7	58	5	118	7

Source: own survey data, 2007

Lack of credit for technology input purchase was the first rank of constraint to utilize agricultural information. It was the first and forth rank of new and previous settlers' farmers' problem respectively. In the study area, usually every household employ daily laborer in his farm land due to the labor demanding nature of cash crop management. Beside the utilization of different agricultural technologies, such situation leads them to look credit supply.

Unsuitability of the information to the prevailing agro-ecological conditions was the second rank of problem to all respondents. During group discussion the farmers explained that most

of the information provided by the DAs not suitable to the existing situation. For example the DAs always telling them the importance of artificial fertilizer, but lack of soil fertility is not a major problem and it has toxic effect to plants in that locality due to high temperature. Similarly, the information of broad bed maker is not fitting to the area due to high sticky nature of the soil and unavailability of oxen for repeated plowing.

The third constraint described by respondents was unsuitability of the information to the farmers' economic status. These groups of respondents have different agricultural information. But, they don't want to take risk by investing on these technologies, due to their low risk bearing capacity. It is the third and sixth rank of problem for new and previous settlers respectively.

Lack of agricultural information provision in the appropriate time is the forth problem reveal by respondent. Some of agricultural information not provided in the appropriate season and time. For example, the DAs provide the availability of high yielding varity of seed information during the sowing time after farmers prepared their own local seed.

Lack of own land is fifth problem. Some of the previous settlers, particularly the new settlers are plowing rented land from other farmers. This group of farmers not interested to utilize fertilizer, herbicides, soil conservation and fertility maintenance technologies etc on rented land, due to the low guarantee of next cropping season utilization.

Thief problem is another constraint revealed by respondent. The presence of illegal livestock market in Ethiopia-Sudan border inhibits them to utilize different agricultural technologies related to livestock. So that farmers mostly selling their oxen immediately after sowing the crop. Specially, fattening and other cattle related technologies are not utilized due to this problem.

The last constraint revealed by all the respondents was the information are ideal and difficult to implement. Some of the information provided by DAs are difficult to convert into practice, specially agricultural information obtained from different mass media. Therefore farmers need certain type of demonstration.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Starting from 2003 the Government of Ethiopia has been implementing a resettlement program in different parts of the country by mobilizing the people from the drought-prone highland areas to the relatively unpopulated fertile low land areas. In Amhara region Metema woreda is one of the selected settlement areas and the activity was done for the last three years (2003-2005).

For the farming households that are newly settled, the farming system in the new area is not similar to their experience in highlands. So extension service is expected to assist and provide agricultural information in order to improve the production and productivity of the farmers, enabling them to achieve food security and income generation. Therefore, this study is aimed to assess the new and previous settler farmer access to and utilization of agricultural information from the extension service and as well as to identify constraints and influencing factors access to and utilization of agricultural information.

A two stage random sampling technique was employed to identify PAs and then respondents. In the first stage of sampling, three PAs were selected purposively from six settlement PAs and the respondents were stratified into new settler and previous settler categories. Equal numbers of sample respondents were allocated for each category and sex was also considered. In the second stage of sampling, probability proportional to size sampling technique was applied to each stratum and 160 sample H.Hs drawn from these stratum based on the stratum proportion. Farmers were interviewed using pre-tested and structured interview schedule.

The primary data sources were both new and previous settler farmers, as well as DAs and subject matter specialists on various aspects of access and utilization of agricultural information of farmers. Secondary data sources were documents, reports of DAs and woreda rural development and agricultural office, and other related institutions. The sources of qualitative data were previous and new settler farmers through focus group discussion, key

informant interviews and personal observations. The qualitative data have served as a supplementary to quantitative data.

Data were analyzed using descriptive statistical tools such as mean, percentage, ranking, standard deviation, T-test, $\chi 2$-test, Cramer's V, Gamma, Spearman Correlation Coefficient (rho), and Pearson's Product-Moment Correlation Coefficient (r) (Sarantakos, 1988) based on the level of measurement of the variables involved. Tobit model was used to analyze the influence of several independent variables on access to and utilization of agricultural information.

In the study area agricultural extension service is the major source of agricultural information. Seven agricultural information sources and methods, and 26 information requiring relevant agricultural activates were identified with the collaboration of woreda experts and DAs. The respondents' information accesses to those 26 activities from the seven information sources and methods were rated with properly designed access frequencies. The same procedure was applied for utilization of agricultural information from the accessed information.

The settler farmers' agricultural information access from training related to cotton; sesame, sorghum, vegetable and fruit production, from livestock production training; goat production, cattle fattening and modern honey production, from natural resource production and conservation aspects; importance of tree plantation, forest firebreak line establishment, community forest utilization and management, soil fertility maintenance, and utilization of fuel saving stove information were assessed separately. Statistically there were significant difference between new and previous settlement categories and the new settlers training access was limited than the previous settlers.

From the total respondent, 16.67% (4) of FHHs and 22.79% (31) MHHs obtain information from training in different agricultural activities. The proportion of FHHs participation in different crop production, livestock and natural resource conservation and management training were lower than MHHs. Moreover, their proportion seems more or less good participation of females, but their number is small due to low sampling size. Generally, the

training provision from extension service biased towards male headed household heads. Such situations restrict the role of women in agricultural development.

Among group extension methods, the participation of both settler categories in field days, demonstration and visit out of the study area were also very low in number; especially the new settlers' participation and agricultural information access from these methods were limited and statistically there was significant difference between new and previous settlement categories. Similarly the FHHs' agricultural information accesses from these methods were lower than MHHs, especially the participation in visiting program all of them were males. Therefore, the new settlers and FHHs' agricultural information access were poorer than the previous settlers' and males headed households respectively.

