

WOLKITE UNIVERSITY

COLLEGE OF AGRICULTURE AND NATURAL RESOURCE

DEPARTMENT OF AGRICULTURAL ECONOMICS

Determinants of Rural Household Income in Gedeo zone Yirga Cheffe woreda

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DETERMINANTS OF RURAL HOUSEHOLD INCOME IN GEDEO ZONE YIRGA CHEFFE WOREDA

A SENIOR RESEARCH PROJECT SUBMITTED TO THE COLLEGE OF AGRICULTURE AND NATURAL RESOURCE DEPARTMENT OF AGRICULTURAL ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR BSC DEGREE IN AGRICULTURAL ECONOMIC

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Apr 2025

Wolkite, Ethiopia

Statement of declaration

1. Students

I declared that this work title" Determinants of rural household income is my own effort and study and that all source of materials used for the study. I have produced it independently except for the guidance and suggestion of the research adviser.

1) Name…….

Signature…… Date……...

2. Advisor

This research proposal has been submitted for review with our approval as university supervisor.

Advisor Name……..

Signature…… Date……..

3. Examiner's

Name**:** _____

Signature: _____ Date: _____

Name**:** _____

Signature: _____ Date: _____

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List of Acronyms and Abbreviations

BLUE	Best Linear Unbiased Efficiency
CIDA	Canadian International Development Agency
CSA	Central Statistical Agency
FDRE	Federal Democratic Republic of Ethiopia
GDP	Growth Domestic Product
IFAD	International Fund for Agricultural Development
MoARD	Ministry of Agriculture and Rural Development
OPHI	Oxford Poverty and Human Development Initiative
OLS	Ordinary Least Square
RHY	Rural Household Income
SAEA	Southern Agricultural Economics Association
YDARDO	Yirga Cheffe District Agricultural and Rural Development Office
SNNP	Southern Nations, Nationalities, and Peoples
UNECA	United Nations Economic Commission for Africa
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WB	World Bank

ABSTRACT

Even though, Yirga cheffe Wereda is one of the most cereal crop producers in Gedeo zone the rural farming households' income is very low. Thus, this study, focused on identifying the micro-level factors that determining the rural household income in the Wereda. Multi-stage sampling technique was adopted for the selection of sample respondents. The district was stratified in to three kebeles based on distance from woreda's town and three kebeles were selected using simple random sampling. Using simple random sampling technique 98 sample respondents were selected from each kebeles. Data was collected using structured questionnaires and interview. Both the descriptive and econometrics statistics (OLS estimation model) were applied for analyzing data. Descriptive statistics were applied to characterize the sample households' demographic, economic, institutional and environmental factors. The OLS estimation result indicated that from nine explanatory variables five variables which are, Education (EDUC) at 5%, off farm activity (OFFA) at 5%, Soil fertility of land (SFERT) at 1%, CREDIT at 10%, improved farm input (IMFI) at 5% significance level. Generally, both the descriptive and econometrics statistics were analyzed and clearly interpreted. It is recommended that the farmers should adopt credit; farmers should be allowed to have long term off-farm employment to augment the farming sector

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CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Agriculture is the principal engine of the world economy. For poorest countries agriculture provides the leading sources of employment contributes the larger fraction of their national income, especially sub-Saharan African countries economy highly depends on agriculture. Since Ethiopia is one of the sub-Saharan African countries its economy is highly depends on agriculture (WB, 2011). For most rural households in Ethiopia agriculture is the main engine or predominant activity. Ethiopia's agricultural sector is a major contributor to the Ethiopian economy and is central to food security and poverty reduction.

Ethiopia's agricultural sector accounts for approximately 30-40% of GDP, remains a major contributor to exports at around 30-40%, and employs about 70-80% of the population. Nearly 80% of the poor depend on agriculture for their livelihood (World Bank, 2023). Rural households in developing countries have for a long time been pre-received as farm households, and that they receive their income from farm activity. Evidence abounds, however, that rural households do not only receive a significant proportion of their incomes from farm activity but also they receive income from non-farm activity.

Ethiopia has on estimated area of 112 million hectares of which 51.3 million hectares is arable land but only about 11.7 million hectare is cultivated, just about 24% of the total cultivable area (MoARD, 2010). This indicates that, given the ecological diversity, the country has a good potential to produce a wide variety of crops in large quantities. According to recent Federal Democratic Republic of Ethiopia evidence, nearly 55 percent of all smallholder farmers operate on one hectare or less. Moreover, CIDA indicates the declining average per capita farmland holdings -36 per cent of households cultivate land below half a hectare, 59.8 percent below one hectare, and 83.8 percent below two hectares.

Despite its potential, Ethiopia ranks among the world's poorest nations, with a per capita income of approximately $1,020 as of 2023, which reflects ongoing challenges related to poverty and economic development (World Bank, 2023). The population

faces issues related to low daily calorie consumption, with many individuals struggling to meet their nutritional needs. A significant portion of the population lives in deep poverty, with about 24% of citizens earning less than the national poverty line (World Bank, 2023).

Research indicates that approximately 29.6% of Ethiopians live on an income below the national poverty line, and a staggering 72.2% earn less than $2.15 per day (World Bank, 2023). Over the past decade, the Ethiopian economy has undergone a notable shift; the contribution of agriculture to GDP has decreased from 52% to around 30-40%, while the industrial and services sectors have grown, now accounting for about 45% of GDP (World Bank, 2023). This transition reflects efforts to diversify the economy and improve living standards, although challenges remain in addressing poverty and food security.

Agriculture is a contributory factor to the widespread rural poverty and food insecurity in Ethiopia is the very low productivity of the smallholders' farm (Canali & Slaviero 2010). Smallholder farmers are the major producer of food through low - input, rain- fed and low-output farming systems (MOARD, 2010). Droughts, erratic rainfall, backward production technologies, small size of farm land, land degradation, low soil fertility are the causes for the low productivity for agriculture. Despite the fact that farm activities is the main source of livelihood in rural households of Ethiopia. Farmers are engaged in a variety on non-farm activities to diversify their income and enable them cope with the risk of crop failures.

However, there is a wide difference between literature's regarding the share of non-farm activities (income) in total households' income in Ethiopia. Barrett & Reacdon, (2010) reported that the share of non-farm income in rural Ethiopia averaged about 36% in 1990. On the other hand, Reacdon et al., (2011) found that non-farm share of total income in rural Ethiopia was about 20% and the rest 80% was from farm activities in 1999 fiscal year. (Sora, 2010s) found that about 75% of rural households engage in off-farm activities and off-farm employment indicating that income from farming is not sufficient to support the household economy.

The rural households in Gedeo zone in general and in the study area (Yirga cheffe woreda) in particular are highly dependent on the rain-fed farming systems. Furthermore, due to the insufficient land resources, traditional method of farming, low

soil fertility, land degradation, Drought, lack of access to credit, lack of improved agricultural inputs and the rainfall pattern variability, the small holders farming households in the study area are becoming unable to meet the annual food requirements. As a result, they are obliged to engage in low return daily wage works, petty trading, services and hand craft activities (like weaving, blacksmith, bamboo and petty works) to supplement their livelihoods and to cope up with the farming risk (Berhanu & Beyene, 2015; Ayele et al., 2014).

In Yirga cheffe woreda even though, the smallholders farm households are involved in diverse livelihood activities, the participation of smallholder rural farm households in to farm activities is influenced by complex and yet empirically unidentified factors. It is thus, so important to identity the major factors affecting rural households' income in Yirga cheffe woreda to improve rural household's livelihoods in the study area.

1.2 Statement of the problem

Agriculture is still the key sector in many developing African countries. Its contribution goes to the extent of stimulating other sectors by providing input supply. However African agriculture is dominantly rain-fed agriculture and, as a result, yields are low and farmers can be trapped in a cycle of poverty and food insecurity for decades (UNECA, 2009; p.117). Africa is in the midst of generalized agricultural crisis, the most visible symptom of which is the continents in ability to feed itself. This crisis is mainly to low level of agricultural technology innovation, diffusion, and adoption of process. This, in turn, can be explained by interwoven nature of the problems (Aweke, 2015).

Ethiopia, once expected to be the bread basket of African is now suffering from severe shortage of its citizens and chronic poverty. The major reason behind is mainly the backwardness of dominant economic sector of the country, agriculture, land traditional tools, draft animals and family labor are still the most important factors of production(Beyene, 2014).Factors such as very small land holding, drought, foods, crop loss due to pest and /or disease, poor road status and gaps in market access in rural areas, means that farm activity is already unable to support all of the rural population, leaving many reliant on the food aid. It is therefore critical to understand that improving rural households income enable people to move out of poverty in to high earning and more sustainable livelihoods (Mideksa, 2015).

Due to smaller farm and low return from farming activities, majority of rural households exposed to chronic poverty. For instance, international food and agricultural development (IFAD, 2011) indicated that most of the Ethiopian rural people are poor and access to one hectare or less of land. Hence, if there are no alternative means of livelihoods substituting this situation the newly born generation will face serious changes than existing. Therefore, these households need to cope with increasing difficulties in agricultural production by improving their income.

In Ethiopia, where income from farm activity varies considerably farm households usually engaged in non-farm activities to supplement their agricultural income (Beyene, 2014). Majority of Yirga cheffe woreda population resides in rural areas and are engaged in farm and non/off farm activities which generate income for rural households to improve their livelihoods. The rural household's income in study area may affected by many socio-economic and other factors such as Environmental and institutional factors. Regarding with this issue and other related topic many studies was conducted by different researcher.

A study conducted by Tassema Urgessa, (2015) by using logit regression, showed that land productivity, non-farm income and productivity are found to be the most determinants of rural household income and sex of household head is the main socio-economic factor for the variation of income among the rural households. A study conducted by Assebe Dereje, (2017) by using logistics estimation model indicated that head of household sex at 1%, land size at 10%, off farm income at 5%, soil type at 5% and climate condition at 1% significance level were positively and significantly affect rural household income.

Even if many researchers have done on this issue, none of them had been done in study area (Yirga cheffe woreda) with this regard. Most of previous study done on this issue was used logistics estimation model. Therefore, in this study I was try to fill this research gap to identity the determinants of rural household income in Yirga cheffe woreda by using Ordinary least squared (OLS) regression model.

1.3 Research question

The researcher wants to address the following researcher questions.

- What are sources of rural household income in Yirga Cheffe Woreda?

- What is the relationship between off farm activities and farm income in the study area?
- What are factors affecting rural households' farm income in Yirga cheffe woreda?

