*__Impact of Cooperatives on Poverty Reduction__: The Case of Licha Hadiya Farmers' Cooperative Union in Lemo Woreda; Hadiya Zone, SNNPR, Ethiopia*

**Thesis submitted to the School of Graduate Studies of Jimma University in Partial Fulfillment of the Requirement for the Award of Degree of Master of Science in Economics (Economic Policy Analysis)**

By

ABEL WUDENAH ABAMAGALA



# JIMMA UNIVERSITY

# COLLEGE OF BUSINESS AND ECONOMICS

# MASTERS SCIENCE ON ECOMOMICS PROGRAM

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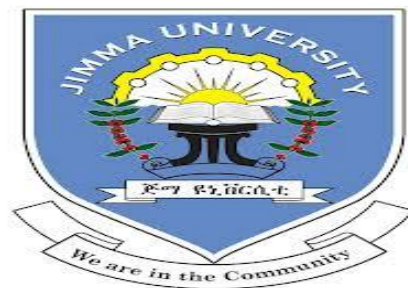
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**JUNE, 31, 2016**

**JIMMA, ETHIOPIA**

# CERTIFICATE

*This is to certify that the thesis entitled "Impact of Cooperative on Poverty Reduction: In Case of Licha Farmers' Cooperative Union in Lemo Woreda, Submitted to Jimma University for the award of the Degree of Master of Science in Economics Business and is a record of bonified research work carried out by Mr. Abel Wudenah Abamagal, under our guidance and supervision.*

*Therefore we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.*

*Main Adviser's Name*　　　　　　　*Date*　　　　　　　*signature*

_____　　_____　　_____

*Co-Advisor's Name*　　　　　　　*Date*　　　　　　　*Signature*

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# DECLARATION

I hereby declare that this thesis entitled *"Impact of Cooperative on Poverty Reduction: In Case of Licha Farmers' Cooperative Union in Lemo Woreda''*, has been Carried out by me under the guidance and supervision of Dr. Jemal Abafita (PhD) and Ato Temsegan Yaekob (MSc).

The thesis is original and has not been submitted for the award of degree or diploma any university or instructions.

Researcher's Name         Date         Signature

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## Board of Examination Thesis

*We, the under signed, members of the board of examiners read this thesis "The Impact of cooperative on poverty reduction: The case of Licha Hadiya farmers' cooperative union in Lemo Woreda, Hadiya Zone, SNNPR, ETHIOPIA and evaluated the final open defense by Abel Wudenah Abamagal. We examined the candidate and then we certify that it is suitable submission for the reward of M.Sc. Degree in Economics (economic policy analysis).*

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# ABSTRACT

*The main objective of this study was to evaluate impact of Licha Hadiya farmers' multi-purpose agricultural cooperative union on poverty reduction in rural household the cause of Lemo district. Primary data was collected through structured questionnaire based on 75 members' respondents and 95 non-members respondents from purposively selected 4 kebeles in Lemo woreda. Total 170 household was selected by using multi-stage sampling method. Secondary data were gathered different published and unpublished relevant material. Hadiya zone cooperative and marketing sectors, Lemo woreda cooperative and marketing sectors are also secondary data source. In study logit model and propensity score matching (PSM) method were employed to achieve the objective of the study that to assess poverty reduction indicators outcome those income, asset, expenditure and human capital between cooperative members and non-members. Based on PSM estimation results of study were Licha Hadiya farmers' cooperative union have significant impact on rural household poverty reduction in most above listed impact indicator outcome variable was significantly different among members and nonmembers of cooperative. The result indicate that as agricultural cooperative have positive and statistically significant impact on participant household those on income from crop sells, durable home assets, saving and house hold food expenditure. In view of such evidences, further promotion, deepening, strengthen and supporting of agricultural cooperative and its service recommended for rural poverty reduction.*

***KEY WORDS****: **Cooperative, Impact evaluation, Poverty, propensity score match.***

# ACKNOWLEDGEMENT

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# LIST OF ABBREVIATIONS

ADLI          Agriculture Development Led to Industrialization

ATT           Average Treatment effect on Treated

CSA           Central Statistics Agency

DFID           Department for International Development

EEA            Ethiopia Economic Association

ETB            Ethiopian Birr

FAO           Food and Agriculture Organization

GDP           Gross Domestic Product

GTP           Growth and transformation plan

HH            House Hold

ICO           International Cooperative Organization

ILO           International Labor Organization

NGOs          Non–Governmental Organizations

NNM           Nearest Neighbor Matching

LDC           Least Developing Country

LHFCU         Licha Hadiya Farmers' Cooperative union

PSM           Propensity Score Match

SNNPR         Southern Nation Nationality People Region

TLU           Tropical Livestock Unit

UNSAID        United State Aid for International Development

# CHAPTER ONE

# INTRODUCTION

## 1.1 Back Ground of Study

Poverty remains a unambiguous reality to more than 2.5 billion people around the world mainly low developing countries who live on 2 dollars a day or less (Watkins, 2005). Out of the total numbers of poor in the world 49% are in sub-Sarah Africa, 32% in South Asian, 15% in East Asian and pacific, 11% in Latin America and Caribbean, 5% in Eastern Europe and Central Asian and 2% in Middle East Africa. The implication is that Sub-Sahara Africa home of poverty. Moreover, almost all developing countries face poverty and with roughly half of their populations in poverty. That most of countries case of the poverty is low farm land in rural areas; even most are unproductive farm land, low adoption of improved agricultural technology and insufficient supportive rural institution. This situation leads to many difficulties for rural house-holds like low medical care, low education access and low quality of living status especially for those their occupation was agriculture (Hulme and Mosley, 1996).

Ethiopia's indigent economy is based on agriculture activities, accounting for half of GDP, 90% of all exports of countries, and creates 80% of total employment (CSA, 2007). The sector is essentially composed of smallholders, as 63% of the farmers cultivate less than 1 hectare, and 47% less than 2 hectares (Ethiopian Economic Association 2004/5). This subsistence agriculture activities accounts for the most part as it is estimated that roughly 30% of agricultural production is marketed.

Moreover, rural households are enclosed in a food insecurity, vulnerability to poverty that caused by low land holdings, unproductive livestock resources, structural dependence on unreliable rainfall, weak rural institutions, poor access to essential services and low market access (Messele, 2002). With regard to this harshness of rural poverty Ethiopia government recently have been struggling to reduce poverty. This is the reason why many organizations including cooperatives are established and are being working in many part of the countries aiming to ensure the wellbeing of people.

Some of the intervention areas are implementation of social and economic policies which address the issue of poverty both at national and individual levels. Those include Agricultural Development-led Industrialization (ADLI) strategy (1995) to bring industrialization through agricultural; Sustainable Development and Poverty Reduction Program (2002-2004)) guaranteeing sustainable development and reducing poverty and Food Security Strategy (2004-2006) this mainly focuses insuring food security. Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2006-2010) and now a day "Growth and Transformation Plan" (2011-2015) main strategies that government intention to alleviate poverty and to sustain economic developments. Through those multi-directional plans and strategies Ethiopia has one of the fastest growing economies in the world, but remains one of the poorest countries at the same time. Early in Ethiopia, cooperative hanged by different constraints through time this still negative perception on rural households to participate on its activities. However, after the downfall of the *Derg* regime in 1991, agricultural cooperatives in Ethiopia have become an integral part of the countrywide strategy for agricultural transformation (MoFED, 2006). Recently, cooperative is one of the acknowledged governmental policy instrument in Ethiopia to eradicate severe bottleneck rural poverty of rural households. This make number of cooperative rise highly that in June 2012, the majority of both the 400,000 primary cooperatives and the 200 cooperative unions in the country were agricultural cooperatives engaged in input and output marketing (Abate *et al*, 2013).

Moreover, in southern nation nationality region recently high expansion of agricultural cooperative that one cooperative federation, forty four cooperative unions and five hundred primary cooperative[1]. Similarly, in Hadiya zone now a day three union and one hundred primary cooperative from this sixty seven are agricultural multipurpose cooperative and remain thirty four are saving and credit cooperative. And above cooperative providing multi-service for their member farmers spatially on agricultural activities also in adoption of new agricultural technology. Many actors suggest that agricultural cooperative have providing unmeasurable service for rural household explicitly more in agricultural production activities and marketing.

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[1] WWW. Southfarmerscooperative.com

Agricultural cooperative provide opportunity for poor people to rise their income (ILO (2007) and empower by directly and indirectly to meet several governmentally strategy a MDGs such as education and reduce children mortality in country (Birchal, J. 2004). Cooperative in other case improve saving habit and provide way out of poverty for rural households (Smith, S and Ross, C. 2006).

Now a day, there is assertion in Ethiopia about potential role of cooperatives that play in economic and social condition especially in site of small holder commercialization. Some of those success that already recorded in Ethiopia cooperative history that include export of coffee, oilseeds and vegetables to markets in Europe and the USA also in country level federation, cooperative unions in which rural households are represented as members through primary cooperatives. Other potential role cooperative is that Importing agricultural soil fertilizer for whole agricultural activities both members and non-members since get at affordable price and on time. More specifically, agricultural cooperatives play an important role in food production, distribution and in supporting long-term food security. Cooperative create employment opportunities, access market information, negotiation better price and providing agricultural input at lower prices and have role on adoption of agricultural technology and extension service (IFAD, 2013). Those show growing evidence and success of cooperatives across countries particularly in area of rural agricultural activities. Taking this growth of cooperatives activities and intervention for rural households as a very important vernacular to reduce rural poverty. Henceforward, this study mainly focused on evaluating the impact of agricultural cooperatives on poverty reduction on rural household at its member's base on household cross-sectional data from Lemo district.

## 1.2    Statement of the Problem

Developing countries like Ethiopia challenged in most case to alleviate deprivation particularly in rural area, since have deep and extensive spread poverty also they have low income. Large number of people on poverty is rural household that their income based on agriculture and this their income source agricultural activities occupied with full of constraints. For this Moges (2013) argue that Ethiopia agriculture has been saddled with severe difficulties of access of fertile farm land deterioration, shortage of access to credit provision, poor agricultural marketing and weak market infrastructure. Hence fore, rural household that employed on agricultural activities need to get sufficient support in order to reduce constraint and bring improve agricultural production.  Burgess et al. (2003) have suggest and argued with other actors that access to credit is critical to enabling the poor to transform their production systems and increase production then exit out of deprivation.