In addition to group extension method, the DAs also provide formal extension advisory service to the farmers. From this important extension method, the information access of the respondent farmers was very low in number, especially the new settlers' and FHHs' access was very limited and there was highly significant formal extension advice service difference between the two settlement categories and sex categories. Also less frequent contact between DAs and respondent farmers prevailed to the new settlement and female category.

Generally, except from seasonal extension orientation and mass media information access, in all cases the extension service, the support of DAs and provision of agricultural information biased towards the previous settler side, so that the new settler farmers' agricultural information access was very limited. Within this limited agricultural information provision, especially the new settlers will not be efficiently familiarized and productive in the new agro ecology. From the survey result, frequency of information access reveals that, only few farmers were invited repeatedly for training program.

In the case of female respondents, the over all participation in training, field day, demonstration, visits, seasonal extension orientation and individual advisory service were biased towards the MHHs, so that the female farmers' agricultural information access was very limited. To improve the rural women's economic status and to bring agricultural

development, attention should be given for them in agricultural human resource development. Within this limited females' agricultural information access and undermining their role, agricultural development will not be successful.

Regarding the utilization of accessible agricultural information, except few respondents the majority of the farmers utilized the accessible sesame, cotton, sorghum, fruit and vegetable agricultural information with different degree of utilization. Livestock production such as goat production, cattle fattening, honey production and animal feed collection and preservation methods more than 63% of respondents utilized the accessible information with different degrees of utilization. In natural resource production and conservation information, except few farmers all of them have utilized the accessible information with different degrees of utilization with more frequent utilization levels for the previous settlers. The female headed respondents utilized the obtained different training information comparable to MHHs. Therefore, these points assure that the farmers can utilize agricultural information, if they exposed to well-organized agricultural information. But the information accesses were limited, especially for new settlers and FHHs.

The information utilization of new settler respondent farmers from field days, demonstration and visit was lower than the previous settlers like training information utilization. But in the orientation of different seasonal activities there was no significant difference between new and previous settlers' categories. The information utilization of female headed farmers from these extension methods were slightly higher than male farmers. But their participation in these extension events were very limited.

Even though the information utilization of new settlers from individual extension method was lower than the previous settler, statistically there was no significant difference between the two settlement categories. The information utilization of females headed farmers from this service is slightly higher that males, but their participation was poor like the above extension events.

To analyze the extension service and farmers' attachment in depth, the respondent farmers were asked to evaluate the responsiveness and potential of extension service addressing their problems. This survey result indicates that the majority of respondents laid on 'no responsive' and 'I didn't ask support' or 'no opinion' responses. This tells us the current extension system has poor linkage with the farmers and the farmers didn't have interest to work with the service provider. If the extension service lacks information to respond timely and solve the farmers' problem, it will be expected to provide from whenever it is available. Therefore, in the absence of appropriate responsive extension service, it can not be expected to provide different relevant and utilizable agricultural information to the farmers and the farmers will not be encouraged to get and utilize agricultural information from extension service.

Regarding the potential of extension service addressing farmers problem, this survey result revealed that the majority of respondents lay on 'not addressing our interest' and 'I did not asked support to evaluate this issue' responses. This tells us that current extension system didn't working based on the farmers' problems and the farmers did not build confidence as the extension service is an agricultural solution provider, so that the majority of the farmers did not ask support from the service provider. In the presence of this entire problem, the WARDO still follow top down planning approach and the farmers did not involve in the problem identification and planning process. Therefore, in the absence of addressing farmers' interest and demand driven extension service, the farmers may not be interested to search and receive agricultural information from the extension service and consequently utilization of agricultural information can not be expected.

Variation in access to and utilization of agricultural information among the sample households was assessed in view of various factors theoretically known to influence farmers' access to and utilization of scientific agricultural information. Result of different descriptive statistics indicated that most of the hypothesized variables were significantly related with farmers' access to and utilization of scientific agricultural information.

To analysis the relative influence of different variables on access and utilization of agricultural information, Tobit econometric model was applied separately for both dependent variables.

The result of the analyses shown that, among different factors influencing access to agricultural information a total of seventeen (17) explanatory variables were included into the model and out of these eight (8) of them had shown significant relationship with access to agricultural information. Accordingly, settlement category, education level, settlement orientation, innovation proneness and production motivation influenced at 1% significance level; and age of household head, frequency of market visiting and credit access at 5% significance level. Except age of household head, all of shown positive relationship with access to agricultural information.

On the other hand, to identify factors influencing utilization of agricultural information a total of sixteen (16) explanatory variables were included into the model and out of these nine (8) of them had shown significant influence on utilization of agricultural information. Accordingly, education level, settlement category, innovation proneness and production motivation influenced at 1% significance level; age of household head and settlement orientation at 5% significance level; and frequency of market visiting and credit utilization at 10% significance level. Except age of household head, all of shown positive relationship with utilization of agricultural information.

5.2. Conclusion and Policy Recommendations

On the basis of this study, the following recommendations are suggested for practical action.

1. This research result in the settlement category variable clearly indicated that agricultural information provision and utilization were generally biased towards the previous settler side. During data collection time, enough number of diploma holder DAs were deployed at PA level. But the woreda SMS team could not able to support, supervise, evaluate and monitor different physical activities and human resources at PA level due to lack of finical resource and lack of management and field experience. Therefore, before implementing new resettlement program the Government should strengthen the extension staff in the above limitations and strategic extension service plan including monitoring and evaluation should be prepared ahead, for all settlers particularly for new settlers.