1.4 Objective of the study

1.4.1 General Objective

The general objective of this study was to identity the determinants of rural household income in Yirga cheffe woreda.

1.4.2 Specific Objective

- To assess the sources of rural household income in Yirga Cheffe Woreda
- To assess the share of off farm and farm income on the total income of the households in study area.
- To identity factors affecting rural households' farm income in Yirga cheffe woreda

1.5 Scope of the study

This study was a cross-sectional analysis to identity the major factors that affect rural household income in Yirga cheffe woreda. Although there are so many sources of rural household income in Yirga cheffe woreda, this study was focused on crop productivity and livestock as a source of rural household income in Yirga cheffe woreda.

1.6 Significance of the study

The researcher believes that the findings of the study will benefit in several ways. Firstly, the study will give open clues about the determinants of rural household income in Yirga cheffe woreda. Secondly, the study will be use full to other researcher who wants to have further investigation in to socio-economic challenges of rural household income; can also be used as an input for policy maker and other concerned bodies to design effective policy to improve rural household's income. Lastly, completing this study will contribute to the researcher's qualifications by

fulfilling part of the requirements needed to earn a BSc degree in Agricultural Economics.

1.7 Limitation of the study

The study was limited with a number of scarcities such as financial resource, human resource, and transportation service. Moreover, attempt was made to focus only on three kebeles out of 18 kebeles found in the woreda and to interview farm households selected from the three kebeles out of large population size found in the selected kebeles.

1.8 Organization of the study

The organization of this study has five chapters. The first chapter consists of introduction, background of the study, statement of the problem, research question, and objectives of the study, scope of the study, limitation of the study, significance of the study and organization of the study. The second chapter included about related literature review. The third chapter consists description of the study area, research methodology, data source of the study, data collection techniques, sampling techniques, Method of sampling, Method of data analysis and model specification, and it followed by chapter four data analysis and discussion of the result are present. On the last chapter, conclusion and possible policy recommendations are present.

CHAPTER TWO

2. REVIEW OF LITERATURE

2.1 Theoretical Literature

2.1.1 Concept and definition of terminologies

According to Collins Essential English Dictionary (2011), income is defined as the total amount of money earned from work or obtained from other sources over a given period of time. The free on-line dictionary (2010) defines income as the amount of money or its equivalent received during a period of time in exchange for labor or services, from the sale of goods or property, or as profit from financial investments. The same source alternatively describes income as money received by a person or organization because of effort (work) or from return on investments.

Farm employment is activities (farm) carried out by family members on both households owned and rented lands. It is an activity mainly focused on crop production and livestock production (MoARD, 2010). Crop production, horticulture production, vegetable production, fodder production share cropping production, rearing livestock and dairy are included in farm employment

Small Farm Households

The concept of small farm household can be approached from different angles. Small farm holders are a farmer those with a low asset base, operating less than 2 hectares of cropland (World Bank, 2009); smallholders as farmers with limited resource endowments, relative to other farmers in the sector (Dixon et al., 2013); smallholder are a farmer (crop or livestock) practicing a mix of commercial and subsistence production or either, where the family provides the majority of labor and the farm provides the principal source of income (Narayanan et al., 2013).

Therefore, the meaning of small farm household in research is to mean farmers who own or rented a farming land, with a maximum land holding size of less than or equal to two hectares, engaged in crop production predominantly for subsistence, and the source of labor is mainly the member of the household.

Off farm employment and income

The terms “off-farm”, “non-farm”, “non-agricultural”, “nontraditional”, etc. normally appear in seemingly synonymous ways. The basic distinctions among activities and incomes are to be made along sect oral and spatial lines (Barrett et al., 2010). According to (Haggblade et al., 2014) off-income or employment mean off the owners own farm that includes wage in agriculture earned on other people’s farms along with non-farm earnings from the owner’s non-farm enterprises or from non-farm wage earnings. Thus, off-income is the sum of rural non-farm income and wage earnings in agriculture.

On the other hand, Off-farm employment is an activity which carried out on the farm but not related to crop production (Baker, 2012). It is any activities that are carried out away from the farm. The non-farm activities include all economic activities in rural areas except agriculture, livestock, forestry, fishing and hunting. Off–farm income is any income source of the farmer that generated from out of the farming activities. (Ellis, 2015) for ex-ample defines off-farm income as income originating from wage labor on other farms whereas (Barrett et al., 2010) refer to off-farm income as all activities away from the farmers own property.

We follow the classification proposed by (Barrett et al., 2010) according to sectors (agriculture and non-agriculture) and functions (wage and self-employment). (Jolliffe, 2009) refers to off-farm income as the aggregate of wage income and income from self-employment outside agriculture.

2.1.2 Theoretical model for analyzing rural household income and its measurements

Theoretical analysis of household income revealed that rural income is mainly derived from farm and non-farm sources. Farm and non-farm variables played a vital role in rural household economy. All variables had their own effects, either increasing or decreasing effect. In this part the study tries to investigate the determinants of rural household income to explore the basic sources of welfare of rural households. It also examined what characteristics of rural households were associated with their real income. It used econometric models and the ordinary least square (OLS) regression estimation technique to establish relationships between rural household income and

various household characteristics. It considered both economic and non-economic characteristics of rural households to identify determinants of household income.

The economic characteristics include land size owned by individual households, and income shares from agriculture, wage-salary, business-commerce, and income from other sources. The non-economic characteristics include household size, household type, household heads age, Sex and educational status. One important dummy variable will be used to capture the effects of credit constraint on the specific household income. These variables included whether the household has credit constraints or not. This implies that a borrower household who needs a deYirga cheffe for more credit and non-borrowers who responded that they couldn't obtain credit will assumed as credit constraint.

2.1.3 Development of Agricultural Theories

Agricultural economists have provided different sources of growth in the sector they are working. They have suggested way in which labor natural resources capital increases in scale of specialization, improved efficiency and technological progress can be stimulated and combined to bring about broad-based agricultural growth. Different economist such as: - Norton and Alwang, Thunen, T.W.Schultz and etc. summarized the literature on agricultural development in six approaches: - Resource exploitation, Resource conservation, Location model, Diffusion theory, High pay off input and, Induced innovation (Dejen, 2007).

2.1.3.1 Resource Exploitation

Also known as frontier model, it concentrates on the expansion of arable land or grazing land, it is a way of increasing agricultural productivity, put by increasing or expansion of arable land. The development of agriculture in North America, South America, and other areas of the world during colonization cited as demonstration for this theory (Norton & Alwang, 2007: p170). The application of this theory to the developing country is very limited. There is more unutilized land left over. Even in areas of Africa and Latina America where additional land with exit disease, disease insect and soil problem prevent use in agriculture. The importance of this model to Ethiopia is low mainly due to shortage of land in temperate high land (Dejen, 2007).

2.1.3.2 Resource conservation

The exact opposite of resource exploitation model is resource conservation model theory. It emphasizes on increasing agricultural productivity through intensive use of land. The application of this theory is strengthened by the introduction of improved seeds, organic manures, labor intensive capital formation in the formation of drainage, inorganic fertilizers of dap and urea, pesticides. High population growth in low developing countries is also another factor which forces to explain better way of sustaining natural resources. Hence, conservation is likely to play an increasing important role in maintaining, if not expanding agricultural production in future (Norton & Alwang, 2007: p171-172).

2.1.3.3 The Location Model

The model is attributing to work German Economist (Heinrichvon Thunen, 1783) in the isolated state. T.W.Schultz also used model of location to explain why agriculture some area grow rapidly than in other areas. The importance of this is the essence of the location model is the approximating of a farm area to the urban. The nearer farm household to the town or city, the higher productivity it produces. This occurs due to availability of transportation and market, and markets, effect on labor and capital workers, case of obtain new and where productive inputs, and access to information (Heinrichvon Thunen, 1783)

2.1.3.4 The Diffusion Theory

The transfer of technology and economic knowledge from the developed countries to the developing counties according to diffusion theory supporters is believed to be important factors to bring about an increase in agricultural productivity in developing countries not between countries, but the diffusion theory can also be applied between farmers in a green country. The transfer of existing technologies knowledge from the more progressive to the lagging farmers could increase productivity (Norton & Alwang, 2007:72)

2.1.3.5 High-pay off Input

Also kwon as transformation approach or quick fix approach, it was clearly (1993) articulated fist by T.W.Schultz in his book, transforming traditional agriculture(Norton and Alwang) the use of high pay off input is also equivalent to

Schultz notion of farmers have as efficient to Schultz notation of farmers as "efficient but poor " since farmers have already exhausted resources found around them, where the efficient criterion is believed to hold, the only way to improve their lives and thus eradicate poverty is the use of green revolution in Asian countries. These countries were successfully to increase agricultural productivity by using modern seed varieties of wheat, corn and rye which are highly responsive of fertilizer, pesticides, and irrigation (T.W.Schultz, 1964).

2.1.3.6 Theory of Induced Innovation

The theory builds from what it calls the failure of the pay-off inputs model. The induced innovation model explains what economics factors stimulate the introduction of improved production techniques. The theory says that resource endowments are the basic determination of factor prices and technical change. The introduced innovation model has an important implication for choice of techniques of production. Accordingly, a country grouped under the "Asian path" where land per person is low, can increase agricultural productivity by using the most abundant resource, labor intensively. That is education, research, and the supply of modern technical inputs could lead to an increase in productivity even though land per person is very low (Hayami & Ruttan, 1988).

2.2 Empirical Review

Much empirical evidence is investigations have been undertaken to justify the effectiveness of the determinants as agreements in empirical work exist, it is not also uncommon to observe contradiction in the finding. For example, some empirical workers stand by the side of Schultz and appreciate the role of education in increasing agricultural productivity and income while others found result denying this conclusion. Both the international and national findings are summarized below.

2.2.1 International findings

(Akram, Naz & Ali, 2011) in Pakistan by using cross-sectional data to analyze an empirical analysis of rural household income finds that, the increase of land holding size, the level of household head education, the household's rental income and non-farm occupation are significantly increases the rural household incomes. The study used semi log multiple regression model to analysis the cross-sectional data.

(Awoniyi & Salman, 2011) investigated the level of non-farm income diversification, its effect on welfare status of farming households and factors that determine levels of non-farm income diversification using Logit regression analysis. The result of the analysis revealed that the factors that determine participation in non-farming activities are age of the household head, sex, having formal education, household poverty status and farm size. The result of the poverty analysis indicates that a larger percentage (53.9%) of farming households whose household heads are not engaged in non-farming activities live below the poverty line compared with farming households (48.3%) whose household head is engaged in non-farming activities.

