

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF SOCIOLOGY**



**POVERTY AS CAUSE OF LIMITED ADOPTION TO CROPS EXTENSION
PACKAGE: A FARMERS' PERSPECTIVE
THE CASE OF *TARMABER WOREDA*, AMHARA REGION (ETHIOPIA)**

**BY:
DAWIT YEKOYESEW**

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ADVISOR: ABEJE BERHANU (PhD)

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APPROVED BY BOARDS OF EXAMINER

SIGNATURE

FACULTY OF CHAIREMAN

Abeje Berhanu
ADVISOR

Degefa Tolossa
EXTERNAL EXAMINER

Yerawork Admassie
INTERNAL EXAMINER

[Signature]
[Signature]

[Signature]

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TABLE OF CONTENTS

Acknowledgement	I
Table of Contents	II
List of Tables	V
List of Figures	VII
List of Appendices	VIII
List of Abbreviations	IX
Abstract	X
CHAPTER ONE: INTRODUCTION	
1.1. Background of the Study	1
1.2. Statement of the Problem.....	2
1.3. Objectives of the Study.....	3
1.4. Significance of the Study.....	4
1.5. Limitations of the Study.....	4
1.6. Organization of the Thesis.....	5
1.7. Summary.....	6
CHAPTER TWO: REVIEW OF THE RELATED LITERATURE	
2.1. Introduction.....	7
2.2. Approaches to Understand Poverty	7
2.3. Measuring Poverty.....	9
2.4. Poverty in Rural Ethiopia: Recent Studies.....	10
2.5. Agricultural Technology Adoption Studies in Ethiopia	11
2.5.1. What is Adoption?	11
2.5.2. Factors Influencing Agricultural Technology Adoption in Ethiopia.....	12
2.6. Theoretical Framework of the Study	13
2.7. Summary.....	16
CHAPTER THREE: RESEARCH METHODOLOGY	
3.1. Introduction.....	17
3.2. Survey	17
3.2.1. Survey Design	17
3.3. Sampling Design.....	17

3.3.1. Sampled Households.....	17
3.4. Methods of Data Collection	19
3.4.1. Primary Data Collection	19
3.4.2. Secondary Data Collection	21
3.5. Data Analysis Methods.....	21
3.6. Methodological Triangulation	21
3.7. Conceptualization and Operationalization of Variables	22
3.7.1. Conceptualization of Important Terms	22
3.7.2. Operationalization of Key Variables	23
3.8. Summary	25

CHAPTER FOUR: DESCRIPTION OF THE STUDY AREA

4.1. Introduction.....	26
4.2. Physical Features	26
4.2.1. Location	26
4.2.2. Relief	27
4.2.3. Climate.....	28
4.3. Population Distribution and Characteristics	28
4.4. Asset Holdings	29
4.4.1. Land Resources.....	29
4.4.2. Livestock Resources	29
4.4.3. Natural Resources	29
4.4.4. Distribution of Social and Economic Services	30
4.5. Farming System	31
4.5.1. Cultivated Land and Crops Production.....	31
4.5.2. Supply and Distribution of Agricultural Inputs	32
4.6. Summary	32

CHAPTER FIVE: RESULTS AND DISCUSSIONS

5.1. Introduction.....	34
5.2. Local Conceptions of Poverty: A Classification of Farm Households.....	35
5.2.1. Well-being Rankings of Farm Households.....	35
5.2.1.1. Worse-off/Poor Households.....	36

5.2.1.2. Medium Households	37
5.2.1.3. Better-off/Rich Households	38
5.3. Demographic and Socio-Economic Characteristics of Respondents.....	38
5.3.1. Demographic Characteristics of Respondents	38
5.3.2 Socio-Economic Characteristics of Respondents	42
5.4. Relationship between Farmers' Characteristics and Adoption of Extension Inputs.....	43
5.4.1. Land Cultivation and Households' Status of Extension Inputs Utilization	44
5.4.2 Socio-Demographic Characteristics of Households and Adoption of Extension Inputs.....	48
5.4.3. Household Assets and Adoption of Extension Inputs.....	50
5.5. Local-level Perceptions to the Causes of Poverty.....	59
5.5.1. Income poverty	59
5.5.2. Isolation/Social Exclusion	59
5.5.3. Vulnerability	60
5.5.4. Physical weakness.....	61
5.5.5. Powerlessness	62
5.6. Summary	63

**CHAPTER SIX: SUMMARY, CONCLUSIONS, POLICY IMPLICATIONS AND
FURTHER RESEARCH NEEDS**

6.1. Summary and Conclusions	64
6.2. Policy Implications	68
6.3. Further Research Needs	69

Bibliography

Appendixes

LIST OF TABLES

Table 1: Frequency and Percentage Distribution of Sample Farm Households by Type and Their Wealth Ranks across <i>Kebeles</i>	18
Table 2: Primary Data Collection through Methodological Triangulation.....	22
Table 3: Conceptualization and Operationalization of Important Variables	23
Table 4: Frequency and Percentage Population Distribution by Sex across Urban and Rural areas of the <i>Woreda</i> during 2001 E.C	28
Table 5: Productivity of Crops (in quintal per hectare) for Main Cropping Season (<i>Meher</i>) during 2000 and 2001 E.C.....	32
Table 6: Frequency and Percentage Distribution of Farm Households by Type of Households and Their Wealth Rankings across <i>Kebeles</i>	36
Table 7: Frequency and Percentage Distribution of Respondents by Sex across <i>Kebeles</i> (N=125)	39
Table 8: Frequency and percentage Distribution of Respondents by Age (N=125).....	39
Table 9: Frequency and Percentage Distribution of Respondents by Marital Status across <i>Kebeles</i> (N=125)	40
Table 10: Frequency and percentage Distribution of Respondents by Their Educational Status across Well-being Ranks.....	41
Table 11: Frequency and Percentage Distribution of Respondents by Household Size across Well-being Ranks	41
Table 12: Frequency and Percentage Distribution of Respondents by Their Land Holding Size across <i>Kebeles</i>	43
Table 13: Land Cultivated (in hectare) for Major Crops per hectare during 2001/02 E.C <i>Meher</i> season.....	44
Table 14: Frequency and percentage Distribution of Respondents by Their Adoption Status of Seeds and Chemical Fertilizers in 2001/02 E.C <i>Meher</i> Season across <i>Kebeles</i>	45
Table 15: Frequency and Percentage Distribution of Respondents according to Their Reasons for Non-Use of Seeds during 2001/02 E.C <i>Meher</i> Season.....	47

Table 16: Relationship between Cooperative, Village-insurance Scheme and Development Committee Membership and Adoption of Extension Inputs.....	53
Table 17: Relationship between Membership in Development Committees and Use of Extension Inputs	54
Table 18: Relationship between Access to Extension Services and Use of Seeds and Chemical fertilizers	55
Table 19: Relationship between Access to Information and Use of Extension Inputs.....	56
Table 20: Multiple Correlation Result for Some Independent Variables and Adoption of Chemical fertilizers	58

LIST OF FIGURES

Figure 1: Theoretical Framework of the Study.....	14
Figure 2: Map of the Study Area	27

LISTS OF APPENDICES

Appendix I: Household Survey Questionnaire for Household Heads from Different Wealth Categories

Appendix II: Check List Guide for Focus Group Discussions and Depth Interviews

Appendix III: List of Names of "*Gotts*" of Sampled *Kebeles*

LIST OF ABBREVIATIONS

ADLI	Agricultural Development Led Industrialization
ANOVA	Analysis of Variance
ANRS	Amhara National Regional State
BoFED	Bureau of Finance and Economic Development
DAP	Di-Ammonium Phosphate
E.C	Ethiopian Calendar
EEA	Ethiopian Economic Association
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
NGO	None Governmental Organization
MoFED	Ministry of Finance and Economic Development
PhD	Philosophy of Doctorate
SPSS	Statistical Package for Social Sciences
UNDP	United Nations Development Programs

ABSTRACT

New agricultural technologies are important in improving the well-being of rural households in Ethiopia. However, there are many factors affecting adoption of these technologies in the country. Researches dealing with adoption of agricultural technologies focus on the effect of demographic, socio-economic, agro-ecological and institutional factors which limit many farm households from taking advantage of crops technology package in Ethiopia. However, inadequate attention is given to geographical and social contexts in which poverty occurs to identify factors in a give society that influences farmers' decisions to adopt.

In this study poverty was conceptualized in Tarmaber Woreda of North Shoa following Robert Chambers' theory of deprivation with the objective to explore factors responsible for farmers' use and non-use of improved seeds and chemical fertilizers. Here, the subjective judgments of farmers about what constitutes well-being in their own communities were given due attention to classify households into worse-off/poor, medium and better-off/rich.

The study was undertaken in three purposefully selected rural Kebeles of the district namely Koso-ber, Yitam-na-kosta and Yizaba-na-woyin. Knowledgeable individuals from 35 gott of these Kebeles were selected. A total of 35 key informants were included to assign farm households in the respective Kebeles into worse-off/poor, medium and better-off/rich based on such indicators as land size, livestock holdings (mainly oxen for ploughing), the number of times that a family feeds its members per day, housing conditions, land renting and/or sharecropping arrangement, household labour force availability, loan status, membership of cooperatives and ability to send children to school. Out of 2120 farm households, worse-off/poor, medium and better-off/rich households constitute 41.5%, 52.2% and 6.7% respectively. Income loss, vulnerability to crop failure and asset depletion, physical weakness, social isolation and powerlessness are locally believed causes of poverty.

After well-being ranking was completed, a cross-section sample of 125 farm households were selected from worse-off/poor, medium and better-off/rich households based on a two-stage stratified random sampling using Proportional Probability to Size (PPS) method. The survey result shows that educational status, size of land holding, membership of cooperatives, ownership of radio, how often farmers attend agricultural related programs, reading pamphlet and perceived distance of the market were found to be significant positive correlates of adoption of chemical fertilizers and improved seeds.

The findings of this study call for the need of policy interventions. The policy that aims at achieving poverty reduction should consider local-level situation of poverty across sub-social groups (i.e. male and female). The extension services should reinforce how farmers diversify their income beyond convincing them to use agricultural technologies. The family package program should be strengthened to tackle pressure of population on land. The public services should reach poor households in remote area.

This finding also suggests areas of interest like panel study of adoption decision of farmers, the relationship between big population size and poverty, market failure and adoption of extension inputs and comparing rural households near to town with the one in remote Kebeles for future study in the study area.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

The majority of the world's poor and food insecure people that live in rural areas of the developing world, and especially in Sub-Saharan Africa constitute 47 percent of the population (Shapouri et al. 2009). For most of rural households in Africa, agriculture is central to their livelihood. Similarly, in Ethiopia, where half of the population lives in poverty, agriculture is major means of livelihood. Thus, at present nearly 84 percent of the total population depends on agriculture for their livelihood at subsistence level. This shows us that poverty reduction has to be addressed through improved productivity in agriculture.

In Ethiopia, agriculture is the base for industrial development and the means for overall economic development. To this end, the government has developed a strategy of "Agriculture Development Led Industrialization" (ADLI), which emphasizes improved productivity in smallholder agriculture and industrialization based on the use of domestic raw materials by adopting labor-intensive technologies (Tesfaye et al. 2001). ADLI is based on the assumption that agriculture is the prime mover in generating increased agricultural output, employment, and income. Despite a small decline in its share to GDP in recent years, the importance of the agricultural sector in Ethiopia is reflected by its over 50 percent contribution, 90 percent of the total export revenue and absorption of the country's 84 percent labor force (EEA 2004). In fact, agriculture provides the path out of poverty and thus the government gives a considerable attention to agricultural development.

Despite its key role as a leading sector for economic growth in Ethiopia, the agricultural sector over the years has performed poorly (Beyene 2004) and thus has been unable to produce sufficient amount of food to provide for the country's rapidly rising population. The poor performance of the sector is attributed to backwardness of the technology used in the production system and low rate of improved agricultural technology adoption. Increasing population pressure and decrease in farm size (Bezabih and Hadera 2007) result in low productivity of the agricultural sector to meet the consumption requirement of households. This is because with the prevailing traditional agricultural technologies and farming practices it would be difficult to have

more output from small farms. It is also characterized by traditional subsistence oriented farming, virtually small-scale, and entirely dependent on rainfall. Small-scale producers operating under rain fed situation characterized by low-input, low-output mixed farming systems and traditional technologies dominate the sector. More than 95 per cent of the country's agricultural output is generated by subsistence farmers who use traditional tools and farming practices. Small-scale farmers account for 95 percent of the total area under crop cultivation and more than 96 per cent of total agricultural output (Ashenafi 2006). It is also stated that the seven million farmers in Ethiopia (Ashenafi 2006) are involved in small-scale agricultural production.

One of the ways to increase agricultural productivity is through the adoption of improved agricultural technologies (Gebre-Medihin and Johnston 2002; Doss 2006; World Bank 2008) between food supply and food demand and the chronic problem of food insecurity in the country, the government of Ethiopia initiated Intensive Agricultural Technology Dissemination Program (IATDP) in 1993. This program aimed at making available improved seeds that are intended to get better the efficiency of smallholder farming systems in terms of increasing farm income and reducing rural poverty in the country.

The Amhara National Regional State (ANRS) being one of the 9 states is characterized by great economic and ecological diversities (BoFED 2001) and is one of the poor and food insecure regions. The regional government has been developing a strategy focusing on the small holder farming communities to increase agriculture production. Agricultural production and food security status of households are not good in the region in general in North Shoa zone (one of ten administrative zones in the region) in particular (BoFED 2001).

1.2. Statement of the Problem

Adoption of modern agricultural technology is imperative to promote rural development and poverty reduction in Ethiopia. Without the development of the agricultural sector there would be fewer opportunities for reducing rural poverty in the country. Hence, the government of Ethiopia has increasingly sought to improve farmers' access to modern technologies and agricultural markets (Spielman 2007). However, despite the explicit efforts made by the government to promote agricultural innovation, evidence indicates that adoption rate of modern agricultural technologies in the country is very low (Kebede et al. 1990; Spielman 2007). An agricultural extension service which fails to take local conditions into consideration (Chambers and Toulmin

1991; Abeje 2004) and lacks an understanding of the diverse agro-ecological and socio-economic environments (Abeje 2008) can be considered at the root of the problem of this low level adoption of technology in the country.

Using econometrics model, some studies reveal the demographic and socio-economic factors affecting adoption of agricultural technologies at the household level in the country (Grover and Antenh 2004). However, identifying these factors with a clear understanding of the diverse agro-ecological and socio-economic environments where different social groups live has received limited attentions. In this study, therefore, an attempt is made to addresses this issue thereby looking at the experience of farm households in *Tarmaber Woreda*¹ of North Shoa regarding to adoption of crops extension package.

Since poverty is a multidimensional and socially and geographically configured (Mullen 1999b) assets and wellbeing vary along with time and across societies. Therefore, understanding poverty in its context (Chambers 1995; Michelle et al. 2005) helps to identify social characteristics and the asset status of households that are likely to influence farm households' decision to adopt agricultural technology. This in turn helps to formulate an appropriate strategy that fits to the micro-level conditions that lends itself to mitigate poverty.

Accordingly, in order to capture local realities and quantitative and qualitative characteristics of rural poverty (Mullen 1999b), participatory poverty assessment (PPA)² was used in the study area. This method helped to examine the situation of poor people from their own perspectives and to identify poverty indicators in the study area.

1.3. Objectives of the Study

The general objective of this study is to examine poverty as cause of limited adoption of crops extension package from farmers' perspectives in *Tarmaber Woreda*. The specific objectives are to:

1. Conceptualize what poverty mean for local people.
2. Examine the local-level perception of the causes of poverty at household level.
3. Examine the characteristics of the poor across sub-social groups (i.e. Male and Female).

¹ *Woreda* is the fourth tier of elected government in the administrative structure of the Federal Democratic Republic of Ethiopia (FDRE) (MoFED 2002). In this study, *Woreda* and district are used interchangeably.

² It is “. . . an instrument for including poor people's views in the analysis of poverty and the formulation of strategies to reduce it through public policy” (Norton et al. 2001:6, as quoted in Ellis and Tassew 2005:1).

4. Explore the socio-economic and agro-ecological constraints that affect the adoption of seeds and chemical fertilizers at household level.

In order to accomplish the above-mentioned objectives both primary and secondary data were collected. Wealth ranking exercise, focus group discussions, key informants interviewing and household survey were employed for eliciting primary information. Secondary data were collected from books, journals, internet sources and annual reports of the study area's agricultural office (see the details on Chapter Three).

1.4. Significance of the Study

The study primarily contributes to the knowledge gap in adoption studies in Ethiopia. It reinforces the need to integrate the social contexts in the current efforts to disseminate agricultural technologies in the study area. It contributes in the current debates on developer based and farmers informed technology development. As the study draws on local knowledge/perceptions of poverty and its causes, it can provide information on the *Woreda's* poverty and social conditions to policy makers. It serves as an input for participatory poverty assessment efforts in the country. It can also give clue for *Woreda's* Agricultural and Rural Development Office about what constraints affect farmers from taking advantage of such technologies as chemical fertilizers and improved seeds. Further investigations can also use the current study as a starting point to assess issues which have not been addressed here and remain to be analyzed particularly in the study area.

1.5. Limitations of the Study

The present study is not without limitations. Since cross-sectional data were collected on adopters and non adopters across well-being rankings, the dynamics of adoption (i.e. farmers' decision to adopt extension inputs over time) has not been adequately addressed in this study.

Methodologically, it was found to be difficult to meet all farm households (2120) of sampled *Kebeles* for wealth ranking exercises. The categorization of households into worse-off/poor, medium and better-off/rich was undertaken only with the key informants from *gott* of each sampled *Kebele* without the presence of all household heads.

In addition, since the study focuses on local-level analysis, the findings presented here will not necessarily hold true in other rural *Kebeles* in Ethiopia where socio-cultural and physical

conditions vary from one community to others. Therefore, there may be a problem in external validity of the study.

