Farm assets and nonfarm activities characteristic and determinants of nonfarm activities in small holder farmers:

The case of North east Ethiopia, Tehuledere District.

Prepared by: Theodros G. Abebe

Submitted in Partial Fulfillment of the Requirements for the Degree of Master's in Management, Economics and Consumer Studies

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Acronyms

ANRS	Amhara National Regional State
Birr	Ethiopian currency with the current exchange rate 1 Euro = 22 Birr
CSA	Central Statistics Agency
GDP	Gross Domestic product
m.a.s.l	meter above sea level.
MoFED	Ministry of Finance and Economic Development
MVP	Multivariate Probit Model
PA	Peasant Association
PASDEP	Plan for Accelerated and Sustainable Development to end Poverty
RICS	Rural Investment climate survey
RNFE	Rural non-farm economy
TDOARDO	Tehuledere District Office of Agriculture and Rural Development
TLU	Tropical Livestock Unit
WB	World Bank

Abstract

Poverty in rural areas of Ethiopia has its root, in low productivity, landlessness and erratic weather dominant areas. Small and fragmented farm size coupled with low level of technology, soil degradation and poor infrastructure, have reduced the capacity of small holder farmers to undertake long term investment on the farm. Therefore non-farm activities provide employment right in their own and also supplement agricultural incomes.This study was conducted with the objective of analyzing and identifying the factors that influence the nonfarm activities in tehuledere district. In order to achieve this objective, primary data were collected from 206 randomly selected households by using structured interview. For the data analysis, descriptive statistics including mean, frequency and percentages were used to describe the farm and nonfarm characteristics of the households. Moreover, t-test and chi-square analyses were employed to compare the nonfarm participant and nonparticipant group. A multivariate probit model was used to analyze the factors that influence participation non-farm activities. A total of 15 explanatory variables in five groups (asset, household characteristics, individual characteristics, time endowment, and price proxy) were considered in the regression. Out of these, cultivated land, Age of household, sex of individual and education variables were found to be significantly influence in the participation of the three types of nonfarm activities (handicraft, trade and sale of food/drink) at different significant level. Therefore, these factors need to be taken into account in planning of rural farm and nonfarm activities by policy makers to come up with projects that can win acceptance by the community.

CHAPTER ONE

I. Introduction

In most developing countries, agriculture is the back bone and the main sector for both its contribution to the GDP and generation of employment. In most African countries, agriculture is the major economic activity accounting the highest share of the GDP. For about two-thirds of the Sub-Saharan population who live in rural areas, the main income comes from agriculture (Csaki and de Haan, 2003).

Although agriculture is the major source of income and employment in most rural areas of population in developing countries, rural households are increasingly earning their livelihoods from non-farm activities. The rural non-farm economy (RNFE) is growing in the last decades. As Haggblade et al. (2002) indicated, at the beginning of the new millennium, around 25 per cent of rural areas full time employment and 35-40 per cent of rural area incomes were accredited to the rural nonfarm economy in the developing countries. Effective development of the RNFE can make major contributions to economic growth and poverty reduction, often by helping multiply and spread the benefits from growth in sectors such as agriculture (Wiggins and Hazell, 2011). This approach has several advantages, especially for poorer households. Their agricultural resources are often too limited to allow for efficient use of all household labour, and nonfarm activities can offer an alternative remunerative allocation, especially during the lean season. Besides, income from agriculture is subjected to high risk due to climatic factors, price fluctuations, pests and diseases. Earnings from nonfarm employment may help to buffer the resulting income fluctuations and improving household security (Lanjouw and Lanjouw, 1995).

Many researchers indicated , nonagricultural activities implemented in rural area are crucial in bringing rural economy progress. For example, over the last three decades the nonfarm economy has got an acceptance in rural developmental issues because of its positive influence on poverty and food security. Participation in rural nonfarm activities is one of the livelihood strategies among poor rural households in many developing countries (Mduma and Wobst, 2005). There is an argument that Africa economies want to be less dependent on agriculture to reduce poverty. Nonfarm enterprises by small holder farmers play an important role in the early stages of diversifying beyond agriculture (Loening et al., 2008). However, very little is

known about the characteristics, constraints and opportunities of nonfarm enterprises (Lanjouw and Lanjouw, 2001); which makes it difficult to assess how this class of enterprises might contribute to poverty reduction. One view is that nonfarm activities provide a way for out of poverty (Loening et al., 2008).

1.1. Statement of the problem

There is a rapid population growth in Ethiopia which resulted in small and fragmented land holding reducing labour productivity and leading to a widespread underdevelopment over the country. The rapid growth rate of youth population, especially, led to youth dependency burden which in turn increases the consumption of basic goods and services and decreases the capacity of domestic savings affecting investment and economic growth (Hailemariam et al., 2011).

As MoFED (2008) indicates, the current high population growth rate brings burden on natural resources, especially on land. The population density of Ethiopia increased from 49 person per Km^2 in 1993 to 71 in 2009 (CSA, 2009) and agricultural density (a ratio of rural population to cultivated land area per hectare) increased from 5.2 person per hectare in 1995/1996 to 7.1 person in 1999/2000 (CSA 1996; 2002). Thus, Scarcity of land is a critical bottleneck nationally in general and in the study area in particular. Farm households are endowed more with labour than with capital and land.

In addition to land scarcity, agricultural production seasonal and, therefore, rural labour cannot be employed throughout the year which needs to widely develop nonfarm activities (Woldehanna, 2000). These non-farm activities diversify the economy and it could be a crucial strategy for the government to fight against poverty, as it absorbs labor thereby minimizing unemployment. But, the existing development conditions give less attention to nonfarm activities and their linkages to agriculture. This is partly due to the fact that the role of the rural non-farm sector in the rural economy is underestimated. The rural non-farm activities and their linkage with farm activities are not as such recognized and this knowledge gap is reflected in policies of most developing countries (Lanjouw and Lanjouw 1997).

Many rural households are not undertaking nonfarm activities due to lack of asset to start the business. Others are confined with less important activities that cannot allow them to grow out of poverty. Thus, identification of the factors determining access and income from nonfarm activities is crucial for policy makers to inform and adjust policies in the rural domain (Reardon et al., 2007).

Most households in the district rely on rain fed agriculture for their livelihood, but population growth has led to fragmentation of available arable land, and average farm size has dropped below one hectare. The traditional development approach of providing technology and infrastructure to increase agricultural production has not succeeded in curbing the trend of increasing poverty, and alternative sources of productive employment must be sought in order to support the additional workforce created by population growth (van den Berg and Kumbi, 2006). Traditionally the rural economy was considered as purely agriculture. Hence policy makers at national levels equate improving the rural economy with promoting and supporting agriculture (Csaki and de Haan, 2003). Therefore this Research was done to contribute to understanding on the determinants of nonfarm participation and describes the characteristics of farm and non-farm activities to the area in particular and for the Amhara region in general.

1.2. Objective of the study

The general objective of the study is to analyze and identify farm and nonfarm activity characteristics and determinants of nonfarm activities participation in small holder farmers.

1.3. Research questions

This study answers the following basic questions:

- What are the farm characteristics of smallholder farmers in the area?
- What are the characteristics nonfarm activities of smallholder farmers?
- What are the determinants of nonfarm activities in smallholder farmers in the study area?

1.4. Organization of the study

The remaining parts of the thesis are organized as follows. The second chapter presents an overview of nonfarm activities in Ethiopia. The third chapter deals with the reviews of related theoretical and empirical literatures about nonfarm employment, the fourth chapter includes data collection and methodology of the study. In the fifth chapter, the data are analyzed and the descriptive and regression results are discussed. The sixth chapter consists of the summary and conclusions.

CHAPTER TWO

II. Background

2.1. Background of Ethiopia Economy

Agriculture is a backbone of Ethiopia's economy. The sector constitutes 51% of the national GDP, a means of employment for 80% of the total labor force in the country, and a source of income, food and foreign currency. About 90% of this agricultural production comes from smallholder system which is a dominant farming system (Alemu et al., 2008).

The performance of agricultural sector in Ethiopia is weak. It is traditional and subsistence oriented (Alemu et al., 2008). Factors which resulted in low productivity of agricultural sector include degradation of natural resources, lack of access to agricultural inputs and markets (Jayne et al., 2003). As there is a rapid population growth, it needs income diversification approaches so that promotion of non-farm enterprise activities is being considered as a promising facilitator of development by Ethiopian government, as manifested in the Plan for Accelerated and Sustainable Development to end Poverty (PASDEP) (Loening et al., 2008).

2.2. The nonfarm Economy in Ethiopia

Size of nonfarm economy

There are variations across studies in the size of rural nonfarm employment and income reported. The proportion of rural households who participate in nonfarm employment is reported to be 81% in Tigray (woldenhanna and Oskam, 2001), 60% in Harerge (Tefera et al., 2005) and 25% in Oromia (Van den and Kumbi, 2006). In welayita, 19% all adults participate in nonfarm employment (Carswell, 2002). Likewise, the share of nonfarm income in total income is 35% in Tigray, 20% in Harerghe, 13% in central and southern regions of Ethiopia (Mutssumoto et al., 2006) and 8% in Oromia. Moreover, nonfarm income account for 44% of cash income in south part of Ethiopia, Wolayita. The differences in the share may be a reflection of the varied agroecological, market and infrastructural conditions in the different part of the country. Differences in survey dates and methodology may also contribute to different nonfarm activity visibility. Most of the nonfarm participants are self-employed except in Tigray where majority (72%) was in wage employment (woldenhanna and Oskam,

2001). This is probably because of the huge food-for-work-programme in Tigray. In fact, 58% of sampled households in the above study were engaged in food for work.

Central statistical Agency of Ethiopia, in collaboration with the World Bank, conducted a unique survey of nonfarm enterprises that covered four major regions of Ethiopia (where 90% of the population lives) in 2006/2007 collecting data on households and enterprise in rural areas. The survey covered 14,646 households and provided information on enterprises start-up, constraints and other operational characteristics. A quarter of all rural households engaged in nonfarm enterprise sector in Ethiopia, either as primary occupation or as part-time employment. There was non-negligible difference in the participation rate across regions with the lowest in Amhara and the highest in southern region. Most enterprises were in trade sector (52%) and most common trade activities were retail sale via stall (shop) and markets (26%). Of female headed households, 41% of them were engaged in nonfarm enterprises whereas only 15% of male headed households (CSA 2007).

Although the proportion of households engaged in nonfarm enterprises was significant, most of the businesses were small and informal and seem to have income smoothening as the main objectives. Almost half of the households reported supporting agricultural income as the main motive for starting business while only 3% reported market opportunities as a motive. The average number of employee in the enterprises was 1.3 and only 3% of the enterprises were registered (CSA 2007).

2.3. The Rural Nonfarm Enterprise Sector in Amhara

Amhara national regional state is the second largest state of Ethiopia next to Oromia region. Participation of nonfarm enterprise is lower in Amhara region compared to other regions as indicated in earlier parts of this report.

After having an overview of the nonfarm enterprise sector in Ethiopia's four major regions, now turn to a more detailed investigation of the nonfarm enterprise sector in Amhara region. Based on evidence from rural investment climate survey (RICS) by CSA and World Bank studies, only 4 % of the Amhara working population was primarily participated in nonfarm activities. In general 277,000 individuals or 6.4% of the working population in the regions were participated in nonfarm activities as primary or secondary occupation, the other 91% of

rural population in Amhara region engaged in Agriculture as primary occupation (Loening et al., 2008). The study area of survey did not include the South Wollo administrative zone.

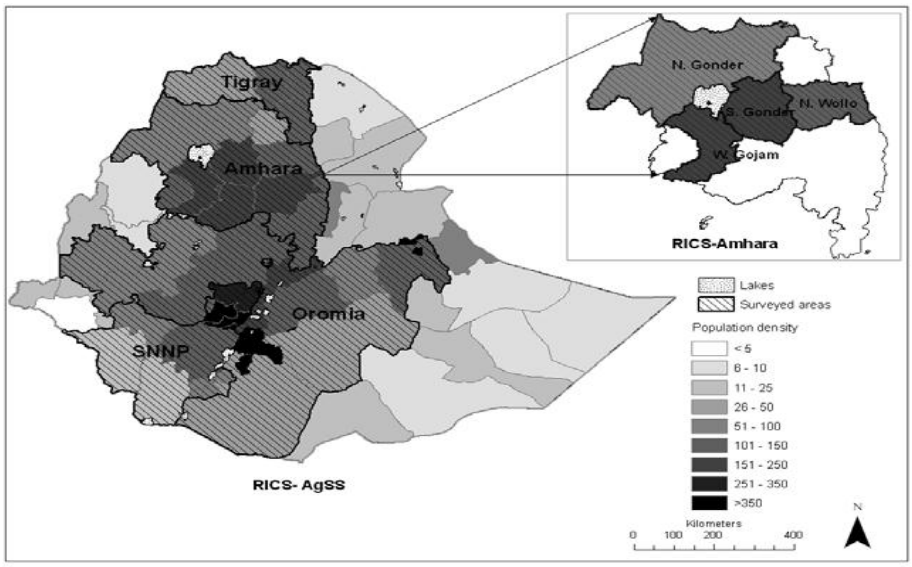

Figure 1: Coverage of the Rural Investment Climate Surveys, 2006/2007

Source: CSA and World Bank (2008).