The study concludes that farming households that are not involved in non-farming activities are more vulnerable to poverty when compared with farming households that engaged in non-income. Using data on 200 households selected from 40 villages of Southeast Nigeria, (Ibekwe et al., 2010) examined factors determining non-income. Their findings shows that age of the household, education level and farm size are the most significant variables determining both farm and off farm income. Specially, the size of farm land is positively associated with income whereas negatively correlated with off farm income.

This indicates that increases in the size of farm land increases farmers' willingness to operate in farm activities than participating in off farm activities. This may further show the fact that small-sized farmers are driven out of farm activities in the study areas. Besides, they also found positive association between household size and income and negative correlation between age of the household and off farm income, implying less participation of older farmers in off farm activities.

(Aikaeli, 2012), study the determinants of rural income in Tanzania by using feasible generalized least square (FGLS) estimation technique, finds that as the size of family labor force, cultivated land size for farm income and educational level of the household head increases, the per capital income of the rural household is significantly increased.

2.2.1 National findings

A review of studies in Ethiopia also addressing issues related to improved agricultural productivity and household income suggest that, the size of farm land and labor productivity are significant for agricultural productivity and positively affect the

household income. As (Adugna, 2012) identifying the determinants of household income in rural households of Ethiopia indicates that, the household demographic characteristics like family size, educational status of the household head and sex of the household head is determining the income of the household to enhancing or to lowering.

The study conducted by (Bogale, Hagedorn & Korf, 2015), in the assassination of the determinants of poverty in rural Ethiopia shows that cultivated land per adult in the household, the living geographical locations of the rural household, educational status of the household head and owning of oxen are significantly important determinants for holding the household resource endowments or households are deprived from basic livelihood assets.

By using a cross-sectional data, a study conducted in walaita and Gemugofa zones of South nation, nationalities and people of Ethiopia for assessing productivity and technical efficiency of smallholder farmers, shows that, there was significant level of productivity improvement among maize producing farmers (Geta et al., 2013). They were used a two stage estimation technique, translog production function to determine the levels of productivity and Tobit regression model to identify factors influencing technical efficiency. The model result depicted that productivity of maize was significantly influenced by the use of labor, fertilizer, and oxen power.

Another literature studies by (Berg & Kumbi, 2014) were suggested that agriculture was the main source of rural income inequality in Oromia national states of Ethiopia. Their results showed that 90 percent of total inequality was due to farm source of income. On the other hand, non-farm income was found to be inequality decreasing source of rural income. (Tesema, 2015) using OLS model indicate that, variables such as household generated their income from non-farm activity for their livelihood (off-income), the sex of the household head, owning of livestock at tropical livestock unit, the number of dependency ratio per households, the farm output per unit of labor input, the farm output per unit of cultivated area of farm input have a significant effect on rural household income.

A study by (IFAD, 2011) states that in Ethiopia, the construction of small-scale irrigation schemes has resulted in increased production, income and diet diversification in the Oromia and Southern Nation and Nationalities People (SNNP)

regions. According to this study, the cash generated from selling vegetables and other produce is commonly used to buy food to cover the household food demand during the food deficit months. The same study further added that during an interview conducted with some farmers, it was disclosed that the hungry months reduced from 6 to 2 months (July and August) because of the use of small scale irrigation. Moreover, the increase in diversity of crops across the schemes and the shift from cereal livestock system to cereal-vegetable-livestock system is starting to improve the diversity of household nutrition through making vegetables part of the daily diet.

Senait Hailu in her under graduate senior essay "Determinants of agricultural productivity in Ethiopia (2006) found convectional factor of production included land, labor, physical capital and livestock to be insignificant. From the above conventional factors area cultivated and fertilizer value had significant role in determining agricultural production by 37% and 27.9% respectively soil quality and education level had fairly large coefficient but were found to be statistically. Senait also found age of house hold and sex of house hold to be very insignificant for determining agricultural productivity (Senait, 2006).

Belay Kejela in his under graduate senior essay entitled productivity determinate of small farm holders in Ethiopia the reason found that number of oxen, improved seeds, fertilizer and the price significantly affect productivity and income of farmers in the Wereda(Belay, 2007:119). On the other hand wealth provided by the number of livestock owned, labor education and contact with extension workers where sound to be insignificant belay hypothesized that livestock is insignificant due to the decrease attention given to crop rather than livestock of at the latter`s number increases labor role might also be undermined due to existence of debo or wonfel (Belay, 2007: 221).

2.3 Conceptual Framework

In this study, there is a dependent variable and independent variable those researchers reviewed in the literature review; independent variables are improved farm inputs, Land size, Credit uses, Age of household, Sex of household, Family size of household, Education level of household, Off farm activities, Soil fertility of households land, and types of boat. These variables have their effects on the dependent variable called rural household income.

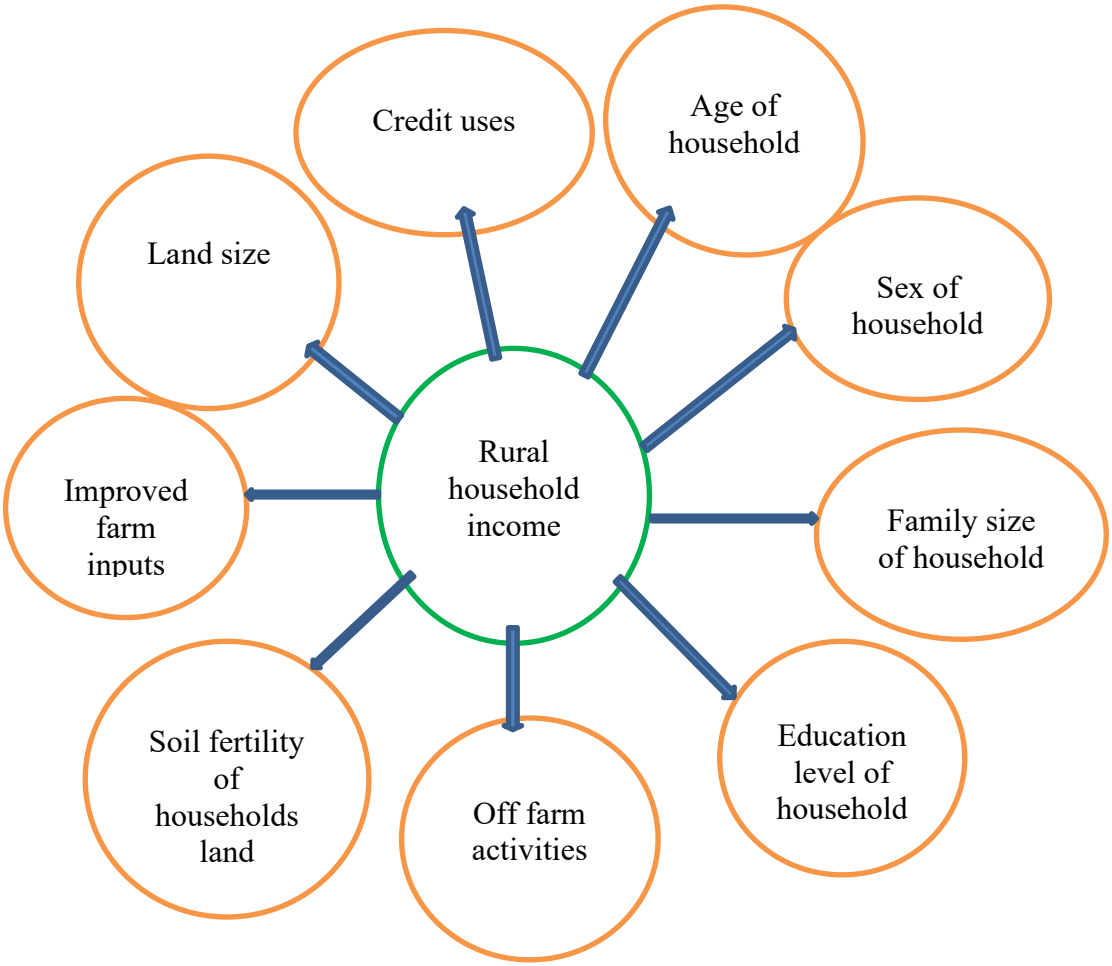


Figure 2.1: Conceptual frame work

CHAPTER THREE

3. METHODOLOGIES

3.1 Description of Study Area

The research was conducted in Yirgacheffe woreda, located in the Gedeo zone of the South Ethiopia Regional state. Gedeo zone was bordered by the Oromia region to the south, Sidama Zone to the north, and Ganjule District to the east. Yirgacheffe woreda lay within Gedeo zone, covering an area of 114,084 hectares (CSA).

The topography of the study area was characterized by hilly and mountainous terrain suitable for terrace farming. The altitude ranged between 1,200 to 2,400 meters above sea level. The climate was mild, with average annual rainfall between 1,200 to 1,500 mm. According to the 2007 national census, the population of Yirgacheffe woreda was estimated to be around 10,977, of which 5,404 were male and 5,573 were female.

Agriculture was the primary economic activity in rural Yirgacheffe woreda, with subsistence farming of crops such as enset, corn, wheat, potatoes, and beans being the main occupation of residents. Major cash crops included coffee, which was grown extensively in the area. Infrastructure in kebeles consisted of gravel roads, small rural markets, primary schools, and basic health posts. Access to facilities like electricity, tap water, and mobile networks was limited.

The research aimed to identify the key determinants of rural household income in Yirgacheffe woreda. Factors that could influence income levels included farm size, type of crops grown, livestock ownership, off-income sources, household demographics, access to agricultural credits, and proximity to markets. The rugged terrain, climate conditions, and rural infrastructure provided the overall context for livelihoods and incomes in the study area.

3.2 Types and sources of data

The source of data for the research was both primary source and secondary source. The primary data was collected from rural household farmers and the secondary source data was collected from the written documents.

3.3 Method of data collection

To collect necessary raw data the researcher was used both primary data collection instrument and secondary data collection instrument. Primary data collection instrument were structured questionnaires and interview was employed. The key informant interview was done for those household who cannot read and write to collect necessary raw data. The secondary data collection instrument published and unpublished such as books, internet, and annual report was used. Information that was used to describe geographical location and Socio-economic activities of the study area was collected from Yirga cheffe woreda Agricultural and Rural development office.

3.4 Sampling Technique

The researcher was used multistage sampling technique in selection of rural household respondents. In first stage, out of 25 woredas in Gedeo zone, Yirga cheffe woreda was selected purposively Yirgacheffe possesses distinct characteristics that render it particularly suitable for this study. These attributes align closely with the research objectives, contributing to its relevance in the context of the investigation. In the second stage the kebeles of Yirga cheffe woreda was stratified in to six as near, medium and far based on the criteria of their distance from woreda's town (Yirga cheffe). In the third stage, sample size was selected from each selected six kebeles by using simple random sampling technique.