The study also faced some practical challenges. Since the study was conducted during the time when Ethiopia was undertaking its the fourth national election, respondents were not free to give answer concerning policy related issues. There was also challenge from key informants and focus group participants particularly from *Yitam-na-kosta and Koso-ber Kebeles*. It was difficult to establish in the beginning a fairly reasonable level of trust with the *Kebele* leaders and with some of focus group participants, particularly in *Yitam-na-kosta and Yizaba-na-woyin Kebeles*.

1.6. Organization of the Thesis

The paper is organized into six chapters. Chapter 1 presents background information, statement of the problem, objectives, significance and limitations of the study. The chapter in what follows (Chapter 2) provides a review of the related literatures about approaches of poverty and some of the current studies on rural poverty in Ethiopia. It also discusses factors affecting agricultural technology adoption in Ethiopia and the theoretical framework of the present study.

Chapter 3 sets out the research methodology that involves justifications for the selection of the study site, study design, sampling design, methods of data collection and analysis, conceptual and operational definitions of important terms and variables (independent and dependent).

Under Chapter 4 a general description of the study area is presented. It discusses the physical settings, the distribution and characteristics of the population, asset holdings and farming systems.

Chapter 5 presents the major findings of this study based on data from well-being exercises and household survey in the study area. It first discusses some of the well-being indicators and describes the classification of farm households based on local conception of poverty. In what follows, it presents the analysis of data from household survey about the demographic and socio-economic characteristics of respondents, the relationship between farmers' characteristics and adoption of extension inputs. It also sets out local-level perceptions to the causes of poverty.

Chapter 6 displays the conclusion, policy implications and recommendations for further research needs in the study area.

1.7. Summary

This chapter has presented the general background of the study. The research gap what makes the current study different from previous researches is discussed. Unlike issues inadequately treated by other studies, this paper tried to investigate constraints of extension inputs based on local-level perception of poverty. The significance, some of the methodological limitations and practical challenges, and organization of the thesis are also described.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1. Introduction

The chapter begins with a review and discusses of the various theoretical approaches to understand the concept of poverty. Following is the review of recent studies on poverty in rural Ethiopia. In this chapter, empirical studies on factors affecting the decision of farmers to adopt improved agricultural technology in Ethiopia will also be reviewed. Since the aim of this study is to explain why farmers do not adopt extension inputs, theoretical framework based on Robert Chambers (1983) theory of deprivation will be presented.

2.2. Approaches to Understand Poverty

Since it is complex, multi-causal and has macro and micro-level dimensions (Mullen 1999b), a simple definition of poverty does not grasp what poverty means (Chambers 1995). In this section, an attempt is made to discuss major approaches namely Income/Consumption (I/C), Basic Human needs (BHN), human poverty and participatory approaches (Shaffer 2001).

Income/Consumption Approach

The income/consumption (I/C) approach states that a person becomes poor when he/she has insufficient access to economic resources which are required to meet basic material needs (Lipton 1997 cited in Shaffer 2001). According to this approach, poverty is a state of having an income or consumption level below a certain standard (Bigsten et al. 1999b).

The Basic Human Need Approach

This approach equates poverty with deprivation which is defined as inability of people to maintain the minimum standards of living (Streeten et al. 1981 cited in Shaffer 2001) in a given society. In other words, poverty is the failure to meet basic needs (food, clothing, and shelter) and to access services such as water, sanitation, nutrition, health and education. However, these minimum basic needs may not universally applicable to all social and economic categories in all societies (Chambers 1995).

The above-mentioned approaches restrict well-being (Shaffer 2001) only to income or consumption and fulfillment of basic needs. However, in recent years, it has become common to consider social deprivation in the analysis of poverty. For this reason, I will attempt to discuss the two imperative component of social deprivation namely human poverty and participatory poverty approaches.

Human Poverty Approach

Human poverty approach views poverty as being characterized by “not only the lack of the necessities of material well-being, but the denial of opportunities for living a tolerable life” (UNDP 1997: 15 cited in Shaffer 2001:5). According to Amartya Sen (1999 cited in Shaffer 2001:5) “poverty must be seen as the deprivation of basic capacities rather than merely as low income.”

Participatory Approach

Participation is the process through which technology development at the international, national, and local levels more responsive and relevant to the needs and potential of the poor; in part, by fostering a reciprocal farmer-researcher partnership, in which research integrates the needs and interests, as well as the traditional technologies and common knowledge of farmers.

Participation calls for the need make development projects people-centered, demand-driven and relevant and appropriate for the poor small producers (farmers). It also shows the need to improve the responsiveness of agricultural research to the needs of the poor and small farmers' participation in the identification and planning of research projects. It helps to find solutions to limited adoption of improved agricultural technologies within given socio-economic and agro-ecological contexts.

The underlying assumption here is that poverty is not just a lack of income but it is also highly associated with social exclusion, vulnerability, powerlessness (Chambers 1983), and other dimensions of deprivations. Chambers (1995:29 cited in Shaffer 2001:6) said that “... deprivation and well-being as perceived by poor people ... question the degree of primacy often attributed to income-poverty... Income matters, but so too other aspects of well-being and the quality of life-health, security, self-respect, justice, access to goods and services, family and social life”

The participatory approach recognizes that poverty lines are intrinsically subjective judgments people construct about what constitutes a socially acceptable minimum standard of living in their

own societies (Mekonnen 1999). The working concept of poverty here is the subjective notion in the sense that people are the best judges of their own situation and that their opinions should ultimately be the decisive factor in defining welfare and poverty (Mekonnen 1999).

Poverty is a multi-dimensional (Townsend 1985; Sen 1983; Chambers 1995) problem that extends beyond the economic, socio-cultural and political situation of an individual or household in a society. Poverty reduction policies should consider the multi-dimensional meaning of poverty (World Bank 2000).

As has been stated, poverty has to be contextually-grounded to address the situation of different social groups. This helps to identify income and non-income correlates of poverty (Devereux and Sharp 2003) and factors affecting use of improved agricultural technologies. In order to examine the wellbeing indicators and use them as basic standard level to understand poverty this approach is important. For this reason, this approach will be employed in this study.

2.3. Measuring Poverty

Social scientists have used different kinds of poverty indices. These are poverty ratio/ head count index, housing index and human poverty index measures of intensity of poverty.

Poverty Ratio/ Head Count Index

It is the most frequently used measure of poverty (Sen, 1983). It estimates the percentage of the population below a specified poverty line. The poverty line, here, is the level of income which is required to attain basic living standard with enough money for things like food, shelter, and clothing, which together form baskets of basic necessities. But, it is criticized as it does not show us the depth or severity of poverty.

Housing Index

The housing index considers the size of the house, the physical condition of the house and the types of materials used for making the roof of the houses as line for measuring poverty. It is not a good measure of poverty since, for one thing, it is possible to find poor people in a good house that may be inherited and provided by the government and, for another, and some rich people may live in dilapidated houses. However, this may be true in the case of relative poverty.

Human Poverty Index

According to this measure, poverty measure based on income criteria does not capture deprivation of many kinds. The Human Poverty Index is an indication of the standard of living in a country. It can reflect the extent of deprivation in a given society. This measure views poverty as multi-dimensional. Accordingly, the working concept of poverty applied in this study is the subjective notion by which poverty line has been done for sampled *Kebeles*.

2.4. Poverty in Rural Ethiopia: Recent Studies

In Ethiopia, like many developing countries, poverty is predominantly a rural phenomenon. Different studies tried to analyze the poverty situation of Ethiopia following different approaches. Using Basic Needs Approach, Bigsten et al. (1999b) found the magnitude, depth and severity of rural poverty in Ethiopia. They stated that large household size, female-headship of households and high dependency ratio increased the probability of households to fall into poverty.

There are factors which exacerbate poverty in Ethiopia. These involve low agricultural production, low non-farm income, low education and poor health, and high population growth and weak institutional structures. Lack of equity in access to productive resources and basic services and their consequential benefits as well as lack of access to opportunities to develop skills and human capabilities (Chambers and Conway 1992) have impeded the socio-economic development of the poor (Webb et al. 1992). Moreover, a wealth of evidences indicate population growth and land degradation, crop and market failures associated with policy (Devereux et al. 2003), droughts and other environmental factors, low productivity due to primitive farming techniques as well as low access to assets (Dercon 1999) as causes of poverty in the country.

Studies on determinants of poverty (Dercon 2001 cited in Sisay and Adugna 2002; Mulat et al. 2003) confirm that the poverty situation is significantly related to subsistence farming or low-return occupations outside of the farming activities, poor agricultural potential, physical inaccessibility, poor health of working adults within households, lack of assets for agricultural production (mainly land and oxen), low educational achievement, small size and quality of cultivable land. In addition, absences of the means by which the poor can address their problems and enhance their active participation in decision-making have hindered their attempts to move out of the state of deprivation (Chambers 1995).

The poor people are “active agents responding to their life conditions in ways calculated to ensure their survival and their esteem in their communities” (Dessalegn 1992:2). However, many of the above-mentioned studies reduce the poor to passive statistics (Dercon 1999). Similarly, they mainly depend on quantitative approaches and analyze causal factors of rural poverty in predetermined variables that may not essentially reflect the situation at local-level. Poverty analysis, however, should be contextual and location-specific (Devereux and Sharp 2003) to derive the causes of poverty.

In this study household survey was conducted after wellbeing ranking exercise across social groups in the study area to examine factors that result in poverty and that affect adoption of crops technology package at a rural household level. While the study employs statistical computation of the casual factors of poverty, an effort was made to identify the variables using wealth rankings what the preceding evidences have given limited attention.

2.5. Agricultural Technology Adoption Studies in Ethiopia

2.5.1. What is Adoption?

There are different definitions for adoption as used by researchers in different discipline. However, the definition given by Rogers (1983) is broadly used in various agricultural technology adoption studies. According to him, adoption is “the process by which a technology is communicated through certain channels over time among members of a social system” (Rogers 1983 as quoted by Hailu 2008:48). Adoption is also the use of an agricultural innovation by farm households in a particular time. The current study conceived adoption as a dichotomous variable as farmers use or not use of extension inputs.

Diffusion, according to Rogers and Shoemakers (1971), refers to a process by which new ideas are communicated among the members’ of a social system. In other words, it is the dissemination of agricultural technologies from research centers to smallholder agriculture by different agents (Stier 1974). Rogers (1983) identified major elements in the diffusion of a technology (an innovation). These include: (a) the technology which is any idea, object or practice that is perceived as new by members of a social system, (b) communication channel which is the means by which information about a new technology is get from agricultural centers to potential adopters, (c) the time period over which a social system adopts a technology, (d) a social system which is a system of

interrelated units that are organized in solving problems to accomplish a common goal (Rogers 1995).

2.5.2. Factors Influencing Agricultural Technology Adoption in Ethiopia

Currently, the Government of Ethiopia is attempting to generate and disseminate improved agricultural technologies to smallholders (Hailu 2008). However, a wide range of economic, social, agro-ecological, and institutional factors (Feder et al. 1985) affect adoption of new agricultural technologies in Ethiopia. Several studies have employed the following two major models to explain factors that hamper or facilitate agricultural technology adoption in a given community. In what follows, an attempt is made to review the contribution of both innovation-diffusion and economic constraint models to agricultural technology adoption.

Innovation-diffusion Model

According to this model, access to information is a decisive factor in the diffusion and adoption of technologies (Rogers 1995). Adoption is influenced by the farmers' characteristics such as age, gender, education levels, training, health etc. It also assumes that farmers' perception of the attributes of a given technology affects its adoption rate. The model emphasizes extension as a means of increasing the adoption of new technologies (Langyintuo and Mulugeta 2005). Accordingly, the problem of adoption is reduced to communicating information on the technology to the potential users.

In many adoption studies (Kebede et al. 1990; Asfaw et al. 1997; Endrias 2003) focusing on various parts of Ethiopia level of formal education of farm household head had positive effect on the adoption of new technologies in Ethiopian agriculture. In contrast, a study by Chilot (1994) shows that literacy experience is found to be non significant in adoption. These conflicting findings justify the need for conceptualizing variables in particular social milieu.

Economic Constraint Model

This model assumes that economic constraints determine technology adoption decisions by farmers. Using this model many studies identified resource endowments such as human and physical asset, access to credit, farm size, supply of complementary inputs, uncertainty, risk preference, extension agent's contact, availability of fertilizer etc, as factors that affect adoption decision of farmers (Degnet and Belay 2001; Wolday 1999; Tesfaye et al. 2001; Berhanu 2002).

income poverty, powerlessness, physical weakness, isolation and vulnerability, which together form deprivation trap that lock people into poverty which is pervasive at household level.

Income poverty sees poverty as being “an inability to maintain the minimum standard of living in terms of consumption” (Chambers 1983 cited in World Bank 2000:32).

Chambers (1983 & 1995) stated that physical weakness comprises ill health, disability or under nutrition. All of these can have the effect of reducing the capacity of individuals to work and earn an income. They can also create permanent dependence on other family members having to look after sick relatives and preventing them from finding work.

According to Chambers (1983) isolation involves physical and social exclusions. Many people who live in geographically remote areas in many rural settings of Ethiopia (Dercon 1999; Ellis and Tassew 2005) have less access to economic infrastructure. The availability of basic infrastructure such as road, the accessibility of input and output markets and transportation services at *Kebele*⁴ and/or *Woreda* level are known to influence the adoption of improved technology in the study area.

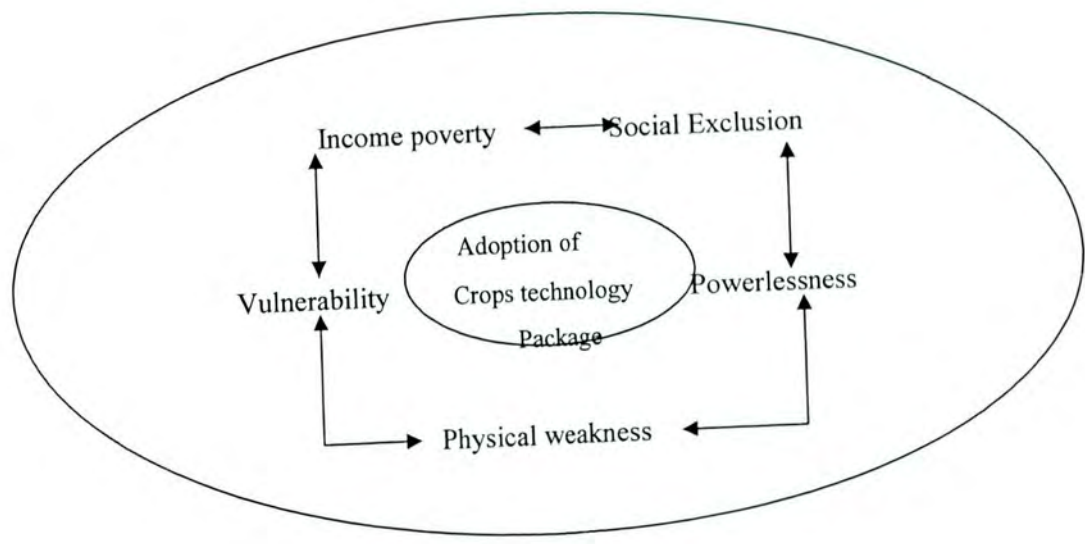


Figure 1: Theoretical Framework of the Study

Source: Adapted from Robert Chambers (1983)

⁴ *Kebele* is s the lowest administrative unit in a settled rural area with its own jurisdiction (MoFED 2002).

Isolation can also have a social dimension (Chambers 1995) in the sense that individuals can be excluded from accessing extension services. That is, lack of access to training services in agricultural practices, for instance, constrain farmers from obtaining new knowledge and skills on improved agricultural inputs. In addition, access to social infrastructure (Ellis and Tassew 2005) such as educational input for agricultural development is as essential element to diffuse the new agricultural technologies. It also involves access to productive asset base of the poor such as land, ownership of livestock, access to techniques and to farm tools. Membership of farmers in farmers' cooperatives in their locality enhances them to make cooperative efforts and collective actions that can facilitate their access to agricultural credit and extension services. Also people can be excluded from social institutions, such as village-insurance schemes (Abeje 2008) from participating in funeral societies ("*Idirs*"), traditional group based credit and savings schemes ("*Iqubs*") and other traditional community-based organizations (Ellis and Tassew 2005).

Poverty also incorporates the concept of vulnerability in the sense that people are not just having low income but are vulnerable to loss of income, loss of economic assets and lack of good health (Quisumbing and Hoddinot 2003a and 2003b cited in Meinzen-Dick et al. 2003). It also represents exposure to external shocks, stress and risk and lack of means to cope floods, drought, crop failure, deaths and/or illness. Vulnerability of people to illness makes them unable to adopt labor intensive technology (Meinzen-Dick et al. 2003).

Chambers (1983) viewed powerlessness in terms of the constraint of existing social, economic or political structures on individuals' or groups' lives. The rural poor people can be dependent on more powerful groups to allow them access to goods and services. Power relations "play out between farmers and outsiders within community, and even within households" (Meinzen-Dick et al. 2003:29). In technology dissemination extension agents may have considerable power over smallholders thereby restricting them from access to improved technologies (Meinzen-Dick et al. 2003). As noted by Shaffer, (2001), Chambers (1997) view powerlessness in terms of lack of information, education, skills, livelihoods assets discrimination and isolation of a certain group's lack of protection and mind disempowering. The possession of household assets and adoption of agricultural technology can be associated to one another.

These dimensions of poverty can impact on one another to intensify the experience of poverty and make it even more difficult for people to overcome those problems (Chambers 1983).