These statistics results clearly indicated that agriculture plays an important role in rural areas of Amhara national regional state which indicated that the share of the rural population engaged in nonfarm employment, here defined as either wage employment or self-employment in nonfarm enterprises was lower than the African average (10.9%) which was reported in Haggblade et al. (2007).

As study by Liedholm (2002 indicates the share of population employed in small firms in Africa and Latin America was high compared to Amhara national regional state. Furthermore, the nonfarm enterprise activity is most of the time a secondary activity.

CHAPTER THREE

III. Litrature Review

3.1. Concepts and Definitions of nonfarm activities

Rural households are increasingly earning for their livelihoods from different activities other than farming: the rural non-farm economy (RNFE) is growing through times. Effective development of the RNFE can make important contributions for the economic growth and poverty reduction in rural area, often by supporting multiply and spread the benefits from growth in sectors such as agriculture, and by linking urban to rural areas (Wiggins and Hazell, 2011).

Different literatures have shown that agriculture is not the only important sector in the rural economy. Studies in different developing countries have shown that the nonfarm sector plays a significant role in contribution of employment and income in the rural areas (Lanjouw and Lanjouw, 2001; Haggblade et al., 2007). Apparently Wiggins and Hazell (2011) indicated that nonfarm activities are increasingly important in rural areas: a growing share of households participate in them, while they provide increasing proportions of rural household income.

The scale of individual rural nonfarm activities varies enormously from part-time self-employment in household based cottage industries to large scale agro-processing and warehousing facilities operated by large multinational firms. Often highly seasonal, rural nonfarm activity fluctuates with the availability of agricultural raw materials and in rhythm with household labor and financial flows between farm and non-farm activities (Wiggins and Hazell, 2011).

Poor people dominate many of the low return activities such as cottage industries, small-scale trading and unskilled wage labour used in construction, and many personal services. Wage labour, in both agriculture and nonfarm business, also accrues primarily to the poor. In contrast, white collar jobs such as medicine, teaching, accounting and administration figure most prominently among higher income households. Poor households tend to dominate those types of

non-farm businesses that are labour intensive and can be conducted competitively on small scales and with limited capital. For this reason, many policy makers view the rural non-farm economy as a potentially important contributor for poverty reduction. Others, however, fear that an abundance of labor-intensive, low-return rural non-farm activities may signal distress diversification and an absence of more productive opportunities given that low capital frequently translates into low productivity and low returns to labour (Shand, 1986 and Islam, 1987).

Definitions of Non-farm activities

There are broadly two categories of non-farm activities being pursued by the households. One form is the non-farm proper, which includes the livelihood sources namely, artisans/service, trade and white-collar jobs. These are either activities which are being pursued by households on a regular or seasonal basis within the village to meet the local demand or government jobs pursued regularly within or outside the village, or manufacturing or service sector jobs undertaken in the village regularly. The second form of non-farm activities is what may be called non-farm migratory. This activity is classified under wage labor in activities like construction, earthwork, factory work and loading (Shylendra and Thomas, 1995).

According to Woldenhanna (2000), non-farm activities in which farm household participates can be categorized into wage employment and self-employment activities. Three types of wage employment can be distinguished, namely paid development work, manual non-farm work, and non-manual (skilled) non-farm work. Paid development work involves jobs in community micro dam construction, community soil and water conservation works such as construction of terraces and afforestation, and other community works done under the food-for-work program. Manual non-farm work is an activity in which farm households work for private and public construction companies in urban and peri-urban areas. Non-manual (skilled) non-farm work involves masonry, carpentry and cementing in public and private construction sites. Non-farm self-employment comprises mainly petty trade, transporting by animals on their back, stone mining, pottery and handicrafts, selling of wood and charcoal, local brewery and selling of fruits.

Defined in another way, non-farm activities include all secondary and tertiary sector employment of both permanent and casual nature. Since these activities are quite diverse, a number of different terms are used in the literature to refer to non-farm employment. Broadly speaking, non-farm activities in the rural areas can be divided into the following categories (Meyer, R. L, 1991):

a. Small-scale industrial activities such as food processing (flour milling, oil processing, soap making and food processing)

b. Cottage industries (handicrafts, spinning of cotton or wool, cloth weaving and dying, pottery, leather tanning and distilling local brews)

c. Artisan activities (blacksmiths, masonry, wood work/carpentry, house construction, repair services and fabrication of farm tools)

d. Commercial activities (trade and transportation)

e. Infrastructure development activities (special public works, feeder roads and irrigation works, and food-for-work programs) and

f. Formal employment including professional and administrative jobs.

3.2. The nonfarm economy in the rural development debate

The rural development thinking has passed through several shifts, from the dual economy view of the modernization paradigm to that of the agricultural-led growth paradigm (Ellis and Biggs, 2001). In the dual economy view, the contribution of the agricultural sector to growth is to transfer resources, particularly labor, to the manufacturing sector (Fei and Ranis, 1964) while the agricultural-led growth paradigm sees agriculture playing an active role in driving growth through production and consumption linkages (Johnston and kilby, 1975). In the different version of debates in these two major paradigms the central point of discussion was the role of agriculture in rural development. The nonfarm economy came into the discussion in reference to its relation with agriculture. With the sustainable livelihood approach, the nonfarm economy comes more explicitly and frequently in to rural development thinking .The livelihood approach recognize and emphasizes the diversified nature of rural household' assets and livelihood strategy(Ellis, 2000). Because nonfarm activities have become an important component of rural households' livelihood, much of this literature focuses on diversification into rural nonfarm

activities (Haggblade, 2007). Diversification is explained by the 'Push factors' such as limited risk bearing capacity, constraints in labor and markets and climate uncertainty or the 'pull factor' such as presence of local engines of growth including commercial agriculture or proximity to an urban area (Barrett et al., 2001).

3.3. Different studies of nonfarm in many countries

Different evidences document showed that nonfarm activities in rural areas have surfaced much earlier than the theoretical and policy recognition of the nonfarm economy. The data collected to investigate the surplus labor assumption of the dual economy model in the 1970s showed large size of nonfarm labor use in developing countries initiating interest in small scale and rural nonfarm business activities (Haggblade, 2007). The studies on micro and small scale industries on income diversification give some insight in to the rural nonfarm economy in developing countries.

Size and importance of rural nonfarm economy

Nonfarm activities account for 30 % of full-time rural employment in Asia and Latin America, 20% in west Asia and North Africa and 10% in Africa (Haggblade et al., 2007). These figures are from national censuses and typically include only primary occupation. The real extent of nonfarm participation is likely to be higher than what the national statistics suggest since many farmers engage in nonfarm activities as part-time employment or during agricultural slack seasons (Anderson and leiserson, 1980). A recent multi-country study that uses data from 15 countries found nonfarm participation rate, including both primary and secondary employment, in range of 67-94%(Winters et al., 2009).

When these are considered, the participation rates are 83% for Asia, 82% for Latine America and 78% for Africa (Winters et al., 2009). The size of nonfarm employment is reflected in the level of income rural households earn from it.

The following table 1 household Survey result showed that non-farm income accounts for about 35% of rural income in Africa and approximately 50% in Asia and Latin America. Based on the

survey, suggests that nonfarm activities play an economic importance in different continents (Readen et al., 2007).

Table 1: Non-farm share of rural income

Region	Nonfarm share of rural income		
	Total nonfarm earning	Local nonfarm business and employment	Transfer and remittances
Africa			
Excluding	34%	28%	6%
Namibia			
Namibia	75%	26%	48%
Asia	51%	40%	11%
Latin America	47%	41%	6%

Source: Reardon et al. (2007), Table 6.1, were summarizing 54 rural income surveys from the 1990's and 2000's. Total citations include 23 for Africa, 2 for Namibia, 14 in Asia and 17 in Latin America.

There are off course Variations within each region. In Africa, for example, the share ranges from 6% in southern Mali to 93% in the unfavourable zones of Namibia (Readen et al., 2007).The share of nonfarm income increases with increasing levels of GDP per capita (Davis et al., 2010). Moreover, income from nonfarm activities has been increasing in importance over time countries (Reardon et al., 2001).

According to Wiggins & Hazell (2011), rural nonfarm employment crucially importance important for woman in developing countries. Women account for about one-quarter of the total full time RNFE workforce in most parts of the developing world.

Similarly, household don't have lands and near those of households depends greatly on nonfarm income sources. Households with less than 0.5 hectare earns between 30 and 90 per cent of their income from nonfarm activities (Hazell and Haggblade, 1993).

Composition

The composition of rural nonfarm employment for developing countries is 20-30% in manufacturing sectors; 20-30% in commerce; 5-15% in construction; 5% in transport and the rest in utilities and other activities (Anderson leiserson, 1980). Within each category there are differences across countries and between regions within the same country with regard to the details of the nonfarm activities (Reardon et al., 2007). For example, in Africa the rural metalwork sector is largely confined to blacksmithing and welding while in irrigation region in Pakistan it includes small-scale manufacturing of diesel and electric well pump sets (Anderson leiserson, 1980).

Studies also indicated that rural nonfarm wage employment is often more important than rural nonfarm self-employment and income from the service sector is more important than income from the manufacturing sector (Reardon et al., 2007). The importance of wage income versus self-employment income tends to be corrected with higher incomes and denser infrastructure (Reardon et al., 2007).

Impact of rural nonfarm economy

Several cross-sectional studies in Africa and Latin America show a positive correlation between nonfarm participation and total income (Reardon et al., 2001). Some studies also found nonfarm employment contributing to increase in agricultural investment (Ruben and Van den Berg, 2001; Bezu and holden, 2008).These findings suggests that, expansion of nonfarm economy may play a positive role in reducing poverty.

Nonfarm Expansion can play a significant role in reducing poverty if most of the poor have access to employment in the sector. But it is not always the case that the nonfarm sectors are more inclusive of poor. In east Africa household members from low-agricultural potential are found to be more likely to be engaged in the nonfarm sector than those in high-agricultural potential (Matsumoto et al., 2006).

While there is evidence of positive correlation between nonfarm participation and total income across several countries, the relationship between the share of nonfarm income and total income

or wealth is not so uniform. In some cases the poor get a higher share of their income from nonfarm activities (De Janvry and Sadoulet, 2001) thereby expansion of the nonfarm sector contributes to greater equality while in others, as shown for most of African studies (Rearden, 1997), the rich and wealthy get a higher share of their income from nonfarm activities implying an inequality increasing nonfarm economy.

Determinants of participation in Rural Nonfarm Employment (RNFE) in Ethiopia

The studies that examine the factors that influencing participation in nonfarm employment used different methodologies and different units of analysis, due to this condition comparison of results difficult. Still some common features arise such as negative effect of agricultural production or income and positive effect of family size and being male (or male headed household)

Tefera et al., (2005) using logit model, analysed nonfarm participation decision of households. They found that nonfarm participation to be negatively correlated with agricultural income and Self-sufficiency and positively correlated with adult male labor. In their participation analysis, Matsumoto et al., (2006) set out to estimate multinomial probit model of occupational choice for individuals in farm, local nonfarm, and migration activities in Ethiopia, Uganda and Kenya. However, because of the number of migrants in the Ethiopia sample was very low (only 15 individuals in the members of 420 household), they combine local nonfarm and migration activities in the Ethiopia data which effectively makes the regression a binary model. The result shows that men are more likely to participate in nonfarm employment. Participation increases with age and the number of local language the respondent can speak and decreases with years of schooling. I find the later result counter intrusive and contrary to what is found in other studies and the result they themselves report for Uganda. None of the household level characteristics were significant but they found that individuals from community with good land productivity are less likely to participate in nonfarm employment. They also estimated households' income from farm and nonfarm activities separately. The result indicates that nonfarm income increases with total assets owned and average years of schooling for adults in the household. Nonfarm income decreases with the number of children in the household.

Woldenhanna and Oskam (2001) estimated tobit modes for household labor supply to nonfarm employment, separately for wage and self-employment. They found upward sloping labor supply curve for both types of activities. Moreover, they found that labor is negatively correlated with agricultural land, livestock and non-labor income. They also estimated a multinomial logit model to analyze the choice between the two types of nonfarm employment. They found that nonfarm wage employment increases with family size and decreases with agricultural production and the number of dependents. On the other hand, self-employment increases with agricultural production and is not affected by demographic factors. They argue that the results imply that households engage in self-employment to gain attractive returns while they engage in wage employment because of push factors. Their study does not find significant effect of education. Van den Berg and Kumbi (2006) estimated tobit models for income from handicraft, food/drink and trade separately. They found that own cultivated land is positively correlated. This is similar to the result from woldenhanna and Oskam (2001). Moreover, they also found that households with heads who are married and literate are more likely to engage in food/drink production and trade.

CHAPTER FOUR

IV. Data and Methodology

4.1. Description of the Study Area

Ethiopia is divided into nine regional states which are further structured into Zones and Districts. The Districts are further classified into peasant associations/kebeles. The study was conducted in Tehuledere District, South Wollo zone of the Amhara National Regional State (ANRS) which is located in the northern east part of Ethiopia. It is one of the 22 Administrative Districts of the South Wollo administrative zone of the Amhara National Regional State (ANRS). It shares borders with Dessie Zuria Destrict in the south, Harbu District in the north, Worebabo and Kallu district in the east, and Ambassel and Kutaber District in the west. It is one of the easily accessible places because the Addis Ababa to Mekele highway passes through the district crossing Haik town which is situated 430 Km away from capital city of Ethiopia.