2. Findings of this study indicated that the agricultural information access of all settlers, particularly the new settlers was very low and its role in human recourse development was underestimated in the study area. Enhancing participation of farmers in various areas of human resource development is the best option for empowering farm operators for better utilization of scientific agricultural information and technologies. More utilization of agricultural information was also observed in visit, training, field day and demonstration extension methods. Therefore, it is recommended that extension should strengthen human recourse development through well organized, training, field day, demonstration and visits. In the study area, even if the FTCs are constructed they are yet not operational. Fulfilling of demonstration material, selection of interested and functional literate farmers (at least) and providing pedagogy training of for DAS are required. Organizing and running of FTC should not be left for tomorrow.

3. The settlement orientation results revealed that, from the current resettlement program participants only 25.27% of the new settlers H.H are sustained in the settlement program. But the remaining 74.73% have returned to their original place. The new settlers were having higher expectation of different things from the participation of resettlement program, so the majority of the new settlers had dissatisfaction to remain in the new settlement area. The finding also revealed that farmers from the remaining settlers, those having poor feeling of staying in the settlement area were found to have poor agricultural information access and utilization. Therefore, it is recommended that the provision of resettlement program information in the highland areas should be institutional (avoiding massive campaign and non professional involvement) and genuine in order to achieve the desired poverty reduction strategy.

4. In this research, the credit provision finding shows that, there was significant difference between new and previous settlers farmers, in the favor of previous settler. In the study area, the provision of credit usually supported by agricultural information in order to achieve the intended credit goals, so that getting of credit have role in the agricultural information access. The availability of current financial resource has a decisive role in the agricultural production process. Especially the new settlers can be seen as resource poor farmers and at early stage provision of credit should be mandatory. Therefore it is recommended that by designing integrated plan and follow-up system between agricultural office, cooperatives

and other local micro-finance institutions credit provision should be deviced to the new settler farmers, especially at early stage of their agricultural development in order to achieve the desired resettlement strategic plan. Beside such credit approach, organizing and promotion of saving and loan associations might be another possible option particularly among new settler, since they are being marginalized by the formal credit institutions in the study are. The experience of village saving and loan associations have found to be successful in different parts of the country.

5. Result of descriptive statistics indicated that, the current extension system in not responsive for farmers' need of support and technology requirements. In addition to this problem, technical supports and provision of agricultural technologies of extension service did not address the farmers' agricultural problems. On the other hand, the DAs and non agricultural professionals forced the farmers to take agricultural input through campaign approach. The major reason of this issue is that planning approach is top to bottom and it is a supply driven system. Also extension professionals spending more time in non agricultural activities through campaign approach such as loan repayment, land tax collection, land distribution in the agricultural investment area, minimization of student dropout in the rural elementary school, mobilizing the rural people for latrine preparation etc. So that in the absence of joint planning and participation of farmers, appropriate professionals support, it can not be expected to address the farmers' problems in order to solve the production constraints. Also farmers may not build confident in the current extension provision. Therefore, it is recommended that planning system should be participatory, bottom to top approach based on the farmers' problems and demands, and agricultural extension support should be institutional (avoiding non-agricultural professionals support) in order to solve all the above complex problems. To make this in reality, the regional government responsible bodies and planners should be convinced.

6. The descriptive statistics result indicates that, there were statistically significant different agricultural information accesses between MHHs and FHHs, so that male respondents were more benefited form different extension service. The survey result shows that; once appropriate agricultural information is accessible for females, they can utilize it as male farmers, so that the participation of women farmers in various areas of extension programmes can play a role in the agricultural development. Therefore, it is recommended

that DAs, professional experts, administrative bodies, planners, and related organizations first, should be build positive attitude towards the importance and role of women in the agricultural development. Secondly they should have to identify relevant agricultural activities in consultation with women in order to address their own needs. Finally well organized agricultural information should be provided in order to enhance their productivity in the agricultural development, in a gender sensitive manner.

7. From this survey results, we can observe that education level had significant and positive relationship with access and utilization of agricultural information. This result shows that education level of farmers has a role to increase the ability to obtain, process and use of agriculture related information and use technologies in a better way. Therefore, due emphasis has to be given towards strengthening rural education at different levels for youth and adults.

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7. APPENDICES

Appendix I. Supportive and Detail Tables Containing Results

Appendix Table 1. The most relevant agricultural activities required information

No	Agricultural activities
1	**Related to cotton**
1.1	HYV type and utilization of cotton training
1.2	Seed rating and sowing online of
1.3	Apply fertilizer of cotton training
1.4	Time of weeding and frequency of weeding of cotton training
1.5	Apply pesticides for bollworm
2	**Related to sesame**
2.1	Seed rating of sesame
2.2	Time and frequency of weeding of sesame
2.3	Time of threshing/shattering of sesame
3	**Related to sorghum**
3.1	Seed rating and sowing online of sorghum
3.2	Apply fertilizer of sorghum
3.3	Time of weeding and frequency of sorghum
3.4	Applying herbicide and pesticides for sorghum _
3.5	Time of Harvesting and threshing
4	**Related to livestock production and management**
4.1	Goat production and handling
4.2	Poultry production
4.3	Modern honey production
4.4	Animal feed collection and preservation
4.5	Fattening plantation
5	**Related to Natural resource**
5.1	Importance of tree plantation
5.2	Forest firebreak line establishment
5.3	Community forest utilization and management
5.4	Soil fertility maintenance
5.5	Fuel saving stoves
6	**Related to fruit and vegetable production**
6.1	Production using irrigation
6.2	Vegetables Cultivation
6.3	Fruit Cultivation training