3.5 Method of Sampling

The sample household respondent was taken from selected kebeles using random sampling method. After the researcher gets the total household of selected kebeles as sample, then the researcher was used the formula of Yammen (1963) to determine the sample size from target population.

$$n = \frac{N}{1+N(e^2)}$$

Where: N = Target population of selected kebeles, e = Level of significance, n = Sample size. The Target population household of selected kebeles were about 4546 and the level of significance were 10 %(0.1). Then the sample size was determined as follows.

n = N/1+N (e) ^2 =4546/1+4546(0.1) ^2 =4546/46.46 = 98

Table 3.1The total number of household from each kebeles included in the sample proportionally as follows

Sample kebeles	Total number of household	Number of sampled household	Percentage (%)
Domerso & Haru	1407	1407/4546×98=30	1407/4546×100%= 31%
Edido & Fsehha Genet	1809	1809/4546×98=39	1809/4546×100%= 40%
Foge & Sukke	1330	1330/4546×98=29	1330/4546×100%= 29%
Total	4546	98	100%

3.6 Method of data Analysis

After the data collection the result was analyzed by using both descriptive and econometric method of data analysis. The descriptive method of data analysis was analyzed by using percentage, frequency distribution, graphs and tables. The econometric method of analysis was analyzed by using Ordinary least square (OLS) regression analysis because dependent variable of the study is continuous variable.

3.6.1 Descriptive analysis

Descriptive analysis was described what is or what the data shows and it are used to quantitative descriptions in a manageable form. Descriptive analysis was used to reduce the data in to a summary format by tabulation (the data arranged in a table format) and measure of central tendency (mean and standard deviation). The reason for using descriptive statistics is to compare the different factors.

3.7 Model Specification

The model was estimated by using OLS estimation model. Because of the dependent variable of the study is continuous (quantitative) variable the researcher was used OLS model for the following Gujarati (2004) the OLS regression model specified as follows.

RHYY = f (SEX, AGE, FSIZE, EDUC, OFFA, SFERT, IMAI, CREDIT, LSIZE)

RHY=α+β1SEX+β2AGE+β3FSIZE+ β4EDUC+ β5OFFA+ β6SFERT+ β7IMAI+ β8CREDIT+ β9LSIZE+μ

Where: α and βs are parameter, RHY = Rural household income, SEX = Sex of household, AGE = Age of household, FSIZE = Family size of household, EDUC = Education level of household, OFFA = Off-farm activities, SFERT= Soil fertility of households' land, IMFI = Improved Farm inputs, CREDIT = Credit uses, LSIZE = Land size, μ = Random disturbance term

3.8 Description of Variables

3.8.1 Dependent Variable

Rural household income (RHY) is dependent variable of this study. It is the value of rural household total income which is measured in terms of Ethiopian birr. This total income is calculated by multiplying the total value of cereal crops produced and total number of livestock that owned by farmers and their price and then sum up.

3.8.2 Independent Variables

Sex of household (SEX)

It is a dummy variable which takes 1 if the household head is male and 0 if the household head is female. These are related to women's lack of control over economic resources and the nature of their economic activity. The existing gender differences; male head household have mobility, participate in different meeting and have more exposure to information about better farm inputs and practice. So, the study will expect it affects positively.

Age of household (AGE)

It is a continuous variable measured in year. By its nature farm needs high physical works. At age above 65 years and at age below 15 years it’s difficult to perform

productive agricultural work to produce surplus output. But the age between 15 years and 65 years are more productive age and they are more active. Therefore, the study will expect that it affects positively or negatively based productive age and unproductive age group.

Family size of household (FSIZE)

It is continues variable which refers to the number of family number in a household. Therefore it will affect positively the household income expects have.

Education level of household (EDUC)

Education level, a dummy variable could be used to distinguish between being literate and illiterate. If the household is literate, the dummy variable for education level would be 1, meaning they can read and write with proficiency. If an individual is illiterate, the dummy variable for education level would be 0, meaning they do not possess the ability to read and write proficiently. Therefore, it will expect that those farmers how are advanced in school level have better opportunity (positively) go agricultural productivity (Beyene, 2012).

Off farm Activities (OFFA)

It is dummy variable which assume 1 if the households are participate in off farm activities and 0 if the household is not participate in off farm activities. So the study will expect it that positively or negatively with household's income.

Soil fertility of Lands (SFERT)

It is used to represent environmental factor which affect rural household income. It is dummy variable which assume 1 if the overall land the household possessed is fertile land and 0 if it is of poor fertility. Therefore, the study will expect that positive relationship with income.

Improved Farm input (IMFI)

It is dummy variable taking the value of 1 if the farmer use improved farm input and 0 if farmer does not use improved farm input. So that it will expect have positive relationship with income.

Credit use (CREDIT)

It is dummy variable which takes a value of 1 if the household use credit and 0 if the household does not use credit. It is measured in terms of weather at least one member of household has received a credit or not. Therefore it will expect that positive relationship with income.

Land size (LSIZE)

It is continues variable which is the total cultivated area of land of household measured by hectare .Therefore, the main hypothesis was that the household who cultivates large size of land can utilize more labor and will be more productive than household those who cultivate small size of land. So, land size will expect to have positive or negative relationship with income.

The summary will be expected signs of the parameters of the model in table as follows.

Table 3.2 Definition, codes, expected signs and types of variable will include in the study**.**

Variable use	Variable code	Variable size	Measurement	Expected sign
Dependent: Rural household income	RHY	Continuous	Ethiopian birr	
Independent:				
Sex of household	SEX	Dummy	1= male 0= female	+ve/-ve
Age of household	AGE	Continuous	Year	+ve/-ve
Family size of household	FSIZE	Continuous	Number of Person	+ve
Education level	EDUC	Dummy	1=literate	+ve/-ve

of household			0=illiterate	
Off farm activities	OFFA	Dummy	1= participate 0=non participate	+ve/-ve
Soil fertility of land	SFERT	Dummy	1=fertile soil 0= non fertile	+ve
Improved farm input	IMFI	Dummy	1=useimproved input 0= otherwise	+ve
Credit use	CREDIT	Dummy	1= use credit 0= otherwise	+ve
Land size	LSIZE	Continuous	Hectare	+ve/-ve

3.9. Diagnostic Test

Diagnostic test and model stability test will be using to make sure that the multiple linear regression model assumption will be violated or not. Therefore the study uses essentially diagnostic test and model stability test to check it.

3.9.1. Test for Normality

The model will assume that the random variable u has a normal distribution. This assumption is necessary for conducting statistical tests of significance of the parameter estimates and for constructing confidence intervals. If the assumption of normality is violated, the estimates of parameters are still unbiased but the statistical reliability by the classical tests of significance (t-statistic and F-statistic) of the parameter estimates cannot be assessed because these tests are based on the assumption of normal distribution of the u's (Gujarati, 2004). The Jarque Bera Test used to check normality.

3.9.2. Test for Autocorrelation

The model will assumes that successive values of the random variable *u* are temporally independent and that the value which *u* assumes in any one period is independent from the value it assumes in any previous period. This implies that the covariance of *ui* and *uj* equals zero. If this assumption is not satisfied, then the value of u in any particular period is correlated with its own preceding value (or values). This is known as autocorrelation or serial correlation of the random variable u (Wooldridge, 2000). Lagrange-multiplier test and durbin-watson d statistics test will used to check correlation between the errors in different time periods accordingly.

3.9.3. Heteroscedasticity Test

The variance of the error term is not constant for all observations, the estimates of the coefficients becomes inefficient (i.e., larger than minimum variance), as well as the estimates of the standard errors becomes biased which leads to incorrect statistical tests and confidence intervals. Thus to assure the assumption of constant variance of the error term, The study will test heat test by using prush pagan test which test chi-square test if it is greater than 5% we conclude there is no heteroscedasticity problem. And if there is heteroscedasticity problem it can be removed by robust during regression.

CHAPTER FOUR

4. DATA ANALYSIS AND DISCUSSION OF RESULTS

In this chapter major result about the determinants of rural household income in Yirga cheffe woreda obtained from both descriptive and econometric of data analysis would be presented. Besides, some discussion on major finding of the survey was also made. In the first section of this chapter summaries of result obtained from descriptive method of data analysis was presented. In the second section result obtained from econometric method of analysis was presented. In this part the result of the estimated model, diagnostic test result of the model and discussion on major findings of the study was presented. So this part of the study devoted to answering the objectives of the study using both Descriptive and Econometric data analysis.

4.1 Descriptive analysis

This section mainly concerned with the result of descriptive data analysis and interpretations based on the data gathered from the respondents. In order to see the determinants of rural household income in Yirga cheffe woreda, questionnaire was randomly distributed to 98 respondents. Analysis was made using graphs, percentage and frequency distribution.

4.1.1 Socio-Economic Characteristics of Respondents

The following table summarizes the socio-economic characteristics of respondents in Yirga Cheffe woreda. Each characteristic is further described in detail in the subsequent sections. It includes descriptive statistics for continuous variables such as age, family size, and land size, as well as frequency and percentage distributions for categorical variables such as sex and education level.

Table 4.1 Socio-Economic Characteristics of Respondents

Variable	Minimum	Maximum	Average	Standard Deviation	Frequency	Percentage (%)
Age of Household Head	23	70	45.3	12.8		
Family Size	1	15	4.5	2.1		
Land Size (hectares)	0	5	2.3	1.5		
Sex of Household Head					Male	71.43
					Female	28.57
Education Level					Illiterate	20.41
					Primary	48.98
					Secondary	15.31
					Preparatory	10.2
					Certificate and above	5.1

Source: own survey, 2024

The table above presents the socio-economic characteristics of the respondents in Yirga Cheffe woreda. The continuous variables indicate that the average age of the household head is 45.3 years, with a standard deviation of 12.8 years, reflecting a diverse age range from 23 to 70 years. The average family size is 4.5 members, with land holdings averaging 2.3 hectares.

For categorical variables, the majority of respondents (71.43%) are male, while females represent 28.57%. In terms of education, nearly half (48.98%) of the respondents have received primary education, whereas 20.41% are illiterate. This

distribution suggests a significant proportion of the population has access to basic education, which is crucial for understanding the determinants of rural household income in the study area.