Tehuledere is 45, 800 hectares wide. The topography of the District can be described as rugged and broken. Elevation ranges from 1400 m.a.s.l up to 2928 m.a.s.l. The average annual precipitation and the average monthly temperature were estimated to be 1030 mm and 21 degree Celsius respectively (TDOARDO, 2010).

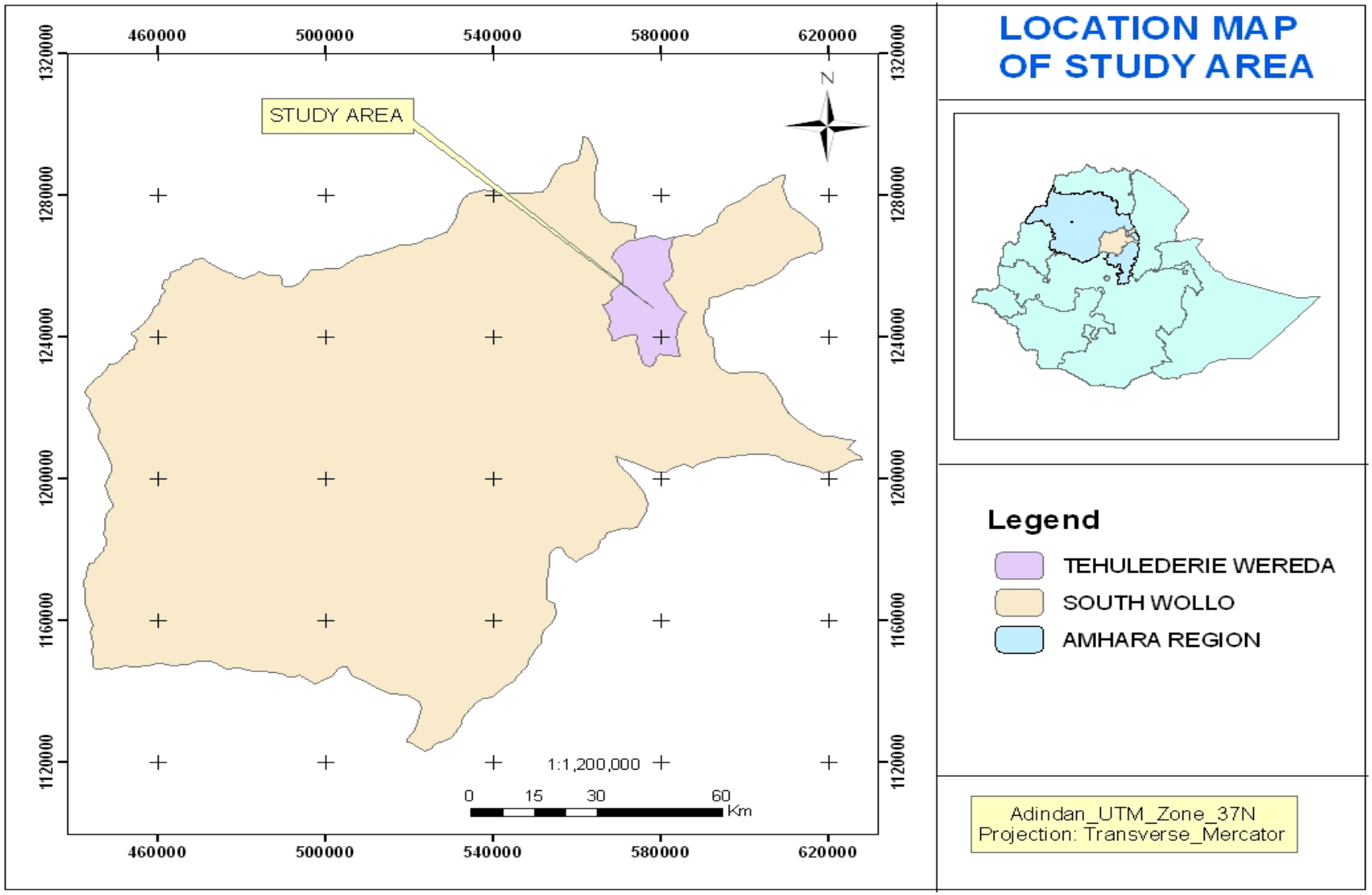

Figure 1: Location map of the study area

The land use features that cover the area are forest and bush land, built up area, barren land, agricultural land, and water covered land. The land use features that take up the largest part of the study area is agricultural land with a total area of 21,539 hectare and a share of 47% out of the total area. The second major land use is forest and bush land as it accounts for 31.2% of the total area. In the District there are many water resources available which cover about 8.3 % or about 3800 ha (Table 2). There are 7 rivers, 82 springs and 2 lakes .These water resources are used for drinking water, fishing , irrigation and as a source of energy for water driven mills (TDOARDO, 2010).

Table 2: The Land Use Pattern of the Study District

Land Use types	**Area(ha)**	**Per cent**
Agricultural land	21,539	47
Forest and bush land	14,308.20	31.2
Built up Area	4,490.80	9.8
Water Covered	3800	8.3
Barren Land	1000	2.2
Grazing	662	1.4
Total	45,800	100.0

Source: TDOOARD, 2010

The total human population of Tehuledere district was about 139,240. About half (50.34%) of this population was male while the remaining 49.66% is female. The District possesses 24,890 households, in which on the average 5 people live per household. The rural community makes up 88.2% of the district population while the urban population makes up only 11.8% of the District population. Out of the total rural human population 122,862 (or 50.8%) are male and 60,355 (or 49.2%) are female. According to the same source, the population is young, as children less than five years of age constitute 36.6% and 19.3% of the urban and the rural population, respectively (CSA, 2008).

The Amhara region enjoys diverse agro-ecological zones with altitudes ranging from 500m to 4620 m above sea level. However, due to its long history of settlement and other socio-economic conditions as well as policy-related factors, much of the region is devoid of vegetative cover. This is clear evidence of the serious disturbance it has been subject to for many years (Waktola, 1999).

As indicated in table 4 the agro-ecological zones in Ethiopia vary greatly in terms of rainfall, length of growing period and average annual temperature. As a general rule, the higher we go, the colder it becomes and the longer is the growing period (Table 3).

Table 3: Traditional Classification of Agro-ecological Zones in Ethiopia

Agro-ecological Zone	Altitude (meters)	Rainfall (mm/year)
Wurch (cold and moist)	> 3200	900 - 2200
Dega (cool and humid)	2300 - 3200	900 - 1200
Weyna Dega (cool sub-humid)	1500 - 2300	800 – 1200
Kola (warm semi-arid)	500 – 1500	200 - 800
Berha (hot arid)	< 500	under 200

Source: (MoA, 2000)

The District is divided into three Agro-ecological zones, namely Dega (highland), Woinadega (medium land), and Kolla (Lowland) (Table 4).

Table 4: The Agro-ecological condition of the studied area

Agro-Ecology Zones	Area share (%)	Population shares
High land	13	13.4
medium land	72	74.1
Low land	15	12.5
Total	100	100

Source: TDOARDO, 2010.

As the largest portion of the District is rural, most of the populations relies on Agricultural activities. As much as 91.25% of the total population of the district rely on Agricultural activities. The second major income source is nonfarm employment. Different nonfarm activities are engaged in the district (TDOARDO, 2010).

The Friday market of Haik town is a big market with very distinct sections for cereals (like sorghum, teff and maize), fruits, vegetables, coffee (raw and dried), cattle, small ruminants, cloths, electronic equipment, baskets, wood, and etc. The village markets are usually of short duration and are located in very remote areas of the District.

4.2. Data source and method of data collection

The survey was carried out between December 2011 and March 2012. During this time data was collected from primary and secondary sources. Secondary sources include published and unpublished materials about farm and nonfarm activities. These materials were collected from the district level office of Agriculture and Rural development, the zone level department of Agriculture and Rural development, the District micro finance institution, and the kebele level office of Administration. In order to assess the farm assets and determinant factors of nonfarm activities, primary data was obtained from direct interviews with the respondents. The respondents were household heads of selected kebeles (lowest administrative unit).

Primary data was collected from households using a structured questionnaire. In addition, discussions were held with elders and key informants to access detail information. Formal and informal methods of data collection were employed. Formal data collection entailed employing a structured questionnaire. The data includes social, institutional, and economic variables from the sample respondents. The Informal method consists of group discussions with farmers, development agents, relevant agricultural professionals and administration offices at all levels. Before the interviews, the questionnaire was translated into the local language, Amharic.The questionnaire was pre-tested before conducting interviews with the whole sample.

4.3. Sampling techniques and procedures

A multi-stage sampling technique was used to select sample households. In the first stage, based on the information of the District office of Agricultural and rural Development, we stratified the district of 20 peasant association (PA) into 3 agro-ecological zones: lowland, medium land and highland. In the second stage, based on agro-ecological zones 3 PA were selected randomly (1 peasant association from each agro ecology). In the third stage, based on random sampling methods the respondents were selected from peasant associations. The size of the household on kebeles was determined based on the probability proportional to size principle (table 5). Based on time available 206 households were interviewed.

Table 5: Sampled Kebeles and respondents

	Total number of Household	**Sex of Household Head**		**Total No. of respondents**	**Percentage**
		Male	Female		
Lowland(Pasomile kebele)	1187	65	5	70	34%
Medium(Korke kebele)	1136	64	3	67	33%
Highland(Messal kebele)	1170	57	12	69	33%
Total	3493	186	20	206	100%

Source: Own survey, March 2012.

4.4. Empirical model

Conceptual framework for participation of nonfarm activities:

Most of the households in the Tehuledere district are subsistence-oriented, with labor markets almost absent. The majority of households depend on self-employment on their farm using own labor resources or supply their outside their farm. The percentage of farmers that have access to credit services is very small. The agricultural productivity of the area is low and risky such that most of the produce is used for consumption. These conditions imply that market prices alone do not govern the allocation of household resources to the different productive activities in the

absence of insurance markets. That is, the household does not simply maximize profits, and production and consumption decisions are non-separable. The household approach is justified when both production and consumption decisions are interrelated (Caillavet, 1994), and when household characteristics play an important role in determining household behaviour, as is the case in imperfect markets (Lofgren and Robinson, 1999).

What do these ideas imply for the determinants of nonfarm activities in this study? Poor households are those with low asset endowments. Most of the capital in the study area is agricultural capital such as land and other agricultural assets, as this is the dominant productive sector and most nonfarm activities are capital extensive.

As Reardon et al. (2006) indicated that agricultural capital has two functions. First, an increase in agricultural capital leads to a higher productivity of both labour and liquid capital in agriculture thereby leading a lower use of these resources in the non-farm sector. The Second function is that it facilitates engagement in the nonfarm sector in that more agricultural capital implies higher liquidity. Thus, there are two contrasting factors at work.

On one hand, the poor may want to diversify for risk reasons. Low asset levels which characterize the poor may impede the poor households from participating in the nonfarm sector, while the rich households which have adequate access to liquidity are not only able to fulfill the requirements of agriculture, but also of nonfarm production. The rich households are in a better position to self-finance for diversification. On the other hand, poverty may push households into the low-wage nonfarm section, as they cannot profitably employ all family labor in agricultural production. Rural poor households in a risk environment have an incentive to diversify income sources especially when agriculture is affected by income risk (more risk-averse behavior than the rich) Reardon et al (2000). If farm and nonfarm activities are not perfectly positively correlated, diversification to nonfarm activities may decrease income variability. This in turn makes it more attractive for the poor, depending on whether the liquidity constraint or the labor surplus in combination with risk aversion is more important.

Either the poor or the rich will engage more in the nonfarm sector. It is the poor who participate more because they are pushed out of agriculture. As Reardon (2000) indicates, some farm

households are motivated to carry out rural nonfarm activities by "push" factors, such as an absence of or incomplete crop insurance and consumption credit markets; the risks of farming, which induce households to manage income and consumption uncertainties by diversifying and undertaking activities with returns that have a low or negative correlation with those of farming. The rich who participate more because they have the means to earn more income (Marrit van berg, 2006). Apparently, Reardon (2000) indicates, some farm households are motivated to carry out rural nonfarm activities by "pull" factors, such as better returns in the nonfarm activities relative to the farm sector. In the same vein, Lanjouw and Lanjouw (2001) explain that, households which are "pulled" into nonfarm activities participate as a means of earning more income and improving their current living conditions. In comparison, factors such as risk to the farm production and lack of access to insurance tend to "push" households into non-agricultural activities. Hence households that are "pushed" into nonfarm activities resort to diversification as a safety net.

The reduced form equations for labor supply to nonfarm production are:

$L_{nf} = L_{nf}(p, T, A, K, Z, I)$

Where: L_{nf} is labor supply to nonfarm production

P is a vector of input and output prices for farm and nonfarm production

T is the number of adults in working age time of labor endowment

A is Land area

K is other fixed capital

Z is a vector household characteristic (such as, sex of household, age of household)

I is individual characteristics (such as sex, education)

The sign and magnitude of the estimated coefficients for land and (agricultural) capital gives direct information on the participation of in the nonfarm sector (Marrit van berg, 2006).