Appendix Table 2. Measurement of frequency of information access and utilization

No	Agricultural activities per training	Frequency of information access	Frequency of information utilization
1	**Training**		
1.1	**Related to cotton**	1= Once per two year 2= Twice per two year 3= More than twice per two year	1= Rarely 2= Occasionally 3= Often
1.1.1	HYV type and utilization of cotton training		
1.1.2	Seed rating and sowing online of		
1.1.3	Apply fertilizer of cotton training		
1.1.4	Time of weeding and frequency of weeding of cotton training		
1.1.5	Apply pesticides for bollworm		
1.2	**Related to seasme**		
1.2.1	Seed rating of sesame		
1.2.2	Time and frequency of weeding of sesame		
1.2.3	Time of threshing/shattering of sesame		
1.3	**Related to sorghum**		
1.3.1	Seed rating and sowing online of sorghum		
1.3.2	Apply fertilizer of sorghum		
1.3.3	Time of weeding and frequency of sorghum		
1.3.4	Applying herbicide and pesticides for sorghum _		
1.3.5	Time of Harvesting and threshing		
1.4	**livestock production and management**	1= Once per two year 2= Twice per two year two year 3= More than twice per two year	1= Rarely 2= Whenever needed
1.4.1	Goat production and handling		
1.4.2	Poultry production		
1.4.3	Modern honey production		
1.4.4	Animal feed collection and preservation		
1.4.5	Fattening plantation		
1.5	**Related to Natural resource**		
1.5.1	Importance of tree plantation		
1.5.2	Forest firebreak line establishment		
1.5.3	Community forest utilization and management		
1.5.4	Soil fertility maintenance		
1.5.5	Fuel saving stoves		
1.6	**Related to fruit and vegetable production**		
1.6.1	Production using irrigation		
1.6.2	Vegetables Cultivation		
1.6.3	Fruit Cultivation training		

Appendix Table 2. Measurement of frequency of information access and utilization (continued)

No	Agricultural activities per training	Frequency of information access	Frequency of information utilization
2	**Advisory service**	1= Once a year 2= Once in six month 3= Once in three months	1= Rarely 2= Sometimes
2.1	Extension advice per year	4= Once in a month 5= More than once a month	3= Always
3	**Seasonal activity orientation**	1= Once and more per month 2= 1-2 in three month	1= Rarely 2= Sometimes
3.1	extension orientation about seasonal activities	3= 1 in six month 4= 1 in a year	3= Always
4	**Frequency of participation in Field day**	1= Once per yea	1= Rarely
5	**Frequency of participation in Demonstration**	2= Once per six month r	2= Sometimes
6	**Frequency of participation in visits**	3= More than once in three month	3= Always
7	**Mass media**	1= Some times	1= Some times
7.1	From radio	2= Once in a week	2= Always when there is
7.2	From television	3= Daily	need
7.3	From leaflet and news letter		
7.4	From posters		

Appendix Table 3. Distribution of sample household heads based on access category

Access level	Settlement category					
	New settlers (N= 80)		Previous settlers (N=80)		Total (N=160)	
	No	%	No	%	No	%
No Access	15	18.8	14	17.5	29	18.1
Low Access	65	81.2	54	67.5	119	74.4
Medium Access	0	.0	12	15.0	12	7.5
High Access	0	.0	0	.0	0	.0
Total	80	100.0	80	100.0	160	100.0

Appendix Table 4. Distribution of sample household heads based on utilization category

Utilization level	Settlement category as new and previous settle					
	New settlers (N=64)		Previous settlers (N=65)		Total (129)	
	No	%	No	%	No	%
No Utilization	3	4.6	2	3.0	5	3.8
Low Utilization	62	95.4	50	75.8	112	85.5
Medium Utilization	0	.0	11	16.7	11	8.4
High Utilization	0	.0	3	4.5	3	2.3
Total	65	100.0	66	100.0	131	100.0

Appendix Table 5. Type of disease affected the respondents

Type of disease	Settlement category						χ2-value	Cramer's V
	New settlers		Previous settlers		Total			
	No	%	No	%	No	%		
Malaria	38	77.6	16	53.3	54	68.4		
Water born	4	8.2	2	6.7	6	7.6		
Wound	1	2.0	1	3.3	2	2.5		
Other diseases	6	12.2	11	36.7	17	21.5		
Total	49	100.0	30	100.0	79	100.0	6.932*	0.296*

Appendix Table 6. Major activity utilized credit from formal and informal institute either in cash or kind

No	Activities	From formal institutions				From informal lenders			
		Settler categories				Settler categories			
		New	Pre.	Total	Rank	New	Pre.	Total	Rank
1	For weeding labor cost	0	19	19	1	20	17	37	1
2	For ox rent or purchase /Traction purpose/	3	15	18	2	13	3	16	2
3	Got production package	1	5	6	3				
4	Crop harvest	0	1	1	6	0	5	5	3
5	For house consummations	0	2	2	5	3	1	4	4
6	For H.Y.V	2	1	3	4				
7	Herbicides					1	1	2	5
	Total	6	43	49		37	27	64	

Appendix Table 7. Original and current number of new settler farmers

No	Settlement PAs	Original number		Current number		Remaining new settlers as % of original	
		Household №	Population №	Household №	population №	Household in %	population in %
1	Dasgundo	3365	6367	666	1939	19.79	30.45
2	Vilage 6,7,8	3070	6847	901	2435	29.35	35.56
3	Kokit	997	1262	229	448	22.97	35.50
4	Kumer	480	998	149	427	31.04	42.79
5	Tumet	5049	6472	993	1564	19.67	24.17
6	Zebachibahir	1463	2267	385	961	26.32	42.39
7	Awssa	3718	6288	1338	3534	35.99	56.20
8	Metema Yohanis	1278	1515	246	364	19.25	24.03
	Total	19420	32016	4907	11672	25.27	36.46

Source: Woreda Agricultural and Rural Development Office (2007)

Appendix Table 8. Descriptions of independent variables.