This show well that majority of rural households require necessary agricultural production supporting institution and marketing services to assist production and increase sales income of their produce. This production sales comprise the major income source for those the rural poor in country. Hence it constitutes a most important means of poverty reduction for the mainstream of the rural poor in country (Walton, 2001).

Different scholars argue on positive contribution of agricultural cooperative on livelihood development and poverty reduction in rural households. ILO and ICA (2012) argue that cooperative suited to address deprivation since it provide access saving and credit service. In other side agricultural cooperative access input require, transport, market for their produce and supply product at affordable price for members. Birchall (2003) stated that cooperatives have a lot of opportunities in lifting the poor out of poverty and reduce all other forms of deprivation. The broad theoretical agreement on that cooperatives have the benefits of identifying financial opportunities for the poor; empowering the disadvantaged group to protect  their welfares in the community and given that security for poor rural households.

In the Ethiopia context, cooperative have been established and operating with ultimate goal on livelihood development and poverty reduction by setting sub-objective that collectively to solve economic problem and improve living standard of members (Ethiopia proclamation No 147/1998). Base on those goals and strategy cooperative had preforming multi-dimensional activities to improve living standard of rural poor household and to reduce poverty.

However, empirical evidence on the poverty reduction impact of cooperatives is scarce in Ethiopia yet to be established (Getnet and Annulo, 2012). Few cases of empirical study include Francesconi and Heerink (2010) and also Bernard et al. (2008) evaluate impact of cooperative on smallholder commercialization. Those two study focus only commercialization impact of cooperative conversely restricted for poverty reduction impact evaluation. Getnet and Annulo (2012) evaluate impact of cooperative on livelihood development and the result indicate positive impact on livelihood development but emphasizes limited outcome.

Other study that taken by Alemu (2011) result demonstrate positive role of cooperative on improving livelihood of rural households. Conversely, in this study have some limitation that on evaluation tool and investigator use only participants' data to evaluate impact of cooperative. Those generally, implies there is limited emphasize on poverty reduction impact analysis and having some research gap on cooperative impact evaluation. Moreover, no impact assessment under taken on LHFCU to evaluate whether or not its intervention bring change on rural households. Therefore, investigator was initiated to fill those gaps by investigating impact of agricultural cooperative on rural household poverty reduction through poverty reduction indicators at Lemo district.

## 1.3 Research Questions

i.  Does LHFCU have significant impact on poverty reduction in case of income and asset accumulation?

ii.  How LHFCU service make members different in saving than non-members?

iii.  Does agricultural multipurpose cooperative service brought better living standard on their members rather than nonmembers?

iv.  Does LHFCU have contribution on education access on their program user than non-user rural household?

v.  Does LHFCU have impact on medical care on their members than non-members?

## 1.4 Objective of Study

The main objective of the study is to evaluate critically the impact of Licha Hadiya farmers' multi-purpose agricultural cooperative union on poverty reduction in Lemo district.

Specifically, the study was pursue the following specific objectives.

1.  To evaluate impact of LHFCU on income and asset accumulation on rural households.
2.  To assess impact of LHFCU on saving and household living status in rural area.
3.  To examine impact of LHFCU on human capital improvement in rural households.
4.  To forward some policy implication and recommend possible solutions depending on the result to concerning bodies.

## 1.5. Significance of the Study

As indicated earlier different actors suggest that agricultural cooperative have contribution on the livelihood development and poverty reduction on rural household. Therefore, the current study has produced, at least in study area, relevant information regarding the impact of cooperative on poverty reduction in rural households.

Understanding whether or not agricultural multipurpose cooperative have really impact on poverty reduction on rural household has important policy implication and reduce scarcity of impact assessment research of cooperative on poverty reduction at Region and country level. Evaluation result of study benefits farmers, marketing and cooperative office, LHFCU and NGOs work on cooperative supporting, market accessing and livelihood development.

Finally, the finding highlights contribute to the overall regional and national efforts aimed at poverty reduction and food security and subsequently fostering development in the country's strategy framework of agricultural development led-industrialization. Moreover, the empirical result of study was used to create awareness for different stakeholders and also serve as background information for others who seek to do further related research and would help in formulating and revising poverty related strategies in other similar socio-economic backgrounds.

## 1.6 Scope and Limitation of Study

The study on the impact of multi-purpose cooperative on poverty reduction was conducted in Licha Hadiya farmers' multi-purpose cooperative union at Lemo district in Hadiya zone, SNNPR. Lemo woreda is one of district from seven district of Licha Hadiya farmers' cooperative union in Hadiya zone. The study pays particular attention in evaluating the impact of multi-purpose cooperatives in rural household poverty reduction with respect to impact indicators. All the multi-purpose primary cooperatives that found under Licha were not covered.

The study is confined to rural agricultural cooperatives which are engaged in only four kebeles on Lemo district. Other limitation in study was baseline data of participant household before being member of cooperative not readily available. Finally, did not assess the overall impacts of agricultural cooperative union on participant rural households.

## 1.7 Organization of Paper

This research paper is organized into five chapters. The first chapter deal with background of study, statement of the problem, research questions, objective of study, significance of investigation, limitation and scope of study. The second chapter include theoretical and empirical review of literature. Third chapter of study include design and method of that investigator applied in the study. Chapter four focus on finding of study. Fifth chapter also include summery, conclusion and recommendation of study.

# CHAPTER- TWO

## LITRETURE REVIEW

## 2.1 Theoretical Review
## 2.1.1 Definition and Concept of Poverty and Cooperative

**Definition and concept of poverty**

Poverty can be described as a multi-dimensional phenomenon and it has a complex concept, which lacks universally accepted a well-ordered definition (World Bank 2000 and Walton, 2001). However, there are some definition commonly used to express this multi-dimensional poverty. Poverty is economic dimension on its behavior and level of material deprivations which troubles the poor, and use distinguishes tool non poor from poor (World Bank, 2000). Define poverty both in term of economic and social problem whereby the household income is insufficient to ensure suitable livelihood, thus leading to hunger, malnutrition, ill health and mortality from illness (Okunmadewa, 1999). Similarly Webster's University Dictionary defines poverty as lack of material well-being on their life. It includes deprivation of income, deprivation of basic needs and lack of access to production assets also social substructure and lack of markets access for their produce. Similarly World summit for social development held in Copenhagen in (1995): states as poverty has various characters which include lack of income and deprivation of productive resource to ensure sustainable improvement in their life, hunger, malnourishment, ill health or lack of access to education and other basic services, increasing morbidity and mortality from illness particularly in children, homelessness and inadequate housing, unsafe environment and social discrimination (Walton, 2001).

Deprivation of basic and fundamental demands of life results into the exclusion of the individual in society due to lack of competence to task choice. Survival is the tendency in mostly in production and the emphasis is to meet food security in household needs to make free from food insecurity as a means. Most of the smallholder farmers that receive less than 2 dollars in a day are not organized sufficiently (Pinto, 2009).

The smallholder farm sector in most low developing countries is largely left without necessary support arrangements in infrastructure, adoption of agricultural technology, market access, extension services, local processing capacity, basic health care and education. They have not been emphasized in strategies to enhance their productions in the relaxed market environments.

Ethiopia has a subsistence agriculture dominated economy and most of that agricultural income dependent household live in remote rural areas and in most case are in poverty. The first remarkable feature of the economy is how small the aggregate value of agricultural goods and market access produced. In most developing countries like Ethiopia are caught in vicious circle of poverty and stagnation this because dependency in agriculture activities, those activities full of constraint such as lack of credit access and market access. This vicious circle of poverty how that dependency of population on agriculture in last 25 years population reduced only at minimum amount and agriculture is dominated by smallholder production that dependent under rain-fed condition (CSA, 1999). Despite the above mention facts, factors that led to failure of achieving food security and reduce poverty in rural household that engaged on agricultural activities. This also bottlenecked for country to record new agriculture growth in the world.

The case for this problem population growth associated with inadequate resource base to support, multidimensional problem for growth of production and productivity. The main development objective of Ethiopia government is poverty eradication henceforward the country's development policies and strategies are geared towards this end (MoFED: PASDEP, 2006). Current rural development policy and strategies of Ethiopia government clearly specifies this problem as the priority in strategy. Basic idea of multidimensional poverty is that well-being of household or individual depends not just on income or consumption but also on several other dimension or capabilities such as health, education access and living status households (Alkire and Foster, 2007).

**Definition and concept of cooperative**

Just as poverty, cooperatives have no universally accepted specific definition because of diverse characters (Kimberly and Robert, 2004). And U.S. Agency for international Development, (1985) explained that, Cooperative forms of social and economic organizations exist throughout the world, engendered and molded by often quite dissimilar social, economic and political traditions. However, there are some commonly used cooperative definitions: - According to ICA (1995), a express cooperative units built with a group of an autonomous persons associated voluntarily to meet their common economic, social needs and aspirations through a jointly owned and democratically controlled enterprise. Based on principles of voluntary business associations formed by people of limited through contribution of share capital that forms the basis of either sharing out the profits that may accrue from the business (ILO, 2002).

Another widely recognized definition cooperative is the one adopted by the United Sates Department of Agriculture (USDA) in 1987; that cooperative is a user-owned, user-controlled business this distributes benefits on the basis of use. This definition generally considered the three primary cooperative principles such as user ownership, user control and proportional distribution of benefits. The user owner principle implies member use of cooperative self-help services and member responsibility to provide some cooperative capital.

The user- control idea to express cooperative business governed by members directly by voting and indirectly through their representative board directors. In other case distribution of benefits on the basis of use this principle indicates that proportionally equal share of benefit, cost and risk of cooperative business for among members. Cooperative benefits may be include better price for goods and service, providing improved services, accessing market for agricultural input and output, and adoption of new agricultural technologies for the members. Ethiopian Federal Negarit Gazeta (cooperative societies Proclamation No. 147/1998) defined cooperative society as a society established by individuals on voluntary basis to collectively solve their economic and social problems and to democratically manage the same.

The International Labor Organization (ILO, 2003) express cooperative as an association of person usually of limited means, who have voluntarily joined together to achieve a common economics and through the formation of a democratically controlled business organization, making equitable contribution to the capital required and accepting fair share of the risks and benefits of the undertaking in which members actively participate. Also DFID (2005), define cooperative depending on its' four main characteristics that involve on their units those: first, they are formed by groups of people, who have a specified need. Secondly, the organization is formed freely by members after contributing to its assets. Thirdly, the organization formed, is governed democratically in order to achieve desired objectives on equitable norms, and fourthly, it is an independent enterprise promoted, owned and controlled by people who are members of cooperative. Although, the poor have very weak transferable assets or lack of recognition for the assets they have i.e. they lack adequate welfare exactly where the relative concept of cooperatives focuses.