Proximity to a rural market facilitates access to new market information and is thus likely to increase the profitability of nonfarm production and services. Hence the distance or proximity of a household market was used as proxies for prices. Access to infrastructure and nearness to towns and cities: there seems to be a consensus that participation increases with nearness to towns and with better infrastructure. Reardon et al. (2007) argues that sometimes access to urban

centers compensates for a lack of private assets such as education. Those individuals' closer to urban centers have a higher probability of getting nonfarm employment and earn more even if they are not educated.

Household characteristics include sex of household head, age of household head, family size etc. Individual characteristics include age, marital status, etc. Three education dummies literacy obtained through informal education, Grade1-4, and Grade > 4 serve a dual purpose as household individual characteristics affecting consumptive preferences and as indicators of human capital available for both farm and nonfarm production.

An important component of individuals' human capital is education. The impact of education on nonfarm employment is consistent across the regions of Africa. Several of the studies document that education increases participation in nonfarm employment and income from it (Reardon 1997). Apparently Matsumota et al (2006) in their research in Kenya, Uganda and Ethiopia found a positive impact of education on non-farm employment which strengthened the earlier finding of Readon (1997).

The age of the participant is another component of human capital indicating work and life experience. Studies in Ghana (Abdulai and Delgado, 1999; lanjouw et al., 2001) discussed that at a younger age, participation increases with age of the individual or the household head (until 30-40 years), after which increase in age is associated with a decline in probability and level of participation. The same trend holds for India with the negative relation starting only after age 50 while in china age is found to have a negative impact.

Gender of the individual or the household head may also affect participation. Women were found to be less likely to participate in rural nonfarm employment in Tanzania (Lanjouw et al., 2001).However the findings in Latin America were not conclusive. In the studies reviewed by Reardon et al. (2001), the effect of gender is either not significant or is very different across studies.

Physical capital is assumed to play a role for nonfarm production, except for a situation where pack animals are included, as these are frequently used by traders. Physical capital for farm production is operationalized as the number of cattle owned, cultivated land ownership. As was explained above, the coefficients for these variables are ambiguous: a larger endowment of farm

assets may facilitate participation through access to cash for nonfarm activities, whereas more agricultural assets mean a higher productivity of labor and variable inputs in agriculture and thus a lower incentive to engage in the nonfarm sector.

Evidence from across studies in Africa suggest that households who experience a decline in farm income, either temporarily or as a long-term trend, adopt nonfarm employment as an alternative strategy (Reardon, 1997). Land holding, which indicates farming potential, is negatively correlated with the share of nonfarm income in Latin America, as those with more land have better farm income (Reardon et al, 2001).However, some of the same studies also found that the level of income from Rural nonfarm employment increases with land holdings. This is because land holdings affect not only the incentives but also the capacity to engage in nonfarm employment. Land holdings can increase access to credit, social capital and own liquidity which are instrumental to access productive activities (Reardon et al., 2007). In India, individuals coming from higher land holding households are more likely to participate in nonfarm employment compared to farm wage employment (Lanjouw and sheriff 2002). Apparently in the Oromia region of Ethiopia, individual landholdings, by far the most important productive asset is negative and significant, which indicates that poorer households earn more income from the nonfarm sector (Van den Berg and Kumbi 2006).

Three location dummy variables, for lowland, medium land and high land, are also included as independent variables.

Agro-climatic conditions and the state of agriculture in the region: In Africa, local non-farm income is higher in more favorable agro-climatic areas. Local nonfarm income also increases with the year's rainfall (Reardon 1997). In Latin America, zones with dynamic agriculture were found to have a higher level of nonfarm income per capita (Reardon et al., 2007). A dynamic agricultural sector has production and expenditure linkages with the nonfarm sector that expand the demand for nonfarm goods and services. A village that has some kind of growth motor, whether agricultural or not, is most likely to see an increase in demand for nonfarm goods and services, thereby increasing the earnings in the nonfarm sector (Reardon. 2007).

The survey data differentiates among three types of nonfarm activities: handicrafts, trade and food & drinks. As a liquidity requirement, risk and labour productivity may differ between

activities, these leads to estimate separate equations for each activity. The data gives information on the participation of non-farm activities, therefore, dummies of participation as the dependent variable used for analysis. Assuming linearity of the labour supply functions and a multivariate normal distribution of the error terms in the labour supply equations, we estimated a multivariate probit model.

4.5. Estimation Methods

Descriptive statistics are important tools to present research results clearly and concisely. They help one to have a clear picture of the characteristics of farm and nonfarm for sample units. By applying descriptive statistics such as mean, standard deviation, percentages, frequency, charts, and graphs, one can compare and contrast different categories of sample units with respect to the desired characteristics so as to draw some important conclusions. In this study, descriptive statistics were computed, along with the econometric models, and arranged in a way that allows one to quickly comprehend their meanings.

An econometric estimate model of participation in the non-farm sector indicated as follows. Based on the above analytical model we directly derive the reduced form equations for labour supply nonfarm production:

$L_{nf} = L_{nf}\,(p, T, A, K, Z, I)$

After estimation, the sign of the coefficients for land and (agricultural) capital gives direct information on the participation in the nonfarm sector. Hence, dummies of participation as dependent variable used for analysis. Assuming linear combination of the labour supply functions and a multivariate normal distribution of the errors terms in the labour supply equations, this gives the following multivariate probit model: The multivariate probit is an appealing model of choice behaviour because it allows a flexible correlation structure for the unobservable variables (Huguenin et al., 2009). MVP is used to fit the distribution of different alternative (claim) types.

$$L_{nf1} = \beta_1 X + \varepsilon_1 \qquad P_{nf1} = 1 \quad if \quad L_{nf1} > 0$$

$$L_{nf2} = \beta_2 X + \varepsilon_2 \qquad P_{nf2} = 1 \quad if \quad L_{nf2} > 0$$

$$L_{nf3} = \beta_3 X + \varepsilon_3 \qquad P_{nf3} = 1 \quad if \quad L_{nf3} > 0$$

Where

X= *p, T, A, K, Z, I* (represent a vector of explanatory variables which clearly explained in the empirical model part)

ε_i = represent the random disturbance terms (stochastic components)

β_i = represent the estimated Coefficient

4.6. Multicollinearity tests

Before running the multivariate probit model, the explanatory variables were checked for the existence of multicollinearity. Multicollinearity problem arises when two or more variables (or combination of variables) are highly correlated with each other. The existence of multicollinearity might cause the estimated regression coefficients to have the wrong signs, smaller t-ratios and high standard errors (Pindyck & Rubinfeld, 1998).

There are two ways to detect the presence of multicollinearity. These are: Variation Inflation Factors (VIF) for association among the continuous explanatory variables. The VIF for each term in the model measures the combined effect of the dependences among the regressor on the variance of term. One or more large VIF indicates multicollinearity. Practical experience indicates that if any of the VIFs exceeds 5 or 10, it is an indication that the associated regression coefficients are poorly estimated because of multicollinearity (Paul, n.d).

According to Verbek (2008) VIF can be defined as:

$$VIF(X_i) = \frac{1}{1 - R_i^2}$$

The VIF values for continuous variables were found to be very small (less than 5). This is to indicate the absence of multicollinearity between those variables (Appendix 2).

CHAPTER FIVE

V. Result and Discussion

This chapter deals with the analysis of the survey data and interpretation of the results of data analysis. Specifically the characteristics of the farm and nonfarm activities of the sample households are analysed and discussed using descriptive statistics. Moreover, an econometric result of multivariate probit is discussed.

5.1. Household characteristics description of statistical result

The study was based on cross-sectional data collected from a total of 206 farm households selected from Tehuledere districts of north eastern part of Ethiopia. Of the total 206 sample households, 51 % reported that they were participating in nonfarm and farm activities. Data included the family members whose age reached for nonfarm participation (greater than 15 years). Based on the survey data 631 individual data were collected from the area. Out of the total individuals, 28% of them were participating in nonfarm activities.

The average age of the whole individuals was 36 years, ranging between 15 and 70 years old. There was statistically significant (at 1% level) difference between the mean age of nonfarm participant and nonparticipant individuals. The survey data shows, the average age of individuals in the participation of nonfarm activities was a little bit less than that of the non-participants (Table 6).

Table 6: General characteristics of sample individual data

	Nonfarm nonparticipant individuals =452	**Nonfarm participated individuals =179**	**Total**	**t/ X^2 Value**
Age	33.69	38.31	36.00	5.000***
Household Head (1=yes)	22	57	41	76.898***
Family size of HHH	4.73	5.47	5.10	-3.819***
Infrastructures				
Distance to all weather road(hours)	0.54	0.61	0.575	1.960*
Distance to market(hours)	1.96	1.98	1.97	0.402
Location variables				
Low land (1=yes)	29.2	33.52	31.36	1.128
Medium (1=yes)	35.40	34.64	35.02	0.033
High land (1=yes)	35.40	31.84	33.62	0.718

Source: Survey data
* Significant at 10%, ** Significant at 5% and *** Significant at 1% probability level

As shown in Table 6, the average family size of nonparticipant and participant households was 5 persons. There was statistically significant (at 1% level) difference between the mean family size of nonfarm participant and nonparticipant households (Table 6).

The survey result showed that 59 % of the sampled individuals were household head from participated in nonfarm .The chi-square test showed that there was statistically significant (at 1%

level). The proportion of household head in nonfarm participant was higher than the nonparticipant (Table 6).

As indicated in the following chart (Figure 3 and 4), the percentage of male individuals participated in nonfarm activities was higher than of male individuals not participated in nonfarm activities. The chi-square test (25.280) showed that there was statistically significant (at 1% level) between sex of the participants and nonparticipants.

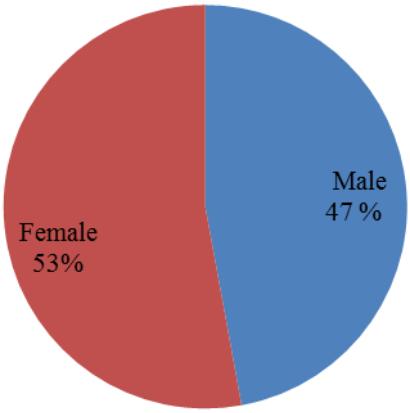

Figure 3 Sex of nonfarm nonparticipant individuals

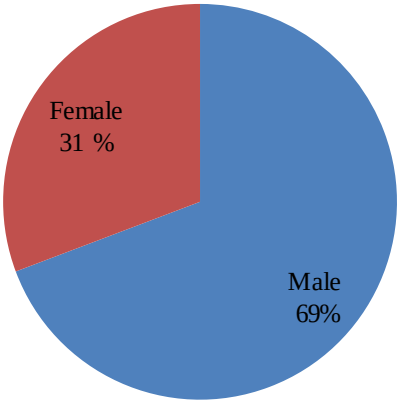

Figure 4 Sex of nonfarm participant individuals

Sources: Survey data

The percentage of married respondents was high in nonfarm participant individuals than nonparticipants (Figure 5 and 6). The chi-square test (29.290) showed that there was statistically significant difference between marital status of nonparticipant and participants (at 1% level).

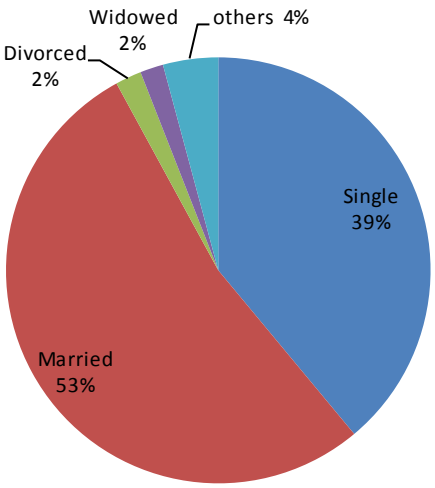

Figure 5: Marital status of nonfarm not participant individuals

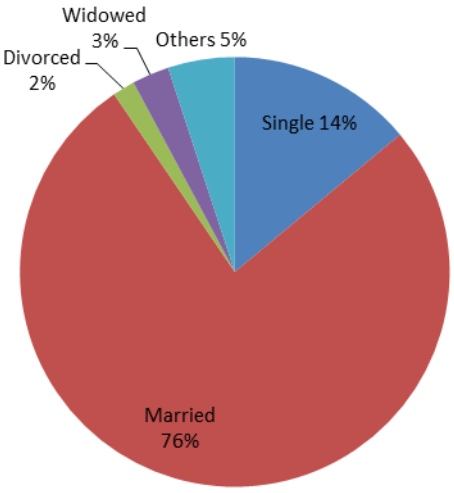

Figure 6: Marital statuses of nonfarm participant individuals

Sources: Survey data

As presented in the following graph, four educational dummies are indicated for education condition as no education, informal education, grade 1-4 and greater than grade1-4 (Figure 5 and 6). The percentage of educated individuals was high in nonfarm participant than nonparticipants.