4.1.1.1 Age distribution of the respondents

Table 4.2 Age distribution of respondents

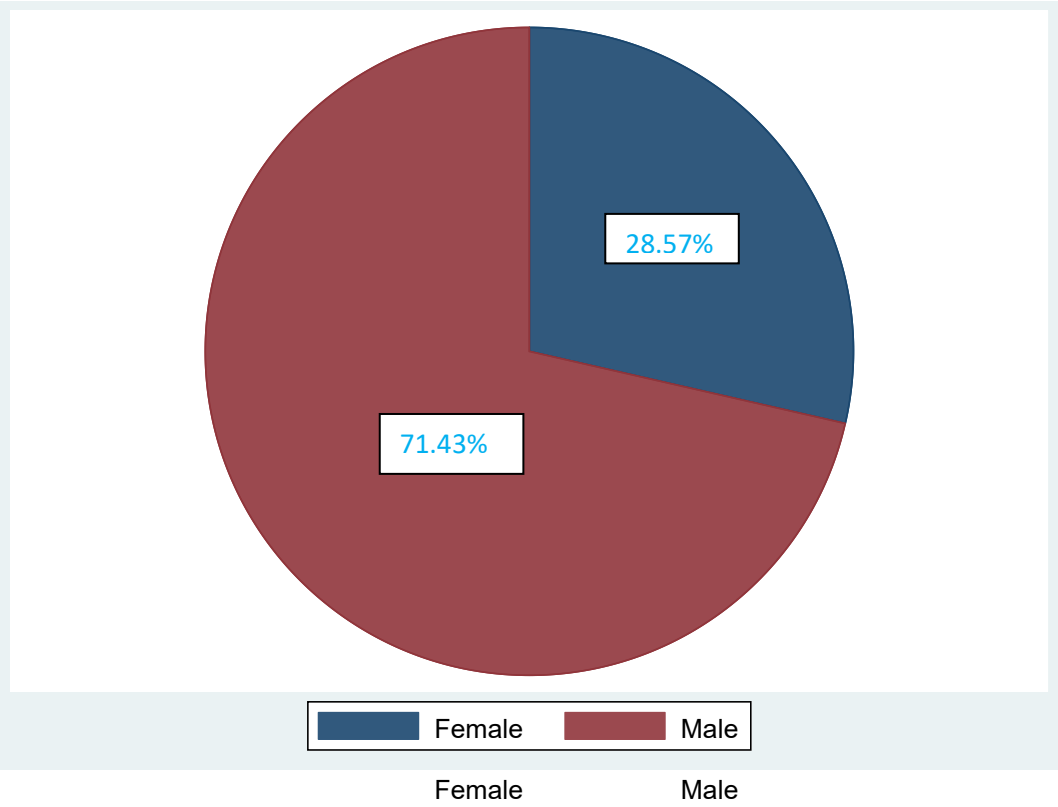
Age	Respondents	Percentage (%)
23-35	34	34.69
36-45	21	21.43
46-55	15	15.31
56-65	15	15.3
above 65	13	13.27
Total	98	100

Source: own survey, 2024

The above table shows that, 34.69% of the respondent's age range from 23-35 years, 21.43% of respondent's age ranges from 36-45 years, 15.31% of respondent's age range from 46-55 years, 15.3% of the respondent's age ranges from 56-65 years and 13.2% of age of respondents were above 65 years old. This implies that the majority of the respondents' age is between 23-35 years old.

4.1.1.2 Sex distributions of the respondents

Figure 4.1 Sex distributions of the respondents



Source: own survey, 2024

From the above figure, 71.43% of the sample respondents are males and the remaining 28.57% of the sample respondents are females. This implies that the majority of households in study area are male households.

4.1.1.3 Number of households with their family size and family labor

Table 4.3 family size of the respondents

Family size	Respondents	Percentage (%)
0-5	78	79.59
6-10	15	15.31
11-15	4	4.08

above 15	1	1.02
Total	98	100

Source: own survey, 2024

The above table 4.2 shows that, 79.59% of the respondents have family size of 0-5, 15.31% of the respondents have family size of 6 -10, 4.08% of the respondents have family size of 11-15 and 1.02% of the respondents have family size of above 15. This implies that the majority of the sample respondents have family size of 0-5.

Table 4.4 family labor of respondents

Family labor	Respondents	Percentage (%)
0-2	12	12.24
3-5	39	39.79
6-8	26	26.54
Above 8	21	21.43
Total	97	100

Source: own survey, 2024

The above table 4.3 shows that, 12.24% of the respondents use family labor 0-2, 39.79% of the respondents use family labor 3-5, 26.54% of the respondents use family labor 6-8 and 21.43% of the respondents use family labor above 8. This implies that the majority of the respondents use family labor 3-5. From this we observe that most of the households in study area use family labor force in farm activities.

4.1.1.4 Distribution of the sample respondents with respect to education level

Figure 4.2 Distribution of the sample respondents with respect to education level

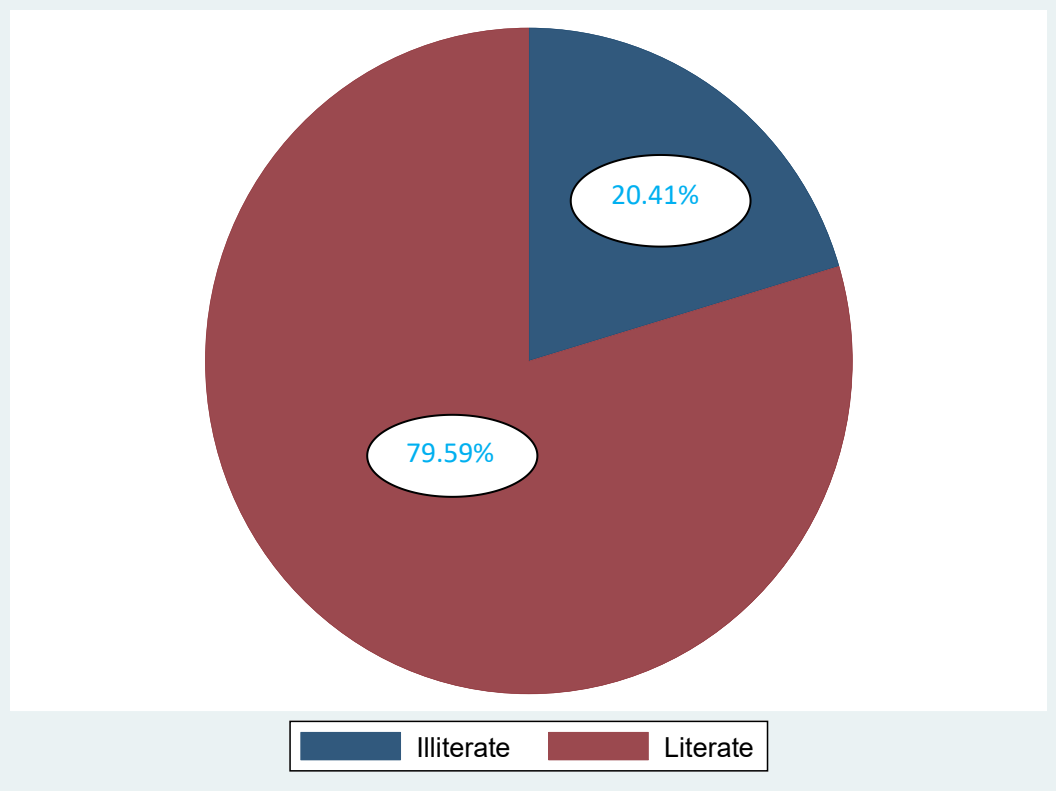


Table 4.5 Distribution of the sample respondents with respect to education level

Education level	Respondents	Percentage (%)
Illiterate	20	20.41
Primary	48	48.98
Secondary	15	15.31
Preparatory	10	10.20
Certificate and above	5	5.10
Total	98	100

Source: own survey, 2024

According to this survey, most of the respondents are literate, 20.41% of the respondents are grouped under illiterate, 48.98% of the respondents grouped under primary education, the remaining 15.31%, 10.20% and 5.10% of the respondents are grouped under secondary, preparatory and certificate and above education level respectively. This information implies that most respondents are literate. Now a day, there are education facilities in the area most of respondents in the locality are literate. Because in the early time there was no such expand educational infrastructure in rural area. So this implies that the more illiterate, has negative impact on income because these farmers have no ability to use modern inputs, such as fertilizer, improve seeds, pesticides, improved tools (tractor) and have no to listen current of market and taking of other necessary things as compared to that of educated households.

4.1.2 Annual income from both crops production and livestock

Table 4.6 Annual income level of respondents

Income	Respondents	Percentage (%)
<35000	19	19.6
35000-50000	31	31.92
50001-65000	24	24.74
65001-80000	20	20.62
above 80000	4	4.12
Total	98	100

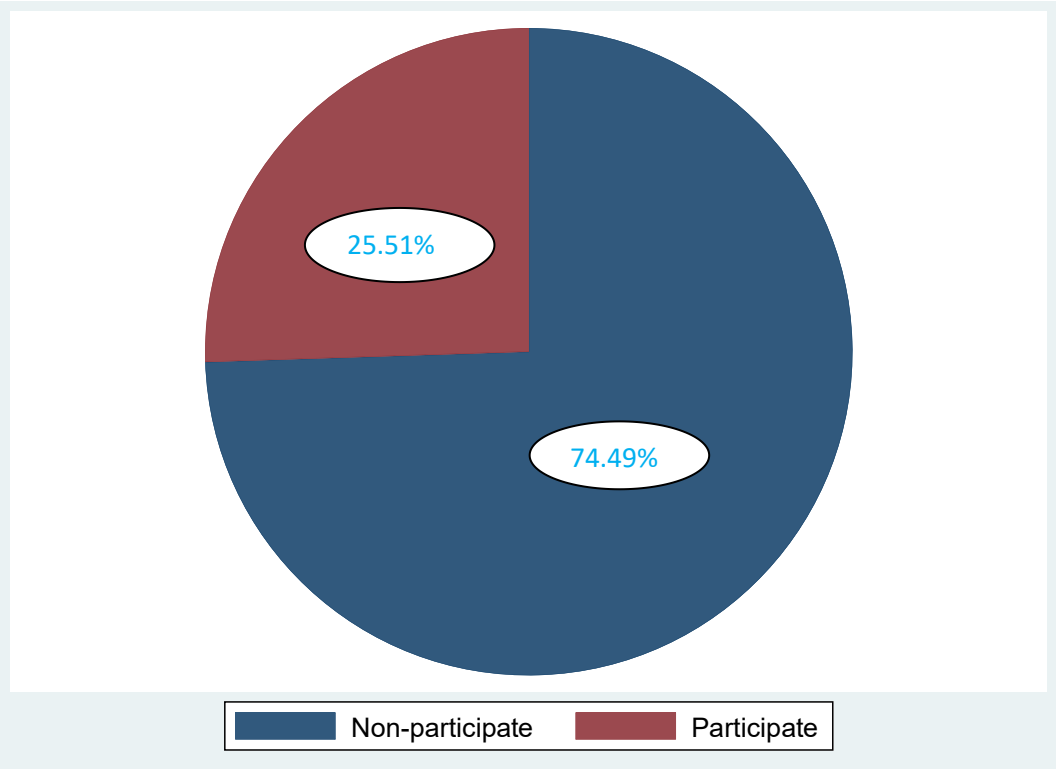
Source: Own survey, 2024

As the above table shows, 30.92% of the respondents have earned annual income between 35000-50000birr, 19.6% of the respondents have earned annual income between <35000birr, 24.74% of the respondents have earned annual income between 50001-65000birr, 20.62% of the respondents have earned annual income between 65001-80000birr and the remaining 4.12% of the respondents have earned annual income above 80000 birr from farm (crop and livestock). Therefore the majority of

the households in study area have earned annual income between 35001-50000birr from crop production and livestock.