Variable name	Description	Variable type	Value
SEXRESP	Sex of respondent	Dummy	Takes a value of 1 if the male and 0 otherwise
EDULEVEL	Education level	Ordinal scaled	1= illiterate,2= functionally literate, 3= primary, 4= secondary school
SETLMEOR	Settlement orientation	Ordinal scaled	1= I don't want to stay here, 2= I am not sure how for how long to stay, 3= Permanently as a farmer
MARKTFRE	Frequency of market visiting	Ordinal scaled	1= Some times, 2= Once per week, 3= More than once in a week
SETTLCAT	Settlement category	Dummy	Takes a value of 1 if the if Previous settlers, 0 new settlers
INNOPRON	Innovation proneness	Ordinal scaled	0= never, 1= after most of the people accept it, 2 = after consulting others who are more knowledgeable, 3 = whenever I come across a new idea,
AGERESP	Age of respondents	Continuous	Measured in years
HEALTHHH	Health status of H.H	Continuous	Measured in No of days
MOBILITY	Mobility of H.H	Continuous	Measured in No of days
SOCIALPA	Social participation	Continuous	Measured in scores
CREDIT	Credit Access	Continuous	Measured in birr
MARKTDIS	Distance of market	Continuous	Measured in Km
ATTCIMFA	Attitude towards improved farming	Continuous	Measured in scores
PROMOTIV	Production motivation	Continuous	Measured in scores
INFOSEEK	Information seeking behavior	Continuous	Measured in scores
ONFARINC	On farm income	Continuous	Measured in birr
OFFINCO	Off farm income	Continuous	Measured in birr

Appendix II. Household Level Interview Schedule

Household Level Interview Schedule

Name of Respondent (including grandfather) _____Code _____
Woreda _____ Kebele _____
Village _____ Date of interview (day/month/year): _____
Name of enumerators: _____
Questionnaire checked by: _____ Date questionnaire checked: _____

1. Are you head of the household?
   a. Yes b. No

2. List down the members of your family including the respondent (use the column head code)

No	**Name**	**Sex** 1=male 0=female	**Age**	**Educational** level 1= illiterate, 2= read and write, 3= primary, 4= secondary, 5=others	**Remark** (e.g. Grade level)
1					
2					
3					
4					

3. Sex of the respondent? 0. Female 1. Male
4. No of family members? (including husband and wife) male ----- Female --- Total -----
5. Religion of the respondent?
   1. Muslim 2. Orthodox 3. Catholic
   4. Protestant 5. Others (specify)
7. In which settlement program came to Metema?
   1. Derg 2. Current government
   3. Voluntary settler 4. Return from Sudan/Lagin/

8. If yes, for how long participated (staid in metema) in the resettlement program? ---- years

9. Do you have low land corps management experience (cotton, sesame, sorghum etc…) in previous area where you came?
   0. No 1. Yes

10. If yes, for how long experience? _____ Years

Health Status

11. Do you face health problem in 2005 & 2006 production years?
    0. No 1. Yes
12. If yes? What disease/problem and for how many days you were sick (out of farming work)?

No	**Disease type**	**N.o of days sick per year**	
		2005	**2006**
1	Malaria		
2	Water born		
3	Wound		
4	Others (specify)		
5	Cumulative of Malaria and others		
	sum		

Settlement orientation

13. Did you get brief information about resettlement issue before you left your native area?
0. No 1. Yes

14. If yes, how did you get the promise information?
0. No concern 1. Not true 2. Very slight/negligible
3. Incomplete 4. Complete .

15. For how long do you want to stay here (in the new area)?
1, I don't want to stay here 2, I am not sure for how long to stay
3, permanently as a farmer 4, others (specify)

16. Land size

	Land resource	**Unit of measurement**	**Size of land**
1	Owned land		
1.1	In 2005 under cultivation	hectare	
1.2	In 2005 under fallow	>>	
1.3	Rented out in 2005	>>	
2	Other lands		
2.1	Rented in 2005	hectare	
2.2	Investment land rent	>>	
3	Others (specify)		

On farm income

17. Crop production and income of 2005/06 production year

crop	area under the crop (ha)	Produced in (quintals)	Product consumed by the household (quintal)	Product sold		
				Quantity in quintal	Price per Quintal (average in 2006)	Income in Birr
Cotton						
Sesame						
Sorghum						
Maize						
vegetables						
Fruit						
Others (specify)						

18. Livestock status and income of 2006 year

	Current livestock resources			Income From Sale in 2006 (In Birr)		
livestock species	Current number	Unit price (birr)	Total price Birr	No of animals	Quantity Sold in 2006	Total price
Cow						
Oxen						
Sheep						
Goat						
Donkey						
Camel						
Hen						
Egg						
Others						

Off farm income and Mobility of respondents

19. Did you get income around the village in the 2006 from the following sources?
0. No 1. Yes

No	Item	Unit	Total days In 2006	Average daily wage/ price rate (Birr)	Total income In 2006 (Birr)
1	Within the village as hired labor	days			
2	From wood sale	days			
3	From Animal feed Sale	days			
4	From Caro /Donkey track/	days			
5	Small Hotel	days			
6	Traditional waving				
7	School guard				
8	Flourmill				
9	From land rent and local brewery				
10	Others (specify)	days			

20. Did you move out of your village to work as hired labor in 2006 (E.C)?
0. No 1. Yes

21. If yes, how long per year?

	Year	N^{o} of Days the household spent out of village as hired labour												Total days
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
1	2005													
2	2006													