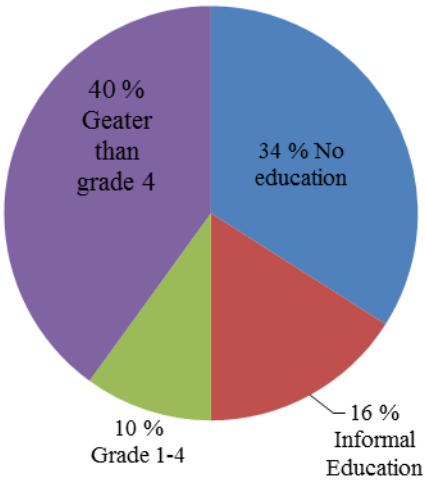

Figure 7 Educational Dummy of nonparticipant individuals

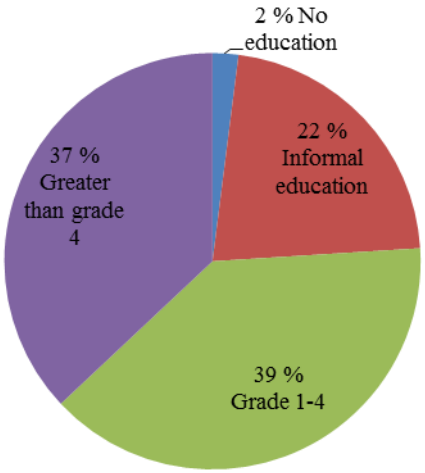

Figure 8 Educational Dummy nonfarm participant individuals

Sources: Survey data

5.2. Farm characteristics

5.2.1. Land

Land is one of the scarce factors of production whose supply is considered fixed. Land is the most important resource for agricultural activity particularly when it is traditional and subsistent. Added to this, the land tenure system can be a constraint to agricultural productivity. Farmers in the group discussion agreed that land is very scarce and getting scarcer since the population is increasing in size. Expansion of farmlands and irrigation possibilities are limited because of the rugged topography of the study area. Not only the small size of the land challenges in the farming community but also the fragmentation of the farm plots makes the farming life difficult. Most of the farmers' who own land in the District have 4-5 plots[1], which are far away from each other. (TDOOARD)

Land rights, whether owned, shared in or rented in, may determine participation of nonfarm activities. The average total size of the cultivated land owned by the sample respondents was 5.2 plots. The mean total own cultivated land of nonfarm participants and nonparticipants were 4.6 and 5.7 plots, respectively and the difference was significant (at 1% level) (Table 7).

[1] Based on date from TDOOARD, 1 plot on average $1023m^2 = 0.1023$ ha
(Lowland = $1150m^2$, medium land $960m^2$, high land $960m^2$)

Table 7: Land ownership

	Nonfarm not participated=101		**Nonfarm participated=105**		**Total mean**	**t-value**
	Mean	Standard Deviation	Mean	Standard Deviation		
Total Own cultivated land(plots)	5.7	1.26	4.6	0.91	5.2	7.165***
private	4.8	1.37	4.2	1.08	4.5	3.760***
Rented/borrowed	0.2	0.34	0.1	0.33	0.2	0.317
Share cropping	0.8	1.02	0.3	0.55	0.6	4.166***
Topography of land						
Plain	3.9	1.31	3.6	1.07	3.8	1.814*
steep	1.1	0.72	0.6	0.70	0.8	4.838***
Hilly	0.6	0.61	0.4	0.52	0.5	2.681***

* Significant at 10%, ** Significant at 5% and *** Significant at 1% probability level

Source: Survey Data

Nonfarm Participant farmers had private owned land of 4.2 plots in an average while the nonparticipants farmers had private owned land of 4.8 plots. This difference was statistically significant (at 1% level). The mean difference of the share cropping for the two groups was statistically significant at 1 % significance level.

Nonfarm Participant farmers rented land on an average of 0.2 plots while the nonparticipants rented 0.1 plots. Given that the nonparticipant farmers relatively owned larger number of plots of

cultivated land than the nonfarm participants, it can be said that land ownership has an influence on nonfarm participation.

Apart from its size, quality of land is an important attribute of production and productivity. The sample respondents were asked about topography of their land. The average total size of the land owned by the sample respondents, 3.8 plots were Plain topography (Table7).

5.2.2. Cropping pattern and Crop production

The farming system of the district is predominantly mixed farming, consisting of both crop production and livestock rearing. Crop production is the major activity by which life mainly depends upon. In the district both annual and perennial crops are grown on all altitudinal variations. The diverse altitudinal variations and socio-economic conditions have allowed the production of different cereals, pulses, fruits and oil crops. Generally the district is part a teff-sorghum production belt area. There are also some horticultural crops like orange, papaya, chat and some vegetables produced in around the lakes and riverbanks (TDOOARD). Based on the discussion with farmers and agricultural experts, the productivity of the crops is very low and most farmers had the experience of failure of crop production. Environmental problems taking the primary cause for the failure of the crop production while crop diseases and pest have also a significant share for the loss of production and productivity.

5.2.3. Livestock

According to the data from the district office of agriculture and rural development, out of the total agricultural production in the study area, livestock contributed to 30 % of household income. Farmers use livestock as a coping up strategy at the time of food shortage. In the study area livestock are used for different purposes which include draught power (cultivation, transport, packing, threshing) milk and meat production, for hides and skin, for fuel, manure, etc. Cattle provide draft power for crop cultivation, manure for household fuel and organic fertilizer, meat and milk for consumption, and other products like hides and skins. Pack animals such as donkeys, horses, and mules are used for transporting loads and human beings. Small ruminants are needed to meet immediate cash demand of the households and also for meat production for household consumption, especially during holidays. Poultry are kept for egg and meat production

both for cash and home consumption. The slaughtering of animals in greater numbers for religious festivals ("Arefa, Mowlid, and fasika") resulted in depletion of the drought power for farming.

TLU (tropical livestock unit) was calculated to measure livestock holding of the households. According to the survey data the total mean livestock size of the sample respondent was 1142 in number or 415.5 TLU. The average size of oxen, cow, and calves was 1.4, 0.9 and 0.8 respectively (Table 8).

Table 8: The average size of livestock ownership of respondents

	Nonfarm not participated=101		**Nonfarm participated =105**		**Total mean**	**t Value**
	Mean	Standard Deviation	Mean	Standard deviation		
Number of cattle(TLU)	2.0	0.80	1.9	0.72	2.0	0.654
Oxen	1.5	0.67	1.3	0.63	1.4	0.209
Cow	0.9	0.65	0.9	0.67	0.9	0.072
Calves	0.8	0.71	0.8	0.64	0.8	-0.385
sheep	1.8	1.98	1.9	2.21	1.8	0.286
goat	0.6	1.28	0.6	1.08	0.6	0.276
Chickens	3.4	2.48	3.5	2.36	3.4	0.036
Number of pack animals(TLU)	0.6	0.76	0.5	0.39	0.5	1.688**
Horse	0.1	0.73	0.0	0.00	0.1	1.647
Mule	0.1	0.27	0.1	0.17	0.1	1.604
Donkey	0.8	0.65	0.8	0.66	0.8	-0.203
Camel	0.1	0.28	0.1	0.19	0.1	0.644
Number of hives	0.9	1.14	0.8	0.95	0.9	0.962

* Significant at 10%, ** Significant at 5% and *** Significant at 1% probability level

Source: Survey Data

The mean size of cattle for the nonfarm participant was a less than nonparticipant which was 1.9 and 2.0 respectively with the standard deviation of 0.72 and 0.80. The mean size of Pack animals for participants was 0.5 and for nonparticipants it was 0.6. There was statistically significant (at 5% level) difference between the mean size of pack animals in nonfarm participant and nonparticipant households. Given that the nonparticipant farmers relatively owned larger number of pack animals than the nonfarm participant (Table 8).

The mean size of number of chickens for participants was 3.5 and for nonparticipants it was 3.4. There was not statistically significant difference between the mean sizes of chickens. The mean size of number of hives for participants was 0.8 and for nonparticipants it was 0.9. There was not statistically significant difference between the mean sizes of number of hives (Table 8).

The major livestock problem in the study area was lack of grazing land. Besides this, prevalence of pest and diseases, lack of water, wild animals attack and poor breed were the other problems reported by the sample farmers.

In general, the agricultural sector of the district is characterized by small farms, scarcity of land for expansion, low yield, and shortage of draught animals and lack of adequate grazing land. To this affect, the farming economy is not in a position to feed and sustain the increasing population of the area. Therefore, farmer's engagement in nonfarm activities is of paramount importance to supplement the farm income and improve the living conditions of the community.

5.3. Characteristics of non-farm activities

Nonfarm activities have an important role in household economy. Under credit constraint and risky environment, nonfarm income can increase household's farm productivity by mitigating risk and promoting farm investment (Evans and Ngau 1991) and finance consumption. Nonfarm income provides farm households with insurance against the risk of farming and thereby enabling them to adopt new technologies. More importantly, nonfarm activities offer cyclical and seasonal employment to supplement meager farm incomes in many drought prone areas of Africa. Therefore this section explores the characteristics of nonfarm employment in the study area.

The major nonfarm economic activities that help rural households in the study area comprise trading, traditional handicraft activities, selling of foods and drinks.

Of the total sample individuals in this study, 28 per cent of them were engaged in nonfarm activities besides farming. The remaining 72 per cent had not participated in nonfarm activities. The mean income from nonfarm activities was 4038 birr[2] in year 2011. The highest and the lowest incomes recorded were about birr 720 and 36000 birr per year 2011 respectively (Table 9).

Table 9: Rate of participation and average income of nonfarm activities

	Handcraft	**Trade**	**sale of food and drink**
No of individual participating	20	81	29
Rate of participation (%)	15	63	22
Mean income of nonfarm (Birr)	4281	5187	2647
	(4527)	(4636)	(876)
Maximum income (Birr)	18600	36000	4800
Minimum income (Birr)	720	1250	1100

Standard deviations in parenthesis
Source: Survey Data

5.3.1. Trade

Trade in the study area is not only bound within the district locality but also in other places out of the study area. Traded items such as cereals, chat, fruit and vegetables and livestock are bought on a market day and are sold on the same or another market day or at another place.

Trading activities are an important source of income for farmers in the study area. Group discussion revealed that there were several part time trading farmers who bought various consumer items such as salt, pepper, spices and clothes from distant areas and sold them to the

[2] Ethiopian currency with the current exchange rate 1 Euro = 22 Birr

local community. The long distance trade involves visit to places like Dessie, woldya which is about 40 km and 90 km respectively from the study area, and the traded goods include chat, cereals, fruit and vegetable, small ruminant animal trade, skins and retailer's commodity trade.

The survey result shows that 63 per cent of the individuals participating in nonfarm activity were engaged in trade. The mean annual income from trade was about 5187 birr with a minimum and a maximum of 1250 birr and 36000 birr, respectively (table 9). The dominant forms of trade items include cash crop trade, grain trade, cattle trade, livestock trade and animal bi-product, retailer's commodity trades. In transporting traded items, vehicles transportation, self-carried, transportation animals such horses, mules and donkey, and hired labour are play an important role.

Trade as a source of income for the farmers was hindered by certain constraints. According to farmers, the main bottlenecks for trade activity in the study area were lack of initial capital, lack of skill and access to market, and lack of back animals.

5.3.2. Handicraft activities

There are a number of crafting activities in which farmers can potentially participate in the study area. Among the non-farm participant farmers 15 per cent were engaged in crafting activities. These include pottery, carpentry, masonry, cementing, blacksmiths, tannery and weaving. Craft workers produce clothes, iron-tips, knives, simple chisels, axes, water and cooking pots for the community.

Group discussion indicated that most of individuals undertake handicraft activity as supporting of agricultural income. The survey result indicates, the mean annual income from handicraft activities of sample respondent was 4281 birr, the highest and the minimum income reported were 18600 birr and 720 birr respectively (table 9).

As the respondents engaged in the handicraft activities reported, they learnt the skill of the work from family, neighbours or friends and training/ education.

5.3.3. Sale of food and local drinks

Sale of food and local drinks is mostly practiced in most villages and rural towns. About 22 per cent of those who participated in nonfarm activities were engaged in sale of food and local drinks. When compared with other nonfarm activities, females dominate in the sale of food and local drinks than males. The mean annual income reported from sale of food and local drinks was 2647 birr with a minimum of 1100 and a maximum of 4800 birr (table 9).

The major problems reported by the respondents regarding of this activity included lack of initial capital to undertake the activity , lack of market for the produce, and lack of skills. Group discussion with the farmers revealed that most of them were engaged in the sale of food and local drinks to supplement the agricultural income. The respondents undertake this activity integrating it with the farming activity.

The foregoing discussion has revealed that nonfarm activity which includes trade, handicraft, sale of food and local drinks and other sources of income is widely undertaken in the study area. These activities are localized and highly agriculture based. Households engaged in these activities could benefit more if they get favourable environment for the sector. The main bottlenecks that hamper the development of nonfarm activities reported by the farmers include capital, transportation, and access to market.

5.4. Econometric estimates of non-farm participation

The dependent variables measure participation for each non-farm activity. These activities are handcraft activities, trade activities and sale of food and drink. The independent variables show assets, household characteristics, individual characteristics, time endowment and price proxy. The description is presented in the table 10.