## 2.1.2 Assessing Cooperative Scheme on Poverty Reduction

Assessing cooperative impact has been the need main concern in order to know whether providing different cooperative services to the rural household has reduced the poverty /or not. Impact may be measured using indicators those income, wealth, food security, child nutrition, employments, quality of life, market stability, and fair market. Khandker (1999) argued that the direct impact of credit access for rural households is on income and creating employment opportunities. This have also impact on other outcomes such as smooth consumption, improve in nutrition, production, fertility and education. According to Meehan (2000), indicate that credit provision and access credit could improve the income of the poor people. Ezekiel (2014) suggest that cooperatives as offer emergency and on the spot loan that provided for members reduce unexpected problems. This make members to quickly respond to unexpected socio-economic problems such as an accident, food shortage, crop failure, financial obstacle among others way which have the potential of disrupting livelihood which secure asset of members.

According to Tiegist (2008) argue agricultural cooperatives played an important role for rural household in providing affordable prices, reducing seasonal price fluctuations, stabilizing the agricultural product markets in favor of the producers. This in turn have large impact on income generation for households. Allahdadi (2011) also suggest that cooperative provide various service on production and distribution, mobilization and supply of financial capital also create employment and income generating opportunities which ultimately bring about poverty reduction.

Ezekiel (2014) also suggest that cooperative societies in both rural and urban areas create and access employment opportunities. That directly employing their personnel officers and as service provider that indirectly generated employment to their members. Cooperatives facilitate employment through members' owned enterprises contributing substantially and also in country level gross domestic product. Since cooperatives impact on poverty reduction and food security results by allowing the possibility for income generation from employment opportunities. Pollet (2009) provides an estimate of direct and indirect employment impact of cooperatives in Ethiopia. Gicheru and M'Imanyara (2012) suggest that contribution of cooperatives in households and in country level in wide as follow: - (i). Cooperatives create more equitable growth by helping markets work better for deprived individuals, increase access to information, and improve bargaining power this in turn bring improve living standard of status of households. (ii). Cooperatives create employment and their access of input contribute to increased agricultural production efficiency. (iii). Cooperatives help to tackle rural poverty by increasing productivity and incomes of agriculturalists through providing affordable price for their produce and by helping them accessing fertilizer, transport and storage service on time and at affordable price. (iv). finally, cooperatives expand poor people's access to financial services, including credit savings and in some cases insurance and remittances. Francesconi and Heerink (2010) found that agricultural marketing cooperatives have built capacity for participant households on commercialization. In other way Bernard et al. (2008) recognized the potential contribution of agricultural cooperatives to agricultural production and marketable surpluses in rural Ethiopia and, this in turn convey overall agricultural development, economic growth and poverty reduction in the country.

### 2.1.3 Overview of Cooperative in Ethiopia

Cooperative have long history in Ethiopia start with self-help traditional informal cooperative those *Debo, Iddir, Iqub* and *Mahiber,* but it is base for today modern cooperatives. There are three distinct periods of cooperative movement observed in the country over these years this indirectly three generation: Cooperative distinct based on governance during the period of Imperial, the period of Socialist and the EPRDF period this third generation.

Modern cooperative movement was started in 1960 (during the Imperial period) under Farm Workers' Cooperatives Decree (Cooperatives Decree No. 44/1966) with depending on basic idea to support agricultural sector growth. During the socialist government in Ethiopia i.e. the Derg regime (1974-1991), cooperatives were formed to for the purpose of government and mainly to support implementation of the government policy of collective ownership of properties. During this period violation of cooperative principles shown to weaken movements of cooperative and most of cooperatives fall to implement their objectives particularly to provide necessary service. Through time those decrease the movement of cooperative in Ethiopia cooperative history. In this case the numerical figure show that in 1974, there are 149 cooperatives, in 1974-1991, increase to 10,524 cooperatives, in 1991, numeral fallen to7366 cooperatives. This show high reduction in growth of cooperative since having governmental intervention and violation of cooperative principle. But, after down fail of Derg regime in 2011 cooperative radically increase to 37247 primary cooperatives and 245 unions Ethiopia.

During this socialist period government practiced communal tenure principle using cooperatives not only that also cooperative have been considered as main governmental instrument to mobilize the people to implement policies. In other side cooperatives were forced to operate in line with socialist government principles, which meant that production and marketing of produce were done collectively, membership to cooperatives was also required, which goes against the basic cooperative principle of voluntarily participation. Where also in this period cooperative especially supported by the government privileged loan by development bank of Ethiopia (Getnet, 2012).

Proclamation No. 138/1978 issued to legalize formation of cooperative is based on mainly at Housing, Credit and Handicrafts. All this have been the main challenges for cooperative in Ethiopia in Dergi regime. That cause powerless cooperative to uplift rural poor on their providing services. After down fail of Dergi regime, current government issued different proclamations, policies and strategies that include:- Proclamation 85/1994-to regenerate cooperatives and Proclamations 147/1998 and 402/2004 to reinforce these principles and strengthen membership encouragements by improving members' rights in the areas of ownership, voting, share transfers, and risk management ( Emana, 2012).

Now a day cooperative play great role in the rural area of Ethiopia since those challenge were reduced that constraint during Derge regime. Recent reports indicate that economic role of cooperative that enhance production by providing inputs like fertilizer cooperatives marketed yearly 357000 metric tons which 67 percent of all fertilizer imports when to link to private distribution of inputs and 85 percent of domestic fertilizer distribution of country (Meherka, 2008). Not only that cooperative also provide specifically, all types of agricultural inputs and collect exports agricultural output this built capacity for participants. For this main indicator is at 2007/08 in Ethiopia, only four unions exported a total of 36593.36 metric ton commodities (USD 104,154,838). In case of employment creation cooperative sector generated 207587 employment (18% was by cooperative unions and 82% by primary cooperatives) and the total value of the employment was estimated at USD 72 million in 2009/10 economic year (Emana, 2010).

Similarly in southern nation nationality the movement rapid and contribution also expected best for rural household. In region recently 1 cooperative federation and 44 multipurpose cooperative union which account 22% of total union number in country. In case of service that cooperative provide mainly soil fertilizer distribute almost in all 987 distributing center with in region past four year. This fulfill 100% demand of each zone and woreda that devotion of cooperative is to help farmers in order to provide inputs at right time, right place and reasonable price[2].

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[2] WWW. Southfarmers cooperative.com

In Hadiya zone expansion of cooperative growing that recently 3 agricultural multipurpose cooperative union with 67 member primary cooperative and also 3 saving and credit cooperative was established with 34 member primary cooperative. In case multipurpose cooperative union those three union have established in 82249 male and 5880 female total 88129 member rural and urban households. And those saving and credit union was established by 1217 male and 1383 total 2600 member households.

## 2.1.4 The Need for Cooperative in Poverty Reduction

The capacity conventional banking sector in Ethiopia has been too weak to serve the need of rural community and the poor are excluded from formal financial markets to establish their small businesses because of they are not recognized as being credit worthy. That means because of high collateral requirements the rural poor have limited access to conventional banks (Costa.et al 2008). Even the rural micro-finance institution cannot answer the question of rural poor household because institutions provide only credit and saving service.

This because the poverty by nature it is multi-dimensional. No single actor can alleviate poverty. Therefore, cooperatives are too essential to reduce poverty since it has multi-dimensional action. Moges (2013) suggest that poverty is multi- dimensional and dynamic phenomenon. It has multiple causes that exhibit economic, social and political characteristics hence poverty reduction policies require multi- dimensional approaches and strategies. This implies that cooperative have multi-dimensional role in rural poor household that can bring economic empower and reduce poverty.

Develtere et al (2007) suggest that as cooperative bring and play important role spatial in rural area by creating job opportunity both direct employment for member and indirect employment opportunity in case of non-member. Those employment creation on federation, union, primary cooperative also in cooperative supporting governmental institution. This make generate income for cooperative participant house hold. Saving habits are encouraged extremely which ultimately put the members in better position to tackle unnecessary disasters. Develtere et al (2008) also suggested that important role of cooperative for their member house hold saving and asset. This specifically, that cooperatives increasingly becoming a major source of productive assets and most in income generating opportunities make that in turn mobilize substantial saving.

ILO and ICA (2012) argue that cooperative as main suited to address all dimensions of reducing poverty and exclusion. Those NGOs suggest that cooperative reduce poverty since providing different economic opportunities for their members, empower the disadvantaged to defend their interests, also provide security to the poor by allowing them to convert individual risks and mediate member access to assets.

In other way they suggest that agricultural cooperative provide inputs require, keep livestock, access transport and market for their produce this intimately increase participant agricultural production. Also consumers cooperatives access good quality household supplies like food, clothing and other products at affordable price such services help pull member out of poverty. There is a widely held agreement among many actors, including the International Labor Organization (ILO), and the International Cooperative Alliance (ICA), that the cooperative is most suited tool to addressing all dimensions of reducing poverty and exclusion. They found that significant impact of cooperative on rural household members of economy. This intensely show agricultural cooperative multi- dimensional impact on rural livelihood development and alleviation of deprivation.

## 2.1.5 Impact Indicators of Poverty

The framework by Ledgerwood (1999) defines purviews impact indicators to measure impact at the household, enterprise, individual and community levels. At the household level, income, assets, consumption expenditure and basic services are indicators of impact assessment. In community level, four domains of economic development include net changes in employment and generate income, social networks and civil participation. Agricultural cooperatives are believed to have considerable impact at poverty reduction on service users. Such perceived benefits are expected to affect the decision of farmers to become cooperative members and business services users. Getnet and Annulo, (2012) describe poverty reduction impact of cooperative on users could be measured using different indicators, including household income, assets accumulation, household off-farm income, input expenditure and saving amount of cooperative participants.

Changes of these indicators that indicate the movements at different levels toward or away from greater economic security are believed to suggest the role of cooperative interventions in expanding options for poor women and men in relation to the broader development goals of and economic growth. Cooperative societies have impact on house hold especially poverty reduction for smallholders in rural area to improve livelihood development by creating employment and as source of business. Also for farm households recently have a comparative advantage for the adoption of new agricultural technology to increase production level and food security.

Hassen (2014) define two impact indicators of program outcome of food security in community level, farm household and smallholder level that objective are being met. Change in daily calorie intake per adult is important indicator of household food security status, Livestock significant difference regarding livestock holding of participant households over non-participation one because increase investment on productive assets which show impact output of intervention.