2.7. Summary

The review of literatures in this chapter focuses on less emphasized areas of the topic in the previous researches. The chapter has presented major approaches of poverty namely income/consumption, basic human needs, human poverty and participatory approaches (Shaffer 2001). Studies on rural poverty in Ethiopia are discussed. The inadequate treatment of local-level socio-economic and physical situations in the study of factors affecting adoption of agricultural technologies in many economic literatures was reviewed. Robert Chambers' theory of deprivation which is found to be important to the current study is also discussed. Five composite dimensions of poverty such as income loss, social exclusion/isolation from social and economic infrastructures, vulnerability to crop failure and natural calamities, physical weakness and powerlessness are discussed as they hypothesized to influence adoption of extension inputs are described.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter introduces the research methods which have been applied to collect primary and secondary information. Survey, sampling design, methods of data collection and analysis, methodological triangulation, conceptual and operational definitions of important terms and variables (independent and dependent variables) will be presented.

3.2. Survey

3.2.1. Survey Design

The study is a cross sectional one. It can be thought of as providing a snapshot of demographic and socio-economic characteristics of farmers and their current adoption status in the study area. It also allows exploring the relationship between the social, economic and agro-ecological factors and adoption of improved seeds and chemical fertilizers in *Tarmaber Woreda* within time allotted for this study. However, it was found impossible to study the entire population of interest over time to know their intensity of adoption of chemical fertilizers and improved seeds in the study area.

3.3. Sampling Design

3.3.1. Sampled Households

The target population in this study comprises of all farmers in *Tarmaber Woreda*. To get representative sample households from the population, this study defines the survey population at two levels, namely at the rural *Kebele* level and at the farm household level. In order to take into account diverse agro-ecological zones in identifying factors affecting adoption of improved seeds and chemical fertilizers, three traditional agro-climatic zones namely *Kola* (hot zone), *Woyina dega* (warm zone) and *Dega* (cold zone) were considered in selecting sample rural *Kebeles*. There are 6, 8 and 5 rural *Kebeles* in *Kola* (hot zone), *Woyina dega* (warm zone) and *Dega* (cold zone) of the study area respectively. Out of these *Kebeles*, *Koso-ber from Dega* (cold zone), *Yitam-na-kosta from Woyina dega* (warm zone) and *Yizaba-na-woyin from Kola* (hot zone) were purposefully selected as they are remote from urban centers.

Well-being rankings were conducted in these sampled *Kebeles*. Farm households were stratified into such wealth ranks as poor, medium and better-off. After well-being rankings were completed farm households were randomly selected from such wealth ranks as poor, medium and better-off. This allowed the researcher to see adoption status of improved seeds and chemical fertilizers across social groups. It was found significant to have a separate analysis for poor, medium and better-off households. In addition, using stratified sampling design; households were categorized in to female-headed and male-headed households. This helps to examine poverty experiences of different categories of households.

As per information obtained from *Tarmaber Woreda* Agricultural and Rural Development Office, there are 366, 450 and 1304 households in *Koso-ber*, *Yitam-na-kosta* and *Yizaba-na-woyin Kebeles* respectively. Taking time constraints and resource into consideration, 6 percent of the farm households were selected for the current study. Accordingly, a total of 125 households were randomly selected from various stratified groups from *Koso-ber* (26), *Yitam-na-kosta* (21) and *Yizaba-na-woyin* (78) *Kebeles* using Probability Proportion to Size (see Table 1).

Table 1: Frequency and Percentage Distribution of Sample Farm Households by Type and Their Wealth Ranks across *Kebeles*

<i>Kebele</i>	Household Type						Total
	Male-headed			Female-headed			
	Poor	Medium	Better-off	Poor	Medium	Better-off	
<i>Koso-ber</i>	7	9	1	3	1	0	21
<i>Yitam-na-kosta</i>	7	10	3	4	2	0	26
<i>Yizaba-na-woyin</i>	20	31	4	12	11	0	78
Total	34	50	8	19	14	0	125

Source: Wealth Ranking Exercises (2002 E.C)

Note: The result of the wealth ranking exercises for all farm households in three sampled *Kebeles* is found in Table 5 of Chapter Three.

3.4. Methods of Data Collection

In order to understand what poverty means in the study area and to explore the various factors affecting adoption of improved seeds and chemical fertilizers a mix of both quantitative and qualitative research methods (Dick et al. 2004) were used. This approach allowed to investigating the socio-economic correlates of adoption of improved seeds and chemical fertilizers at household level in the study area. It is also helpful to triangulate and cross-check the data so that accuracy and analytical power (Adato et al. 2003; Yerasework 2000) can be enhanced. With this in mind, a set of quantitative and qualitative research methods were employed in this study to address the issues as stated in the aforementioned objectives.

3.4.1. Primary Data Collection

Well-being Ranking

Participatory rural appraisal techniques, specifically well-being rankings, were undertaken to identify indicators of poverty in the study area and to categorize sampled households into different socio-economic strata. It provides a rough indicator of relative wealth categories in the study area. A community group of key informants (from both male and female who know the area very well) were asked to propose lists of criteria defining different levels of well-being in the community. Individuals (both male and female) from each *Kebele* were also participated to carry out the exercise separately in group discussion.

There are 11, 8 and 16 *gotts*⁵ found in *Yitam-na-kosta*, *Koso-ber* and *Yizaba-na-woyin Kebeles* respectively (see Appendix III). In order to categorize farm households into poor, medium and better-off, a key informant from each *gott* was selected with the support of extension workers to assign households into these wealth categories. Then, list of sample households falling into poor, medium, and better-off wealth categories were asked using household survey method.

Focus Group Discussions/Interviews

Focus group discussions were conducted with group of farmers in each selected rural *Kebele* in the study area to share their thoughts, feelings, attitudes and ideas on poverty and factors affecting use and non-use of extension inputs. A total of three focus group discussions were carried out in the study area. The first focus group discussion was held in *Koso-ber* consisting of

⁵ A group of households range from 30-40 for political administration purpose in the study area.

four male and two female household heads. The second was conducted in *Yitam-na-Kosta* where 6 male household heads were participated. Since female household heads were not willing and were not found free to discuss issues with males, a separate group discussion was held with 3 females. The third discussion was held in *Yizaba-na-woyin* with a group of farmers comprised of 4 male and 2 female household heads. In all focus group discussions both male and female household heads were selected from wealth categories of poor, medium, and better-off in each *Kebele*. In addition, informal discussions were held with *Woreda* and sampled *Kebeles* officials at different times.

This instrument was found important for getting rich data in participants' own perception about the causes of poverty and constraints of the adoption of extension inputs. Farmers were able to build on one another's responses and come up with ideas they might not have thought of in a one to one interview.

Household Survey

In this study, household survey in selected *Kebeles* was conducted after well-being rankings⁶ and focus group discussions. It allowed to identifying the profile of the rural households and their asset endowment position in the study area. The primary data on basic household information and assets of each household were collected from the sample households using semi-structured questionnaire. A semi-structured questionnaire containing both open-ended and closed-ended questions was designed to elicit information relevant to the issues under investigation. This survey instrument helped to explore variables which correlate with adoption decision of farmers at household level. The questionnaire was administered face-to-face to heads of the households by the researcher and enumerators, who are grade 12 students of Debr Sina preparatory school, trained for this purpose.

Depth Interviews /Key Informant Interviewing

Information on the cultural norms specific to the study area that affects the adoption of improved seeds and chemical fertilizers was gathered from extension agents who assumed to participate in the daily lives of local community.

⁶ Well-being rankings and wealth rankings are used interchangeably in this study.

To get information about the issue under consideration, structured interview was held with officials at *Woreda* and *Kebele* level in the study area. The reason why this interview type is selected is that it is more inexpensive. It is believed also that depth interview with individuals who have specialized knowledge about some aspects of agricultural technology and poverty in the study area is relevant. The interview technique was useful as it allowed for more in-depth assessment of the dissemination strategies of seeds and chemical fertilizers at household level.

3.4.2. Secondary Data Collection

To supplement the primary data that obtained from household survey secondary sources of data were reviewed. Secondary sources of data include published and unpublished information from *Tarmaber Woreda* Agricultural and Rural Development and Finance and Economic Development offices about the issue under consideration. Also the list of households for each sample *Kebele* was obtained from the respective health extension center. Books, Master theses and PhD dissertations on the topic under investigation were obtained from Addis Ababa University, particularly sociology department library. Periodicals, seminar papers, conference proceedings were accessed through internet sources.

3.5. Data Analysis Methods

In this study, a statistical analysis of the results of household survey for descriptive statistical conclusions was undertaken. In order to measure statistical significance of continuous and discrete variables (and independent and dependent variables) with respect to adoption of improved seeds and chemical fertilizers in different strata of the sample households, descriptive statistics such as percentages, frequencies, mean and standard deviations, T-test, Chi-square, ANOVA and multiple correlations were utilized with the help of Statistical Package for Social Sciences (SPSS) version 13. They were used to examine the relationship between independent variables and farmers' adoption decision, which is dependent variable.

Descriptive statistical analysis was found to be important for comparative analysis between adopters and non adopters of different strata of the sample households in this study.

3.6. Methodological Triangulation

Methodological triangulation is a technique in which several research methodologies can be combined to facilitate validation of data through cross checking more than two sources.

Table 2: Primary Data Collection through Methodological Triangulation

<i>Unit of Analysis</i>	<i>Observation Unit/Data source</i>	<i>Methods of Data collection and Analysis</i>
<i>Kebeles</i>	(a) 35 key informants from a total of 35 <i>gotts</i> of sampled <i>Kebeles</i> (Knowledgeable farmers)	(a) Well-being ranking (b) Focus group discussion/ interview
Farm Households	(a) Sample household heads	(a) Household Survey
Crops Extension Package	(a) <i>Woreda</i> officials (b) Sampled <i>Kebeles</i> extension workers	(a) Structured interview (b) Depth interview

3.7. Conceptualization and Operationalization of Variables

In this section, conceptual and operational definitions of both independent and dependent variables are presented. The identification of independent (explanatory) variables that are hypothesized to influence the farmers' decision to adopt improved seeds and chemical fertilizers has been selected based on wealth ranking exercises of the current study.

3.7.1. Conceptualization of Important Terms

Adopters: Farmers who were found to be users of the recommended amount of chemical fertilizers and seeds during the time of this study.

Non adopters: Farmers who were found to be non-users of the recommended amount of chemical fertilizers and seeds during the time of this study.

Household: A group of individuals who live together in the same dwelling unit whether related or not.

Household Size: Total number of household members who are living in given household.

Availability of Labour Power: Access to local-level labour arrangement (i.e. *däbo* and *wānfäl*).

Education: Formal years of school attended by household head.

Training: Farmers participation in formal agricultural training.

Size of Land holding: The size of the land that a given household possess as measured by hectare.

Farmer Cooperatives: Organizations that are intended to distribute improved technologies or provide information about any other agricultural input and output at rural *Kebele* level.

Livestock Holding: The number of oxen owned by a farm household.

Credit: Availability of financial sources and possibility of getting credit by farmers.

Agro-ecology: The climatic condition of the study area where the sampled farm households live.

Availability of Improved Seeds: The availability of technologically improved seeds in a given area and accessibility by farmers through affordable prices to increase productivity.

3.7.2. Operationalization of Key Variables

This section describes how the independent and dependent variables are defined. The variables were obtained after wealth ranking exercises.

Table 3: Conceptualization and Operationalization of Important Variables

Concepts	Variables	Indicators
Household Characteristics	Age of household head(Interval- Ratio ⁷ scale)	The number of years that a household head live starting from his birth
	Sex of household head (Nominal scale)	Whether the household head is male or female(1=Male, 2=Female)
	Total household size (Interval-ratio scale)	Total number of household members living in the household
	Level of household head education (Ordinal scale)	The grade level that the farmer has achieved(1=Unable to read and write, 2=Read and write, 3=Elementary 1 st cycle(1-4), 4=Elementary 2 nd cycle(5-8) 4=High school (9-12), 5=Above grade12)
	Training Participation(Nominal scale)	Whether the household head participate in any agricultural service trainings(1=Yes, 2=No)

⁷ In SPSS language, variables at interval-ratio are referred to scale.

Concept	Variables	Indicators
Household Assets	Farm size (Interval- Ratio scale)	Total household land size in hectares
	Livestock possession(Interval Ratio scale)	The total number of farm oxen that a household possesses
	Membership of farmers cooperatives(Nominal scale)	Whether the household head is the member- of farmers cooperatives(1=Yes, 2=No)
	Membership of development committee(Nominal scale)	Whether the household head is the member of development committee(1=Yes, 2=No)
	Visiting Successful framers' field (Nominal scale)	Whether the household head visited fields of other farmers who have used improved seeds and/or chemical fertilizers (1=Yes, 2=No)
	Perception of market distance (Nominal scale)	The perception of the distance of nearby market from one's own home(1=Near, 2=Far, 3=Very far, 4=Never perceive the distance)
	Mass media exposure(Nominal scale)	Whether the farm household has radio attend programs on agricultural(1=Yes, 2=No)
Extension Inputs	Extension service(Ordinal scale)	Number of farmers contact with extension agent within a year (1=Never, 2=Sometimes, 3=Frequently)
	Input availability(Nominal scale)	<ul style="list-style-type: none"> • Whether improved seeds are available in nearby area(1=Yes, 2=No) • Whether chemical fertilizers are availability in nearby area (1=Yes, 2=No)
	Chemical Fertilizers (Interval- Ratio scale)	The amount of fertilizer household used during 2001/02 E.C <i>meher</i> season (in kilogram)
	Improved Seeds(Interval- Ratio scale)	The amount of improved seeds household used during 2001/02 E.C <i>meher</i> season(in kilogram)

Concept	Variables	Indicators
	Farming Experience (Interval-Ratio scale)	Farming experience of household heads of seeds and chemical fertilizers in years
	Access to credit (Nominal scale)	Whether the farm household has access to credit(1=Yes, 2=No)
	Sources of credit (Nominal scale)	Households access to any one of the following sources of credit (1=cooperatives, 2=NGOs, 3=Private money lenders/ 'Arata-abadari', 4=Relatives, 5=Saving and credit association, 6=other)
Poverty	Subjective (Ordinal scale)	Own rating of one's own poverty/wealth status

3.8. Summary

The purpose of this chapter has been to describe the research methods used in the present study. The study is a cross-sectional by which data was collected at one point during 2009 from 125 sample households. Survey designs, sampling design and such research methods by which primary data were collected as well-being rankings, focus group discussions, household survey and depth interviews are discussed in this chapter. Secondary sources of data to supplement data from primary one are also described. Statistical methods of data analysis such as T-test, ANOVA and multiple correlations were also presented. In order to checking results triangulation of more than two methods were used in a study. The definition of concepts and variables applicable to this study are also discussed.

CHAPTER FOUR

DESCRIPTION OF THE STUDY AREA

4.1. Introduction

This chapter provides the general information regarding *Tarmaber* district. It describes the physical settings, the distribution and characteristics of the population, asset holdings and farming systems. The data presented in this chapter were collected from *Tarmaber Woreda* Agricultural and Rural Development Office, Finance and Economic Development Office and Health Office, and agricultural bureaus of the sample *Kebeles*. They were also obtained from discussions with officials in the *Woreda*.

4.2. Physical Features

4.2.1. Location

Amhara National Regional State (ANRS) is one of the nine regions of Federal Democratic Republic of Ethiopia. It lies between 8°45' and 13°45' North latitude and 35°46' and 40°25' East longitude (Tesfaye et al. 2001). The region is divided into 11 administrative zones, 113 *Woredas* (districts) and 3,015 *Kebeles*. It accounts for 11 % (170, 150 km²) of the total area of the country (Tesfaye et al. 2001).

North Shoa is one of the 11 administrative zones in the region that lies between 8°38'-10°42' North latitude and 38°40'-40°03' East longitude (Abeje 2007). Based on figures from the Central Statistical Agency in 2005, this zone has an estimated total population of 2,159,301, of which 1,080,266 were males and 1,079,035 were females; 255,275 or 11.8% of its population are urban dwellers. With an estimated area of 16,070.23 square kilometers, North Shoa has an estimated population density of 134.37 people per square kilometer. *Tarmaber Woreda*, from which data for this study is collected, is one of the 24 *Woredas* of North Shoa administrative zone.

Tarmaber Woreda is located in eastern edge of the Ethiopian highlands. The district boundaries are *Menze Lalomama* district in the north, *Ankober* district in the south, *Kewet* district and Afar Regional State in the east, *Morete-na-jeru* and *Baso-na-worena* districts in the west (see the Map on figure 1).