Econometric results

The estimation of the multivariate probit model is shown below in table 10. A total of 15 explanatory variables in five groups (asset, household characteristics, individual characteristics, time endowment and price proxy) were considered in the economic model. Out of these, 7, 8 and 8 variables were found to have a significant influence on the participation of handicraft, trade

and sale of food/drink activities respectively at a different significant level. The STATA 10 econometric software was used to estimate this model.

Table 10: Multivariate probit estimates for participation in non-farm activities (N=631)

Explanatory Variables	Handicraft activities	Trade	Sale of food and Drink activities
Assets			
Cultivated land	-0.211*	-0.340***	-0.149*
	(0.120)	(0.073)	(0.092)
Number of cattle	0.038	0.058	0.213
	(0.184)	(0.110)	(0.153)
Number of pack animals	0.003	0.188	-0.128
	(0.235)	(0.127)	(0.256)
Household characteristics			
Sex head (male=1)	4.333	-0.280	-0.900*
	(184.167)	(0.367)	(0.480)
Age head (years)	-0.046**	-0.322**	-0.031*
	(0.023)	(0.013)	(0.018)
Family size	0.070	0.041	0.139*
	(0.106)	(0.065)	(0.082)
Marital status head	3.896	-0.231	0.685
	(172.062)	(0.346)	(0.564)
Dependency ratio (Children+elderly)/adults	-0.002	0.003	-0.001
	(0.003)	(0.002)	(0.002)
Individual characteristics			
Sex(male=1)	0.536*	0.471***	-0.537**
	(0.316)	(0.167)	(0.215)
Age(years)	0.027**	0.037***	0.048***
	(0.014)	(0.009)	(0.012)
Education, Grade1-4 (yes=1)	0.855**	0.947***	0.703***
	(0.347)	(0.199)	(0.259)
Education, Grade > 4(yes=1)	0.968**	0.492**	0.769**
	(0.398)	(0.240)	(0.307)
Location (Agro ecology)			
Lowland(yes=1)	0.298	-0.509*	-0.378
	(0.386)	(0.270)	(0.362)
Medium land(yes=1)	-0.746*	-0.217	-0.217
	(0.459)	(0.260)	(0.336)
Proxy price			
Distance to nearest market(hours)	0.011	0.012***	0.004
	(0.007)	(0.005)	(0.06)
R(01,02) = 0.041 (0.132); R(01,03) = 0.120(0.198); R(02,03) = 0.160 (0.118)			

Notes: Standard errors in parentheses

* Significant at 10% level, ** significant at 5% level, *** significant at 1% level
Sources: Survey results

The signs of the coefficients for agricultural assets are crucial for the participation of nonfarm activities in the rural area. The coefficient of by far the most important productive asset, cultivated land, is negative and significant for all three activities, indicating that small land holding households are more likely to be engaged in nonfarm activities in the area. Similar outcomes were found by Van den berg and kumbi (2006) in Oromia Ethiopia indicating that entry barriers are of limited importance and that non-farm activities are a means to use surplus labour from agriculture productively. As Winters et al. (2007) indicated, households with smaller cropped area may decide to engage in nonfarm activities to make up for their limited resource base (crops and livestock), and hence the coefficient on landholdings would be negative. Farmers at better levels of land holdings may choose to specialize on farming. The coefficient for pack animals is not significant for all the three activities. This is possibly due to the small number of farmers who own pack animals. Cattle ownership had no significant effect on participation in the three types of non-farm activities (Table 10).

Among household characteristics, the coefficient of household sex suggests that females are more likely to participate in sale of food and drink activities. This statistical significance result reflects traditionally females dominate in this activity. Household sex had no significant effect on the other two types of activities. The statistical significance and negative coefficient of the variable household head age reflects the younger household head participation dominates the three nonfarm activities. For cultural reasons, the family ties are such that the younger members of the family provide for and take care of the elderly, and therefore, the elder members of the family probably do not participate intensively in nonfarm activities. In the household characteristics case the average age of household head is 46 years. The maximum age is 70 and the minimum 26 years. The coefficient for family size is significant for sale of food and drink activities, this is possibly due to more labour increases the contribution for the activities increased. Larger family size household is possibly to delegate the cooking and/or local drink preparation activities to the family's member which supports to engage on non-farm activities of the area. In this regard, households having more family members who participate in the sale of

food and drink activities increase. There is no significant effect of family size in the other two types of activities.

The individual characteristics present as follows. There is a positive and significant effect of age of the individuals on the participation in the three types of nonfarm activities. These positive effects of age on participation in non-farm activities may be explained by the fact that due to heavy population pressure, relatively older individuals support their livelihood with participate in the activities. In the household individual characteristics case the average age of the individual is 35 years. The maximum age is 70 and the minimum 15 years. Among individual characteristics, sex of individual results suggests that females are more likely to participate in the sale of food and drink. This statistically significant result reflects the fact that females traditionally dominate in this activity. Handicraft and trade activities seem to be more accessible to men. This may be a reflection of the fact that most women are dedicating themselves to domestic activities. Similar outcomes were found by Matshe and Young (2004) in Zimbabwe. Carafa (1993) highlights the participation of women in the rural areas in several activities ranging from domestic to agricultural production, recognizing the multiple roles that women play with regard to household welfare and economy. This, as Glick and Sahn (1997) acknowledge, may have a strong influence on the type of activities women will become involved in. This may be due to the many roles that women have in the household (Table 10).

An interesting result in the regressions is the positive and significant effect of education on participation in the types of nonfarm activities. Primary education (Grade1- 4 or first cycle education) enhanced the probability of engagement in the three nonfarm activities. Apparently, formal education greater than grade 4 also enhanced the participation of nonfarm in the three types of nonfarm activity. This indicates that educational attainment is one of the most important determinants of participation in nonfarm activities. The skilled and educated farmers have a positive interest in the involvement of non-farm activities in the study area. This may be because non-farm activities require some skills and training. Hence, households with some skill and educational background tended to engage in non-farm activities. Education tends to improve rationality and stimulate diversified use of resources (Table 10). Similarly, studies conducted by

Barttell, Reardon and Webb in (2001); Van den berg and kumbi (2006) have reported similar results.

The coefficient of the location variable, low land agro-ecology is negative and has a significant effect on participation in trading activities. This is due to the fact that a dispersed rural area negatively affects participation in trading activities. According to TDARDO the land size of low land agro ecology relatively higher than the other agro ecology zone of the district therefore the people in lowland areas concentrated on agricultural activities. There is no significant impact on participation in the other two types of nonfarm activities. The coefficient of the medium land location variable is negative and has a significant effect on the participation of handy craft activities. This is due to cultural influence on many handicraft activities that influence the participation level. There is no significant impact on participation in the other two types of nonfarm activities (Table 10).

The coefficient for the price proxies is discussed in the model section. The coefficients for the price proxies seem at a contradictory, a possibility that we discussed in the model section. As expected, households that live closer to market sites are more likely to be engaged in trade activities. The significantly positive relationship of distance to the nearest market and the likelihood participation in trade seems to contradict this observation. There is no significant effect on participation in the other two types of nonfarm activities (Table 10).

CHAPTER SIX

VI. Summary and conclusion

In countries like Ethiopia, where subsistence agriculture and the small holding farm are dominates in the overall National Economy. Even though agriculture is the backbone of Ethiopia's economy, it will no longer provide sufficient employment for the growing rural labour force through time. Hence, the promotion of non-farm activities in addition to farm activities seems indispensable to alleviate rural poverty.

This study contributes to understanding of the rural economy in Tehuledere district, Amhara regions of Ethiopia by addressing three research questions: i) what are the farm characteristics of smallholder farmers in the area? ii) What are the characteristics non-farm activities of smallholder farmers? iii) What are the determinants of non-farm activity participation in the area?

Data used for the study were collected from 206 households drawn from Tehuledere district. A multi-stage sampling method was used to select the households. In the first stage, based on the information of district office of Agricultural and Rural Development, 20 peasant associations (PA) of the district were stratified in to 3 agro ecology zone: lowland, medium land and highland. In the second stage, three peasant associations were randomly selected out of the 20 PAs found in the district. In the third stage, based on random sampling method the respondents were selected from peasant association. In this study, descriptive statistics were computed, along with the econometric models, and arranged in a way that allows one to quickly comprehend their meanings.

According to the descriptive result, the proportion of youngsters in the nonparticipant was more than nonfarm participant. Most of the individuals participated in nonfarm were literate at different educational level. Most of individuals participated in nonfarm activities were male.

Land is one of the scarce factors of production whose supply is considered fixed. Land is the most important resource for agricultural activity particularly when it is traditional and subsistent. Added to this, the land tenure system can be a constraint to agricultural productivity. Farmers in the group discussion agreed that land is very scarce and getting scarcer since the population is increasing in size. Expansion of farmlands and irrigation possibilities to increase production were difficult because of the rugged topography. Not only the small size of the land challenges in the farming community but also the fragmentation of the farm plots makes the farming life difficult. Most of the farmers who own land in the district have 4-5 plots, which are far away from each other. (TDOOARD)

The farming system of the district is predominantly mixed farming, consisting of both crop production and livestock rearing. Crop production is the major activity by which life mainly depends upon.

The major nonfarm economic activities that help rural households in the study area comprise trading, traditional handicraft activities, and selling of foods and drinks. According to the descriptive result, 28 per cent individuals reported that they were engaged in nonfarm activities besides the farming. The mean income from nonfarm activities was found to be 4038 birr in year 2011. The highest and the lowest incomes recorded were about birr 720 and 36000 birr per year 2011 respectively.

Regarding the determinants of participation in nonfarm activities, a total of 15 explanatory variables in five groups (asset, household characteristics, individual characteristics, time endowment, and price proxy) were considered in the economic model. The results of the multivariate probit model revealed that 7, 8 and 8 variables were found to be significant effect on the participation of handicraft, trade and sale of food/drink activities respectively at different significant level.

According to regression result cultivated land, Education, age of household head and sex of individual characteristics were significant in the three types of activities. The conclusions were given based on core significant variables.

The coefficient of cultivated land is negative and significant for all three activities, indicating that small land holding households are more likely to be engaged in the non-farm activities in the area. The growth in population has resulted in a smaller farm size. The coefficient of household age was negatively related with participation in nonfarm activities. This is because, younger farm household heads cannot get enough land to support their livelihood compared to the older farm households. Therefore the younger households head have to rely more on nonfarm employment than the older ones to support their livelihood. The variable education also had a positive and significant influence on participation in nonfarm activities. Nonfarm activities require some skill and training hence households with some skills and education tend to engage in non-farm activities.

Understanding the determinants of nonfarm activities and the characteristics of the farm and nonfarm activities would help policy makers to design and implement more effective policies and programs for non-farm enterprises.

Based on the findings of the study, the following points need to be considered as possible poverty alleviates strategy. The rural development strategy should not only emphasis in increasing agricultural production but concomitant attention should be given in promoting non-farm activities in the rural areas. The promotion of non-farm activities in addition to farm activities seems indispensable to alleviate rural poverty.

The second findings of the study also revealed that educated farmers are more likely to involve in non-farm activities. Thus education could be an effective instrument in increasing participation in non-farm activities. Therefore the task of upgrading the skills and production techniques of local farmers should be given a special attention. Development programs to promote non-agricultural employment should focus on the establishment of skill training centres at local level.

Reference

ABDULAI, A. & DELGADO, C. L. (1999) Determinants of nonfarm earnings of farm-based husbands and wives in Northern Ghana. *American Journal of Agricultural Economics,* 81**,** 117-130.

ALEMU, B. A., NUPPENAU, E. & BOLAND, H. (2008) Technical Efficiency of Farming Systems across Agro-ecological Zones in Ethiopia: An Application of Stochastic Frontier Analysis.

ANDERSEN, D & LEISERSO, M. W. (1980) Rural Non-farm Employment in Developing Countries. *Economic Development and cultural change,* 28, 227-248.

BARRET, C. B., REARDON, T. & WEBB, P. (2001) Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food policy,* 26, 315-331.

BEZU, S. & HOLDEN, S. (2008) Can food-for-work encourage agricultural production? *Food policy,* 33**,** 541-549.

CAILLAVET, F., GUYOMARD, H. & Lifran R. (1994). Agricultural Household Modelling and Family Economics. *Developments in Agricultural Economics, Elsevier*.

CARSWELL, G. (2002) Livelihood diversification: increasing in importance or increasingly recognized? Evidence from southern Ethiopia. *Journal of International Development,* 14**,** 789-804.

CSA (2007) Household Income, Consumption & Expenditure (HICE) Survey 2004/5: Analytical Report. *Statistical Bulletin*. Central Statistical Agency of Ethiopia.

CSA (2009). *National Strategy for the Development of Statistics*. Addis Ababa.

CSA (Central Statistics Agency), (2008) 'Summary and Statistical report of the 2007 population and housing census', Addis Ababa, Ethiopia.

CSA & WB (2008). The 2006/2007 Rural Investment Climate Survey: *Basic Information Document*. Addis Ababa: processed.

CSAKI, C. & DE HAAN, C. (2003) *Reaching the Rural Poor: A Renewed Strategy for Rural Development*, World Bank Publications.