## 2.2 Empirical Review

### 2.2.1 Study in Other Country

Many studies in different area found different result for the contribution of agricultural cooperative used at rural and urban household level by employing different approaches to impact evaluation. USIAD (2010) studies the impact of cooperative in India, Bangladesh, the Philippines and Argentine. Suggest that cooperative contributing significantly on their participants by access to market information, alleviating deterioration of produce price and improving individual bargaining power through collective action. In Kenya, Tanzania and Uganda, ILO (2012) the result show cooperative had contribution. That 64% increase participation of members in the community affairs. This indicate contribution of cooperative on rural household empowering. And number of decisions being made on spouses in the area of economic activities increased from 45% to 80%, and children's education rise 57% to 78% on cooperative members households.

Salamatu (2007) assess role of cooperative on poverty alleviation in Kaduna south local governmental area of Nigeria. Descriptive statistics result of study show that cooperative have alleviates poverty including improve in the standard of living, provision of essential needs and increase income of members. Similar study Fapojuwo et al in (2012) undertake on contribution of cooperative to poverty alleviation in Ogun state, Nigeria. They employ descriptive statistics. The result show that poverty incidence of cooperative members is 0.5500 while non-members 0.5714. That means nonmembers are poor than cooperative members also show that less prone to poverty by cooperative members represents fair standard of living and sign of economic growth to cooperative members as pair non-cooperative member counterparts.

Zakari et al (2015) evaluate impact of cooperative on crop producing farmers in Nigeria state. Employ for data analysis double difference method. Double difference estimates show cooperative have positive impact on their beneficiaries, that difference of difference show 2960.03kg. Study found high severity index 0.04 exist on non-beneficiaries compare to severity index of beneficiaries 0.02 after obtaining service. Therefore, Cooperative has impact in improving living standard and compact poverty.

DFID at 2009 in Indian dairy cooperative founds that cooperative generate employment as well as increase productivity and income of small farmers by helping them collectively negotiating better price for the seeds, fertilizer, transport and storage. In this dairy cooperative create for 13.4 million rural household job opportunities and boosts income to people across their value chain those farmers in 13000 villages and over 7000 distributer. Members of the cooperative Society in western Cameroon increased family consumption of fresh milk, household income increased from USD430 in 2008 to USD3000 in 2012, with extra income used to pay school fees for children, for family emergencies and access to quality food increased from 14 to 76 per cent over the same period most of them exit from poverty (ILO and ICA 2015).

In Tanzania, improved cooperative marketing of agricultural products like milk and coffee has meant that cooperative members can afford fees for education of their children; in Egypt, 4 million farmers derive income from selling agricultural produce through agricultural marketing cooperatives.

## 2.2.2 Study in Ethiopia

In Ethiopia, 900,000 people in the agricultural sector are estimated to generate most of their income through cooperative. Multi-purpose and credit cooperative have positive role in poverty reduction. By providing their members with access to small loans – which otherwise are difficult or impossible to obtain for poor people – they enable individuals to support their own self-employment, be it through retail shop keeping, farming or keeping livestock (Gicheru, (2012)).

In 2012 Getnet and Anullo undertake impact assessment of cooperative on livelihood at Borich district in SNNPR. The finding of study shows that positive impact of cooperatives on rural livelihoods. They employ propensity score match for data analysis. That cooperative have significant impact on income, saving, asset accumulation and employment opportunities on their members by its service. Similar to this impact evaluation study under taken on agricultural cooperative by Bernard, et al (n.d). Their ATT impact result revealed that agricultural cooperative have positive impact on production income of rural small holders in Sidamo zone.

Alemu (2011) result show that 92% improved on house hold expenditure, income increase through securing better price for produce and supplying input in low price. This benefit enable them to diversify income, improve expenditure and enhance their livelihood in this study of role of cooperative on rural poverty reduction at Sidamo zone, SNNPR.

Pollet (2009) provides an estimate general information in relation with that cooperative contribution on both direct and indirect employment in Ethiopia. Based on this cooperative created job opportunities 196730 from this 81651 direct employment opportunities and 115079 indirect employment opportunity created in both rural and urban area of Ethiopia. In other case co-operatives contribute to poverty reduction by increasing their members' access to financial and other assets (including information), thereby allowing small farmers to increase their productivity and their incomes (DFID (2010) and Gicheru (2012)). Besides cooperative impact on agricultural production efficiency on their participant rather than non-participants in Ethiopia (Abate. et al, 2014).

There is covenant belong some actors on the positive role of cooperatives on economic improvement of and poverty reduction on participants' household in study as reviewed above. In most case previous review show that agricultural cooperative have positive impact on participant rural household. Impacts in most case revealed that on rural household by improving income, saving, expenditure, asset accumulation, creation of job opportunity and production efficiency.

However, most study have some gap especially on the data analysis tool that they employ to evaluate impact of cooperative. This for some case Getnet and Annulo (2012), Bernal.et al (n.d) and Abate.et al (2014) that they employ propensity score match tool this good for impact evaluation, but focus on specific poverty reduction indicator outcome. In other study Gicheru (2012) and Alemu (2011) on their study employ logit and descriptive statistics to evaluate role of cooperative on rural household.

Some studies have been conducted on role and contribution of cooperative in Ethiopia. The investigator review some of these related studies and found out that none of this studies has been done on LHFCU. Even in Ethiopia only Getnet and Annulo (2012) study conduct on livelihood development impact of cooperative by using propensity score matching, unless no more research conducted on poverty reduction impact of cooperative by using impact evaluation method of propensity score matching. Therefore, they fail to control what have been occurred in their absence cooperative service on that rural households. This indicate shortage of empirical study on poverty reduction impact of cooperative particularly on rural households in Ethiopia. More over Licha farmers' cooperative union in Lemo district at southern nation nationality region.

# CHAPTER THREE
## DATA SOURCE AND METHODOLOGY

## 3.1    Description of the Study Area

Lemo woreda is one of the 11 woreda in Hadiya Zones in the Southern Nation Nationality People Region. It is a part of *Gibe* and *Belate* basin. Hosanna is zone administrative town that located in Lemo *woreda* and LHFCU placed in Hosanna town which is located at a distance of 235km away from the capital city, Addis Ababa to the south. The total populations of Lemo district is 137,687 forms this 68,123 were males and 69,564 were females and 93% of which live in rural areas were mostly subsistence farmers depending on rain fed production and 7% of its population is urban dwellers (LWFEDO, 2015). Its altitude is 1900 m.a.s.l. It is characterized by temperate type of climate with daily temperature ranging from 18 $0^c$ and 27 $0^c$. The area experience type of rainfall classified as small from March to April and main rain seasons are from July to September. Population of Lemo *woreda* in that inhabitant is Hadiya and Christian in religion. Agricultural activities mainly, mixed agriculture is well known and practiced by the farmers in area. Basically, wheat, *teff*, maize, barely, bean, pea, and Sorghum are most important agricultural crops in and staple food of rural community also *Enset* is source of staple food. Study area is the most wheat potential in SNNPR. For some farmer coffee and 'chat' as cash crop (LWFEDO, 2015).

## 3.2 Method of Data Collection and Source of Data

The primary data for this study were collected from selected *kebeles* both LHFCU participant and non-participant respondents on Lemo *Woreda*. Secondary data were collected from government offices LHFCU main office and from those selected *kebeles* primary multi-purpose cooperative centers and other relevant organizations those from Lemo woreda and Hadiya zone cooperative and marketing organization. The Primary data was collected from the sampled respondents of both cooperative members and nonmembers on different characteristic such as demographic and socio-economic characteristics of households by means of structured questionnaire which pre-tested prior to its use in the field. Enumerators collect data by using questionnaire with close supervision of the investigator. Also secondary data was used for this study from internet, reports, books, journals, articles, and working papers.

## 3.3 Sampling Method and Sample Size

The study was conducted at Licha multi-purpose cooperative union in Lemo *woreda* at Hadiya Zone, South Nation Nationality Region. Multi-stage sampling method was conducted to define sample size from the target population. In this case two stages sample design procedure were adopted. In first stage, four kebeles is purposively selected from LHFC intervention Lemo district.

Those are *Tachigna Ambicho, Dabube Balesa, Shacha Oroma* and *Masibera kebeles*. Those are from three multipurpose cooperative of district selection was depending on accessibility for data collection, and to reduce agro-ecological difference since district has two ecology.

Also to reduce probability of tumbling all four kebeles in one primary cooperative researcher select two from *kebeles* good practices also two from *kebeles* weak practices on cooperative practices.

In second stage stratify total population of sample kebeles' household in to two stratums those cooperative participant and non-participants. The first stratum is from multi-purpose primary cooperative members who are use cooperative services. The second stratum is from non-members that in the multi-purpose primary cooperative. Representative sample size from each selected *kebele* and from members and nonmembers that was assigned depend on their proportion. At *kebele* representative respondents from both was selected by using simple random sampling method from each members and non-members.

According to obtained data from Lemo Woreda District Agricultural and cooperative Office (2015) in the purposively selected four *kebeles* (*Tachigna Ambicho, Dedude Balesa, Shecha Oroma* and *Masbira*) there are about 1700 households (N). Researcher take ideal 10% of from this total population of sample *kebeles* by considering time and budget limitation to determine sample size. Therefore, 170 sample size (n) were taken for the purpose of study from this sample size research take 75 treated and 95 controlled groups to increase matching probability among the group. Finally, the total sample size was distribute into the sample *kebeles* proportional to the total size of households head in selected *kebeles.* The total sampled households from each sample *kebele* are given in the following table.