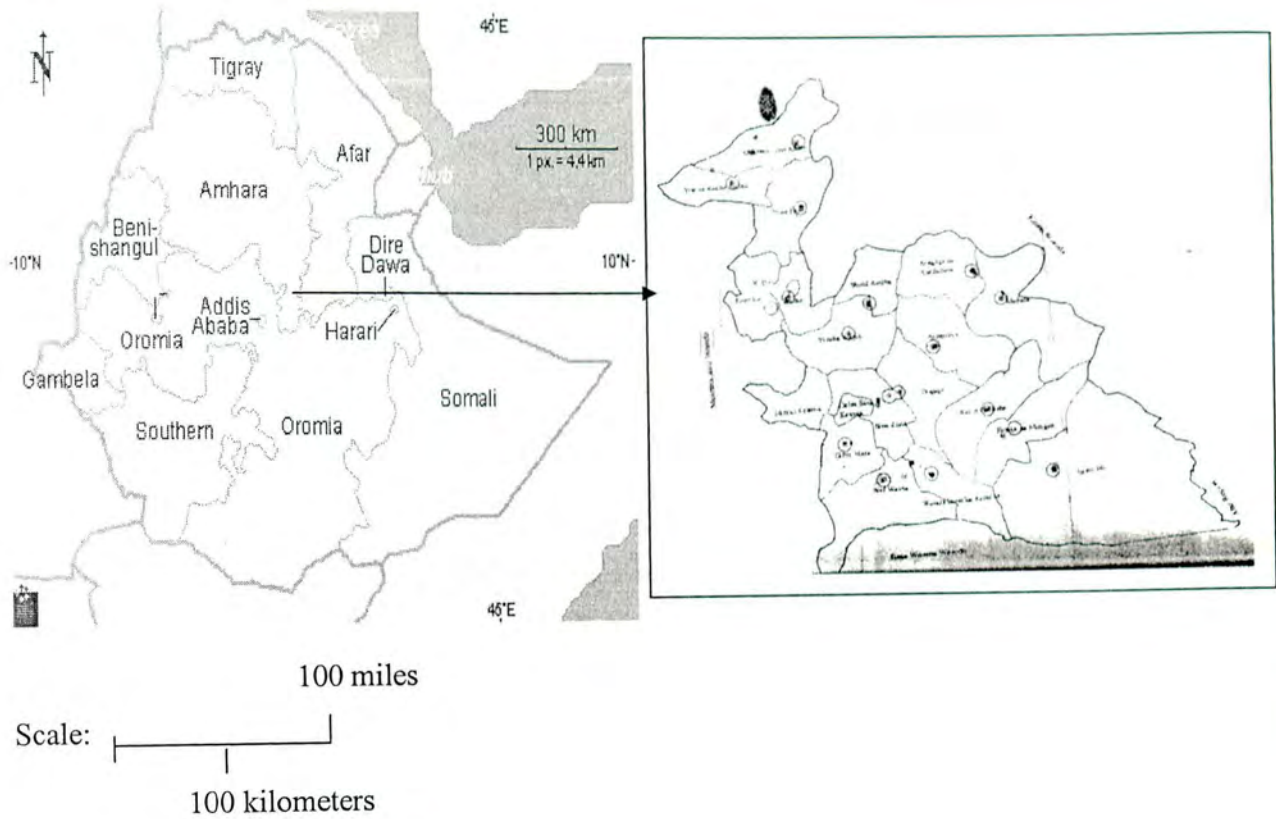


Figure 1: Map of the Study Area

Source: <http://flagspot.net/flags/et%28.html>. Retrieved on July 14, 2010

4.2.2. Relief

The topography and terrain of the district consists of plateau (3.5%), hills (45%), valleys (15%) and uneven landscape (36.5%). One of the highest mountain peaks of North Shoa called *Mt. Kundi* (3730m) is found in this district which divides the Abay (Blue Nile) and the Awash basins in the country. The district comprises altitude ranging between 1500 and 350 masl⁸. About 4 % of the district area is below 1500 masl, 56 % is between 1500 and 2500 masl, and 40 % is between 2500 and 3500 masl (*Tarmaber Woreda Finance and Economic Development Office 2009*). The topography of the area is steep and dissected by ravines and gorges through which rivers and streams tumble down the eastern escarpment of the Great Rift Valley.

⁸ Meters Above Sea Level

4.2.3. Climate

The district is classified in two three major traditional agro-climatic zones, namely, *dega* (cold), *woyina dega* (warm) and *kola* (hot) which cover 54.5%, 28% and 17.75% of the area respectively (*Tarmaber Woreda Finance and Economic Development Office 2009*).

The mean annual rainfall ranges from 1100 mm to 1400 mm⁹. Much of the rainfall occurs in the months of June, July, August and September (locally known as '*kiremt*' season). The driest months are November, December, January and February (locally known as *bega* season). The mean annual temperature for the district is estimated to be 15-24°C¹⁰.

4.3. Population Distribution and Characteristics

As Table 4 below reports, the district has an estimated total population of 89,256, consisting of 45,209 (50.7%) men and 44,047(49.3%) women. It comprised 0.5 % of the region's population. The total population of men is more than women. About 87.15 % (77,781) of the population are estimated to be rural inhabitants, while 12.85 % (11,475) are urban. With an estimated area of 639.2 square kilometers, the district has an estimated density of 140 people per square kilometer.

Table 4: Frequency and Percentage Population Distribution by Sex across Urban and Rural areas of the *Woreda* during 2001 E.C

	Rural	Urban	Total
Male	39,797(51.2)	5413(47.2)	45,209(50.7)
Female	37,984 (48.8)	6062(52.8)	44,047(49.3)
Total	77781(87.15)	11,475(12.85)	89,256(100)

Source: *Tarmaber Woreda Finance and Economic Development Office (2009)*

Note: Percentage in the parentheses.

Based on Finance and Economic Development Office of the *Woreda* (2009), there are 17,060 male and 4859 female headed households with an average household size of 5 persons in the *Woreda*. As concerns age structure, population less than 14 years age accounts for 41.9 % (37,406) and between 15-59 ages is 51.6 % (46,018) of the district in the last year. Only 6.5 %

⁹ Millimeters

¹⁰ Degree Centigrade

are more than 59 age. This shows that the working age population is large compared with the very young and old age people. The majority of the people of the district are from the Amhara ethnic group and the dominant religion is Ethiopian Orthodox Christian.

4.4. Asset Holdings

4.4.1. Land Resources

Tarmaber district is comprised of 23 *Kebeles* with 19 rural and 4 urban and with a capital of *Debre-sina* town. The total land area of the district is estimated to be 639.2 square kilometers, which makes 0.3 percent of the Amhara region's area and 3.6 percent of North Shoa zone. Out of the total area, 15315.32 hectare of land is under cultivation, 13933.51 hectare is available for grazing, 19916.12 hectare is covered by forests and vegetables and the rest 4229.58 hectare is used for other purposes (*Tarmaber Woreda* Finance and Economic Development Office 2009).

Government officials from Agricultural and Rural Development office noted that many rural households have insufficient land to meet their food needs. This is due to the rapid population growth rate which has led to severe land shortages and rapid natural resource degradation. According to informal discussion with officials also revealed that land degradation has been an ongoing problem in the area due to removal of natural vegetation for cropping, grazing, and fuel wood and construction materials.

4.4.2. Livestock Resources

Livestock ownership in many rural communities is considered as indicator and determinant of poverty in Ethiopia (Dercon 1999). In all rural communities, "livestock are the single most important store of wealth in the country" (Dercon 1999:32).

As per the *Woreda's* Agricultural and Rural Development Office annual report, during 2001 E.C there are 56,914 cattle, 42,243 sheep, 42,474 goats, 9620 huffed animals, 42693 hen and 2195 swarm of beehives. One of the veterinary experts of the district stated that inadequate rains over successive rainy seasons have resulted in deterioration of livestock, particularly in *Yitam-nakosta Kebele*.

4.4.3. Natural Resources

One of the best-preserved areas of natural forest called "*Wof-washa*" in North Shoa Zone is found in this *Woreda*. Informal interview with development agents revealed that farmers leave

their sheep and cattle unattended when they are very busy with their cultivated crops. He continued to say that population pressure is forcing farmers constantly to expand their cropped area and they have started to clear fields for cultivation of crops, mainly for barley. It resulted in soil erosion.

In the North West highland areas of the *Woreda* such as *Mezezo and Tifitif Dingay* there is a den of exotic trees, particularly *Eucalyptus* which is an important source of revenue for the *Woreda*. The district is the home for opal field lies around 12 miles north of *Mezezo* and extends for several square kilometers along the northern side of the *Yitam-na-kosta* ridge. The district also known for differ species of birds such as *Serinus ankoberensis* ("Sorena"), *Gypaetus barbatus*, *Buteo oreophilus*, *Falco peregrinus*, *Accipiter rufiventris*, *Tachymarptis Melba* and *Monticola solitaries* (*Tarmaber Woreda Agriculture and Rural Development Office 2009*).

4.4.4. Distribution of Social and Economic Services

Access to social services influences the livelihood of people in a given society. The household labour for production depends on the health status of members. Although there are improvements in urban centers of the district, officials stated that people in rural areas have limited access to different forms of social and economic infrastructure. There are many works remain to be done in the *Woreda*.

As per Health Office of *Tarmaber Woreda* (2009) annual report, the health care service of the district is characterized by limited access. There are only two health centers and 17 health posts for nearly 89,256 people. This may be manifested by unfavorable proportion of health centers to people ratio (1:44628) and health posts to people ratio (1:4575). The most pressing health problems evident during 2008/09 were diarrhea, rheumatism, fevers. Water-borne disease such as malaria was also reported by local health officials as found particularly in lowland rural *Kebeles* of the *Woreda*.

Having access to education is considered an important of indicator of development since it has effect on the choice of economic opportunities and activities. This access is usually influenced by the availability of schools in a given society. There are 46 primary schools (1-8 grade) including first cycle (1-4), two secondary schools (10-12) and one preparatory school in the *Woreda*. Regarding to farmers training centers, as to recent data from Agricultural and Rural

Development Office (2009) of the district, large number of the farmers have not taken training on extension packages to provide farmers with inputs and special skills about agriculture.

The total road length and coverage in the district during 2008/09 is 111 kilo meter (km), of which 35 km is asphalt road, 30 km gravel road, 46 low graded road (*Tarmaber Woreda* Finance and Economic Development Office 2009). Based on data from visual inspection, especially the sample *Kebeles*, roads are still very limited and access to markets are lacking for many poor households. It is argued in informal discussion that rural road that connects *kebeles* to nearby main roads is needed.

4.5. Farming System

4.5.1. Cultivated Land and Crops Production

Eighty five percent of the people in the *Woreda* earn their living from subsistent farming where crop production and livestock raring constitute the main farm activities and the major sources of livelihood. They are an ox-plough community whose overall farming system is strongly oriented towards crop production. The principal cereal crops in the *Woreda* are teff, barley, wheat, maize, sorghum and beans. Pulses and oil crops are the other major categories of field crops. It can be seen from the Table 5 that there is reduction in amount of crop out per hectare in 2008/09 production year. This may partly be caused by the lack of cash to purchase seed for many farm households. This may be due either to lack of provision of improved seeds and improper use of extension inputs such as fertilizers which enhance land productivity. It may be also attributed to unpredictable weather condition and some other natural calamities which hindered farmers from investing on land.

Table 5: Productivity of Crops (in quintal per hectare) for Main Cropping Season (*Meher*) during 2000 and 2001 E.C

Crops	Yield per hectare (Qt/ha)	
	2007/08	2008/09
<i>Teff</i>	22.01	18.29
Wheat	23.11	19.54
Barely	24.4	19.35
Beans	16.11	16.23
Maize	24.01	21.44
Sorghum	22.12	23.05
Total Production	131.76	117.9

Source: *Tarmaber Woreda* Agricultural and Rural Development Office (2009)

Note: One quintal (qt) = 100 kilo gram

4.5.2. Supply and Distribution of Agricultural Inputs

The provision of accessible improved agricultural inputs is crucial to increase the outcome of the land. Data from *Tarmaber Woreda* Agricultural and Rural Development Office (2009) revealed that only 21 quintals of improved seeds were used by farmers in the last year (2009). Only 394 quintal of urea, 405 quintal of Dap and 22 sacks of gypsum (i.e. a white or colorless minerals consisting of hydrated calcium sulfate) were distributed for farmers. Moreover, farm households were supplied with set of farm hand tools such as flat hoe, shovel and sickle to enable them to use potentially accessible cultivable land. As informed from extension workers many farm households could not take these inputs because of input price constraints.

4.6. Summary

The chapter has attempted to provide a brief description of the study area. It is located in Amhara Regional State within North Shoa administrative zone. The 45 %, 36.5%, 15% and 3.5% of the area are hills, uneven landscape, valley and plateau, respectively. Such agro-climatic zones as *dega* (cold), *woyina dega* (warm) and *kola* (hot) constitute 54.5%, 28% and 17.75%. The mean

annual rainfall is between 1100mm and 1400mm. The total population of the *Woreda* is 89,256 in 2008/09, which is about 0.5% of the region's population. The total area of the district is 639.2 square kilometers. The livelihood source of large proportion of the population in the area is agriculture. Wheat, teff, barely, beans, maize and sorghum are the major crops grow in the district. Socio-economic infrastructures are lacking mainly for remote rural areas.

CHAPTER FIVE

RESULTS AND DISCUSSIONS

5.1. Introduction

The data for this study is based on well-being ranking exercises and a rural household survey conducted in *Tarmaber Woreda* focusing on the socio-economic correlates of adoption of extension inputs.

This chapter first discusses the result of the well-being ranking exercises which were conducted with key informants from “*gotes*” of three sampled *Kebeles*. They were asked to suggest criteria used in defining different levels of well-being in the community. It was important to capture people’s own perspectives and their definitions of poverty. Drawing in qualitative and quantitative data collected from these *Kebeles*, households were categorized into worse-off/poor, medium and better-off based on locally conceived indicators of poverty. The key informants from *Koso-ber* called the “worse-off/poor” households in local term as “*cheger tegna*” (those with problem). In *Yizaba-na-woyin* and *Yitam-na-kosta Kebeles* they have slightly different name which is “*mecheresha deha*” (completely poor). They have also categorized those who have nothing under “*minim yelelew menati deha*” or “*tsom adari*”. These are worse-off/poor households. Results of the focus group discussion particularly on the causes of poverty as conceived by farmers in the study area also presented.

The household survey was undertaken after the well-being ranking exercise was completed. The well-being ranking exercises helped the researcher to capture variations in terms of asset possession across farm households in the study area. It also helped to examine the socio-economic factors responsible for lack of adoption of extension in *Tarmaber* district. Thus, this chapter also presents the results of household survey focusing on the demographic and socio-economic characteristics and their association with adoption of crops¹¹ extension packages in the study area. In this study, those farmers who have used below the recommended level of inputs as well as those who did not use chemical fertilizers during 2001 E.C production season were

¹¹ For the purposes of this study, four major crops namely wheat, barley, *teff*, and beans were selected.

classified as non-adopters and those who have used the recommended¹² amounts of inputs were grouped under adopters' category.

5.2. Local Conceptions of Poverty: A Classification of Farm Households

5.2.1. Well-being Rankings of Farm Households

As has been noted earlier, group interviews were carried out with key informants who were asked to classify households in their locality. Wealth statuses that define poverty and well-being were more or less similar in the study area. Since there were more features in common than those which distinguish one *Kebele* from another, there was no significant difference in the indicators of wealth among farm households of sampled *Kebeles*. Therefore, farm households were classified into three well-being categories based on indicators common to all farm households in the study area (see Table 6).

Participants of well-being ranking exercises have used such indicators for well-being as land size, livestock holdings (mainly oxen for ploughing), the number of times that a family feeds its members per day, housing conditions (e.g. type of roof, other materials by which houses were constructed and number of huts), land renting and/or sharecropping arrangement, household labour force availability (hired-in or hired-out of labour by the household), loan status, membership of cooperatives and ability to send children to school.

¹² When we see the recommendation of seeds and fertilizers utilization in North Shoa in general and in the study area in particular, it is 125-150 kg wheat with 150 kg DAP and 100 kg urea per hectare, 25-30 kg *teff* with 100 kg DAP and 50 kg urea per hectare, 125 kg barely with 100 kg DAP and 50 kg urea per hectare and 175 kg beans with 100 kg DAP per hectare.

Table 6: Frequency and Percentage Distribution of Farm Households by Type of Households and Their Wealth Rankings across *Kebeles*

<i>Kebele</i>	Household Type						Total†
	Male-headed			Female-headed			
	Poor	Medium	Better-off	Poor	Medium	Better-off	
<i>Koso-ber</i>	106(28.7)	169(46.1)	22(6)	50(13.7)	17(4.6)	2(0.5)	366
<i>Yitam-na-kosta</i>	117(26)	190 (42.2)	51(11.3)	62(13.7)	27(6)	3(0.6)	450
<i>Yizaba-na-woyin</i>	342(26.2)	517(39.6)	61(4.6)	193(14.8)	187(14.3)	4(0.3)	1304
Total	565(26.6)	876(41.3)	134(6.3)	315(14.8)	231(10.9)	9(0.4)	2120

Source: Well-being Ranking Exercises (2002 E.C)

Notes: Percentage in the parentheses. There may be slight discrepancy in the total percentage of each wealth category due to rounding.

†The total household number of the study area was obtained from health extension office of each sample *Kebele*.

The result of the above Table shows the distribution of households across worse-off/poor, medium and better-off/rich. Regarding the distribution of households across these wealth categories, male-headed households were found in medium wealth rank in each *Kebele* (see the characteristics of medium wealth rank on 5.2.1.2 below). However, female-headed households were in worse-off/poor. This shows the deterioration of rural women life in the study area.

As it was reported by group discussion with farmers female-headed households occurred mainly due to husband death. It could be attributed to dissolution of families because of disagreement on utilization of household assets mainly land.

5.2.1.1. Worse-off/Poor Households

These are households with no animals, mainly ox for farming activities. They own land ranging from 0.25 to 0.375 hectare. Lack of farming oxen made them to serve better-off farm households with their labour to get oxen in return. Having no oxen to plough the land at the time of rainy season created a problem in the production of crops of the season.

These are also households with small huts (“*dasasa gojjo*”) which are constructed using locally available materials such as grass, stone, and sludge.

Female headed households of this category are mainly unable to send their children to school. Focus group informants noted that “*When we cannot find food to feed them twice a day, schooling is not possible to think about.*” They could not provide them with food and thus were forced to give them to better-off farm households where they have been exchanging their labour for food. The children are exploited in the sense that they are keeping cattle from morning to night even without taking launch.

Since they produce small amount of crops for consumption, they also borrow money from saving-and-loan association to buy food for consumption. They do not left cash to purchase agricultural inputs. In most cases, these households rent their land to pay back the money that they have received from the association. As a result, the household heads mainly husbands often have to migrate to the neighboring *Kebele* for work. They hire-out of their labour to others in the community.

They eat two meals a day. As group informants in *Yitam-na-kosta* indicated farmers in this category eat food which is low in content-“*injera*¹³” with “*chew*” (*salt*)” and sometimes dry (“*derek*”) “*injera*”. They are not hard working members and often rent their land to others. Some of them are facing the problem of alcoholism. They are not producing crops using irrigation. According to participants of group discussions in the study area, these households tend to be elderly farmers with no children to support them, women who were divorced or widowed and newly formed families with no land. Such households constitute 41.5 % of the total number of households in the study area (see Table 6).