22. If yes, how much income out of the village as hired labour in 2006?

	Item	Unit	Total days In 2006	Average daily wag/ price rate (Birr)	Total income In 2006 (Birr)
1	In agri. investment area as hired labor	days			
2	On distant farms as hired labour (local rich farmers farm)	days			
3	In the near town as hired labour	days			
4	Others (specify)	days			

23. Do you move out of your village in the last two years to visit your native area?
0. No 1. Yes

24. If yes, how long per year?

	Year	N^{o} of Days spent out of village to visit your native area												Total No of days
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
1	2005													
2	2006													

25. If yes, what was the reason to visit the native area?
1. Family bad situation 2. Weeding 3. to visit my relatives
4. to keep my land in Dega 5. For recreation 6. To bring my family
7. To mobilize other people for settlement 8. To get cultural medicine
9. When I am moving for trading 10. To harvest my crop in native area

Social particpation

26. Do you have membership/official status in any formal and informal organization or association? (Tick the degree and frequency of participation) (Social Participation)

No	Formal & Informal institutions	Degree of participation			Frequency of participation in meetings		
		Leader (3)	Committee member (2)	Member (1)	Whenever Conducted (2)	Some times (1)	Never (0)
1	District council						
2	PA council						
3	Religious club						
4	Marketing cooperative						
5	Union						
6	School council						
7	Irrigation association						
8	Participation in on farm research						
9	Women's associations						
10	Health committee						
11	Youth group						
12	HIV clubs						
13	Iqub						
14	Land administration committee						
15	Others (specify)						

Mass media information access and utilization

27. How frequently did you have access and utility to media for the last two years/2005/06/? (Tick below)

Code	Mass media type	Frequency of information access				Rank on based on accessibility	Frequency of accessible information utility			Rank n based on utility	Reason for not utilize
		Daily (3)	Once in a week (2)	Some times (1)	Never (0)		Always when there is need (2)	Some times (1)	Never (0)		
01	Radio										
02	Television										
03	News paper										
04	Posters										
05	Leaflets										

28. If not utilized the accessible information, what was the reason? (write the code in the above table)

Code	Constraints of utilization
1	It is not timely /season relevant
2	I am not familiar for this technology
4	My land is rented for others
5	Lack of credit for technology input purchase
6	It is not suitable to the prevailing agro-ecological conditions
7	Knowledge and information do not consider experience
8	I did not sow crop that require fertilizer
9	Others (specify)

Advisory service information access and utilization

29. Did you get formal extension advice in 2006 year?
0. No 1. Yes

12.1 If no, what was the reason? Tick below

Code	Constraints of access
01	Lack of money (earlier thinking about unable to implement)
02	Information not relevant to me (not important)
03	Information not required to me (not address my interest)
04	Poor communication with DA
05	Even if DA available, but did not have appropriate support
06	Long distance of institutions
07	Development agent bias
08	Lack of interest
09	Others (specify)

30. If yes, who encourage the advice (tick below)?
1, extension agent 2, Both extension agent and me 3, voluntary 4,Others

31. If yes, how frequently do you get extension advice per year?

1, Once a year 2, Once in six month 3, Once in three months
4, Once in a month 5, More than once a month

Seasonal orientation information access and utilization

32. Did you get extension orientation about seasonal activities in 2006?
0. No 1. Yes
33. If no, what was the reason? Use question No 12.1 codes) _____
34. If yes, how frequently per year?

1, 1 in a year 2, 1-2 in six month 3, 1-2 in three month 4, Once a month
35. If yes, in which place?

1, In the church 2, In the mosque 3, In the market
4, In meeting held for other purpose 5, In meeting held for Extension purpose
6, Personal contact 7, Others (specify)

Training information access and utilization

36. Did you get training related to cotton production during the last two years/2005/06?
0. No 1. Yes
37. If yes, how frequently did you get training related to the recommendations of Cotton crop and utilization of the accessible information in the last two years?

	Productive roles	Subjects of training obtained		Utilization of information				Reason for not utilize use question N^{o} 11.1 code
		Yes	No	Never (0)	Rarely (1)	Occasion ally(2)	Often (3)	
1	HYV type and utilization							
2	Seed rating and sowing online							
3	Apply fertilizer of							
4	Time and frequency of weeding							
5	Apply pesticides for bollworm							
	others (specify)							

38. Did you get training related to sesame production during the last two years/2005/06?
0. No 1. Yes

39. If yes, how frequently did you get training related to the recommendations of sesame crop and utilization of the accessible information in the last two years?

	Productive roles	Subjects of training obtained		Utilization of information				Reason for not utilize use question N^{o} 11.1 code
		Yes	No	Never (0)	Rarely (1)	Occasionally(2)	Often (3)	
1	Seed rating of sesame							
2	Time and frequency of weeding of sesame							
3	Time of threshing/shattering of sesame							
4	others (specify)							

40. Did you get training related to sorghum production during the last two years/2005/06/? 0. No 1. Yes

41. If yes, how frequently did you get training related to the recommendations of sorghum crop and utilization of the accessible information in the last two years?