4.1.3 Distribution of the respondent's based on off farm activities.

Figure 4.3 distributions of respondents on off farm activity



Source: own survey, 2024

The above figure shows, 74.49% of the respondents have not participates in off farm activity and 25.51% of the respondents in the survey have participates in off farm activity. Majority of respondents are not participated in off farm activity, like petty trade, craft work, daily labor. The participation of households in off farm activity increases the rural households off farm income, the increment of this income supports the rural household farmers to purchase the farm input such as fertilizer, pesticide, herbicide, improved seed and veterinary service for livestock. This implies that the participation of rural households in off farm activity positively affect the rural household income.

4.1.4 Economic factors affecting rural households' income

4.1.4.1 Land holding and size of land

Table 4.7 land holding of respondent

	Size of land in hect	Respondents	Percentage (%)
	0	8	8.16
	<2.5	38	42.22
	2.5-5	34	37.78
	>5	18	20
	Total	98	100

Source: own survey, 2024

The above table shows that most of sample respondents have their own land (farm land) which account 91.84% and the rest of 8.16% have not own lands. And the second (tab two) shows the size of land for 90 respondents who have land. As indicated in the above table, 42.22% of the respondents have land size of <2.5 hectare, 37.78% of household (sample respondents) have Land size of 2.5-5 hectare, and 20% of the sample respondents have Land size of >5 hectare. Therefore the majority of rural households in study areas have land size of less than 2.5 hectares.

4.1.5 Institutional factors affecting rural household income

4.1.5.1 The Access to credit

Table 4.8 the access to credit, purpose, and reason for not taking and source of credit

No	**Do you access to credit**	Number of respondents	Percentage
a	Yes	74	75.51
	No	24	24.49

	Total	98	100%
b	**For what purpose**	-	-
	To purchase farm input	21	21.44
	To buy livestock	9	9.18
	To start nonfarm business	8	8.16
	To Purchase farm implements	13	13.27
	To buy clothes to children	5	5.10
	Payment of tax	3	3.06
	Health expense	8	8.16
	To purchase food	7	7.14
	Total	74	75.51%
C	**Reasons for not taking credit**	-	-
	Institution is not available	4	4.08
	Interest rate is too high	8	8.16
	Institution is far from Keble	5	5.10
	Not allowed by religion	2	2.04
	Fear of loan repayment time	3	3.07
	I do not want	2	2.04
	Total	24	24.49%
d	**Source of credit**	-	-

	Bureau of cooperative	11	11.22
	Farmer Union	18	18.37
	Private money holder	10	10.20
	OMO Microfinance	35	35.71
	Total	74	75.51%

Source: own survey 2024

The above table 4.7 shows, 75.51% of the sample households receive credit while 24.49% of households did not due to various reasons such as high interest rate, fear of loan repayment time, religion doctrine, far distance of credit institutions from their locality and unavailability of the credit institutions (Table 4.7a). This means out of 24.49% of household, 4.08% of the respondents did not receive credit due to unavailability of credit landing institution, 8.16% of households due to higher interest rate, 5.10% of households due to institution far from kebele, 2.04% of households due to religious doctrine, 3.07% of households due to fear of loan repayment time, and 2.04% of households due to not want credit (Table 4.7c). This implies that most of households did not receive credit service due to high interest rate on credit service.

As the above table 4.7d indicates, 75.51% of households did receive credit from different sources. This means out of 75.51% households, 11.22% of households receive credit from Bureau of cooperative, 18.37% receive from farmers Union, 10.20% of households receive from private money holders, and 35.71% of households receive from OMO Microfinance. This implies that the majority of households' source of credit in study area is the Oromia Credit and Saving Share Company which delivers credit in cash. Out of the credit users majority of households used it to purchase modern agricultural inputs while some of them used it in fulfilling clothes to the children, payment of taxes, to purchase farm implements, to start nonfarm business and to cover health expenses. This means out of 75.51% of households, 21.44% of households use credit to purchase farm input, 9.18% to purchase livestock, 8.16% to start nonfarm business, and 13.27% to purchase farm implement, 5.10% to

buy clothes to their children, 3.06% for tax payment, 8.16% for health expense, and 7.14% to purchase food. This implies that majority of credit user households use credit to purchase farm (Table 4.7b). Therefore, formal credit utilization has a positive influence on rural household income in study area.

4.1.5.2 Improved farm input users

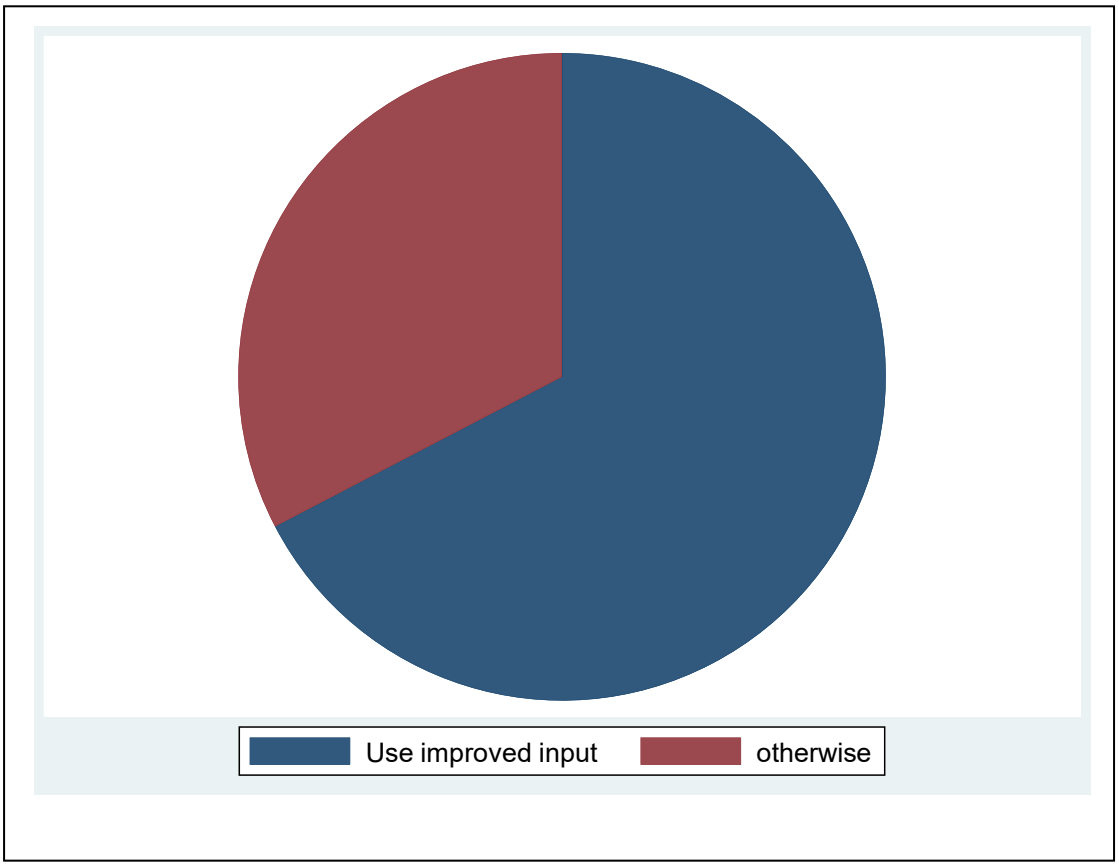


Figure 4.4 shows improved farm input use by sample respondents

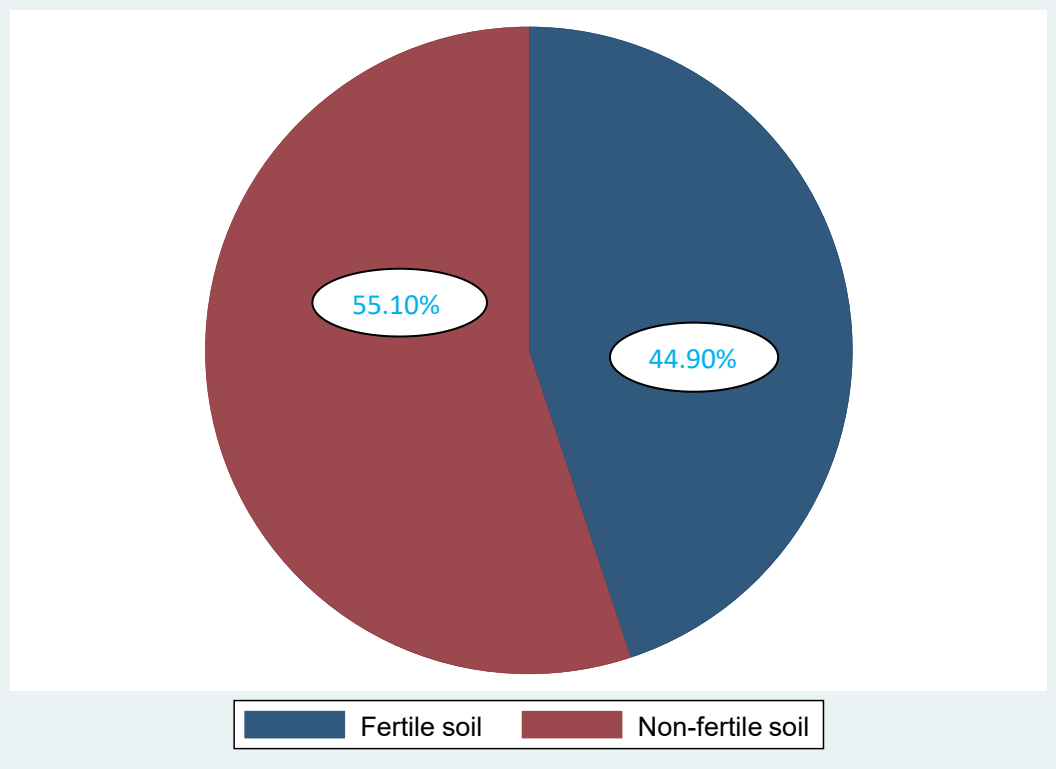
Source: own survey, 2024

As the above figure indicates, 67.35% of the respondents are using Improve farm inputs and 32.65% of the respondents are not using Improve farm inputs. This implies that the majority of households (sample respondents) in study are improved farm input user.