5.2.1.2. Medium Households

These are households with 1-2 oxen. They on average possess 0.5 hectare of land. In most cases, they plough their land using co-paring of oxen (“*mekenajo*”). Each farm household in this category own one house with corrugated iron and two booths (“*gojjo bet*”). They do not rent out their land and also they cultivate their own land. They do not have grazing land for their cattle. Many of them do not borrow money. They have partially accepted improved agricultural inputs

¹³ The thin round flat bread made from cereals on a large round flat clay pan.

in the sense that they use small amount of improve seeds and fertilizers below what is recommended. Such households constitute 52.2 % of the total number of households in the study area (see Table 6).

5.2.1.3. Better-off/Rich Households

These households have more than two hectare of land. They have access to land through rent or contract or “purchase” of small plot of land. They possess more than three oxen, cows, and about 15-20 goats and 15-30 sheep. They also own animals such as horse, mules and donkeys. Each farm household under this category usually own more than three corrugated iron houses and big huts. Their children are likely to go to school. Many of them engage in other income sources like trade, animal fattening etc. They usually manage meals three times a day. They lend money to others. Many of them also lend food to many rural poor during bad times. These households also sell crops on the market after feeding members. They harvest 2-3 pile of crops (“yahel kimerr”) on their field. They could hire labour. As some extension workers said rich farmers often invite guests to their homes. Such households constitute 6.7 % of the total number of households in the study area (see Table 6).

5.3. Demographic and Socio-Economic Characteristics of Respondents

In this part, sample respondents were interviewed on a number of demographic and socio-economic background variables. The results are described in the following sections.

5.3.1. Demographic Characteristics of Respondents

Sex of Respondents

As shown in Table 7, out of 125 respondents, male-headed households constitute 92(73.6%) while female-headed households are 33(26.4%). The numbers of male-headed households are larger than that of the female-headed households in the study area. As expected, men-headed households represent the majority of the households in the study area.

Table 7: Frequency and Percentage Distribution of Respondents by Sex across *Kebeles* (N=125)

Sex of household head	<i>Kebeles</i>			Total
	<i>Koso-ber</i>	<i>Yitam-na-kosta</i>	<i>Yizaba-na-woyin</i>	
Male	16(76.2)	20(76.9)	56(71.8)	92(73.6)
Female	5(23.8)	6(23.1)	22(28.2)	33(26.4)
Total	21(100.0)	26(100.0)	78(100.0)	125(100.0)

Note: Percentage in the parentheses.

Age of Respondents

Data on the age of the respondents is presented in Table 8. The mean age of the household heads in the study area was 44 years.

Table 8: Frequency and percentage Distribution of Respondents by Age (N=125)

Age	Frequency	Percent	Mean	Std. Deviation
≤24	6	4.8	44.10	11.459
25-34	15	12.0		
35-44	47	37.6		
45-54	35	28.0		
55-64	20	16.0		
≥65	2	1.6		
Total	125	100.0		

As shown in the above Table, it was found that 47(37.6 %) respondents are within the age group of 35-44 while only 4.8 percent(6) and 1.6 percent(2) are less than 24 and more than 65 years old, respectively. Most farmers between 35-44 years of age tend to be more active and physically fit to agricultural activities compared to old farmers.

Marital Status of Respondents

From Table 9, it can be seen that the majority of the respondents, 84.8 percent (106), are married, 6.4 percent (8) single, 8 percent (10) widowed and 0.8 percent (1) divorced.

Table 9: Frequency and Percentage Distribution of Respondents by Marital Status across *Kebeles*
(N=125)

Marital Status	<i>Kebele</i>			Total
	<i>Koso-ber</i>	<i>Yitam-na-kosta</i>	<i>Yizaba-na-woyin</i>	
Married	19(90.5)	21(80.8)	66(84.6)	106(84.8)
Single	1(4.8)	1(3.8)	6(7.7)	8(6.4)
Divorced	1(4.8)	0(0.0)	0(0.0)	1(0.8)
Widowed	0(0.0)	4(15.4)	6(7.7)	10(8.0)
Total	21(100.0)	26(100.0)	78(100.0)	125(100.0)

Note: Percentage in the parentheses.

Educational Status of Respondents

Table 10 shows that 28 percent (35) of the respondents are unable to read and write. While 22.4 percent (28), 23.2 percent (29), 18.4 percent (23), 7.2 percent (9) and 0.8 percent (1) are able to read and write, elementary 1st cycle (1-4), elementary 2nd cycle (5-8), high school (9-12) and above 12 grade respectively. More than half of the respondents (50.4 %) had never gone to school or did not have formal education. Table 10 also shows that the majority of worse-off/poor and medium respondents had lower level of education compared to better-off/rich respondents. This can affect their attitude towards the acceptance of improved technologies since education gives farmers the ability to perceive and react to it. It could be a crucial asset which could help people in acquiring knowledge on new agricultural technologies, attaining goals and exploiting available opportunities.

Table 10: Frequency and percentage Distribution of Respondents by Their Educational Status across Well-being Ranks

Educational Status	Wealth Categories			Total
	Worse-off	Medium	Better-off	
Unable to read and write	15 (28.3)	18(28.1)	2(25.0)	35(28.0)
Able to read and write	13(24.5)	14(21.9)	1(12.5)	28(22.4)
Elementary 1 st cycle(1-4)	9(17.0)	14(21.9)	0(0.0)	23(18.4)
Elementary 2 nd cycle(5-8)	14(26.4)	11(17.2)	4(50.0)	29(23.2)
High school (9-12)	1(1.9)	7(10.9)	1(12.5)	9(7.2)
Above grade 12	1(1.9)	0(0.0)	0(0.0)	1(0.8)
Total	53	64	8	125

Note: Percentage in the parentheses.

Household Size

The average household size of respondents was almost 7 individuals. About 56 percent (70) of the respondents have members ranging from 6 to 8 persons. This may be attributed to unrestrained population growth in the study area.

Table 11: Frequency and Percentage Distribution of Respondents by Household Size across Well-being Ranks

Household Size	Wealth Categories			Total
	Worse-off	Medium	Better-off	
<3	1(1.9)	2(3.1)	0(0.0)	3(2.4)
3-5	15(28.3)	18(28.1)	4(50.0)	37(29.6)
6-8	30(56.6)	36(56.3)	4(50.0)	70(56.0)
>8	7(13.2)	8(12.5)	0(0.0)	15(12.0)
Total	53	64	8	125

Note: Percentage in the parentheses. There may be slight discrepancy in the total percentage of each wealth category due to rounding.

As indicated in Table 11, the worse-off/poor and medium respondents have larger household size. Participants of the focus group discussions from *Yitam-na-kosta Kebele* noted that larger

household size is one of the causes of poverty in the study area. They have reported that it results in farm sub-division and fragmentation which created crisis on livelihoods of households. However, it would be difficult to draw conclusion that large household size caused households to be poor. Large household size can be a source of labour and leads to diversification of livelihood. This needs therefore further investigation but it is beyond the scope of this study.

5.3.2 Socio-Economic Characteristics of Respondents

Farm Land

Land is a crucial asset in rural Ethiopia. The average land size in the study area is 0.66 hectare. The minimum and the maximum amount of land respondents owned are 0.25 and 2 hectares, respectively. Table 12 shows that out of 125 sample households, 73(58.4%) possessed less than 0.5 hectare of land. In Dessalegn Rahmato's term it is "starvation plots" which can never guarantee even subsistence (Dessalegn 1994 cited in Devereux et al. 2003:17). The land holding is too small to provide the livelihood for rural households under the prevailing level of technology. This is attributed to many factors. The size of agricultural land holdings in rural Ethiopia declines overtime due to rural population growth (Dercon 1999; Ellis and Tassew 2005). Similarly, Abeje (2008), based on a research conducted in some other *Kebeles* of the district indicated that increased population growth and the 1996 land redistribution were major factors for fragmentation of landholding.

In addition to the above-mentioned factors, focus group informants from *Koso-ber* and *Yitam-nakosta* noted that when a new household is formed by two couples, their parents mainly from male side are expected to share (give) a plot of land from their already small land holding size.

Table 12: Frequency and Percentage Distribution of Respondents by Their Land Holding Size across Kebeles

Farm Size	Kebele			Total
	Koso-ber	Yitam-na-kosta	Yizaba-na-woyin	
<0.50	12(57.1)	11(42.3)	50(64.1)	73(58.4)
0.50-0.99	0(0.0)	6(23.1)	18(23.1)	24(19.2)
1.00-1.49	8(38.1)	7(26.9)	8(10.3)	23(18.4)
1.5-1.99	1(4.8)	2(7.7)	1(1.3)	4(3.2)
2+	0(0.0)	0(0.0)	1(1.3)	1(0.8)
Total	21	26	78	125

Note: Percentage in the parentheses.

Oxen Ownership

Like many other ox-plough farming communities in Ethiopia, oxen are a key to the farming activities of the study area. They are indicators of poverty status. Most households, 76 (60.8%), owned a pair of oxen, 38(30.4%) owned one ox and 6(4.8%) owned more than 3 oxen. There are only 5(4 %) households who did not own oxen. Out of 38(30.4%) households who owned one ox, 23(60.6 %) are from worse-off/poor households.

In terms of types of household there are 92 male-headed households who owned an average of oxen 1.75 with a standard deviation of 0.736. The 33 female-headed households owned an average of 1.52 with a standard deviation of 0.566. From this it is possible to see that the sample means are different for the two households and that, on average, male-headed households owned more oxen than female-headed households. However, the difference between the sample mean of 1.75 and 1.52 was not significant ($t= 1.664$, $df=123$, $p=0.099$).

5.4. Relationship between Farmers' Characteristics and Adoption of Extension Inputs

In this section, factors that were found to be influencing the adoption of improved seeds and chemical fertilizers in the study area are presented. Since improved seeds and chemical fertilizers adoption decisions are made at the household level, it is essential to understand factors that affect household decisions so that the information can be used to devise policies and programs at grass

root level. This study, therefore, tries to provide insights into the factors that affect low use of improved seeds and chemical fertilizers in the study area.

5.4.1. Land Cultivation and Households' Status of Extension Inputs Utilization

Land Cultivation

Here, an attempt was made to examine the land cultivated by adopters and non-adopters. As can be seen from Table 13 the land size cultivated during 2001/02 E.C *meher* season for adopters and non-adopters was found to be not statistically significant at 0.05 level ($t=1.065$, $df=123$, $p=0.289$).

Table 13: Land Cultivated (in hectare) for Major Crops per hectare during 2001/02 E.C *Meher* season

Farm Land (in hectare)	Adopters			Non-adopters			t statistics
	N	Mean	Std. Deviation	N	Mean	Std. Deviation	
Cultivated Land	46	0.6168	0.2743	79	0.5632	0.2691	1.065¥
Area of wheat	46	0.2364	0.1424	63	0.2671	0.1066	-1.286¥
Area of <i>teff</i>	38	0.2632	0.5320	55	0.3675	0.2605	-2.216†
Area of barley	24	0.2552	0.1402	45	0.2777	0.1528	-0.601¥
Area of beans	35	0.2132	0.1194	50	0.2725	0.1610	-1.847†
Area of maize	5	0.1250	0.000	4	0.2187	0.0625	-3.416†

Note: ¥ shows not significant at 5% level, † Indicates significance at 5% level

The area of land that adopters and non-adopter allocated for wheat production was 0.2364 and 0.2671 hectare, respectively. There was no a significant difference in their allocation of land for wheat ($t=-1.28$, $df=107$, $p=0.201$). It was also true for barely ($t=1.065$, -0.601 , $df=67$, $p=0.550$). The area of land that adopter and non-adopter allocated for *teff* production was 0.2632 and 0.3675 hectare respectively. There was a significant difference in their allocation of land for *teff* ($t=-2.216$, $df=91$, $p=0.029$). It was also true for beans ($df=83$, $p=0.068$, $df=7$, $p=0.011$).

Extension Input Utilization

The two most important extension inputs selected for this study are improved seeds and chemical fertilizers. When farmers were asked about the amount of chemical fertilizers and improved

seeds used during 2001/02 E.C *meher* season, most of them did give figures. Thus, the data are analyzed and presented in Table 14.

Table 14 shows the percentage of adopters and non adopters of improved seeds in 2001/02 E.C *meher* season and across sample *Kebeles*. It also presents percentage distribution of the respondents according to their experience of chemical fertilizers use and their current adoption status.

Table 14: Frequency and percentage Distribution of Respondents by Their Adoption Status of Seeds and Chemical Fertilizers in 2001/02 E.C *Meher*¹⁴ Season across *Kebeles*

Extension Inputs	Kebele			Total
	<i>Koso-ber</i>	<i>Yitam-na-kosta</i>	<i>Yizaba-na-woyin</i>	
Seeds				
Adopters	3(14.3)	9(34.6)	34(43.6)	46(36.8)
Non-adopters	18(85.7)	17(65.4)	44(56.4)	79(63.2)
Chemical Fertilizers				
Past Experience				
Adopter	13(61.9)	23(92.0)	64(82.1)	100(80.0)
Non-adopter	8(38.1)	3(11.5)	14(17.9)	25(20.0)
During 2001/02 <i>meher</i> season				
Adopter	3(14.3)	9(34.6)	34(43.6)	46(36.8)
Non-adopter	18(85.7)	17(65.4)	44(56.4)	79(63.2)
Total	21	26	78	125

Note: Percentage in the parentheses. There may be slight discrepancy in the total percentage due to rounding.

Seeds Adoption

Out of the total respondents only 46 (36.8%) respondents adopted seeds while 79(63.2%) did not adopt. When we see the adopter categories across *Kebeles*, the non-adopters are greater than adopters in each *Kebele* (see Table 14). Between groups comparison of percentage revealed that out of 53 worse-off/poor households, 37(69.8%) did not adopt seeds. There is no a single

¹⁴The starting month for *Meher* (Main) season varies from *Kebele to Kebele* in the study area. But, for major crops (wheat, *teff*, barley and beans) which are the interest of the current study it begins from June first to December 30.

household from better-off/rich who did not use seeds during the survey year. In addition, out of 33 female-headed respondents, 78.8 percent did not adopt seeds during 2001/02 E.C *meher* season in the study area. Whereas 53(57.6%) out of 92 male-headed households did not adopt seeds. This shows that worse-off/poor households and female farmers are not in a good position in their use of seeds. This may be attributed to differences in household asset possession in the study area.

Reasons for Non-Use of Seeds

The respondents were asked to give their reasons for non-use of seeds during the last *meher* season (2001/02 E.C). The survey result of the current study suggests that the majority of farmers (41.2%) in *Yitam-na-kosta Kebele* reported lack of income as their reason for non-use. The case, however, was different in *Koso-ber and Yizaba-na-woyin kebeles* where most farmers have reported unavailability of seeds in their *Kebeles* as a reason for non adoption (see Table 15). Some farmers believed that seeds performed poorly within local situation and are not good than locally preferred ones. The 5(29%) respondents from *Yitam-na-kosta Kebele* reported that they have never received advice from extension workers. They stated that "*Development agents are not often available in our Kebele.*" One of the extension workers (key informants) noted that this can be attributed to unequal proportion of worker to farmers (i.e. one extension worker for 450 households) even below what is recommended by the government (i.e. 3 extension workers in each rural *Kebele* of Ethiopia) in this *Kebele*.

Table 15: Frequency and Percentage Distribution of Respondents according to Their Reasons for Non-Use of Seeds during 2001/02 E.C Meher Season

Reasons	Kebele			Total
	<i>Koso-ber</i>	<i>Yitam-na-kosta</i>	<i>Yizaba-na-woyin</i>	
Lack of money	4(22.2)	7(41.2)	6(13.6)	17(21.5)
Seed not available in nearby area	10(55.5)	1(5.9)	20(45.4)	31(39.2)
Lack of interest	0(0.0)	0(0.0)	3(6.8)	3 (3.8)
To avoid risk	3(16.6)	1(5.9)	1(2.2)	5(6.3)
Use only traditional seed	0(0.0)	1(5.9)	6(13.6)	7(8.9)
Expecting to see changes on other farmers	2(5.5)	2(11.8)	4(9.1)	8(10.1)
Advice not given by extension workers	0(0.0)	5(29.4)	4(9.1)	9(11.4)
Total	18	17	44	79

Note: Percentage in the parentheses. There may be slight discrepancy in the total percentage due to rounding.

Chemical Fertilizers

The major soil type found in the district is brown (38%). The rest 25 %, 12 %, 3% and 22% are grey, red, black and others (*Tarmaber Woreda* Agricultural and Rural Development Office 2009). To increase yield different amount of chemical fertilizers is suggested for each of the major crops in the study area. For wheat it is 150 kg DAP and 100 kg urea per hectare, for *teff* it is 100 kg DAP and 50 kg urea per hectare, for barley it is 100 kg DAP and 50 kg urea per hectare and for beans it is 100 kg DAP per hectare.

Results in Table 14 above also indicate that while the majority of respondents, 100(80%), have experience in using chemical fertilizers, just 46(36.8%) adopters were found during the last *meher* season (2001/02 E.C). It is apparent from this figure that more than half of the farmers discontinued to use recommended amount of chemical fertilizers. Focus group participants from *Yizaba-na-woyin* noted that “*In the past, we were using chemical fertilizers and allotted land for demonstration plots. However, all of us discontinue to them.*” This substantial reduction in use of chemical fertilizers could be attributed to many factors. The survey result of this study suggests that 31.6 percent (25) of farmers reported that this was mainly due to lack of money to purchase from the market and the escalating price of chemical fertilizers. The 24(30.4%) farmers

attributed their low fertilizers adoption to its inaccessibility in nearby area although they desire to buy. While 12(15.2%) farmers believed that application of chemical fertilizers reduces the fertility of the soil. Still some other farmers 18 (22.8%) reported that animal manure has more important as it is suitable for the local agricultural zone. Abeje (in his study of "*Matching Extension Services with Farmers' Needs: Towards Combining Social and Agro Ecological Approaches to Ethiopian Extension*") also points out that lack of cash and poor performance of the package were found to be responsible for discontinuing fertilizer use (Abeje 2008). According to Hailu (2008), household income can also be considered as one of factors that influence adoption of chemical fertilizers in Ethiopia.