Table-1: Sample size distribution among of selected *kebeles*

| No | Name of selected kebele | Total HH | Member of cooperative | Non-member of cooperative | sample size | Sample size of treated | | Sample size of non-treated | |
|----|------------------------|----------|----------------------|--------------------------|-------------|-----------------------|------|---------------------------|------|
| 1 | Tachigna Ambicho | 579 | 350 | 229 | 58 | No | % | No | % |
| | | | | | | 26 | 44 | 32 | 56 |
| 2 | Dedude Balesa | 314 | 163 | 151 | 31 | 14 | 44 | 17 | 56 |
| 3 | Shacha Oroma | 387 | 210 | 177 | 39 | 17 | 44 | 22 | 56 |
| 4 | Masibera | 420 | 260 | 160 | 42 | 18 | 44 | 24 | 56 |
| | Total | 1700 | 982 | 718 | 170 | 75 | 44 | 95 | 56 |

**Figure 1. Study area administrative and selected kebeles map**
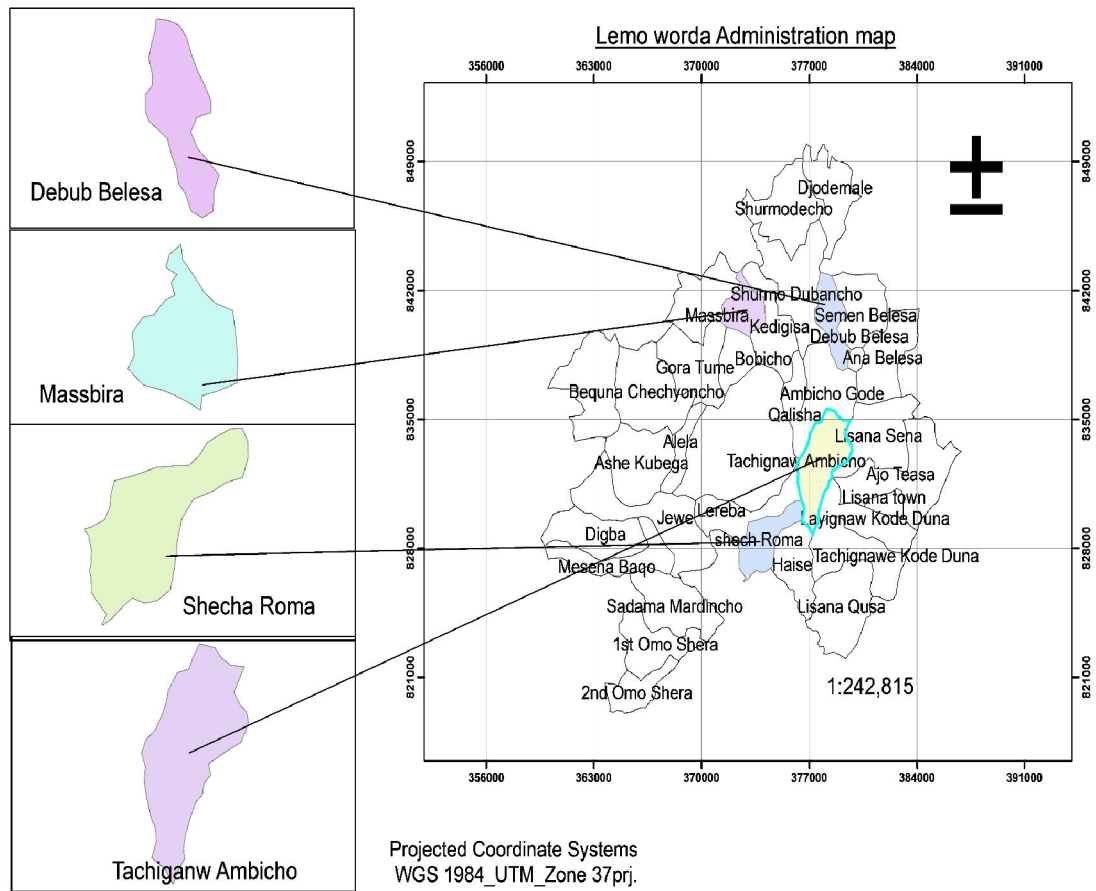


*Source: from Hadiya zone administrative top map.*

## 3.4 Methods of Data Analysis

### 3.4.1 Model Specification

In this impact analysis researcher employed both descriptive statistics and econometric model. Specifically, descriptive statistics used to describe weight of both treated and untreated respondents demographic and socio-economic characteristic in study area. For this purpose descriptive statistics such as mean, standard deviation, percentage and t-test for continues variables and $chi^2$ for dummy variables was employed. Since descriptive statistics are employed to clearly present estimation results. In case of that to compare and contrast treated with untreated categories of sample units of respondents with respect to the chosen characteristics (covariates), thus to reach some necessary findings and conclude based on results.

Propensity score match employed to found quality match covariate among cooperative participants and non-participants for the purpose of difference compression also to quantify important cooperative impact indicators empirical results. For both case STATA version 13 Software by compactable Psmatch2 with ado employed for the analysis of the data.

### 3.4.2 Propensity Score Matching

The methodology employed to evaluate impacts of cooperative on household poverty reduction and livelihood improvement utilizes different approaches like difference in difference, Instrumental variables and Propensity score match. However, most are have their drawback difference in difference work if baseline data of households and IV applicable more for experimental case and it have face most of time selection bias.

The methodological difficulty in the estimate effect obtained by comparing a treated group with non-treated groups could be biased because self-selection and systematic judgment problem (Dehajia and Wahba, 2002). However, PSM relatively reduce this risk of bias on impact evaluation and create good opportunity to evaluate impact of program in the absence of baseline data. In PSM the relevant different between two units of treated and untreated group are captured in the observable covariates which occurs when outcome are independent of assignment to treat, then the matching yield an unbiased estimate of treatment impact.

Impact of cooperative are multidimensional on their members, that observable in different forms like income creation, asset accumulation, employment, education, health and risk reducing condition in rural households. There are also spill-over effects multi- dimensional cooperatives extend to member and society at large as indirect benefits. Those cause measuring and impact evaluation difficult of cooperative intervention (Getnet and Anullo, 2012).

The correct solution for this puzzle is propensity score matching, because it diminish dimension of covariate by matching respondents with covariates for treated and untreated groups. Becker and Ichino (2002) argue that deploying propensity score matching reduce the high dimensionality challenge of observables characteristics in impact evaluation to specific direction. Since PSM reduce dimension of covariate and can balance observables between treated and untreated. Not only PSM reduce the dimensionality of observables characteristics of treated and untreated groups but also it reduces bias. Dehejia and Wahbia (2002) show that applying propensity score matching reduce bias. Similarly Rubin (1983) suggest that PSM as a method to reduce bias in the estimation of treatment effects with observational data set. Since, PSM reduce mean of covariates and selection bias by matching algorithm among treated and untreated. Therefore, in this study in order to evaluate impacts of LHFCU on household poverty reduction propensity score matching was employed.

The method has been applied by previous studies to assess impact of cooperative on small-holders commercialization in Ethiopia Francesconi and Heerink (2010) also Getnet and Annulo (2012) employ to assess the impact of cooperative on livelihood development in *Sidamo* zone and Hasen (2012) have employed in impact of irrigation on poverty alleviation and its determinants on water resource in south *Wollo.*

The propensity score matching, using the predicted probability of an individual receiving the treatment of interest (e.g. providing of agricultural inputs in credit, accessing fair market for their agricultural products (*i.e* collecting product from their members and distributing dividend) and promoting saving and employment creation) to make comparisons between individuals with the treatment and those without treatment, involves first specifying a function matching the proximity of one household to another in terms of household characteristics and then grouping households so as to minimize the distance between matched cases this in turn avoid bias.

Empirically, the propensity score is the conditional probability of rural household that receiving a treatment based on given covariates, X (individual household level characteristics).

$$P(X) = Pr\{D = 1 \mid X\} = E\{D \mid X\} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Where D = {0, 1} is the dummy variable representing whether a household are member of cooperative (1) or not (0) and X is the multidimensional vector of treatment characteristics relatively stable household characteristics in own context.

In this study logit model was employed to predict the probability of each household participating in the program as a function of observed household characteristics used sample of the cooperative participants and non-participant. In the logit model the participation of the households on cooperative was treated as dependent variable which takes the value of 1 and 0 for untreated when household not participate on cooperatives the same to as shown above.

The explanatory variables in this model are a) family size; b) age of household head; c) education level of household head; d) marital status of house hold head; e) household head sex; f) size of land hold under cultivation; g) use of chemical fertilizers (DAP and Urea) ; h) use of improved seeds; i) having access for credit; j) household off-farm income and k) distance from market. The mathematical formulation of logit model is given by:-

$$P = E(Y = 1 / Xi) = \frac{1}{1+e^{\beta 0+\beta i Xi}} \text{-------------------------------------------- (2)}$$

$$\text{Then } p_i = \frac{1}{1+e^{-zi}} \quad \text{for household participate in cooperative}$$

$$1\text{-Pi} = \frac{1}{1+e^{zi}} \quad \text{for household not participate in cooperative}$$

$$\frac{P_i}{1-P_i} = \frac{1+e^{Z_i}}{1+e^{-Z_i}} \text{------------------------------------------------------ (3)}$$

$\frac{P_i}{1-P_i}$ the odds ratio in the favor of participating in the cooperative to the probability of household not participate. To normalize take natural log

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$$Li = \ln\left(\frac{P_i}{1-P_i}\right) = Zi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots + \beta_n Xn \text{ -----------------------(4)}$$

Where; Pi = is a probability of being participated in the program

$Z_i$ = is a function of explanatory variables ($X_i$) which is also expressed as:

$\beta_0$ = is an intercept

$\beta_1, \beta_2, \cdots \beta_n$ = are slopes of the equation in the model,

$L_i$ = is log of odds ratio which is not only linear in $X_i$ but also linear in the parameters,

($X_i$) = observable characteristics if the disturbance term ($u_i$) is introduced to the logit model

$$Zi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_n Xn + u_i \text{-------------------------------- (5)}$$

Here main question is how far household get improvement and reduce poverty favor in terms of poverty indicators as a result of participating in cooperative relative to household that not participating in this case investigator use average effect of treatment on treated(ATT). Therefore, impact of cooperative based on PSM is defined as follows by ATT:

$$\text{ATT} = E\{Yi - Yo | D = 1\}$$

$$\text{ATT} = E(Yi - Yo | D = 1) = E(Yi | D - 1) - E(Yo | D = 1) \text{ ---------------------- (6)}$$

Where, $Yi$ = the outcome in the treated condition (improvement for members household);

$Yo$ = the outcome in the control condition (improvement for nonmembers household; and

D = indicator variable denoting use of cooperative service (i.e. D=1, household that member of cooperative and D=0, household not a member of cooperative). $E(Yi|D-1)$ is expected outcomes for those who participate in cooperative in scheme; $E(Yo|D=1)$ is the counterfactual outcome that would have occurred in the absence of participation.

Note that above eq. (6) because of unobserved counterfactual outcome ($E(Yo|D=1)$) it is subject to selection bias. In this way Ikenwilo et al.(2014) argue that at the same

time it is impossible to observe the same individuals in the both the treated and untreated groups (i.e $E(Yo|D = 1) \neq E(Yo|D = 0)$.