	Productive roles	Subjects of training obtained		Utilization of information				Reason for not utilize use question N^{o} 11.1 code
		Yes	No	Never (0)	Rarely (1)	Occasionally (2)	Often (3)	
1	Seed rating and sowing online of sorghum							
2	Apply fertilizer of sorghum							
3	Time of weeding and frequency of sorghum							
4	Applying herbicide and pesticides for sorghum _							
5	Time of Harvesting and threshing							
	others (specify)							

42. Have you ever attend training related to livestock production during the last two years?
0. No 1. Yes

43. If yes, how long per year and at what level utilize it?

	Training Title	Year		Frequency of getting information				Utilization of information			Reason for not utilize use question N° 11.1 code
		2005	2006	Once per year (1)	Once per six month (2)	Once per three month (3)	More than once in three month (4)	Never (0)	Rarely (1)	Whenever needed (2)	
1	Goat production and handling										
2	Poultry production										
3	Modern honey production										
4	Animal feed collection and preservation										
5	Fattening plantation										
	others (specify)										

44. Have you ever attend training related to natural recourse conservation and management during the last two years?
0. No 1. yes

45. If yes, how long per year and at what level utilize it?

	Training Title	Year		Frequency of getting information				Utilization of information			Reason for not utilize use question N° 11.1 code
		2005	2006	Once per year (1)	Once per six month (2)	Once per three month (3)	More than once in three month (4)	Never (0)	Rarely (1)	Whenever needed (2)	
1	Importance of tree plantation										
2	Forest firebreak line establishment										
3	Community forest utilization and management										
4	Soil fertility maintenance										
5	Fuel saving stoves										
	others (specify)										

47. Have you ever attend training related to fruit and vegetable production, post harvest handling and management during the last two years?
0. No 1. Yes

48. If yes, how long per year and at what level utilize it?

	Training Title	Year		Frequency of getting information				Utilization of information			Reason for not utilize use question N^{o} 11.1 code
		2006	2006	Once per year (1)	Once per six month (2)	Once per three month (3)	More than once in three month (4)	Never (0)	Rarely (1)	Whenever needed (2)	
1	Production using irrigation										
2	Vegetables Cultivation										
3	Fruit Cultivation										
4	others (specify)										

Local information exchange

50. Where did you get the knowledge of cotton, sesame and sorghum management practice after arriving in Metema woreda?

No	Source of Knowledge	Wher did you get the knowledge of these crops?			Rank Major source of knowledge at the beginning
		cotton	sesame	sorghum	
1	The previous settler				
2	Development Agents				
3	Owen experience				

51. After getting different new agricultural information from development agents and other sources, do you discuss with others to disseminate the information?

0. No 1. Yes 2. I didn't get information

Field day, Demonstration and Visits information access and utilization

52. Have you ever participated in the following extension events (Field days, Demonstration and Visits) over the last two years?
0. No 1. Yes

No	Extension Events	Did you participated in the last 2 years?		Frequency of events			Remark
		Yes	No	Once per year (1)	Once per six month (2)	Once and more per three month (3)	
1	Field days						
2	Demonstration						
3	Visits						
4	All						

53. If not participated what were the reasons?

1. Not invited
2. I was busy
3. I am not interested
4. In my thinking not relevant
5. I don't have information about good works reasons?
6. Others (specify) If no participated, what was the

Information seeking behavior

54. Where is the source of your current agricultural information regarding the following activities?

	Activities related to	**Current Information source**								Sum of sources
		MoA (6)	Radio /TV	Input dealers	Market place	Friends/ neighbors	other farmers	no where	Others (specify)	
1	Cotton production									
2	Sesame									
3	Sorghum									
4	Goat production									
5	Poultry production									
6	Modern honey production									
7	Milking procedure									
8	Animal feed collection and preservation									
9	Importance of tree plantation									
10	Community forest utilization and management									
11	production using irrigation									
12	vegetables Cultivation									
13	fruit Cultivation									
14	others (specify)									

55. How often you need to get new information on the following activities (information seeking behavior)

	Activities	Always (2)	Some times (1)	Never (0)
1	Cotton production and management			
2	Sesame production and management			
3	Sorghum production and management			
4	Goat production and handling			
5	Poultry production			
6	Modern honey production			
7	Milking procedure			
8	Animal feed collection and preservation			
9	Importance of tree plantation			
10	community forest utilization and management			
11	production using irrigation			
12	vegetables Cultivation			
13	fruit Cultivation			
14	Others (specify)			

Innovation proneness

56. Did you previously utilize Agricultural technologies related to cotton, sesame, sorghum, livestock, natural resource, fruit and vegetable production? (in 2005/06)(Tick No, Yes)

57. If yes, what were the technologies? Tick, how the respondent accept/adopt the new idea

	Agricultural technologies	Tick		How do you accept/adopt a new idea?		
		Yes	No	1	2	3
1	Cotton HYV					
2	Sesame HYV					
3	Sorghum HYV					
4	Fruit Vegetable HYV					
5	Maize HYV					
6	Fertilizer use					
7	compost					
8	Herbicide utilization/round up/					
9	Herbicide utilization/2-4D/					
10	Insecticide					
11	Poultry production					
12	Modern honey production					
13	Animal feed collection and preservation					
14	Cattle fattening					
15	Milk churner					
16	Motor utilization					
17	Pedal pump utilization					
18	New forest tree					
19	fuel saving stove					
	Others (specify)					

1= After most of the people accept/adopt it?
2= After consulting others who are more knowledgeable and using it?
3= Whenever I come across a new idea such as after getting training, field visiting etc...