In addition, according to informants of focus group discussions, lack of sufficient amount of rainfall and even unpredictable rain (especially in *Yitam-na-kosta Kebele*) that is needed to use chemical fertilizers (especially urea) without which the crops would not grow discouraged farmers from using chemical fertilizers. Farm households' decision to use chemical fertilizers is therefore affected by such risk as fear of crop failure that they have experienced in the preceding years. Many of them are reluctant to borrow money since they perceived that they would face problems when they fail to repay the loans for lenders. As one of extension workers (key informants) from *Yizaba-na-woyin* explained that:

Farm households in this Kebele are economically inefficient to buy chemical fertilizers from their own cash stock. There are even difficulties of taking loan from local lenders with an interest rate of one 10% return for purchasing chemical fertilizers. This emanates from the fear of farmers due to their pessimistic expectation of crop yield failure caused by bad weather conditions and mainly the concern of farmers to preserve the prior intact relation they have with lenders from loosing due to falling to return accordingly as per as the agreement.

5.4.2 Socio-Demographic Characteristics of Households and Adoption of Extension Inputs

In this section, the demographic variables which are expected to influence adoption of seeds and chemical fertilizers are discussed.

Age of Respondents

The Independent t-tests revealed that the mean age of adopters is 42.04 with standard deviation of 11.325 and the non-adopters have 45.29 ages with a standard deviation of 11.438. From this it can be said that the age of non adopters is greater than that of adopters of seeds and chemical

fertilizers. However, they did not differ significantly in their age at 0.05 level ($t=-1.536$, $df=123$, $p=0.127$). Suggesting that age is not a factor in extension inputs adoption in the study area.

The Pearson's correlation coefficient is used to measure the association between age and adoption of seeds and chemical fertilizers. It revealed that these variables had weak and negative relationship at 0.05 level ($r=-0.102$, $p=0.376$). Only one percent of the variance in the dependent variable (adoption of seeds) is explained by the dependent variable (age of the respondents) [r^2 (Coefficient of determination) = 0.0104]. The result of correlation coefficient also shows that age has just 2.8 percent effect on adoption of chemical fertilizers among respondents ($r=-0.123$, $p=0.28$). The negative relationship implies that farmers with old age might not have higher ability to use new technologies more efficiently than newly formed households. Fufa and Hassen (2006) also found that the older the farmers the less their willingness to try new innovations or take risks.

Household Size

The survey result shows that seed and chemical fertilizers non-adopters had larger household size with almost seven (6.89) individuals than adopters with almost six (6.14) persons. The test statistics (2.377) with 0.019 Sig. (2-tailed) values indicates that there was a statistical significant difference at the 0.05 level in total persons living in adopter and non adopter households in the study area.

A negative and weak association has been found between household size and amount of seeds used ($r=-0.077$, $p=0.503$). Only 0.5 percent of the variance in adoption of seeds (dependent variable) among households was explained by household size (independent variable). This implies that households with large members used no more improved seeds than household with small members. As the result of Pearson's correlation also revealed that household size and amount of chemical fertilizers have negative and weak association but not significant statistically ($r=-0.063$, $p=0.583$).

From the above result it can be seen that households may to invest on purchasing food for consumption and household expenditure than on buying improved seeds and chemical fertilizers. It has been also noted that household size negatively affects adoption of new agricultural

technologies particularly among poor households (Shakya and Flinn 1985 cited in Fufa and Hassen 2006) who have no cash to purchase extension inputs.

Educational Status of Respondents

Acquisition of formal education can facilitate awareness and affect farmers' use of agricultural inputs (Nkonya et al. 1997 cited in Kassu 2009). It enables farmers' to access information needed to make a decision to use an innovation and helps them to understand easily instructions given for them about new technologies. In this study, therefore, a positive association is expected between educational statuses of respondents and adoption of seeds and chemical fertilizers.

The chi square computation ($\chi^2 = 7.088$ with 5 degree of freedom, 0.0012 alpha and +0.167 gamma value) shows that the relationship between educational status of farmers and adoption of chemical fertilizers and seeds was found to be statistically significant ($p < 0.05$). The gamma value here implies that education is positively related to use of chemical fertilizers and seeds in the sense that the adoption status increased when the farmers moved from inability to read and write to able to read and write through primary school to secondary school and so forth.

5.4.3. Household Assets and Adoption of Extension Inputs

As stated before, the amount of land under cultivation, number of oxen and other livestock owned are among the most important household assets in rural Ethiopia (Mulat et al. 1998; Ellis 2000) that are expected to influence use of extension inputs. In addition, membership of cooperatives and village-insurance schemes, access to extension services and credit are also some of factors influencing agricultural input utilization. Thus, in this study an attempt was made to investigate the relationships between these assets and adoption of seeds and chemical fertilizers in the study area.

Size of Landholding

As noted earlier, there are 46(36.8 %) respondents who adopted seeds and chemical fertilizers in the 2001/02 E.C *meher* season with an average of 0.70 hectare of land with a standard deviation of 0.31894. The 79(63.2%) respondents, who did not adopt chemical fertilizers, possessed an average 0.65 hectare of land with a standard deviation of 0.32. From the above, we can see that adopters of seeds and chemical fertilizers owned more hectare of land than non-adopters. However, the test statistics ($t = 0.943$ with 123 degree of freedom) was not significant since the

“Sig. (2-tailed)” value was 0.348, which is greater than 0.05 level of confidence of the current study. Thus, there was no a statistically significant difference in land holding between adopter and non adopter of seeds and chemical fertilizers.

When land holding is disaggregated across male and female-headed respondents 92 male respondents possessed an average of 0.67 hectare of land with standard deviation of 0.34. The 33 female-headed respondents owned 0.63 hectare of land with a standard deviation of 0.24. As the computation of the test statistics ($t=0.741$ with 123 degree of freedom) revealed there was no statistical difference in the adoption of seeds and chemical fertilizers with regard to possession of land between male and female-headed respondents because the “Sig. (2-tailed)” value was 0.304, which is greater than 0.05 level. The Pearson’s correlation shows that there was positive and statistically significant association between amount of chemical fertilizers use and farm size at 0.05 level ($r=0.331$, $p=0.003$). This shows that households with large plot of land have the probability to adopt chemical fertilizers. However, farm size and adoption of improved seeds have no statistically significant relation ($r=0.085$, $p=0.385$).

Oxen Possession

Non adopters of seeds and chemical fertilizers in 2001/02 E.C *meher* season possessed an average of 1.5 oxen with a standard deviation of 0.62. Adopters, on the other hand, possessed 1.96 oxen on average with a standard deviation of 0.77. This shows that adopters owned more oxen than non adopters. The result of the test statistics ($t= 3.295$ with 121 degrees of freedom) shows that there was statistically significant difference between adopters and non adopters of seeds and chemical fertilizers in terms of oxen ownership since the “Sig. (2-tailed)” value was 0.001, which is less than 0.05 level. This means the number of oxen that adopters and non-adopters owned was significant. From this it can be said that number of oxen that adopters and non-adopters owned makes difference in their adoption status of chemical fertilizers and seeds in the study area.

The correlation between the number of oxen and amount of seed used was not significant at 0.05 level ($r=-0.117$, $p=0.309$). But, the two variables have negative and moderate association implying that households may reduce their use of seeds to add one more ox for ploughing.

In Abeje’s (2008: 14) study that the “possession of livestock can facilitate households” access to extension inputs” in Ethiopia. According to him, oxen ownership was a principal factor that

influences farmers' access to fertilizers. It serves as collateral to access to credit and fertilizer loan. Therefore, in this study, a positive association is expected between number of oxen and use of chemical fertilizers.

Similarly, the Pearson's correlation analysis revealed that there was a positive but weak association between number of oxen and amount of chemical fertilizer used by households. This implies that households with more oxen may have access to fertilizers loan than household with no or small number of oxen. Group interview with farmers also confirmed that shortage of oxen means poor land preparation and failure to plant at the right time, and thus discouraging farmers from buying fertilizers.

Availability of Labour Power

Since farming is a labour intensive activity in rural Ethiopia, it becomes difficult without adequate labour force at household level. To answer this, rural communities have local system of labour exchange arrangements.

Farmers were asked about whether they have faced labour shortage and the ways how they solved the problem during 2001/02 E.C *meher* season. About 29(63%) adopters and 47(59.5%) non-adopters reported that they faced labor shortages. The majority of adopters (82.8%) and non-adopter (69.6%) used community labour arrangements (i.e. *dābo and wānfāl*). Hired labour covered the labour power of 17.2 percent (5) and 21.7 percent (10) of adopters and non adopters respectively. This shows that non-adopters used more hired labour. A local labour arrangement called *Lammāna* (i.e. imploring) was the source of labour for 8.7 percent (4) of non-adopters. According to focus group informants from *Yizaba-na-woyin* and *Koso-ber* hard working and labour-rich households are more likely than labour-poor households to adopt seeds and chemical fertilizers which require more intensive labour.

The chi-square analysis shows a moderate association between adoption of seeds and chemical fertilizers and access to one of the above-mentioned sources of labour but not statistically significant ($\chi^2=4.895, df=3$ and $p=0.180$, Phi or $V=0.255$).

Memberships of Cooperatives and Village-insurance Schemes

Table 16 summarizes the respondents' membership status to cooperatives and village-insurance schemes in the study area.

Table 16: Relationship between Cooperative, Village-insurance Scheme and Development Committee Membership and Adoption of Extension Inputs

Variables	Chi square			
	χ^2	df	p	Cramer's V
Membership of Cooperatives	10.544†	4	0.032	0.284
Membership of Village-insurance Scheme	4.908¥	3	0.179	0.198
Membership of Development Committee	0.403¥	1	0.526	0.057

Note: † indicates significance at 5% level, ¥ shows not significant at 5% level

The result of One-Way analysis of variance shows that there was no statistical difference in seeds and chemical fertilizers adoption status of farmers by their membership of such cooperatives as buyers, women, mineral-producers, multi-purpose ("Hulle-geb") and farmers in the study area. Membership to these cooperatives did not make difference on farmers adoption of seeds in the study area ($F=1.455$, $df=1$, $p=0.232$). Similarly, it was not also significant for adoption of chemical fertilizers at 0.05 level ($F=0.484$, $df=3$, $p=0.695$).

However, the chi square analysis for membership of cooperatives shows that there was statistically significant relationship between being a member of cooperatives and adoption of seeds and chemical fertilizers at 0.05 level ($\chi^2=10.544$, $df=4$, $p=0.032$). The relationship between these two variables was moderate (Phi or $V=0.284$). This indicates that households who are members of any one of the above-mentioned cooperatives have a high probability of adopting seeds and chemical fertilizers than those households who are not members. This may partly be due to interpersonal relations and their networks which facilitate diffusion of information regarding new inputs. In addition, adoption of seeds and chemical fertilizers by farmers may be explained by adoption among other members of the cooperatives in which they may learn from each other's experience. However, since it is beyond the scope of the current study, the effect of

social learning in adoption of seeds and chemical fertilizers needs further investigation in the study area.

Table 16 also shows the percentage of adopters and non-adopters in terms their membership of village-insurance schemes in the study area. About 21(45.7 %) adopters and 45(57%) non-adopters are members of “*Idir*” and “*Mahabar (Senbeta)*” respectively. The chi square measure of association between respondents membership to any one of the above-mentioned schemes and adoption of seed was not found to be significant at $p < 0.05$ ($\chi^2 = 4.908$, $df = 3$, $p = 0.179$).

The result of One-Way analysis of variance shows that there was no statistical difference in mean amount of seeds and chemical fertilizers used and farmers’ membership in development committee (see Table16). But, discussion with farmers showed that membership of development committee can affect farmers’ access to agricultural inputs. Those farmers who are cadres (“*gambar qāddām*”) are given priority in the provision of inputs.

Table 17: Relationship between Membership in Development Committees and Use of Extension Inputs

Extension Input	Membership of Development Committee		
	F	df	p
Seeds	1.851	1	0.178¥
Chemical fertilizers	0.443	1	0.508¥

Note: ¥ shows not significant at 5% level

Extension Services

Extension services are crucial for farmers to gain information about new agricultural technologies (Chilot et al. 1992; Doss 2003) as access to information influences adoption of new agricultural technologies. The numbers of extension visits received by farmers, visiting successful farmer’s fields and training on crop technology packages were used to measure farmers’ access to information. A statistically significant relationship is expected between these variables and adoption of seeds and chemical fertilizers in the study area.

Table 18: Relationship between Access to Extension Services and Use of Seeds and Chemical fertilizers

Extension Services	Chi square		
	χ^2	df	p
Number of visits by extension workers	1.687¥	2	0.430
Visited successful farmer's fields	0.397¥	1	0.529
Received training on crops technology packages	0.145¥	1	0.703

Note: ¥ Not significant at 0.05 level.

As the above Table indicates, the value of chi square test (χ^2) for number of contacts with extension workers was 1.687 with 2 degrees of freedom and with 0.430 "Sig. (2-tailed)" values. The alpha value (0.430) is greater than 0.05 significant level of the current study. This shows that there was no statistically significant relationship between extension worker contact and adoption of seeds and chemical fertilizers. However, the difference means of the categories of extension contact (i.e. never, sometimes and always) was significant at 0.05 level ($F=5.911$, $df=3$, $p=0.004$). This implies that farmers who have received information frequently have high probability of adopting seeds and chemical fertilizers than those who have never and sometimes got information from development agents.

From Table 18, it can be noted that the chi square (χ^2) measure of association of visiting successful farmers' fields and seeds and chemical fertilizers adoption was found to be not significant at 0.05 significant level ($\chi^2=0.397$, $df=1$, $p=0.529$). However, discussion with adopters revealed that many of them have adopted seeds and chemical fertilizers after they have visited a demonstration on other farmers' plots.

The chi square test analysis revealed that there was no statistically significant association between receiving training on crop packages and adoption of seeds and chemical fertilizers at 0.05 level of significance ($\chi^2=0.145$, $df=1$ and $p=0.703$). However, interviews with farmers confirm that lack of knowledge about how to use it as the factor for non-use of these inputs.

Access to Information

In all surveyed *Kebeles* 60 percent of adopters reported that they have obtained information on seeds and chemical fertilizers from extension workers, followed by cooperatives (23%) and fellow farmers (17%). Here, farmers were also asked their level of access to other sources of information like radio and pamphlets.

From Table 19 it can be seen that significant ($p < 0.05$) association is observed between ownership of radio and adoption of seeds and chemical fertilizers. The association between these two variables was moderate (Φ or $V = 0.270$) and further analysis shows that farmers who owned radio have high probability to adopt improved seeds and chemical fertilizers than those who did not own (see Table 19). But, owning radio may not be a good indicator since there may have been farmers who chose not to use radio. Thus, farmers were asked the extent of use of radio on issues related to farming.

Table 19: Relationship between Access to Information and Use of Extension Inputs

Variables	Chi square			
	χ^2	df	p	Cramer's V
Ownership of radio	6.523†	1	0.011	0.270
How often farmers used it to attend agriculture related programs.	10.691†	2	0.005	0.368
Read pamphlets	6.396†	1	0.011	0.226
How often farmers used it to read agriculture related issues?	0.652¥	2	0.722	0.098
Never				
Sometimes				
Always				

Note: † Significant at 0.05 level., ¥ Not significant at 0.05 level

About 78 percent of adopters and 87 percent of non-adopters have attended/listened agricultural related programs from radio they owned. The chi square analysis indicated that there was statistically significant association between the extent of attending agriculture related programs and adoption of seeds and chemical fertilizers at 0.05 significant level ($\chi^2 = 10.691$, $df = 2$,

$p=0.005$). This implies that farmers who have attended agricultural programs have high probability to adopt improved seeds and chemical fertilizer than those farmers who have not attended. This is because they have given information about new extension inputs.

The chi square result in Table 19 also indicates that there is moderate (Cramer's $V=0.226$) statistically significant relationship between access to pamphlet and adoption of improved seeds and chemical fertilizers. This implies that farmers with good access to pamphlets have adopted improved seeds and chemical fertilizer than those farmers who have not. But, this might be the case for farmers who are at least able to read and write.

Access to Credit

Lack of access to credit constrains farmers from adopting agricultural technologies (Doss 2003). But, a simple measure of whether farmers have access to credit is not enough since ownership of land and oxen is often thought to be a prerequisite for obtaining credit and to participate in credit and fertilizer loan schemes in Ethiopia (Doss 2003; Abeje 2008). In this study, therefore, an attempt was made to investigate the influence of these variables.

The 56 (44.8%) of adopters of seeds and chemical fertilizers and 69 (55.2%) of non-adopters obtained credit in 2001/02 E.C *meher* season. The result of the chi square analysis revealed that there was association between access to credit and adoption of improved seeds and chemical fertilizers. However, the association between the two variables was weak (Phi or $V=0.08$) and not statistically significant at 0.05 level ($\chi^2=0.796$, $df=1$, $p=0.372$).

The multiple correlations was run to investigate the relation between access to credit and amount of chemical fertilizers used after controlling for the effect of farm size and number of oxen. The result of Table 20 shows that these variables accounted for about 14 percent ($R^2=0.14$) of variation in amount of chemical fertilizers used.

Table 20: Multiple Correlation Result for Some Independent Variables and Adoption of Chemical fertilizers

Independent Variables	Unstandardized		Standardized		
	Coefficient		Coefficients		
	B	Std. Error	Beta-weight	t-value	P
(Constant)	19.916	14.537		1.370	0.175
Farm Size	25.008	9.593	0.2888	2.607	0.011
Number of Oxen	2.760	4.066	0.074	0.679	0.499
Access to Credit	-8.001	5.866	-0.151	-1.364	0.177

Note: $F=4.057$, $p=0.010$, $df=3$ and 76 , $R=0.374$ (Adjusted $R^2=0.140$)

The beta-weight suggests that farmers who have more hectare of land did adopt chemical fertilizers. In other words, land size was important independent variable than number of oxen and access to credit to use chemical fertilizers in the study area.