DAVIS, B., WINTERS, P., CARLETTO, G., COVARRUBIAS, K., QUINONES, E., ZEZAA, A., STAMOULIS, K., K. AZZARRI, C. & DIGIUSEPPE, S. (2010) A Cross-Country Comparison of Rural Income Generating Activities. *World Development,* 38, 48-63.

ELBERTS, C., &LANJOUW, P. (2001) Intersectoral Transfer, Growth, and Inequality in Rural Ecuador. *World Development,* 29, 481-496.

ELLIS, F. (2000) *rural livelihoods and diversity in developing countries*, Oxford, Oxford University Press.

ELLIS, F. & BIGGS, S. (2001) Evolving Themes in Rural Development 1950s-2000s. *Development policy review,* 19**,** 437-448.

EVANS, H. E. & NGAU, P. 1991. Rural-Urban Relations, Household Income Diversification and Agricultural Productivity. *Development and Change,* 22**,** 519-545.

FEI, J. C. H., RANIS, G. & CENTER, Y. U. E. G. (1964) *Development of the labor surplus economy: Theory and policy*, Irwin Homewood, IL.

GLICK, P., SAHN, E. (1997) Gender and Education Impacts on Employment and Earnings in West Africa: Evidence from Guinea. *Economic Development and Cultural Change*, 794-823.

HAGGBLADE, S., HAZELL, P. B. R. & REARDON, T. (2007) *Transforming the Rural Nonfarm Economy.* Baltimore: Johns Hopkins University Press and International Food Policy Research Institute.

HAGGBLADE, S., HAZELL, P. B. R., REARDON, T. A., ENVIRONMENT, I. F. P. R. I. & DIVISION, P. T. 2002. *Strategies for stimulating poverty-alleviating growth in the rural nonfarm economy in developing countries*, International Food Policy Research Institute, Environmental and Production Technology Division.

HAILEMARIAM, A., ALAYU, S. & TELLER, C. (2011) The National Population Policy (NPP) of Ethiopia: Achievements, Challenges and Lessons Learned, 1993–2010. *The Demographic Transition and Development in Africa***,** 303-321.

HAZELL, P. & HAGGBLADE, S. (1993) Farm-nonfarm growth linkages and the welfare of the poor. *Including the poor***,** 190-204.

HUGUENIN, J., PELGRIN, F. & HOLLY, A. 2009. Estimation of multivariate probit models by exact maximum likelihood. *Working Papers*.

ISLAM, R. (1987) Editor. Rural Industrialisation and Employment in Asia. New Delhi: ILO.

JANVRY, A. & SADOULET, E. (2001) Income strategies among rural households in Mexico: The role of off-farm activities. *World Development,* 29**,** 467-480.

JAYNE, T. S., YAMANO, T., WEBER, M. T., TSCHIRLEY, D., BENFICA, R., CHAPOTO, A. & ZULU, B. (2003) Smallholder income and land distribution in Africa: implications for poverty reduction strategies. *Food policy,* 28**,** 253-275.

JOHNSTON, B. F. & KILBY, P. (1975) *Agriculture and structural transformation: Economic strategies in late-developing countries,* Oxford University Press New York.

LANJOUW, J. O. & LANJOUW, P. (1995) Rural Nonfarm Employment. Background paper for World Development Report 1995 Washington: The World Bank.

LANJOUW, J. O. & LANJOUW, P. (1997) The Rural Non-Farm Employment: *A survey .policy Research working paper No.1463,* The World Bank.

LANJOUW, J. O. & LANJOUW, P. (2001) The rural non-farm sector: issues and evidence from developing countries. *Agricultural economics,* 26**,** 1-23.

LANJOUW, P. & SHARIFF, A. (2002) Rural Non-farm Employment in India: Access, Income and Poverty Impact. *Working Paper series No.81*.

LIEDHOLM, C. (2002) Small firm dynamics: evidence from Africa and Latin America. *Small Business Economics,* 18**,** 225-240.

LOENING, J., RIJKERS, B. & SODERBOM, M. (2008) Nonfarm microenterprise performance and the investment climate: evidence from rural Ethiopia.

LOFGREN, H. & ROBINSON, S. (1999). To Trade or Not to Trade: Non-Separable Farm Household Models in Partial and General Equilibrium. *IFPRI, TMD Discussion Paper ,* 37. Washinton, D.C.

MATSHE, I. & Young, T. (2004). Off-farm labour allocation decisions in small-scale rural households in Zimbabwe. *Agricultural Economics,* 30, 175-186.

MATSUMOTO, T., KIJIMA, Y. & YAMANO, T. (2006) the role of local nonfarm activities and migration in reducing poverty: evidence from Ethiopia, Kenya, and Uganda. *Agricultural economics,* 35**,** 449-458.

MDUMA, J. K. & WOBST, P. (2005) Determinants of rural labor market participation in Tanzania. *African Studies Quarterly,* 8**,** 32-47.

MEYER, R. L. (1991) *Supporting rural non-farm enterprises: what can be learned from donor programs?* Philippine institute for development studies.

MOFED (2008). Ethiopian Progress towards achieving the MDGs, 2007/8. Federal Democratic Republic of Ethiopia. *Ministry of Finance and Economic Development (2008a).*

PAWLAK, K. & MATUL, M. (2004) Realizing mission objectives: a promising approach to measuring the social performance of microfinance institutions. *Journal of Microfinance/ESR Review,* 6**,** 1-26.

PAUL, K. (N.D.) 'Multicollinearity: Causes, Effects and Remedies', M. Sc. (Agricultural Statistics), Roll No. 4405I.A.S.R.I, Library Avenue, New Delhi-110012. http://www.scribd.com/doc/52198487/Multicollinearity-Causes-Effects-Remedies.

REARDON, T., BERDEGUÉ, J., BARRETT, C. B. & STAMOULIS, K. (2007) Household income diversification into rural nonfarm activities. *Transforming the Rural Nonfarm Economy. Opportunities and Threats in the Developing World. Johns Hopkins University Press, Baltimore.*

REARDON, T., BERDAGUE, J., & ESCOBAR, G. (2001) Rural Nonfarm employment and Incomes in Latin America: Overview and Policy Implications. *World development* 29, 395-409.

REARDON, T. (1997) Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. *World Development,* 25**,** 735-747.

RUBEN, R & VAN DEN BERG, M. (2001) Nonfarm Employment and Poverty Alleviation of Rural Farm Households in Honduras. *World development* 29, 549-560.

SHAND, R. T. (1986) Off-farm employment in the development in rural Asia. Canberra: Australian National University.

SHYLENDRA, H. & THOMAS, P. 1995. Non-Farm Employment: nature, magnitude and determinants in a semi-arid village of Western India. *Indian Journal of Agricultural Economics,* 50**,** 410-416.

TEFERA, T. L., PERRET, S. & KIRSTEN, J. F. (2005) Diversity in Livelihoods and Farmers Strategies in the Hararghe Hilands, Eastern Ethiopia. *International Journal of Agricultural Sustainability,* 2, 133-146.

VAN DEN BERG, M. & KUMBI, G.E. (2006) Poverty and The Rural nonfarm economy in Oromia, Ethiopia. *Agricultural Economics 35, no,* supplement 3, 469-475.

VERBEEK, M. (2008) A *guide to modern econometrics,* Wiley.

WAKTOLA, A. (1999) *Exploratory Study of two regions in Ethiopia to Identify target areas and partners for intervention*, DCG.

WIGGINS, S. & HAZELL, P. (2011) Access to rural non-farm employment and enterprise development. *Background Paper for the IFAD Rural Poverty Report.*

WINTERS, P., DAVIDS, B., CARLETTO, G., COVARRUBIAS, K., QUINONES, E. J., ZEZZA, A., AZZARRI, C. & STAMOULIS, K. (2009) Assets, Activities and Rural Income Generation: Evidence from a Multicounty Analysis. *World Development,* 37, 1435-1452.

WOLDEHANNA, T (2000) Economic Analysis and Policy Implications of Farm and Off-Farm Employment. A Case Study in the Tigray Region of Northern Ethiopia. PhD thesis. Wageningen: Wageningen University, the Netherlands.

WOLDENHANNA, T. & OSKAM, A. (2001) Income diversification and entry barriers: evidence from the Tigray region of northern Ethiopia. *Food policy,* 26**,** 351-365.

Appendix:

Appendix 1: **Multivariate probit result**

```
mvprobit ( act_craft= hhh_age hhh_sex hhhfam_size hhhmari_status dep_ratio loclow
locmid sex age educ_primery educ_great numland_total cattle_owner packanimal_owner
avnm_dph) ( act_trade= hhh_age hhh_sex hhhfam_size hhhmari_status dep_ratio loclow
locmid sex age educ_primery educ_great numland_total cattle_owner packanimal_owner
avnm_dph) ( act_salefad= hhh_age hhh_sex hhhfam_size hhhmari_status dep_ratio loclow
locmid sex age educ_primery educ_great numland_total cattle_owner packanimal_owner
avnm_dph)

Iteration 0:   log likelihood = -352.56848
Iteration 1:   log likelihood =  -350.4099
Iteration 2:   log likelihood =  -349.8465
Iteration 3:   log likelihood = -349.72952
Iteration 4:   log likelihood = -349.71623
Iteration 5:   log likelihood = -349.71389
Iteration 6:   log likelihood =  -349.7135
Iteration 7:   log likelihood = -349.71344
Iteration 8:   log likelihood = -349.71343

Multivariate probit (MSL, # draws = 5)            Number of obs   =        631
                                                  Wald chi2(45)   =     143.84
Log likelihood = -349.71343                       Prob > chi2     =     0.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
act_craft    |
     hhh_age |  -.0455251   .0226645    -2.01   0.045    -.0899467   -.0011034
     hhh_sex |   4.334938   184.1671     0.02   0.981     -356.626    365.2959
 hhhfam_size |   .0701534   .1058494     0.66   0.507    -.1373077    .2776144
hhhmari_st~s |   3.895899   172.0621     0.02   0.982    -333.3396    341.1314
   dep_ratio |  -.0019589   .0028992    -0.68   0.499    -.0076411    .0037234
      loclow |   .2978281   .3855344     0.77   0.440    -.4578054    1.053462
      locmid |  -.7458063   .4586475    -1.63   0.104    -1.644739    .1531263
         sex |   .5361517   .3157355     1.70   0.089    -.0826785    1.154982
         age |   .0274476    .013608     2.02   0.044     .0007764    .0541187
educ_primery |   .8548243   .3466925     2.47   0.014     .1753194    1.534329
  educ_great |   .9684331   .3977942     2.43   0.015     .1887708    1.748095
numland_to~l |  -.2109776   .1201657    -1.76   0.079    -.4464981    .0245429
cattle_owner |   .0378077   .1839013     0.21   0.837    -.3226322    .3982477
packanimal~r |   .0033472   .2346016     0.01   0.989    -.4564635    .4631579
    avnm_dph |   .0109905   .0071482     1.54   0.124    -.0030197    .0250007
       _cons |   -9.75736   252.0405    -0.04   0.969    -503.7476    484.2329
-------------+----------------------------------------------------------------
act_trade    |
     hhh_age |  -.0322556   .0127902    -2.52   0.012    -.0573239   -.0071873
     hhh_sex |  -.2795838   .3668402    -0.76   0.446    -.9985773    .4394096
 hhhfam_size |   .0412258   .0653017     0.63   0.528    -.0867632    .1692147
```

```
hhhmari_st~s |  -.2305796   .3455511    -0.67   0.505    -.9078474    .4466881
   dep_ratio |  -.0000363   .0017971    -0.02   0.984    -.0035586     .003486
      loclow |  -.5094236   .2698671    -1.89   0.059    -1.038353    .0195063
      locmid |  -.2171025   .2604636    -0.83   0.405    -.7276017    .2933968
         sex |   .4710095   .1670012     2.82   0.005     .1436932    .7983259
         age |   .0365487   .0085344     4.28   0.000     .0198216    .0532758
educ_primery |   .9466192    .198534     4.77   0.000     .5574998    1.335739
  educ_great |    .491982   .2399671     2.05   0.040     .0216552    .9623087
numland_to~l |  -.3401794   .0732817    -4.64   0.000    -.4838089   -.1965499
cattle_owner |   .0581704   .1100498     0.53   0.597    -.1575231     .273864
packanimal~r |   .1878283   .1270922     1.48   0.139    -.0612679    .4369244
    avnm_dph |   .0124102   .0047274     2.63   0.009     .0031447    .0216756
       _cons |  -.3873941   .6883163    -0.56   0.574    -1.736469     .961681
-------------+----------------------------------------------------------------
act_salefad  |
     hhh_age |  -.0308676   .0175962    -1.75   0.079    -.0653555    .0036203
     hhh_sex |  -.9001442   .4795587    -1.88   0.061    -1.840062    .0397737
 hhhfam_size |   .1386944   .0815208     1.70   0.089    -.0210835    .2984722
hhhmari_st~s |   .6847268    .563797     1.21   0.225     -.420295    1.789749
   dep_ratio |  -.0002524   .0023299    -0.11   0.914    -.0048188    .0043141
      loclow |  -.3777115   .3623028    -1.04   0.297    -1.087812     .332389
      locmid |  -.2172415   .3358427    -0.65   0.518    -.8754811     .440998
         sex |  -.5365393   .2145558    -2.50   0.012    -.9570608   -.1160177
         age |   .0480283   .0123851     3.88   0.000     .0237539    .0723026
educ_primery |   .7025123   .2592366     2.71   0.007     .1944179    1.210607
  educ_great |    .768526   .3065898     2.51   0.012     .1676209    1.369431
numland_to~l |  -.1485564   .0920373    -1.61   0.101    -.3289462    .0318333
cattle_owner |   .2127232   .1531011     1.39   0.165    -.0873494    .5127957
packanimal~r |  -.1282941   .2555122    -0.50   0.616    -.6290888    .3725006
    avnm_dph |   .0037369   .0063873     0.59   0.559     -.008782    .0162559
       _cons |  -2.472981   .9638944    -2.57   0.010    -4.362179   -.5837824
-------------+----------------------------------------------------------------
    /atrho21 |   .0406138   .1324061     0.31   0.759    -.2188974    .3001251
-------------+----------------------------------------------------------------
    /atrho31 |   .1210195   .2013957     0.60   0.548    -.2737087    .5157478
-------------+----------------------------------------------------------------
    /atrho32 |   .1617654   .1214799     1.33   0.183    -.0763308    .3998617
-------------+----------------------------------------------------------------
       rho21 |   .0405915    .132188     0.31   0.759    -.2154669     .291427
-------------+----------------------------------------------------------------
       rho31 |   .1204322   .1984746     0.61   0.544    -.2670724    .4744115
-------------+----------------------------------------------------------------
       rho32 |    .160369   .1183557     1.35   0.175    -.0761829    .3798306
------------------------------------------------------------------------------
Likelihood ratio test of  rho21 = rho31 = rho32 = 0:
             chi2(3) =  2.17012   Prob > chi2 = 0.5379
```