4.1.6 Environmental factor affecting rural household income

4.1.6.1 Soil fertility of land

Figure 4.5 show the fertility of land the sample respondents



Source: own survey 2024

The above figure shows, the fertility of land of the sample respondent. According to the above figure, 44.90% of respondents land was fertile and the remaining 55.10% of sample respondents land was not fertile. Therefore, the majority of the respondent's land in study area was non-fertile land.

4.2 Econometric Analysis

In this section the researcher employs econometric method of analysis to identify the major factors that significantly determine the rural household income in Yirga cheffe woreda. To this end multiple linear regression model with Rural household income (RHY) as a dependent variable is estimated by Ordinary least square (OLS), because the dependent variable of the study is continuous variable. Before the result of econometric model are interpreted the necessary test are undertaken.

4.2.1 Diagnostic test of the model

4.2.1.1 Heteroscedasticity test

Heteroscedasticity occurs when variance of random disturbances term around its zero mean is not constant or changes with the explanatory variable of the model. It causes the variance of Ordinary least square (OLS) parameter estimates large and hence less precise but presence of heteroscedasticity does not affect unbiasedness and consistence properties of OLS estimators. Under the presence of heteroscedasticity, the variance of the coefficient of OLS estimate are incorrect and inefficient

The presence or the absence of heteroscedasticity in the model can be tested by Cameron & Trivedi 'decomposition of IM-test. If p-value is below the chosen level of significance (5%), we reject null hypothesis and accept alternative hypothesis that means there is heteroscedasticity (large variance). Otherwise, rejected alternative hypothesis and accept null hypothesis that means there is Homoscedasticity (constant variance).

Hypothesis

Ho: constant variance

Ha: not constant variance

The result shows that the P value of Chi square (Chi^2) obtained from this test is high, accept null hypothesis that is the P value (0.2722) greater than 5% level of significance. So that reject alternative hypothesis and accept null hypothesis. Therefore, there is no problem of heteroscedasticity (see appendix)

4.2.1.2 Multicollinearity test

Multicollinearity exist when two or more explanatory variables of the model are linearly interdependent each other. Interdependence of explanatory variables is tested by Variance inflating factors (VIF). If VIF is greater than or equal to ten (VIF $\geq$10) or tolerance (1/vif) is less than or equal to 0.10, accept alternative hypothesis that is multicollinearity. If VIF is less than ten (VIF<10) or tolerance (1/vif) is greater than 0.10 (1/VIF) > 0.10, accept null hypothesis that is no multicollinearity.

Result of Multicollinearity test

Hypothesis

Vif<10: no problems of multicollinearity

Vif>/=10: there is a problem of multicollinearity

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. estat vif
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Variable	VIF	1/VIF
sfert	1.62	0.617341
offa	1.58	0.631815
imfi	1.32	0.759228
sex	1.30	0.766372
lsize	1.22	0.820645
educ	1.19	0.837726
fsize	1.09	0.915964
age	1.07	0.935742
credit	1.07	0.936562
Mean VIF	1.27	

From the result VIF is less than 10 for all independent variables that include in the model. From this conclusion is that there is no problem of multicollinearity between explanatory variables is possible to estimate the individual effect of each variable on dependent variable. Since the average of VIF is less than 10 or (1.27<10) there is no problems of multicollinearity among explanatory variables (see appendix).

4.2.1.3 Test for Model miss-specification

A model miss specification error can occur when one or more relevant variable are omitted from the model or one or more irrelevant variables are included in this model. If relevant variables are omitted from the model, the common variance they share with included variables may be wrongly attributed to those variables, and the error term is inflated. On the other hand, if irrelevant variables are included in the model, the common variance they share with included variables may be wrongly attributed to them. Model specification error substantially affects the estimate of regression coefficients.

To test for misspecification Ramsey RESET was used. According to Ramsey reset test a model specification is fit for regression if the p-values stated in P>F is greater than the chosen level of significance (1%).

Hypothesis

Ho: model has no omitted variables

Ha: model has omitted variables

According to this taste indicates the model has no relevant omitted variable since the test was failed to reject the null hypothesis. Prop> F is 1.99% which is greater than 1% of the significance levels of the specified model of the study (see appendix)

4.2.1.4 Normality test

Ordinary least square (OLS) assumes that the random term U has a normally distributed. Symbolically which read as: U is normally distributed around zero mean and constant variance? This means that small value of U's have a higher probability to observe than large values. This assumption is necessary for constructing confidence interval. If the assumption of normality is violated, the estimates of parameters are still unbiased but the statistical reliability by the classical tests of significance of the parameters cannot be assessed because these tests are based on the assumption normal distribution of the U. The normality test adopted Shapiro-wilk test for normal distribution. This test computes the skeweness and kurtosis measure of the OLS residual and it follows the chi square distribution (Gujarati, 2004). The null hypothesis is that has normal distribution against the alternative hypothesis that the U is not normally distributed.

Hypothesis

Ho: u is normally distributed

Ha: u is not normally distributed

The nature of normal distribution in this model was tested by Kermel density estimate test and the result show higher p-value (0.10309), which implies that the residual (error term) follows normal distribution. So that we can accept there is normal distribution of null hypothesis, means the model is normally distributed (see appendix)

Table 4.9 Result of estimated model

```
. reg rhfy sex age fsize educ offa sfert imfi credit lsize
```

Source	SS	df	MS	Number of obs	=	98
				F(9, 88)	=	32.90
Model	1.2016e+10	9	1.3352e+09	Prob > F	=	0.0000
Residual	3.5715e+09	88	40585397	R-squared	=	0.7709
				Adj R-squared	=	0.7474
Total	1.5588e+10	97	160699707	Root MSE	=	6370.7

rhfy	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex	945.1949	1627.235	0.58	0.563	-2288.592	4178.982
age	-22.84116	39.78851	-0.57	0.567	-101.9125	56.23014
fsize	136.0687	247.7571	0.55	0.584	-356.2964	628.4339
educ	5313.317	1744.554	3.05	0.003	1846.382	8780.252
offa	4630.113	1857.255	2.49	0.015	939.2082	8321.017
sfert	16279.91	1646.692	9.89	0.000	13007.45	19552.36
imfi	4583.624	1574.944	2.91	0.005	1453.755	7713.494
credit	2598.438	1546.351	1.68	0.096	-474.6106	5671.486
lsize	315.3228	277.1534	1.14	0.258	-235.4614	866.107
_cons	4236.376	2948.704	1.44	0.154	-1623.554	10096.31

4.2.2 Discussion and interpretation of estimated model

4.2.2.1 Over all test of the model

To examine weather regression model is statistically significant or not F test is used. As the result of F test indicates the model is significant at 5% level of significance.

Since P value for F test is less than 5% this implies at least one of the explanatory variable included in the model is a relevant variable in explaining rural household income (RHY). From the previous regression result F calculated is 32.90 and p value is 0.0000 this shows that reject null hypothesis and accept alternative hypothesis. That means the coefficient of all explanatory variables affect the variation of rural household income (RHY) is statistically significant.

4.2.2.2 Goodness of fit of the model

The goodness of fit of the model is measured by coefficient of determination, which measures the percentage of the total variation in the dependent variable that is

explained by the variation of all the explanatory variables included in the model, Therefore, R squared is used to measure the goodness of fit of the estimated model.

As the above regression result shows that R square=0.7709, which implies 77.09% of the total variation in Rural household income (RHY) is explained by the joint variation of all explanatory variables included in the model or 77.09% of variation of dependent variable is due to the variation of independent variable included in the model And the remaining 22.91% is explained by the variable excluded from the model. But the adjusted R squared (0.7474) or 74.74% indicates that there is good fitness of values for a given result.

4.2.3 Discussion of individual test of the result

From the estimated model, the research finds that Education level (EDUC), Off-farm activity (OFFA), Soil fertility of land (SFERT), Improved farm input (IMFI) and CREDIT have a significant effect on the Rural household income (RHY) at 1%,5%,10% level of significance. But, all the remaining explanatory variables such Family size (FSIZE), Age of household head (AGE), Sex of household head (SEX) and Land size (LSIZE) are insignificant at 1%, 5%, 10% level of significance. Among the explanatory variables that affect rural household income (RHY), Age of household head (AGE) has negative relationship with rural household income (RHY). Whereas, the reaming explanatory variables such as Sex of household head (SEX), Family size (FSIZE), Education (EDUC), off farm activity (OFFA), improved farm input (IMFI), Soil fertility of land (SFERT), Land size (LSIZE) and CREDIT have positive relationship with Rural household income (RHY).

4.2.3.1 Interpretation of Significant Variables

Education Level (EDUC)

The regression results indicate that education level (EDUC) has a positive and statistically significant effect on rural household income (RHY) at the 1% level of significance. Specifically, holding all other explanatory variables constant, an increase in the age of the household head by one year corresponds to an increase in rural household income by 5,313.31 Ethiopian birr. This finding aligns with previous studies, such as those conducted by Adebiyi and Okunlola (2013) and Beyene (2014), which highlight the critical role of education in enhancing agricultural productivity

and income. These studies suggest that educated household heads are better equipped to adopt modern agricultural practices and manage resources effectively, leading to improved income outcomes. Thus, the econometric estimation supports the hypothesis that education is a vital determinant of rural household income, underscoring the need for educational interventions to enhance livelihoods in Yirga Cheffe woreda, consistent with the study's objective to identify key factors affecting income in the region.