Perception of Distance of the Market

Access to input and output market is an important factor affecting households' use of extension inputs (Langyintuo and Mulugeta 2005). But, just market accessibility may not be a good measure since market failure may occur in the provision of the desired inputs. But, this is beyond the scope of this study. It is, however, possible to know the perception of distance of the market as it is expected to influence adoption of extension inputs.

Farmers were asked about their perception of the distance of the nearest market from their home. About 49(39.2%) respondents said the distance of the market as very far from their home, 41(32.5%) perceived the distance as far while 32(24.2%) perceived the distance as near to their home. The remaining respondents did not recognize the distance of the market.

The chi-square test revealed that there was statistically significant association between respondents perception of distance of market and use of extension inputs at 0.05 level ($\chi^2=12.911$, $df=3$, $p=0.0.005$). These variables have moderate and negative (Phi or $V=-0.323$) implying that respondents who perceived the market distance as very far did not adopt extension inputs. Similarly, Mulat et al. (1998) stated that lack of efficient and effective input and output

market systems is a major impediment to the development of Ethiopian agriculture and food production.

5.5. Local-level Perceptions to the Causes of Poverty

Focus group discussions were also conducted in the study *Kebeles* to explore perceived causes of poverty. In this study, following Robert Chambers (1983), five composite dimensions of poverty are applied.

5.5.1. Income poverty

Many poor households have lack of productive assets to generate income. Having no income for many rural poor households means inability to reach or pay for health services provided in towns. As focus group informants from *Yitam-na-kosta* noted many poor farmers have depleted their farm assets due to health care cost. Declining incomes due to low return from agriculture and high prices of agricultural inputs like fertilizers were the main issue for many farmers in the study site. Group of farmers from *Koso-ber* also noted that poor households cultivate less than 0.5 hectare spend their farm income gained from annual based agricultural produce to expenses related to family members mainly children. Lack of money to purchase agricultural inputs becomes more intensified among those who have no other sources of income outside agriculture. Accordingly, an absence of diversification of sources of income through engaging in non-farm activities is an outlined factor for being incapable to get income incurred to improve their land.

5.5.2. Isolation/Social Exclusion

As has been noted by Robert Chambers (1983), isolation of households from access to information and other economic infrastructure constrain them from breaking out of the vicious circle of poverty. The evidence from focus group discussion and visual inspection confirms that poor households have no access to road. Focus group informants in *Yizaba-na-woyin* noted that although they produce crops and other vegetables for the market, it would be difficult for them to transport it to the neighboring towns (*Debre-sina, Armaniya and Shewarobit*). They explained that “*Bad condition of the roads does not allow trucks to come to our Kebele. This makes it difficult to sell our harvest.*”

Access to extension inputs can contribute significantly to enhance the productivity of farmers and contribute to poverty reduction. Discussions with groups of farmers also revealed that the rural

kebeles are far away from the *Woreda's* town (*Debre-sina*) and from towns of adjacent *Woredas*. As a result, households do not have access to information about agricultural inputs. Many of them are far from where best practices on agriculture are available. By comparing households in *Asfachew* and *Armaniya* (these are *Kebeles* along the main transport line and near to urban centers *Debre-sina* and *Shewarobit*) one of the extension workers (the key informants) noted that it is not easy for farmers of the study area to exchange information on agricultural related issues with the neighboring farmers. As one of the key informants from *Yizaba-na-woyin Kebele* also noted that extension workers spend less time performing their advisory roles in the study site. Rather, they have been visiting repeatedly the nearby households and exerted their efforts in these areas since they are accessible through vehicles and supervisors from North Shoa zone Agricultural and Rural Development Department also prefer to see the best practices near to towns.

Except the newly ongoing construction of health centers in *Yitam-na-kosta*, healthcare facilities in the study site are not easily accessible. Bird et al. (2002 cited in Sisay 2002) stated that household-level poverty outcomes are significantly influenced by differential access to health services.

Rural people require trading their products in exchange for the goods not locally available. Market access is therefore crucial to support rural livelihoods diversification. However, in the study area many rural poor households often face with lack of markets because of distance from roads. Focus group informants from *Yizaba-na-woyin* noted that since the market is far away, it is difficult to bring the product to the neighboring market. Informants from *Yitam-na-kosta* also explained that when adult household members are sick, transporting the products to the market is not easy.

5.5.3. Vulnerability

According to Robert Chambers (1983), vulnerability means to exposure to incident and stress, and difficulty in coping with them. He continued to argue that a "household becomes poorer through having to deal with unforeseen circumstances such as crop failure, accident, sickness, funerals or flooding.

According to focus group informants in *Yitam-na-kosta*, land sub-division as a consequence of high population pressure negatively impacts the livelihood conditions of farm households. Pressure on land reduces the productivity of the land in the sense fragmentation of land holdings and short fallow periods. Land redistribution beside the one taken in 1996 in the region, it has

been caused in the study area by provision of the land for the newly formed families. That is, for instance, when the one of the family members mainly son is engaged in marriage, his parents allotted a plot of land.

Vulnerability of agricultural production to weather conditions and pests is common for households in *Yitam-na-kosta and Koso-ber Kebeles*. Unpredictable natural hazards have affected many farmers. As key informant from *Yizaba-na-woyin* noted many households face crops failure as a result of landslides. Except some better-off households who could withstand with this shock, many households in this *Kebele*, particularly in “*Yizaba*”, “*Ayna maryam*”, “*Debr*”, “*Korontos*”, “*Mamid-amba*” and “*Zurit-amba*” “*gotes*”, which already are resource-stressed areas diversely affected. According to the *Woreda’s* Agriculture and Rural Development Office, the 2006 landslides uprooted crops and destroyed houses. About 4,049 people were displaced and over 75 percent crop loss has occurred in the area. Nearly 1,400 houses have been damaged. Access to the area has been disrupted due to damage to feeder roads. Households were left with nothing with grazing land for their cattle. The affected communities have been displaced and moved to *Sina* and *Armaniya*.

As per data from *Yizaba-na-woyin* and *Yitam-na-kosta* Kebeles agriculture office crop diseases that influence the living and production of local people are occurred during 2000E.C and 2001E.C “*belg*¹⁵” season. It results in loss in total harvests and in a loss of income. Also, income decline/loss also exacerbates by poor soil fertility which lower farm output.

5.5.4. Physical weakness

Chambers (1983) noted that ill-health and physical weakness reduce the earning capacity of household members. Households affected by disease or physical weaken are unable to cultivate larger areas or to work longer hours on the farm. Evidences from focus group discussion in *Yitam-na-kosta* also confirmed that household head illness during critical farm operation season create problems to some poor households.

It is mainly true of some households in the study area such as female-headed ones who often rent-out a small tract of land to farm as sharecropper. In most cases, these households often rent-out their land rather than farming it by themselves. In group discussion with females in *Koso-ber* it

¹⁵ Short rainy season roughly from January first to May 30 in the study area

was revealed that ploughing is mainly practiced by male labour. Women are unable to farm their land since they lack male labour power. As a consequence of labour shortage female-headed households lose self confidence to begin to plough the land. As the women participants of the group discussion explained:

We do not start to do farming on our land. If we have started to plough it, we would not be able to go through all stages of farming activities successfully. We are saying this since our harvest was adversely affected in the last (2009) "belg" season.

In most cases, female-headed households rent their land to get half of the product. The product they get from crop sharing could not fulfill the food demand of poor households and face food shortage in the next pre-harvest season. Since they receive only half (50%) farm output, it is difficult for them to fulfill household consumption.

Interviews with key informants from *Yitam-na-kosta* and *Koso-ber Kebeles* indicated that alcoholism is the problem of farmers that contribute to poverty since it weakens their ability to effectively work on their farm. Laziness also thought to be a cause of poverty among poor households. Since they fear the hardships they would face on the farm, some poor farm households choose to rent their land to other farmers.

5.5.5. Powerlessness

Since agriculture is a labour intensive activity from land preparation to harvesting stage, it is not easy for many households of the study area to practice it without reciprocal labour exchange ("*debo*"). The key informant from *Yizaba-na-woyin* noted that the labour that female-headed households contribute do not equate with male-headed households. Thus, there is a tendency for male-headed households not to cooperate with female-head households. He continued to note that women often participate in meetings and training on agricultural inputs. They fear the social stigma that they are considered as idler or jobless ("*sara fâtt*").

As indicated by group discussion participants from *Yitam-na-kosta*, membership and participation in cooperatives is the main source of chemical fertilizers and seeds. However, poor and women are excluded from being members of cooperatives since they are unable to afford the money for membership. This has implication in the sense that non-members would not have access to information and discussion about extension inputs.

5.6. Summary

In this chapter the assessment of poverty in the study *Kebeles* as perceived by households was presented. Different criteria such as land holding, livestock ownership, food availability and other household assets are used to classify households as worse-off/poor, medium and better-off/rich. The worse-off, medium and better-off households constitute 41.5, 52 and 6.2 % of the study population respectively.

Based on survey data the association between major socio-economic variables and adoption of chemical fertilizers and seeds was tested using chi square, independent sample test, ANOVA and multiple correlations.

Based on farmers' perception causes of poverty as lack of income, remote from urban infrastructure and exclusion from local based, vulnerability to natural calamities, physical weakness and unable to participate in crops package training are also discussed.

CHAPTER SIX

SUMMARY, CONCLUSIONS, POLICY IMPLICATIONS AND FURTHER RESEARCH NEEDS

In this chapter, a briefly summary of the main findings of the research, policy implications and recommendation for future research are presented.

6.1. Summary and Conclusions

As has been mentioned in the foregoing discussion, agriculture remains the backbone of Ethiopian economy. It is believed that agriculture is a significant contributor to transform the nation from traditional agricultural society to industrial one. Despite this important place, it is characterized by low level of productivity. In order to enhance agricultural productivity and ensure food security at farm household level in Ethiopia, the government has been disseminating improved agricultural inputs aimed at fostering agricultural growth. However, adoption of these inputs remains very low among small farmers. This study, therefore, attempted to explore factors affecting adoption of improved seeds and chemical fertilizers in *Tarmaber Woreda*.

In order to identify the potential factors responsible for non-use of extension inputs understanding multiple dimension of poverty is relevant. Failure to recognize poverty as multi-dimensional and understanding its meanings and causes are diverse and contextual lead to wrong poverty reduction strategies. Hence, due attention was given to conceptualize poverty in present study based on farmers own perceptions with the aim to know the ground reality which likely to influence farmers' adoption status of two most important extension inputs namely improved seeds and chemical fertilizers. Accordingly, the following specific objectives are attempted to address. These are: conceptualizing what poverty mean for local people, examining the causal factors that result in poverty at household level, examining the characteristics of the poor across social groups, explore the demographic, socio-economic, agro-ecological and institutional constraints that affect the adoption of seeds and chemical fertilizers at household level, analyze policy implications in relation to adoption of agricultural innovations.

For this study three rural *Kebeles* namely *Yitam-na-kosta*, *Koso-ber* and *Yizaba-na-woyin* were selected based on four important criteria. These include: they represent the three traditional agro-ecological zones (*dega*, *woyina dega* and *kola*), remote from urban centers, vulnerable to landslide and crops failure, inadequate with social and economic infrastructures.

In order to know local realities, using well-being rankings method key informants from these purposefully selected rural *Kebeles* asked to present quantitative and qualitative indicators of poverty. The following indicators of poverty were emerged from wealth ranking exercises to categorize farm households into worse-off/poor, medium and better-off/rich wealth rank categories. These include land size, livestock holdings (mainly oxen for ploughing), the number of times that a family feeds its members per day, housing conditions (e.g. type of roof, other materials by which houses were constructed and number of huts), land renting and/or sharecropping arrangement, household labour force availability (hired-in or hired-out of labour by the household), loan status, membership of cooperatives and ability to send children to school. Accordingly, out of 2120 farm households, worse-off/poor, medium and better-off/rich households accounted for 41.5%, 52.2% and 6.7% respectively. Worse-off/poor households are households with no oxen for ploughing and possessed between 0.25 and 0.375 hectare of land. Each household here has only small huts. It is difficult for female-headed households under this wealth rank to send their children to school. Thus, they choose to give them to better-off/rich farmers to whom they exchange labour for food. As poor households cultivate less than 0.5 hectare of land they have spend their farm income gained from annual based agricultural produce to household consumption. They rent their labour to other community members (mainly better-off farmers) for pay. Also they rent their land. They eat food which is poor in quality. As the discussion has shown, elderly farmers, female-headed households and newly formed families are characterized as worse-off/poor. Farm households of medium wealth rank owned 1 to 2 oxen and possess on average 0.5 hectare of land. They manage three meals a day. These households have house constructed with corrugated iron and two booths. They do not rent both their labour and land to others. Unlike the above-mentioned wealth ranks, better-off/rich households owned more than 2 hectare of land and can access land through rent and/or contact. They have 3 and above oxen for ploughing. In addition, they own such domestic animals as sheep (15-30), goats (15-20), cows, horse, mules and donkeys. Better-off/rich households usually have more than three corrugated iron houses. Children are likely to go to school. They mainly manage two meals a day and also engaged in other income sources to improve their livelihood. They usually lend money and food to others. Since they have relatively large tract of land, better-off farmers hire-in labour. Based on farmers own perception income loss due to low return from agriculture, vulnerability to crop losses and asset depletion particularly due to bad weather conditions and landslides;

physical weakness which lessened the working capacity of farmers; social isolation in terms of lack of access to market (market constraints), information about improved agricultural inputs and health services, road; and powerlessness as poor mainly females could not attend training on extension inputs and meetings on community concern issues are some of the causes of poverty. Discussion with farmers also showed that big population size cause serious pressure on land. It mainly leads to fragmentation of land and therefore low agricultural productivity as it results in short fallow period.

Drawing on household surveys the demographic and socio-economic characteristics of 125 *farm households, who were selected from worse-off/poor, medium and better-off/rich wealth ranks based on a two-stage stratified random sampling using Proportional Probability to Size (PPS) method*, were analyzed. Using descriptive statistics tools such as chi-square, independent sample t-test, ANOVA and multiple correlations, *statistical significance of some of socio-economic variables* which likely to influence farmers' decision to adopt improved seeds and chemical fertilizers were analyzed.

Male-headed households represent the majority of the household in the study area. The average age of the household heads was found to be 44. The educational achievement of worse-off/poor, medium and female-headed households are not good as compared to male-headed and better-off/rich households. More than half (50.4%) of household heads did not go to school. The average household size is 7. Such wealth categories as worse-off/poor and medium households have large family members. Land and oxen are the two most important productive assets in the study area. The average land holding size is 0.5 hectare which is not enough even for subsistence, mainly for worse-off/poor households. It was mainly caused by 1996 land redistribution, unstrained population growth and allotment of some plot from already small land holding to newly formed families. Oxen are a crucial asset for farming in the study area. The majority of households owned a pair of ox. It is considered as store of wealth and status marker.

The findings reveal that farmers' adoption status was influenced by households' size. Households with large members are striving to get food for consumption instead of allocating money for buying extension inputs. Educational status of household head and adoption of improved seeds and chemical fertilizers have also positive and statistically significant association. The adoption status of farmers will increase as they achieve the highest grade. As the foregoing discussion has shown, worse-off, medium and female headed households have low educational achievement and more likely non-users of chemical fertilizers and improved seeds. This calls for the need to emphasis strengthening educational level across different wealth ranks.

Land holding had no statistically significant association with adoption of improved seeds and chemical fertilizers. However, the discussion with farmers showed that land holdings are crucial to get loan for chemical fertilizers. This needs further investigation. This study found negative relationship between oxen possession and adoption of seeds in the sense that households may not purchase improved seeds to buy one more ox. Also, households having more oxen were more likely to use fertilizers. Similar with previous research (Abeje 2008), households having more oxen were more likely to use more amounts of chemical fertilizers. In addition, shortage of oxen means not planting at right crops season and poor land preparation which more likely discourage farmers from purchasing chemical fertilizers. The finding also shows that membership of cooperatives has positive, moderate and statistically significant association with adoption of extension inputs. However, membership of village-insurance schemes and development committee has no statistically significant relationship with adoption decision of farmers.

Farmers who have received information frequently from extension workers were found to be adopters of improved seeds and chemical fertilizers. However, visiting successful farmers' field and receiving training on crops technology package had no statistically significant association with use of improved seeds and chemical fertilizers. Ownership of radio, how often farmers used it to attend agricultural related programs and reading pamphlet were found to have statistically significant influence on adoption of chemical fertilizers and improved seeds. After controlling the effect of two most important prerequisites for loan (i.e. land and oxen) access to credit was tested. But, land size was found a decisive factor. Farmers mainly fear to take loan from local lenders and saving-and-credit institutions since they would expect crop yield failure to pay back as per the agreement. Perception of the nearby market as very far has negative and statistically

significant relations in the sense that perceiving market distance as far hamper adoption of extension inputs.

6.2. Policy Implications

Rural poverty reduction strategies have to be started with local-level poverty analysis and directed to the local peoples' needs. The rural policies in Ethiopia should enhance the livelihood of poor farm households and give attention for innovative grass root level programs.

A major issue brought to the forefront by farmers was population growth which results in increased demand for land. Ongoing family planning program in the country should reach people in the study area.

Farmers underlined that the importance of diversification of sources of income along the intensification of agriculture to improve income of households mainly worse-off/poor and female-headed households. Thus, this shows the need for strategy designed to know how farmers diversify their sources of income. There should be efforts to educate and train farmers to improve their ability how to make alternative livelihood choices available in their locality. Without this effort, the aim of poverty reduction strategy would not be successful in the study area.

This study also suggests the need for intervention in providing farmers with social services such as education, road and health. Infrastructural programs should be aimed at improving rural people access to communication which likely influences farmers' adoption decision of extension inputs. Presence of communication channels in areas where farmers live would undoubtedly facilitate awareness about improved technologies. This can be accomplished, in part, by providing farmers the opportunities to visit the crops field of successful farmers and train them about crops technology package.