Appendix 2：**Multicollinearity test result**

```
collin hhh_age hhh_sex hhhfam_size hhhmari_status dep_ratio loclow locmid sex age educ_primery educ_great numland_total
cattle_owner packanimal_owner avnm_dph

  Collinearity Diagnostics

                       SQRT                    R-
  Variable      VIF     VIF    Tolerance    Squared
----------------------------------------------------
   hhh_age      1.58    1.26    0.6339      0.3661
   hhh_sex      2.09    1.45    0.4784      0.5216
hhhfam_size     1.49    1.22    0.6713      0.3287
hhhmari_status  2.11    1.45    0.4749      0.5251
 dep_ratio      1.65    1.28    0.6075      0.3925
    loclow      2.40    1.55    0.4162      0.5838
    locmid      2.78    1.67    0.3596      0.6404
       sex      1.16    1.08    0.8631      0.1369
       age      1.85    1.36    0.5397      0.4603
educ_primery    1.35    1.16    0.7388      0.2612
educ_great      2.40    1.55    0.4174      0.5826
numland_total   1.26    1.12    0.7905      0.2095
cattle_owner    1.29    1.14    0.7753      0.2247
packanimal_owner1.17    1.08    0.8541      0.1459
  avnm_dph      2.13    1.46    0.4685      0.5315
----------------------------------------------------
  Mean VIF      1.78

                         Cond
        Eigenval         Index
---------------------------------
    1    11.3866          1.0000
    2     1.1767          3.1107
    3     0.9416          3.4775
    4     0.5560          4.5256
    5     0.5404          4.5904
    6     0.3762          5.5015
    7     0.3058          6.1023
    8     0.2831          6.3425
    9     0.1172          9.8579
    10     0.0988         10.7328
    11     0.0665         13.0855
    12     0.0492         15.2199
    13     0.0435         16.1758
    14     0.0276         20.2941
```

```
    15     0.0209          23.3357
    16     0.0100          33.8235
----------------------------------
 Condition Number         33.8235
 Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
 Det(correlation matrix)    0.0214
```

Appendix 3: **Correlation matrix**

```
corr hhh_age hhh_sex hhhfam_size hhhmari_status dep_ratio loclow locmid sex age educ_primery educ_great numland_total
cattle_owner packanimal_owner avnm_dph
(obs=631)
```

	hhh_age	hhh_sex	hhhfam~e	hhhmar~s	dep_ra~o	loclow	locmid	sex	age	educ_p~y	educ_g~t	numlan~l	cattle~r	packan~r	avnm_dph
hhh_age	1.0000														
hhh_sex	0.0174	1.0000													
hhhfam_size	0.0501	0.1805	1.0000												
hhhmari_st~s	0.0096	0.6926	0.2575	1.0000											
dep_ratio	-0.3676	0.0850	0.3106	0.0017	1.0000										
loclow	0.1166	0.0077	-0.0439	-0.0174	0.2476	1.0000									
locmid	-0.1568	0.1310	0.1057	0.1486	-0.0914	-0.4872	1.0000								
sex	0.0261	0.0877	0.0125	0.0756	-0.0326	0.0308	-0.0304	1.0000							
age	0.2856	0.0900	-0.0671	0.0478	0.0150	0.1056	-0.0514	0.0358	1.0000						
educ_primery	-0.1095	0.0802	0.0471	0.0781	0.0566	-0.0204	0.0273	0.0660	0.0978	1.0000					
educ_great	-0.1077	-0.0156	0.1447	0.0102	-0.0740	-0.2956	0.1664	0.1929	-0.5847	-0.3794	1.0000				
numland_to~l	0.1348	0.1167	0.1300	0.1187	-0.0863	-0.2422	0.2932	0.0228	0.0240	-0.0894	0.0976	1.0000			
cattle_owner	0.0668	0.2285	0.3006	0.1504	0.0155	0.0110	0.0009	0.0374	-0.0015	-0.0158	0.0382	0.2530	1.0000		
packanimal~r	0.1301	0.1237	0.0269	0.0307	-0.1152	-0.1666	0.0646	0.0376	0.0314	0.0181	-0.0148	0.1629	0.2438	1.0000	
avnm_dph	-0.0101	0.1677	0.0707	0.1819	0.1063	0.2213	0.4847	0.0008	0.0318	0.0302	-0.0512	0.0559	0.0070	0.0393	1.0000

Appendix 4: Survey questionnaire

Survey Questionnaire

PERSON INTERVIEWED: Preferably the head of household, if not available, any ¦ adult member of the Household who is able to give information on the other household members.

1. Background Information

1.1. Name and Code of Interviewer _____

1.3. Name and Code of PA _____

1.4. Agro-ecology of the PA _____

1= Kolla(lowland) 2= WoinaDega(medium land) 3= Dega(Highland)

2 HOUSEHOLD ROSTER

2.1 HH Member I.D #	2.2 Name	2.3 Relationship to Head of household husband .....1 Wife.....2 Son/daughter .....3 Grandchild .. . .4 Father/mother .....5 Sister.. .. .. … ..6 Brother. .. .. .7 Hired labor.. ... . 8 Other, specify 9	2.4 Sex Male 1 Female 2	2.5 Age	2.6 What is present marital status? Single.. .. .. ..1 Married .....2 Divorced.. .. .. 3 Separated.. .. ..4 Widowed .....5 Other, specify...6	2.7 What is (NAME'S) Religious denomination? Orthodox .....01 Muslim .....02 Protestant.....03 Catholic .....04 Other,specify..05	2.8 Education level No Education.....1 Can read and write.. .. ..2 Primary education (1-4) grade……..3 Junior(5 – 8) grade.....4 secondary education(9 – 10) grade.....5 secondary education(11-12) grade.....6 Above Grade 12.....7
01							
02							
03							
04							
06							
07							
08							
09							

2.1 HH Member I.D #	2.2 Name	2.9 Activities that the house hold members participates(more than one activities selection is possible) Farming……1 weaving……2 Tannery……3 carpentry……4 Black smith ……5 Carpet making……6 Pity trading -selling of food……7 -selling of drink……8 -fuel wood sell……9 -wood sell……10 retailer……11 Whole saler……12 Daily laborer……13 Cattle tending……14 pottery……15 Grass and Hay sell……16 Coal & wood sell……17 Grass and Hay sell……18 Farm implements sell……19 Traditional medicine sell……20 Vegetable sales……21 Guarding……22 masonry……23 cementing……24 Saftynet……25 Office work……26 Others, specify……27	2.10 Type of activities			2.11 Share of time Hr. per day for activities(within 24 hours)		
			Primary	secondary	tertiary	For Primary activities	For Secondary activities	For Tertiary activities
01								
02								
03								
04								
06								
07								
08								
09								
10								

3. Crop production

3.1. Do you (or other members of your household) own Land?

1= yes 2= No

3.2. If yes 3.1, what total size of land do you have in any form (per plot)? _____

1= Private_____ 2= Rented/Borrowed_____ 3= Share Cropping_____ 4= Others (Communal) _____

3.3. Topography of the land (per plot)

1= Plain _____ plot2= Steep_____ plot 3= Hilly_____ plot

4. Livestock

4.1. Livestock ownership

Type of Livestock	Total number
Oxen	
Cow	
Calves	
Sheep	
Goat	
Chickens	
Horse	
Mule	
Camel	
Beekeeping(hives) -modern - Kenya top bar -traditional	
Other specify	

4.2. What specific problems do you have in raising livestock?

1= Grazing 2= Diseases 3= Lack of Water 4= Wild Animals 5= Theft 6= Poor breed 7= others (Please Specify)

5. Non-farm activities based on the answer on 2. 9

5. 1.Self-employed activities

5.1.1 Activities	5.1.2 Why did you engage in those Self-employment activities? To supplement farm income…..1 As a major mode of livelihood…2 Inherited from family ……..3 Others (Specify) ……..4	5.1.3 What types of instruments do you use to undertake the activity? Traditional ……1 Modern/Improved …2 Others (Specify)……3	5.1.4 How long does the potential market for activity take for round trip (Hr.)? _____	5.1.5 How do you transport your activities to market places? Pack animals…1 Hired labor…..2Carried by family…3 Car transport…..4 Others (Specify)….5	5.1.6 Who are your potential customers for the activity? Local Farmers..1 Local Merchants..2 Merchants from other areas …3 Others (Specify)..4	5.1.7 What are the potential problems you usually face in the activity? Lack of initial capital….1 Poor transport facility..2 Shortage/lack of pack animals ……3 lack of skill……..4 Market shortage……..5 Others (Specify)……6	5.1.8 At what time do you undertake the activity? All the time …1After/before farming …..2 Off season…3 Others (Specify)…..4	5.1.9 Do these activities compete with farming in terms of time? 1= Yes 0= No
weaving								
Tannery								
carpentery								
Black smith								
Carpet making								
Pitty trading								
-seling of food								
-seling of drink								
-fuel wood sell								
-wood sell								
Retailer								
Whole saler								
Cattle tending								
pottery								
Grass and Hay sell								
Farm implements sell								
Traditional medicine sell								
Carpenter								
masonry								
Other specify.								

5. 2.wage-employed activities

5.2.1 Activities	5.2.2 Why did you engage in those Wage-employment activities? To supplement farm income…..1 As a major mode of livelihood…2 Others (Specify) ……..3	5.2.3 Where are you employed? In this PA……..1 In other PAs of same district……..2 Neighbouring woreda……..3. Others (Specify)….4	5.2.4 How long does the activity take for round trip(Hr.)?_____	5.2.5 How do you use for transport? Pack animals……..1 On foot ……..3 Car transport……..4 Others (Specify)….5	5.2.6 Who is your employer? Local Farmers...1 Private sector…2 Government..3 NGO's……4 Others (Specify)..5	5.2.7 What are the potential problems you usually face in this occupation? Low payment……..1 Job insecurity ……..2 Unavailability of work..3 Others (Specify)……..4	5.2.8 At what time do you undertake the activity? All the time …1After/before farming …..2 Off season…3 Others (Specify)..4	5.2.9 Do these activities compete with farming in terms of time? 1= Yes 0= No
micro dam construction								
community soil and water conservation works								
carpentry								
masonry								
cementing								
Cattle tending								
Daily laborer								
Guarding								
Farming								
Safety net								
Office work								
Others, specify								

6. Rent and others income

6.1. Does anyone in the family get income from rent or other income source?

1= Yes 0= No

6.2. If Yes to QI1, how many of your family members are got it?

6.3. If Yes to Q I1, please give the following details?

Income source	quantity	income
Oxen renting		
Pack animals renting		
House renting		
Remittances		
Traditional Saving 'equib'		
Others (specify)		

7. Households Access to infrastructure

7.1 Availability of services to the House hold	7.2 Write 1= if available in the village 2=if available in *Tabiya* 3= if available in neighboring t*abiya* 4= if available only in*woreda* town 5= other specify	7.3 Distance **per hour** From HHs home to the service or place
Woreda town		
Primery school		
Secondary school		
All weather road		
Dry season road		
Nearest market (local market)		
Main market		
Animal health center		
Residence of extension agents.		

8. Income obtained from different activities in 2011/ 2003)

Income source	Income obtained
Nonfarm Self-employment activities) listed on 5.1	
-	
-	
-	
-	
-	
-	
Wage employed activities listed on 5.2	
-	
-	
-	
-	
-	
-	
Rent and others income listed on 6.3	
-	
-	