Off farm activity (OFFA)

The regression results indicate that off-farm activity (OFFA) has a positive and statistically significant effect on rural household income (RHY) at the 1% level of significance. Specifically, holding all other explanatory variables constant, households that engage in off-farm activities experience an increase in their income by 4,630.11 Ethiopian birr compared to those who do not participate in such activities. This finding is consistent with previous studies, such as those by Adebiyi and Okunlola (2013) and Barrett et al. (2010), which highlight the critical role of off-farm income diversification in enhancing household livelihoods and reducing vulnerability to agricultural risks. In the context of c, where agricultural production is often subject to climatic uncertainties, off-farm activities provide a vital income source that helps stabilize household income, thereby improving overall economic resilience. Therefore, promoting off-farm employment opportunities and skills development in this region could significantly contribute to improving rural household income, aligning with the study's objective to identify determinants of income in Yirga Cheffe woreda.

Soil fertility of land (SFERT)

The estimated results indicate that soil fertility (SFERT) has a positive and statistically significant effect on rural household income (RHY) at the 1% level of significance. Specifically, holding all other explanatory variables constant, if the land is classified as fertile, rural household income increases by 16,279.91 Ethiopian birr compared to households with unfertile land. This finding aligns with previous research, such as that by Geta et al. (2013), which emphasizes the critical role of soil quality in enhancing agricultural productivity and, consequently, household income. Similarly, studies by Adebiyi and Okunlola (2013) have shown that improved soil fertility directly correlates with higher yields and income for rural farmers. In the

context of Yirga Cheffe woreda, where agricultural practices are heavily reliant on soil quality, this result underscores the importance of sustainable land management and soil conservation practices. Enhancing soil fertility through appropriate agricultural interventions can significantly contribute to improving rural household income, thereby addressing one of the key objectives of this study to identify determinants of income in Yirga Cheffe woreda.

Credit (CREDIT)

The regression results indicate that credit (CREDIT) has a positive and statistically significant effect on rural household income (RHY) at the 10% level of significance. Specifically, holding all other explanatory variables constant, households that utilize credit experience an increase in income by 2,598.43 Ethiopian birr compared to non-credit user households. This finding corroborates the prior positive hypothesis and is consistent with previous research that emphasizes the critical role of credit in enhancing agricultural productivity and household livelihoods. For instance, Adebiyi and Okunlola (2013) found in their study in Oyo State, Nigeria, that access to credit significantly boosts rural income by enabling farmers to invest in improved agricultural inputs. Similarly, Anyanwu (2011) reported in Rivers State, Nigeria, that credit access is vital for farmers to manage risks and enhance their productivity. Furthermore, Shumet (2011) in Tigray, Ethiopia, and Chiputwa et al. (2011) in Shamva District, Zimbabwe, highlighted that credit is essential for improving agricultural practices and livelihoods. These studies collectively reinforce the importance of credit access as a determinant of rural household income, underscoring the need for policies that facilitate credit availability to support rural economic development in Yirga Cheffe woreda..

Improved farm input (IMFI)

The regression results indicate that improved farm input (IMFI) has a positive and statistically significant effect on rural household income (RHY) at the 1% level of significance. Specifically, holding all other explanatory variables constant, an increase in the use of improved farm inputs by one unit leads to an increase in rural household income by 4,583.62 Ethiopian birr. This finding is consistent with previous research, such as that by Adebiyi and Okunlola (2013), which highlighted the essential role of improved agricultural technologies in enhancing productivity and income among rural

farmers. Similarly, studies conducted by Geta et al. (2013) and Shumet (2011) in Ethiopia confirm that the adoption of modern inputs significantly boosts agricultural output and household income. These studies collectively underscore the importance of promoting access to improved farm inputs as a vital strategy for increasing rural household income in Yirga Cheffe woreda, aligning with the study's objective to identify key determinants of income in the woreda.

CHAPTER FIVE

5 CONCLUSIONS AND RECOMMENDATION

5.1 CONCLUSION

Improving the rural farming household income is one of the general agenda in developing country in general and in Ethiopia in particular. This priority agenda of improving the rural farm household income is reflected in agriculture and rural development policy of many developing countries.

The general objective of this study was to identity the major factors that affect rural household income in Yirga cheffe woreda. The researcher was used multistage sampling technique (purposive, stratified and simple random) in selection of sample respondents. Based on the data collected from the survey of 98 sampled households, determinants of rural household income was analysis using both descriptive and econometrics statistics.

Ordinary least square (OLS) estimation technique was applied to analysis the inferential statistics. The ordinary least square (OLS) estimation procurers for the determinants of rural household income five variables were found to statistically significantly creating variation for rural household income at 1%, 5% and 10% significance level. The variables those statistically significantly affect the rural household incomes are includes: Education (EDUC), off farm activity (OFFA), Soil fertility of land (SFERT), improved farm input (IMFI), and Credit access (CREDIT) at 10% significance level.

Among the explanatory variables that affect rural household income (RHY), Age of household head (AGE) has negative relationship with rural household income (RHY). Whereas, the reaming explanatory variables such as Sex of household head (SEX), Family size (FSIZE), off farm activity (OFFA), improved farm input (IMFI), Soil fertility of land (SFERT), Land size (LSIZE) and CREDIT have positive relationship with Rural household income (RHY).

5.2 RECOMMENDATION

Based on the study analyzed in both descriptive and econometrics statistics the following policy recommendation are remarked for the further improvement of rural household income In Ethiopia in general and study area Yirga cheffe Wereda in particular.

- The gender difference of the household head in rural household indicated female headed faced so money problems either economic or social problems. As a result their income was more or less lower than male headed households. So the local governments shall be give higher priority (providing subsidy, affirmative action in case of adaptation of new farming technology, providing award for model female farmers independently, subsidized credits during pre-harvesting, harvesting and post-harvesting time) to female headed household.
- Promotion of off farm activities are best focusing to speed up the enhancement of rural household income because, Increasing the off farm income was important for the increasing of rural household income. Therefore, farmers should be allowed to have long term off-farm employment to augment the farming sector.
- The farmer should enhance the land quality through improve soil structure, organic matter and controlling land degrading, cropping and pasturing practice contribution to production intensification and sustainable land use.
- Government and other concerned body should go through the provision of improved farm input and promoting the expansion of credit institution in the rural area.

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APPENDIX 1

COLLEGE OF AGRICULTURE AND NATURAL RESOURCE

DEPARTMENT OF AGRICULTURAL ECONOMICS

RESEARCH QUESTIONNAIRES

By: Surafel Shisema NSR/2241/14

Adviser: Mesfin Agza (PhD)

Specific objectives

- To assess the sources of rural household income in Yirga Cheffe Woreda
- To assess the share of off farm and farm income on the total income of the households in study area.
- To identity factors affecting rural households' farm income in Yirga cheffe woreda

I am 4th year Agricultural economics student at university of Wolkite and I am conducting research for the fulfillment of BA degree in Agricultural economics. The purpose of this questionnaire is to collect data, so as to obtain data to examine the **determinants of rural household income in Gedeo zone Yirga Cheffe woreda.** The information obtained from these questions will be used only for academic purposes and confidential. Therefore, you are requested to your genuine response. You place mark tick (√) for close ended question in a given box and give short and precise answer for open ended question. I would like to say thanks for spending time on giving relevant information.

1. Name of kebeles.....

2. Age of household head.....

3. Sex of household head. Male ( ) Female ( )

4. Family sizes. Male..... Female..... Total.....

5. Do you participate in off farm activities? Yes ( ). No ( )

6. Year of formal education. Illiterate ( ) Primary ( ) Secondary ( )

Preparatory ( ). Certificate and above ( )

7. What is the total size of land that your household cultivates, measured in hectares? **(**Please specify the number of hectares: _____)

8. Do you rented in additional farm land from other Small holder farmers? Yes ( ). No ( )

9. If your answer question "10" yes how large is the rented land in timed? .....

10. How large is the total land that you cultivated in timed.....

11. Do you take any credit from formal credit lending institutions? Yes ( ). No ( )

12. If your answer for question "13" is yes for what purposes? .....

13. Indicate your source of credit.....

14. Do you use improved Agricultural inputs? Yes ( ) No ( )

15. How do you perceive the condition of your land? Fertile ( ) Not fertile ( )

16. Annual incomes from farm activities.....

A - Annual income from crop production

Types of crops	Total harvest Kg/Qt	Amount consumed Kg/Qt			
			Kg/Qt	Unit price	Total income
Coffee					
Barley					
Maize					
Wheat					
Beans					
Potato					
Cabbage					
Onion					
Garlic					
Pepper					
Peas					
Share cropping					
Others					
Sub-total					

B-Annual income from livestock

Types of livestock owned	Total number of livestock owned	Conversion factor	TLU
Ox			
Cow			
Claf			
Horse			
Donkey			
Mule			
Goat			
Sheep			
Chicken			
Others			
Total TLU			

APPENDIX 2

```
. reg rhfy sex age fsize educ offa sfert imfi credit lsize
```

Source	SS	df	MS	Number of obs	=	98
				F(9, 88)	=	32.90
Model	1.2016e+10	9	1.3352e+09	Prob > F	=	0.0000
Residual	3.5715e+09	88	40585397	R-squared	=	0.7709
				Adj R-squared	=	0.7474
Total	1.5588e+10	97	160699707	Root MSE	=	6370.7

rhfy	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
sex	945.1949	1627.235	0.58	0.563	-2288.592	4178.982
age	-22.84116	39.78851	-0.57	0.567	-101.9125	56.23014
fsize	136.0687	247.7571	0.55	0.584	-356.2964	628.4339
educ	5313.317	1744.554	3.05	0.003	1846.382	8780.252
offa	4630.113	1857.255	2.49	0.015	939.2082	8321.017
sfert	16279.91	1646.692	9.89	0.000	13007.45	19552.36
imfi	4583.624	1574.944	2.91	0.005	1453.755	7713.494
credit	2598.438	1546.351	1.68	0.096	-474.6106	5671.486
lsize	315.3228	277.1534	1.14	0.258	-235.4614	866.107
_cons	4236.376	2948.704	1.44	0.154	-1623.554	10096.31

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of rhfy

         chi2(1)      =     1.21
         Prob > chi2  =   0.2722


. ovtest

Ramsey RESET test using powers of the fitted values of rhfy
       Ho:  model has no omitted variables
                  F(3, 85) =      3.46
                  Prob > F =      0.0199
```

```
. estat vif
```

Variable	VIF	1/VIF
sfert	1.62	0.617341
offa	1.58	0.631815
imfi	1.32	0.759228
sex	1.30	0.766372
lsize	1.22	0.820645
educ	1.19	0.837726
fsize	1.09	0.915964
age	1.07	0.935742
credit	1.07	0.936562
Mean VIF	1.27	