58. How quickly you wish to accept and adopt a new different idea in your life? (Out of agricultural technologies for those not utilize agricultural technologies)

Activities	How do you accept/adopt a new idea? (similar to the above measurment)			
	0	1	2	3

Responsiveness and potential of Extension service addressing farmers problem

59. Did the extension provide technical support and different agricultural technologies related to cotton as fast as possible based on your question? (fill the following responsiveness table)

60. Did the extension provide technical support and different agricultural technologies related to cotton based on your interest? (fill the following farmers problem table)

	Activities	Responsive ness of Extension service			Addressing farmers problem		
		I didn't ask support (0)	No (1)	Yes It is fast(2)	I didn't ask support (0)	No problem solving (1)	Yes It is problem solving (2)
I	Related cotton						
II	Related to sesame						
III	Related to sorghum						
IV	Related to livestock						
V	Related to horticulture						
VI	Related to natural resource						

Production motivation

61. Are you satisfied with the current level of production in your farming?
    0. No 1. Yes
62. If no, how much you work to increase in future?
    1. No plan to increase 2. by 25%
    3. by 50 % 4. by double or more
63. How do you wish to improve your production?
    1. with out any improving as it is 2. by adding more land
    3. by improving my practices 4. by asking to other who produce more than me

64. Do you have a plan to use different or new agricultural technology in next cropping season?
    0. No 1. Yes
65. If no plane to use agricultural technology, what was the reason?
    1. Lack of money 2. Lack of awareness to new technologies
    3. Lack of interest 4. I don't want to stay here
    5. Technologies are not profitable 6. Others (specify)
66. If yes, which technologies (list below and rank based on your interest)?

	Technologies	**Rank** /Based on appropriate for you/

Attitude towards improved farming

67. To what degree do you agree on the following statement?

    1. We should do farming the way our ancestors did
       1, Strongly Agree2, Neutral 3, Disagree
    2. Farming should be considered as a way of life and not as business
       1, Strongly 2, Agree 3, Neutral Disagree
    3. Change in traditional farming is always good and shall be encouraged
       3, Strongly Agree3, Neutral Disagree

    4.New agricultural knowledge and information is important in life and development
       3, Strongly Agree2, Neutral 1, Disagree

Credit access

68. Do you have credit access in money form from the government in the last two years /2005-2006/ to purchase agricultural technologies?
    0. No 1. Yes
69. If no access, what were the reasons?

    1. No credit provision 2. Credit rate is high 3. Collateral problem
    4. Lack of credit interest 5. Timely I have money 6. Biasness of PA administrator
    7. Credit not allowed for settlers 8. Frighten of group credit system
    9. My religion prohibited lending money with rate. 10. Credit providers not believe me
    11. Lone repayment not consider crop production price fluctuation
    12. PA administrator categorized me as persons lack capacity to repay lone 13. Others (specify).

70. Do you have credit access in money form from the informal lender in the last two years /2005/2006/ to purchase agricultural technologies?
    0. No 1. Yes
71. If no access, what were the reasons? /Use question No 36.1 chooses/

72. Did household have got agricultural credit the previous two years from formal credit institutions to purchase agricultural technologies? (2005 & 2006)?
    0. No 1. Yes
73. If yes, for what purpose and how much Birr?

	purpose of credit	2005	2006
		Amount of birr	Amount of birr
1	For H.Y.V		
2	Fertilizer		
3	Got production package		
4	For Ox rent or purchase /Traction purpose/		
5	For Weeding labor cost		
6	Herbicides		
7	Insecticides		
8	Motor pump/ for irrigation/		
9	Pedal pump /for irrigation/		
10	Animal fattening		
11	Modern hives		
12	BBM		
13	For house consummations		
14	Crop harvest		
15	others (speify)		

74. If not get, what were the reasons? /Use question No 36.1 chooses/

75. Did household have got agricultural credit the previous two years from informal credit institutions to purchase agricultural technologies? (2005 & 2006)?
    0. No 1. Yes

76. If yes, for what purpose and how much Birr?

	purpose of credit	2005 Amount of birr	2006 Amount of birr
1	For H.Y.V		
2	Fertilizer		
3	Got production package		
4	For Ox rent or purchase /Traction purpose/		
5	For Weeding labor cost		
6	Herbicides		
7	Insecticides		
8	Motor pump/ for irrigation/		
9	Pedal pump /for irrigation/		
10	Animal fattening		
11	Modern hives		
12	BBM		
13	For consummations		
14	Crop harvest		
15	others (specify)		

77. If not get to credit, what were the reasons? /Use question No 36.1 chooses/

Market Visiting frequency and distance

78. How frequently do you visit the near by market?
    1. Not at all 2. Some times 3. Once per week 4. more than once in a week

79. If yes, what was the reason of marketing visiting?
    1. To purchase and sale 2.to get market information 3. Others (specify)

80. How far your residence from the following market? -------K.M or hr.

Natural resource production and conservation

81. How many trees used during the last two years (2005-06) for the following purpose? Tick the sources.

	Materials	Local unit	Two years consumption	Where is the source?			
				From natural forest	From own plantation	From market	Others (specify)
1	For cooking						
2	Foe house construction						
3	For fencing						
4	For farm implements						
5	For house furniture						
6	other (specify)						

82. How many tree planted in homestead in the last two years? ---------- in 2005 and ----------in 2006

Constraint of agricultural information access and utilization

83. Identify the degree of the following constraints in access to AKI by the respondents in three point scale.

No	Constraints of Access	/ Tick once for each/		
		Very important constraint	Somewhat important constraint	Not constraint
1	Lack of money (earlier thinking about unable to implement)			
2	Information not required to me (not address my interest)			
3	Long distance of institutions			
4	Development agent bias			
5	Even if DA available, but did not have appropriate support			
6	Lack of awareness			
7	Cultural/ religious influence			
8	Low educational level			
9	Others (specify)			

84. Identify the rank order of the following constraints in utilization of AKI by the respondents in the order of their importance

No	Constraints of utilization	/ Tick once for each/		
		Very important constraint	Somewhat important constraint	Not constraint
1	It is not timely /season relevant			
2	Knowledge and information do not consider experience/indigenous knowledge/			
3	The information is for ideal conditions only			
4	I am not interested in using them			
5	Lack of credit for technology input purchase			
6	It is not suitable to the prevailing agro-ecological conditions			
7	Not suitable to my economic status			
8	Lack of land			
9	Others (specify)			