For estimation ATT result using the E[Y0/D = 0] mean outcome of untreated respondents can cause to a self-selection bias reason is indicated above, outcome of individuals from treated and untreated group not the same even in the absence of treatment of cooperative. It can be possible to note ATT as:

E [Y 1 /D = 1] - E [Y 0 /D = 0] = ATT+E [Y 0 /D = 1] - E [Y 0 /D = 0] ------------- (7)

E [Y0/D = 1] - E [Y0/D = 0] = 0--------------------------------------------------------- (8)

Then ATT defined unbiased situation equation stated the same to above equation (6);

ATT=E (Yi – Yo │D=1) =E (Yi │D - 1) – E (Yo | D=1)

Under two key conditions, PSM method applied to estimate ATT and to make it free from bias. The first is the conditional independence, in which we assume that there exists a set of observable characteristics ( X ), such that after controlling for these, the potential outcomes are independent of whether the individual is in the treatment group or in the control group hence the conditional independence assumption expressed as;

$(Y1, Y0) \perp D \mid X$------------------------------------------------------------------------- (9)

Where: Y1 and $Y_0$ are household outcomes if it participates and receives a service and household outcomes if it does not participate and not receives services from cooperative, "⊥" is referred to as independence, and X is a set of observable characteristics.

The second is common support assumption, in which we assume that there is a positive, non- zero probability of being both treated and untreated, for each value of *X.*

( $0 < P(D = 1 \mid X) < 1$ )----------------------------------------------------------------- (10)

The detail of this assumption is presented latter since common support condition is one of steps of implementation of propensity score match. Rosenbaum and Rubin (1983) suggest that treatment assignment become strongly ignorable and the PSM estimator of A*TT* is free of selection bias when those two condition are satisfied.

**Choice of Algorithm**

Matching estimators: After the estimation of propensity score, in PSM is choosing among different matching estimators. In theory, several matching estimators (matching algorithm) of PSM are available. However, only the most commonly applied estimators are compared to select one that best fit for own data.

Nearest neighbor matching (NNM) is the most straightforward matching estimator. This match treated household with untreated household individual in closest in terms of covariate (Caliendo and Kopeinig, 2005). NNM in this study employ since the study take investigation on non-experimental. Therefore the nearest neighbor matching help to estimate treatment effect on treated with untreated rural households by comparing one group with closest propensity score.

Caliper matching estimator imposes a tolerance level on the maximum propensity score distance (caliper) so that bad matches are avoided and hence the matching quality rises. In caliper matching case untreated group use as a matching partner for treated group individual with in the propensity range to build counterfactual for analysis (Caliendo and Kopeinig, 2005). Kernel matching is to match treated group with untreated by using weighted average covariates of all individuals untreated group in order to construct counterfactual (Caliendo and Kopeinig, 2005). This method use more information and hence advantageous in lowering variance rather than others.

However, it has own drawback of probability of using bad match from observations this in turn impose the common support. Region of common support:- Employing of common support is the third important step in PSM because average treatment effect on treated and on untreated group defined in the common support region for evaluation of program (Caliendo and Kopeinig, 2005). The common support region is the area within the minimum and maximum propensity scores of treated and comparison groups, respectively and it is done by discarding of those observations whose propensity scores are smaller than the minimum and greater than the maximum of treated and untreated this increase robustness of match for non-experimental variable, respectively (Caliendo and Kopeinig, 2005).

Testing matching quality also important step in PSM is checking for matching quality whether the matching procedure can balance the distribution of covariates among both group or not (Caliendo and Kopeinig, 2005). In this study four matching quality indicators are employed those, standardized bias, T-test, joint significance and Pseudo-$R^2$. Final step in the implementation of PSM in own case is checking the sensitivity of the estimated ATT results. The estimation of treatment effect on with matching estimators is based on selection at observables assumption. Here this study under take in a agricultural cooperative and treatment are not randomly to participate on union. Therefore, untreated and treated group are matched by observable covariates.

This cause probability to happen bias due to residual imbalance in unobservable covariates. Since a hidden bias might rise if those unobserved variables which affect assignment into treatment and outcome variable which abolish CIA (Rosenbaum, 2002). Therefore, this problem addressed by sensitivity analysis. In the study to check those sensitivity of the estimated ATT by using Rosen bound bounding approaches.

### 3.3.1 Model Variable Choice

Heckman (1997) show that omitting important variable as seriously increase bias in result estimates, and suggest that only variables that influence simultaneously the participation decision and outcome variable should be include. It is also clear that only variable those are unaffected by participation (or the anticipation of it) should be included in the model.

**Dependent variable**

The p-score in this study generated by using different variables (characteristics) that expected to determine rural household propensy of participants on agricultural cooperative. The dependent variable of the study used in the logit investigation is binary variable. That takes the value 1 if a respondent participants on cooperative  (take as treatment group) and it takes the value 0 if a farm household did not participants cooperative (control group).

**Outcome variables**

To evaluate the average treatment effects on treated, the study used a set of outcome variables those poverty reduction impacts of cooperative on their members than non-members. These provide transfers to the rural household economically empower and reduce poverty also prevents asset depletion at the household level. In this study, the researcher considers five the following impact indicators of cooperatives.

1).Household incomes (HHI) this income change among on participant group is an important indicator. That cooperative creates income generating opportunities by supporting, encouraging surplus production and facilitating market access for their produce. Provision of agricultural input which include fertilizer and improved seeds by cooperative at affordable price that result in reduce total agricultural input expenditure also increase agricultural production. According Getnet and Annulo (2012) suggest that increase income of rural household cooperative service user since cooperative paid fairly high price for their produce.

Also extension service that given for service user enable farmers use improved seeds and providing chemical fertilizer through cooperative this rise better crop yield and revenue. Cooperative create job opportunity, it is indicators income and source of business especially for small land holders on community as expressed in theoretical literature part.

2) Household Asset (HHA) this household asset one of indicator in this study includes farmland (used for both annual and perennial crop production) livestock (include oxen, milk cows, and small ruminants). Cooperative beneficiary households increased their investment on productive assets such as livestock holdings. From a livelihood perspective, different types of cooperatives mediate the access of their members to assets that they utilize to earn a living. For instance, agricultural cooperatives help rural house hold to get access to the inputs they require to grow crops and reduce livestock risk, and access market for their produce (Birchall, 2004).

3) Household saving (HHS) is another impact indicator; it is expected that being members of cooperative encourage and mobilize rural house hold in order to participate saving and credit activities positive relation in agricultural cooperative.

Similarly, consumer cooperatives have significant role on rural household by providing basic materials for them that access to household goods like food, clothing, and other products (Birchall, 2004). This will reduce basic consumption expense and increase building capital asset of saving on cooperative service user.

And enhancement in the level of household saving is also expected to reduce business constraints faced mainly on rural households and this in turn improve adoption of modern agricultural technologies. Improvement in their production activities will increase income this in turn build household saving capacity.

4) Household consumption expenditure (HHCExp) also main impact indicator especially for livelihood development and poverty reduction program. If impact is significant on that household level and community the program cause increase consumption expenditure and nutrition in take daily. The immediate impact of cooperative is on income, which is expected to have impact on consumption expenditure of households' diet. Thus, consumption expenditure is used to evaluate the effect of the access to credit.

The increase in consumption expenditure is expected to improve household diet and living conditions. The number of meals per day and responsiveness of access to nutrition are also will be considered in the analysis.

**5**) Human capital; improvement in expense for education and medical care and increasing response for health service good impact indicators of improvement in livelihood. In this case to assess impact of cooperative on human capital investigator use only education and medical facility as outcome variable from human capital.

**Explanatory variables**

The explanatory variables will used in the logit analysis include the demographic and socio-economic characteristics of rural households. It is expected that those explanatory variables affect the tendency of households in order to participate or not in cooperative. The variables are:-

a) Family size **(**Fmsize**)**:- it mainly considers family size of rural household of respondents. Household size will positively affect probability of participation in cooperative. This indicates propensity to become a member of agricultural cooperatives

is high for households with large family size. If those dependent are economically active between age between 15 and 60 positively affect.

b) Age of household head **(Hhage)**: - The age of household head refers to the length of time since birth, which the respondent has been alive. For this Francesconi (2014) suggest that household head age positively affect in youth age and negatively on old age stage the participation on cooperative. So researcher hypothesized that increase households head age positively affect probability to participate at agricultural cooperatives.

c) Education level of household head **(Hhedu)**: - The educational level of the individual is one of the important factors preparing the individual to receive and utilize new information to be more productive. It is assumed that the level of education of the household head will positively affect the participation in cooperative marketing.

d) Household head sex **(Hhsex)**:- it refers to the sex of the household head and it might affect access and use to new agricultural production information provided by stockholders. Due to cultural obstacles, more rural female are far from important extension on new agricultural technologies.

This might prevent female headed households from accessing and using information and reduce their interest and willingness to use new agricultural practices on their farms. Getnet and Annulo (2014) argue that being household head male positively and female negatively affect household participation in cooperative activity (membership)

e) Household head marital status **(Hhmartial):-** Marital status of household head being married positively affects livelihood participation. Therefore, household head being married positively and others affect negatively.

f) Size of land household hold under cultivation **(Landha)**:- it is one of the important resources to achieve the objectives of alleviate poverty and secure country economic development. The land holding of the farm households positively affect positively when household have sufficient land to cultivate for crop production in order to get fertilizer in credit and to sell in affordable price its produce.

g) Use of improved seeds **(Impseedus)**:- Household demand of improved agricultural seeds will positively relate with in probability of membership/participation.

h) Use of chemical fertilizers (DAP and Urea) (Totafert). Also this is household socio-economic characteristics. It relate positively with probability to participate in agricultural cooperative.

i) Household off-farm income (Offfarm):- Farm households that have off-farm incomes negatively relate with probability to participate in cooperative and are less likely to participate in cooperatives. Because their agricultural activities might reduce or loss focus and might not give attention cooperative participation.

j) Market distance to home (Mktdist):- Access to market is hypothesizing to be positively affect probability of household participation on cooperative. Because if the household was far to the market the farmer they might not get privet would not tend to buy improved agricultural inputs and sell his/her products in the market. Therefore when household with lack of market access will be have more probability to be member of cooperative.

k) Having other Credit access (othcredacc):- Rural house hold that having others credit access from rural institution play negative role. Because rural house hold search credit for the purpose of agricultural activities to buy fertilizer and improve seed in sowing period that household with good credit access participation may decrease.