The observation the current study suggests that the efforts of disseminating agricultural inputs in the study area should consider the distribution between geographical areas and across social groups. Moreover, the national extension program needs to move beyond its national aim of addressing food security to distribution of agricultural inputs between well-being categories. Such effort allows in bringing a nation's concern of reducing poverty.

As has been noted, use of improved seeds and chemical fertilizers by farmers is dependent upon the accurate information provided to them. Thus, extension workers have to be available when farmers required to them.

An extension programs which operates within a community context is important. Awareness of the social and environmental context wherein farmers live is invaluable for policy makers. The findings of the present study, therefore, clearly reinforces the often-noted needs for integrating “both indigenous and external technologies in ways that is socially acceptable, economically feasible and environmentally sustainable” in Ethiopian extension (Abeje 2008:21). Failure to take the local context into account by policy makers therefore would hamper to achieve the nation’s goal of agricultural growth.

6.3. Further Research Needs

There are issues which have not been addressed by the present study. Further research on the factors that lead some farmers to be poor would be useful. For example, given the finding that worse-off/ poor households have large members, is large population size lead them to be poor? The negative impact of high population growth on poverty needs further investigation in the study area.

Farmers’ adoption decision over time using panel study remains to be analyzed in the study area. The study finds the associations between being the member of cooperatives and adoption of extension inputs as farmers learn from their fellow about these technologies. However, the extent to which social learning influences diffusion and dissemination of extension inputs remains to be investigated. This is because empirical studies and theoretical perspectives show the vital role of social learning in the diffusion of improved agricultural technologies in Ethiopia. Continuing research is also required to examine market failure to provide farmers with extension inputs and their adoption decisions. Unavailability of market might not be taken as the factor for non-use of extension inputs in the study *Kebeles*. Thus, failure of the market in he provision of inputs should be investigated.

A comparative analysis between households of different wealth categories of remote areas (e.g. *Yitam-na-kosta Kebele*) and the one near to urban centers (e.g. *Asfachew or Sina Kebeles*) would need continuing research in the study area which could assist strategy design to make all farm households equal access to extension services. This is because as the data obtained from

extension workers in *Yizaba-na-woyin* and *Yitam-na-Kosta* shows farm households in these *Kebeles* and that of *Adoka* and *Mezezo* cannot get information about agricultural technologies.

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APPENDICES

Appendix I: Household Survey Questionnaire for Household Heads from Different Wealth Categories

Dear respondent,

This questionnaire is designed to identify the socio-economic, agro-ecological and institutional factors affecting adoption of a crops technology package in *Tarmaber Woreda*. The accurate information that you are going to provide is significant to know the above-mentioned factors and to attempt to consider the local contexts in crops technology package in *Woreda*. Therefore, I would like to kindly request you to give factual response for each of the following questions.

I would like to pledge you that the information that you are going to provide will be solely used for academic purpose and they will not have any problems on your life. Your information will remain confidential. Thank you for your cooperation in advance.

General Instruction

The questionnaire has both closed and open-ended questions. You are required to answer each close-ended questions by putting '√' and open-ended questions by writing words. There are specific instructions that are peculiar to some questions. Please provide correct answers to these questions accordingly.

Certification

Interviewer's Name: _____

Signature: _____

Date (Date-Month-Year): _____

Field Supervisor's Name: _____

Signature: _____

Identification

1. Questionnaire ID Number -----

2. Kebele -----

 1. *Koso-ber*-----

 2. *Yitam-na-kosta*-----

3. *Yzaba-na-woyin*-----

Basic Socio--Economic Characteristics of Household

3. Sex of household head

1. Male -----

2. Female-----

4. Age of household head(in years)-----

5. Household Size (including the household head)

1. Male (in number) -----

2. Female(in number)-----

SUM-----

6. Marital Status of the household head

1. Married-----

2. Single-----

3. Divorcee/ed-----

4. Widower/ed-----

7. Educational Status of household head

1. Unable to read and write-----

2. Able to read and write-----

3. Elementary 1st cycle (1-4) grade-----

4. Elementary 2nd cycle (5-8) grade-----

5. Grade 9-10 -----

6. Grade10-12 -----

7. Above grade 12 -----

Land Cultivation and Input Utilization

8. Do you have land for cultivation?

1. Yes -----

2. No-----

9. If Yes to Question 8, how many hectares do you own?

10. If Yes to Question 8, how many hectare of land you have cultivated for the last *meher* season(2001/02 E.C)

11. Have you cultivated land other than your own in the last *meher* season (2001/02 E.C)?

1. Yes -----

2. No-----

12. If Yes to Question 11, in what ways you have got the land? [YOU CAN CHOOSE MORE THAN ONE ANSWER].

1. Through renting-----

2. Through sharecropping -----

3. Through contract -----

4. If any other, please specify _____

13. How many oxen you owned?

14. If your answer for Question 13 is one ox, how do you plough your land?

1. Co-paring of the ox (*Mekenajo*)-----

2. Crop sharing-----

3. Exchange for labor-----

4. If any other, please specify _____

15. Did you use improved seeds for the last *meher* season (2001/02 E.C)?

1. Yes-----

2. No-----

16. If No to Question 15, give reason(s) for not using improved seeds?

1. I cannot afford the money to buy it-----

2. I have heard about improved seeds but it is yet not available in my area-----

3. I have not any information about improved seeds-----

4. I don't want it-----

5. I fear that an improved seeds may have risk-----

6. I only use the local traditional seed-----

7. I want to keep my self neutral until I would have seen the impact on the majority

of the farmers-----

8. If any other, please specify _____

17. If Yes to Question 15, what motivates you to adopt during the *meher* season (2001/2002)?

1. Because the majority of the farmers were adopting it-----

- 2. Because I know that it improves productivity and solve problem of household food shortage-----
 - 3. I have visited successful farmer's fields where seeds have been grown-----
 - 4. I have participated in seeds breeding trial on a plot of land-----
 - 5. I have listened successful stories of other farmers on crops cultivation-----
 - 6. If any other, please specify _____
18. If Yes to Question 15, where did you get information about improved seeds from?

19. How often do use chemical fertilizers?
- 1. Every *meher*-----
 - 2. Sometimes-----
 - 3. Never-----

20. Which chemical fertilizer do you often use?
- 1. Dap-----
 - 2. Urea-----
 - 3. If any other, please specify _____

21. Did you use chemical fertilizers in the cultivation of crops during 2001/02 *meher* season?
- 1. Yes-----
 - 2. No -----

22. If No to Question 21, give your reason(s) for not using chemical fertilizers?
- 1. I know that it increases soil fertility but I have no money to buy it-----
 - 2. Non- availability in my *kebele* although I have money to afford it-----
 - 3. I think that it causes for loss of soils physical property-----
 - 4. I don't think that chemical fertilizers can increase the fertility of the soil than animal manure-----
 - 5. If any other, please specify _____

23. Did you use pesticide and /or insecticide during 2001/2002 *meher* season?
- 1. Yes -----
 - 2. No-----

24. If No to Question 23, give your reason(s) for not using pesticide and /or insecticide?

25. Did you use herbicides during 2001/2002 *meher* season?

1. Yes -----

2. No -----

26. If No to Question 25, give your reason(s) for not using herbicides?

Crops Output

27. I would like to ask you about cultivated and irrigated land, the amount of input you have utilized and crops yield you obtained during the 2001/2002 "*meher*" season in the following table.

S.N	Crops Type	Cultivated land (ha.)	Inputs Utilized	
			Seed (in Kg ¹)	Fertilizer
				DAP(in K.g)
1	Wheat			
2	<i>Teff</i>			
3	Barley			
4	Beans			
5	Maize			
	Total			

Membership of Farmers Co-operatives and Development Committee

28. Are you a member of co-operatives in your *Kebele*?

1. Yes -----

2. No -----

29. If Yes to Question 28, in which type of co-operatives that you were the member? [YOU CAN CHOOSE MORE THAN ONE ANSWER].

1. Buyers co-operative -----

2. Women co-operative -----

3. Mineral-producers co-operative -----

4. Multi-purpose co-operative -----

5. If any other, please specify -----

¹ Kilogram

30. If No to Question 28, give reason (s) for not being a member of any one of the above-mentioned cooperatives?

31. Are you a member of village-insurance scheme(s) in your *kebele*?

1. Yes -----

2. No -----

32. If Yes to Question 31, in which type of village-insurance scheme(s) that you have been participating? [YOU CAN CHOOSE MORE THAN ONE]

1. *Idir*-----

2. *Iqub*-----

3. Religious club (*Mahaber*) -----

4. If any other, please specify _____

33. If No to Question 31, give reason (s) for not being a member of any one of the above-mentioned scheme?

34. Are you a member of development committee in your *Kebele*?

1. Yes -----

2. No-----

35. If Yes to Question 34, what are the benefits?

1. _____

2. _____

36. I would like to ask you about the criterion by which you were selected for getting improved seeds first as compared to other farmers from the *woreda's* agriculture and rural development office. Why you were chosen? [WRITE AT LEAST FOUR REASONS THAT YOU HAVE RECIVED IN THE SPECE PROVIDED IN ORDER OF THEIR IMPORTANCE].

1. _____

2. _____

37. If No to Question 34, give reason(s) for not being a member?

Agricultural Extension Workers Contact

38. How often have you given advice from extension workers during the 2001/2002 *meher* season?

- 1. Never-----
- 2. Sometimes-----
- 3. Frequently-----
- 4. Occasionally-----

39. What kinds of advices? [WRITE THE ADVICES YOU HAVE RECIVED FROM AGRICULTURAL EXTENSION WORKERS ON FARM RELATD ISSUES IN THE SPACE PROVIDED].

- 1. _____
- 2. _____
- 3. _____

40. How useful the advice was to increase your productivity?

Participation and Training of Farmers on Crops Technology Package

41. Have you given any training about crops technology package in this training center?

- 1. Yes-----
- 2. No-----

42. If Yes to Question 41, how many times you have received the training?

43. If No to Question 41, give season(s) for not receiving the training on crops technology package?

Credit Service

44. Did you receive credit in the 2001/2002 *meher* season?

- 1. Yes-----
- 2. No-----

45. If Yes to Question 44, from which source did you obtain credit? [RANK SOURCE BY WRITING 1st, 2nd, 3rd AND SO ON IN THE BOX PROVIDED].

- 1. Micro-finance-----
 - 2. Local money lenders (*Arata- abedari*) -----
 - 3. NGO-----
 - 4. Relatives-----
 - 6. If any other, please specify _____
46. If Yes to Question 44, for what purpose did you use the money? [RANK THE POURPOSE BY WRITING 1st, 2nd 3rdAND SO ON IN THE BOX PROVIDED].
- 1. For getting food for household consumption -----
 - 2. For purchasing chemical fertilizers -----
 - 3. For purchasing improved seeds-----
 - 4. For purchasing chemicals-----
 - 5. To buy teaching materials like pen, pencils, exercise book-----
 - 6. To pay school fee-----
 - 7. If any other, please specify _____

Mass Media as Source of Information on Agricultural Technology

I would like to ask you about the type of mass media that you own and the extent to which you have used it for attending programs on agriculture.

47. Do you have radio?
- 1. Yes-----
 - 2. No-----
48. If Yes to Question 47, how often do you use it to get information on agriculture related programs on?
- 1. Never-----
 - 2. Sometimes-----
 - 3. Always-----
 - 4. Occasionally-----
49. Do you have access to pamphlets to read information on improved agricultural technologies?
- 1. Yes-----
 - 2. No-----
50. If Yes to Question 49, how often do you use it to read information on agriculture?
- 1. Never-----

- 2. Sometimes-----
- 3. Always-----
- 4. Occasionally-----

Household Labor Availability

51. Did you face labor shortage in production of crops in the last *meher* season (2001/02 E.C)?

- 1. Yes-----
- 2. No-----

52. If Yes to Question 51, how did you solve it?

- 1. By hiring -----
- 2. Using local based cooperation-----
- 3. If any other, please specify _____

Farmers Perception on Distance to Local Market

53. How do you perceive the distance of the market in *woreda* from your home?

- 1. Near-----
- 2. Far-----
- 3. Very far-----
- 4. I have not yet perceived the distance of the market from my home-----

54. Have you visited demonstration plots of successful farmers?

- 1. Yes -----
 - 2. No-----
-

Appendix II: Check List Guide for Focus Group Discussion and Depth Interviews

I. Check List Guide for Focus Group Discussions (FGDs) with Household Heads

Date: _____

Kebele: _____

Participant (household head):

Number of women: _____

Number of men: _____

Total Number: _____

Guidelines for FGDs

Focus group discussion is essential to learn about the experiences and perceptions of people and to address a single topic in depth. One can rich insights for a given issue during a focus group interview since the comments of each respondent can stimulate reactions from the other respondents. Participants, range from 6-10 people, with similar experiences or socio-economic backgrounds are selected. This makes them to feel comfortable to talk with one another. In the current study focus group participants are selected purposively from different wealth categories and from adopters and non adopters of a crops technology package.

Introduction

First of all, I would like to thank those of you who are coming to participate in this focus group discussion/interview. The objective of this discussion is to identify the factors that hinder farmers from adopting corps technology package.

You feel free and confident on what you are going to say on the topic during discussion with one another. No one will have access to your information for other purposes than academic one.

I would like to ask you that you have to participate fully, respect comments of all participants.

A discussion will last from 1 to 1½ hours .We will have refreshment at the middle of the discussion.

(A) Questions to Farm Households of Different Wealth Categories

1. What were locally believed causes of poverty? Please rank them according to their importance?

Probe for:

- ☞ Income loss
- ☞ Physical weakness/illness
- ☞ Social and physical exclusion
 - a) Road access
 - b) Access to market
 - c) Education, training
 - d) Extension services
- ☞ Vulnerability
 - a) Crops disease/crop failure
 - b) Drought
 - c) Food shortage during pre-harvest season
- ☞ Powerlessness

(B) Questions to Non Adopters of the Crops Technology Package

1. Do you think that application of improved agricultural technologies improve the productivity of the land? If yes, why did not you use them? If no, why? **(Probe)**.
2. What were the possible reasons that hindered you from adopting the components of crops technology package?

Probe for:

- Improved seeds
 - Chemical fertilizers
 - Irrigation
2. Can you explain for us the possible solutions to tackle the above mentioned problems of adopting crops package? What responsibility does the *woreda's* agricultural and rural development have? What preparations do think you have for adopting the package?
 3. Do you think that the current state of disseminations of agricultural technologies enough? If no, what do you suggest?**(Probe)**

4. What possible mechanisms do you suggest to make all farm households beneficial of crops technology package?

II. Check List Guide for In-depth Interview with Extension Workers

1. Were all farmers accept your advises on the farm-related issues? If not, why?
2. Could you give me the detail on the possible factors that influence farmers' adoption of components of crops technology package such as improved seeds, organic fertilizer, chemicals, irrigation and the advice of agricultural extension workers too(**Probe**).
3. Were there any cultural beliefs and practices that hamper farmers from adopting the above -mentioned components of a crops package? If yes, please provide details on how they affect them? Describe the cultural beliefs for each component of crops technology package? (**Probe**).
4. Could you please describe the strategy (strategies) that you have used when you disseminate the improved seeds, fertilizer and chemicals?
5. The vision of the agricultural policy of Ethiopia is to make poverty history. As I have seen from the wealth ranking exercises, there are poor people, mainly female headed households. Did you have any strategy to reach these poor households? If yes, what? If no, why not?
6. To what extent the indigenous farming knowledge of the farmers was involved in the development of crops? (**Probe**).
7. What criteria you have taken when you fist disseminated agricultural inputs to farmers?
8. Did farmers take training on crops technology package so far? If no, why? If yes, what are the basic techniques that have been always used to train farmers about crops technology package? What are the criterions that you have take in to consideration when trainees are selected?
9. Could you tell me please the ways how members of development committee are selected in?
10. To what extent the living standard of adopters of a crops technology package is improved as compared to non adopters? Could you please describe the indicators of improvement?

Appendix III: List of Names of “Gotts” of Sampled Kebeles

<i>Koso-ber</i>	<i>Yitam-na-kosta</i>	<i>Yizaba-na-woyin</i>	
1. <i>Tach-temre</i>	1. <i>Kosta</i>	1. <i>Ayna amryam</i>	11. <i>Shenko-mentir</i>
2. <i>Temre-afaf</i>	2. <i>Batug</i>	2. <i>Debr</i>	12. <i>Sis-gedel</i>
3. <i>Gorebela</i>	3. <i>Imbitata</i>	3. <i>Silase-gedam</i>	13. <i>Shera-fit</i>
4. <i>Melet</i>	4. <i>Arid-amba</i>	4. <i>Yizaba</i>	14. <i>Fura-na-gongo</i>
5. <i>Fila</i>	5. <i>Madia-ber</i>	5. <i>Korontos</i>	15. <i>Gena-memcha</i>
6. <i>Jem-na-shemshem</i>	6. <i>Lay-yita</i>	6. <i>Zurit-amba</i>	16. <i>Mamid-amba</i>
7. <i>Koso-na-lay amba</i>	7. <i>Meha- yita</i>	7. <i>Korech-na-tucha</i>	
8. <i>Den-na-kurkur amba</i>	8. <i>Tach-yita</i>	8. <i>Belbela</i>	
	9. <i>Wat-mesno</i>	9. <i>Ashal</i>	
	10. <i>Kib-beret</i>	10. <i>Mosebit</i>	
	11. <i>Gezet-amba</i>		

Source: *Tarmaber Woreda* Agricultural and Rural Development Office (2009)

Declaration

This thesis is my original work and has not been presented for examination in any study program of any institution or University and all sources of material used for the thesis have been dually acknowledged. No part of this thesis could be reproduced without permission of the author and/or that of Addis Ababa University.

Declared by:

DAWIT YEKOVESEW

Candidate

DAWIT YEKOVESEW

Signature