Table 2. Dependent and explanatory included in propensity score match

| Variable name | description variable | variables | expected sign |
| --- | --- | --- | --- |

| Dependent | participation(1=yes; 0=no) | Dummy | |
|---|---|---|---|
| Covariates | | | |
| Hhsex | sex of household head (1=male; 0=female) | Dummy | (+/-) |
| Hhmartial | household head martial (1=married; 0=unmarried) | Dummy | (+/-) |
| Fmsize | Number of family members | Continuous | (+/-) |
| Hhage | household head age | Continuous | (+/-) |
| Hhedu | household head education status | Continuous | (+/-) |
| Mktdist | market distance from their home | Continuous | (+/-) |
| Offfarm | household head off-farm income | Continuous | (-) |
| Totafert | total amount of fertilizer that household used | Continuous | (+) |
| Landha | household cultivated land holding in hector | Continuous | (+) |
| Othcredacc | other credit access for household (1=yes, 0=no) | Dummy | (+/-) |
| Impseedus | using improved agricultural seed (1=yes, 0=no) | Dummy | (+/-) |

Before proceeding different test to estimate researcher first check existence of multicollinearity among explanatory variables. Since it is very important to identify seriously estimation affecting variables in model. Variance inflation factor (VIF)

techniques is employed to detect the problem of multicollinearity among continuous explanatory variables (Gujarati, 2004).

$$VIF (Xi) = \frac{1}{1+Ri^2} \underline{\hspace{5cm}} \quad (11)$$

Where VIF, variance inflation factors, $R_i^2$ is the squared multiple correlation coefficient between $X_i$ and other explanatory variables. When the value of VIF is greater than 10, it indicate for the existence of multicollinearity.

Contingency coefficient is used for testing multicollinearity among discrete explanatory variable (Gujarati, 2004). For contingency coefficient test by using following formula.

$$C = \sqrt{\frac{x^2}{n+x^2}} \quad \underline{\hspace{5cm}} \quad (12)$$

Where C is contingency coefficient, $x^2$ is the chi-square value and n=total sample size. For dummy variables, if the value of contingency coefficient is greater than 0.75, it is an indication of existence of the multicollinearity problem among those dummy explanatory variables.

# CHAPTER FOUR
## RESULTS AND DISCUSSION

## 4.1 Demographic and Socio-economic Characteristics of Respondents

### 4.1.1 Basic Demographic and Farm Statistics of Respondents

In this section demographic and farm characteristics of respondents both treated and untreated households were represented from those selected four kebeles. As shown in the basic demographic and farm characteristics respondent households statics in Table 3, of total treated group 92% male and remaining 8% female. On controlled group 78.95% male and remaining 21.05% female. With respect to respondents household family size treated group are relatively more family size than controlled group that as shown below in table 14.67% family size below four, 42.33% family size fail between four to six and 43% were family size above six for treated and 17.89% were family size below four, 48.43% between four up to six and 33.68% above family size for untreated. In case of household head age 72% of cooperative members were in age between 35-55, the remaining 6.67% and 21.33% below 35 and above 55 respectively. Non-members household head age 63.16% between ages 35-55, other 14.73% below 35 and 2.11% above 55.

In case of household head education status both treated and untreated group have different percent of respondent in categories were illiterate, read and write but treated group were a little bit small in percent. In treated respondent 50.67% and 80% from untreated illiterate, read and write. Others in treated group primary 30.67%, secondary and above were 18.66%. For untreated group primary 11.58, secondary and above were 8.42% those are small compare to treated groups. Land size among both treated and untreated group relatively cooperative members have large land size.

Treated group 55.99% respondent have land size 0.5-1 hector other 4% below 0.5 and 29.34 % have land size interval 1.01-2.5 hector last 10.67% above 2.5 hector. As indicated in below table for untreated group 71.63% respondent have land within range between 0.5-1 hector. Remain respondents 4.16% have below 0.5 hector, 21.05 % land in range 1.01-2.5 hector and 3.16% above 2.5 hector.

Table 3. Basic demographic and socio-economic characteristics respondent household

| No | Description | | Categories | % | No | Description | | Categories | % |
|----|-------------|--|-----------|---|----|-------------|--|-----------|---|
| 1 | Household head sex | Treated | male | 92 | | Land size | Treated | Below 0.5 ha | 4 |
| | | | female | 8 | | | | Between0.5-1 ha | 55.99 |
| | | Untreated | male | 78.95 | | | | Between 1.01-2.5 | 29.34 |
| | | | female | 21.05 | | | | Above 2.5 ha | 10.67 |
| 2 | Household size | Treated | Below 4 family size | 14.67 | | | Untreated | Below 0.5 ha | 4.16 |
| | | | Between 4 - 6 | 42.33 | | | | Between 0.5-1 ha | 71.63 |
| | | | Above 6 | 43 | | | | Between 1.01-2.5 ha | 21.05 |
| | | Untreated | Below 4 | 17.89 | | | | Above 2.5 ha | 3.16 |
| | | | Between 4-6 | 48.43 | 4 | Household head education | Treated | Illiterate and read, and write | 50.67 |
| | | | Above 6 | 33.68 | | | | Primary | 30.67 |
| 2 | Household head age | Treated | Below 35 | 6.67 | | | | Secondary and above | 18.66 |
| | | | Between 35-55 | 72 | | | Untreated | Illiterate and read, and write | 80 |
| | | | Above 55 | 21.33 | | | | Primary | 11.58 |
| | | Untreated | Below 35 | 14.73 | | | | Secondary and above | 8.42 |
| | | | Between 35-55 | 63.16 | | | | | |
| | | | Above 55 | 22.11 | | | | | |

Source: own field data, 2016

**4.1.2 Household Mean Characteristic for Continuous Variables**

As shown below in table 4, mean difference for continuous household characteristics in case of both treated and untreated groups. Mean family size for cooperative member household was 2.30 and 2.157 for untreated means relatively similar family size that fail in family size gap (4-6) members. That group with 0.14 mean difference this indicate insignificant difference among those two group. In case of household head age insignificant in mean difference between treated and untreated group relatively 4.7 mean age with mean difference value 0.015. This indicate for both group household age fail in a gap 46-55. With respect to household education level between two groups mean difference was 0.574 that statistically significant at 1% significance level.

As represented below in table market access was strongly significant difference between treated and untreated group with in distance from their home at significance level 1%. Figure in table indicate treated group have mean distance 4.30km and 2.41km for untreated households with mean difference 1.87km. In case of amount of fertilizer that treated group employed for agricultural purpose was significant difference at significance level 1% from untreated group. That treated group have used mean amount of 183kg and other controlled group used 138.2kg fertilizer with mean difference 51.12kg. Finally, household land holding condition different between treated and untreated group since mean land for treated 1.15 hector and for untreated group 0.98 hector with mean difference 0.16 hector and the difference was insignificant.

Table 4. Household mean characteristics (for continuous variable)

| Explanatory variables | Total (N=170) | Treated (N=75) | Non-Treated (N=95) | Different in Mean | t-Value (p-value) |
|---|---|---|---|---|---|
| | Mean(STD) | Mean(STD) | Mean(STD) | Mean | |
| **Hhsize** | 2.3 (0.72) | 2.30 (0.74) | 2.157(0.704) | 0.148 | 1.34(.181) |
| **Hhage** | 4.7 (0.94) | 4.72 (0.88) | 4.70 (0.99) | 0.015 | 0.101(.919) |
| **Hhedu** | 1.71 (1.24) | 2.03 (1.36) | 1.45 (1.07) | 0.574 | 3.09(.002) |
| **Mktdist** | 3.24 (1.77) | 4.30 (1.63) | 2.41 (1.42) | 1.87 | 8.01(.000) |
| **Totafert** | 160.8(101.8) | 183 (133.3) | 138.2 (58.9) | 51.12 | 3.35(.001) |
| **Landha** | 1.06 (0.705) | 1.15 (0.77) | 0.98 (0.64) | 0.16 | 1.5(.134) |

Source: Own survey data, 2016.

## 4.1.3 Household Mean Characteristic for Dummy Variables

Here on dummy variable four of them are strongly significant between treated and untreated rural household in study area. Basically, male headed household have more probability to participate in cooperative than female. The same to as presented in table 5, below descriptive statistics household head sex significantly affect participation in agricultural cooperative with significance level 5% ($X^2 = 5.5**$) and male in treated group was 92% remaining 8% female headed. In case of untreated group 78.95% were male and 21.05% female headed households.

With respect to using improved seed in study area there is large significant difference between treated and untreated in participation at agricultural cooperative. From participant that use improved seed was 82.7% and remaining 17.3% are non-user, but only 48.4% use improved seed and most part that 51.6 % were non-user from untreated group. Those result show there is significant difference between cooperative participant and non-participant at 1% ($X^2 = 21.2***$) significance level.

Below table result show that from total respondents 88% house hold that no any credit access and for non-members were 71.6, but only 12% from member and 36 % are have other credit access in area. This show significance difference between members and non-members that get other credit access at significance level 1% ($X^2 = 0.77***$). At last, in case of off-farm income between treated and untreated group that large percent of member respondents that 94.67% have no off-farm income and 67.4% from non-members this show high difference between both group and it was statistically significant at significance level 1% ($X^2 = 19.1***$).

Table 5: Descriptive statistics of household characteristics (for Dummy variables)

| Explanatory variables | | Treated (N=75) | | Non-Treated (N=95) | | Total (N=170) | | $X^2$(p-value) |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | |
| **Hhsex** | Male | 69 | 92 | 75 | 78.95 | 144 | 85.5 | 5.5(.020) |
| | Female | 6 | 8 | 20 | 21.05 | 26 | 14.5 | |
| **Hhmartial** | Married | 63 | 84 | 75 | 79 | 138 | 81.5 | 0.7(.436) |
| | otherwise | 12 | 16 | 20 | 21 | 32 | 18.5 | |
| **Impseedus** | Used | 62 | 82.7 | 46 | 48.4 | 108 | 65.85 | 21.2(.000) |
| | Not-used | 13 | 17.3 | 49 | 51.6 | 62 | 34.45 | |
| **Othcredacc** | have access | 9 | 12 | 27 | 28.4 | 36 | 20.2 | 0.77(.013) |
| | No access | 66 | 88 | 68 | 71.6 | 134 | 79.8 | |
| **Offfarm** | Have | 4 | 5.33 | 31 | 32.6 | 35 | 18.96 | 19.1(.000) |
| | No | 71 | 94.67 | 64 | 67.4 | 135 | 81.04 | |

Source: Own survey data, 2016.

## 4.2. Economic Contribution of Cooperative

As shown below table 6, represents inferential evidence in study area what and whether agricultural cooperative contributing significance impacts on their members or not. In case of job opportunity creation institution mainly have positive role in members household. Licha agricultural cooperative have create for 18 house hold members and also for 4 rural house hold those are not members of cooperative. This result confirm that LHFCU have bring statistically significant contribution in increasing job opportunity for members at 1% significant level. In other side contribution of on non-members implies indirect impact of agricultural cooperative. Implication of this outcome that cooperative have positive economic contribution on community for its participants by creating job opportunity and those supported by Getnet and Annulo (2012), Ezekie (2014) and Pollet (2009). In table respondent house ownership results indicate that cooperative members have desirable difference than from non-members. That cooperative members have better in having own house, types of house (iron roof house) and improving house that members no one are homeless but 6 households are homeless dependant. In other case cooperative participants have 30.67% of respondent are with iron roof house and only 16.84% for non-participants respondents. In case of improving their house cooperative members have better situation than non-members that 37.4% participant and 14.74% nonparticipant. Generally, respondent's asset house condition designate that cooperative participant statistically significant different with house improving and in iron roof types at significance level 1% and 5% respectively. But result do not support Getnet and Annulo (2012) that their result show cooperative have no significant contribution on house asset. This might be agriculture cooperative participants give more consideration for their house than other asset accumulation.

As table result revealed with respect to food availability condition cooperative participant have better status camper to non-participant. As shown below cooperative members only 4.4% households and 24.2% non-member households face shortage of food in a year. This result show that there is statistical significant difference between participant and non-participant in food availability at 1% significance level.

As shown below table rural household improvement in medical care have significant difference among participant and non-participant of cooperative. Response of respondent indicate that 65.3% reports as improve and 34.7% reports that have no improvement and in case of non-participants 40% reports improve in medicine care and

60% respondents have reports no improvement. This indicate that participant house hold have better improved than non-participants and it is statistically significant at 1% level. Economic implication is cooperative members have better living standard in case of human capital of medical care rather than non-members.

Table 6. Economic contribution of cooperative on household for binary outcome.

| Impact indicators | Categories | Treated | | Un-treated | | Total | | $X^2$(p-value) |
|---|---|---|---|---|---|---|---|---|
| | | N=75 | % | N=95 | % | N=170 | % | |
| **Job opportunity** | Have get | 18 | 24 | 4 | 4.3 | 22 | 12.9 | 14.3(.000) |
| | No | 57 | 76 | 91 | 95.7 | 148 | 87.1 | |
| **Built their house** | Have | 75 | 100 | 89 | 93.7 | 164 | 96.47 | 4.9(.035) |
| | No | 0 | 0 | 6 | 6.3 | 6 | 3.53 | |
| **Type of house** | Iron roof | 23 | 30.67 | 16 | 16.84 | 45 | 26.5 | 4.5(.043) |
| | Grass roof | 52 | 69.33 | 79 | 83.16 | 123 | 73.5 | |
| **Improve house** | Improve | 28 | 37.4 | 14 | 14.74 | 51 | 30 | 11.5(.001) |
| | Not improve | 47 | 62.6 | 81 | 85.26 | 119 | 70 | |
| **Shortage of food** | No shortage | 71 | 94.6 | 72 | 75.8 | 143 | 84.1 | 26.4(.000) |
| | Face shortage | 4 | 4.4 | 23 | 24.2 | 27 | 15.9 | |
| **Improvement in medicine** | Have | 49 | 65.3 | 38 | 40 | 87 | 51.2 | 10.7(.001) |
| | No | 26 | 34.7 | 57 | 60 | 83 | 48.8 | |

Source: own survey data, 2016

As revealed in table 7 below, economic contribution of agricultural cooperatives on member rural households in case of continuous outcome variables. In case of house hold meal eating condition between members and non-members have significant difference in rural area. Those participant rural households eat meat per a week is greater than of those non-participants in mean difference 0.63 at 1% significance level.

This show that cooperative members have better consumption compare to non-members because culturally house hold consume more meal when their income increase since it is best improvement indicator proxy for rural area. With respect to yearly house hold consumption of food was depend both on market produce and home produced food products. Market produce food products consumption between cooperative participants and non-participants there is mean difference that non-members use more food from market but it is statistically not significant difference. However, cooperative members more consume food from their produce in farm than non-members and it is statistically significant at 1% level with mean difference of 3033.5 ETB in one year. This household consuming large amount of their consumption of home produce food indicate improvement in agricultural activities and sustain life than non-members.

Table 7. Economic contribution of cooperative on household for continuous outcome

| Outcome variable | Total (N=170) | Cooperative members (N=75) | Non-members of cooperative (N=95) | Difference in mean | t-value | P-value |
|---|---|---|---|---|---|---|
| | Mean(STD) | Mean(STD) | Mean(STD) | | | |
| Meal/w | 1.623(.721) | 1.97 (.787) | 1.35(.52) | 0.63 | 6.21 | 0.000 |
| Yrmkexp | 2001(1142) | 1946.7(1341.9) | 2044(962.5) | -97.33 | 0.55 | 0.582 |
| Yrhpfpri | 6562.7(2214.75) | 8257.9(1832) | 5224.4(1439.5) | 3033.5 | 12 | 0.000 |

Source: own survey data, 2016

## 4.3 Econometric Estimation Results

### 4.3.1 Propensity Score Matching Model Result

Propensity score matching (PSM) was applied to deal with the main objectives (evaluating the impact of agricultural multi-purpose cooperative on poverty reduction indicators at rural households) of study. Specific objective of evaluating impact of cooperative on household asset accumulation, house hold income, saving, household food expenditure and house hold education and health facility of the study.

As specified earlier in descriptive and inferential statistics result covariate for rural household both demographical and socio-economically condition varies significantly. Hence, the matching process was performed for all this specific object of study on poverty reduction indicators.

### *4.3.1.1 Estimation Result of Propensity Scores*

The logistic regression model specified in equation "5" was that employed to estimate propensity scores for matching treated households with non-treated households. Also simply realize covariate variation among members and non-members and how those explanatory variable determine rural household participation cooperative. As specified in the model specification part of study dependent variable a dummy variable indicating whether the household has been in the participation of agricultural cooperative (take treatment) which takes a value of 1 and 0, otherwise (untreated). The explanatory variables used are variables that explain participation characteristics of the farm households and it employed for matching members house hold with non-members.

Before estimating the model, data were checked for occurrence of strong multicollinearity among explanatory variable by using appropriate diagnostic techniques. First, the presence of strong multicollinearity among continuous explanatory variable was tested using variance inflation factors (Appendix 2). Second, contingence coefficient was used to test to check existence strong multicollinearity between discrete variables (Appendix 3). There was no any continuous or discrete explanatory variable dropped from estimated model since no serious problem of multicollinearity were detected from both the VIF and contingency coefficient results.

Table 8 (Logistic regression result) show that pseudo-$R^2$ value of estimated model Stata result is 0.4399 which slightly less than 0.5. Therefore, results show treated rural households do not have diverse characteristics overall and obtaining a good match among treated and non-treated household become easier.

As given away below in Table (8) the estimated coefficient results point toward that participation in the agricultural cooperative union was significantly influenced by eight explanatory variables. Market distance from their home and using improved seed significantly influence household participation in program strongly at 1% significance level. Household head sex, total amount fertilizer (both DAP and Urea in kilo gram) that household used yearly and having other credit access significantly stimulus rural household participation at 5% significance level. Household head sex and total amount of fertilizer (DAP and Urea in kilo gram) have positively influence participation. But, having other credit access influence negatively household participation in agricultural cooperative union.

Finally, having household head education status, having off-farm income and holding land size influence participation at 10% significance level. Household having good education status and having high land size positively rural households' participation in cooperative. There is strong positive relationship between household head sex being male and participation in cooperative might be due to that male have higher chance to know purpose cooperative and get more awareness creation training than female headed house hold head. Similarly, the positive relationship between educated household head and participation on cooperative, in fact that educated head have good opportunity to adopt new agricultural technology and have better chance to know about purpose cooperative because he might read different reading material such as manual and articles than non-educated household head. On the other hand, household market distance from their house positive influence participation in cooperative. This might be lack of market access for their agricultural product lead rural household to become member of cooperative in order to supply their product. Total amount of fertilizer (DAP and Urea) and using improved agricultural seed have positive relationship with participation in cooperative. This might be using large amount of fertilizer need much money to buy enough amount for that season.

Therefore, household might need fertilizer in credit to use enough amount. In this case household participate in agricultural cooperative to get those credit service of cooperative. Having other credit opportunity negatively affect participation of rural house hold in cooperative at significance level of 5%. This refer that having opportunity of credit access to purchase fertilizer and improved seed in sowing period make participation less in agricultural cooperative.

Table 8. Logit regression result

| Treatm | Coef. | Robust.Std.Err m | z-value | P>z |
|---|---|---|---|---|
| Cons | -9.79441 | 2.402296 | -4.08 | 0.000 |
| Hhsex | 3.350976 | 1.580756 | 2.12** | 0.034 |
| Hhmartial | -1.44814 | 1.459753 | -0.99 | 0.321 |
| Fmsize | -.0489528 | .468329 | -0.10 | 0.917 |
| Hhage | .0807784 | .3088868 | 0.26 | 0.794 |
| Hhedu | .2859101 | .1595269 | 1.79* | 0.073 |
| Mktdist | .6564956 | .1663174 | 3.95*** | 0.000 |
| Offfarm | -1.530307 | .9070939 | 1.69* | 0.092 |
| Totafert | .0142111 | .0056474 | 2.52** | 0.012 |
| Landha | .9390725 | .5670118 | 1.66* | 0. 098 |
| Othcredacc | -1.338669 | .5791979 | -2.31** | 0.021 |
| Impseedus | 1.633367 | .4648404 | 3.51*** | 0.000 |

| | |
|---|---|
| Number of obs = 170 | Wald chi2(11)= 65.18 |
| Pseudo R2 = 0.4399 | Prob > chi2 =0.000 |
| Log likelihood = -65.283081 | |

Source: own survey data, 2016

This above covariates of rural households presented below in figure 2 that shows distribution of estimated propensity scores for both treated and untreated respondents. In figure red colour (above middle horizontal line) represent treated rural house hold distribution condition of covariates and below middle horizontal line (green colour) represent untreated house hold covariate distribution. Most of treated group households have propensity score around right from 0.5 in figure where are significant majority of the untreated households have propensity scores around lift from 0.5.
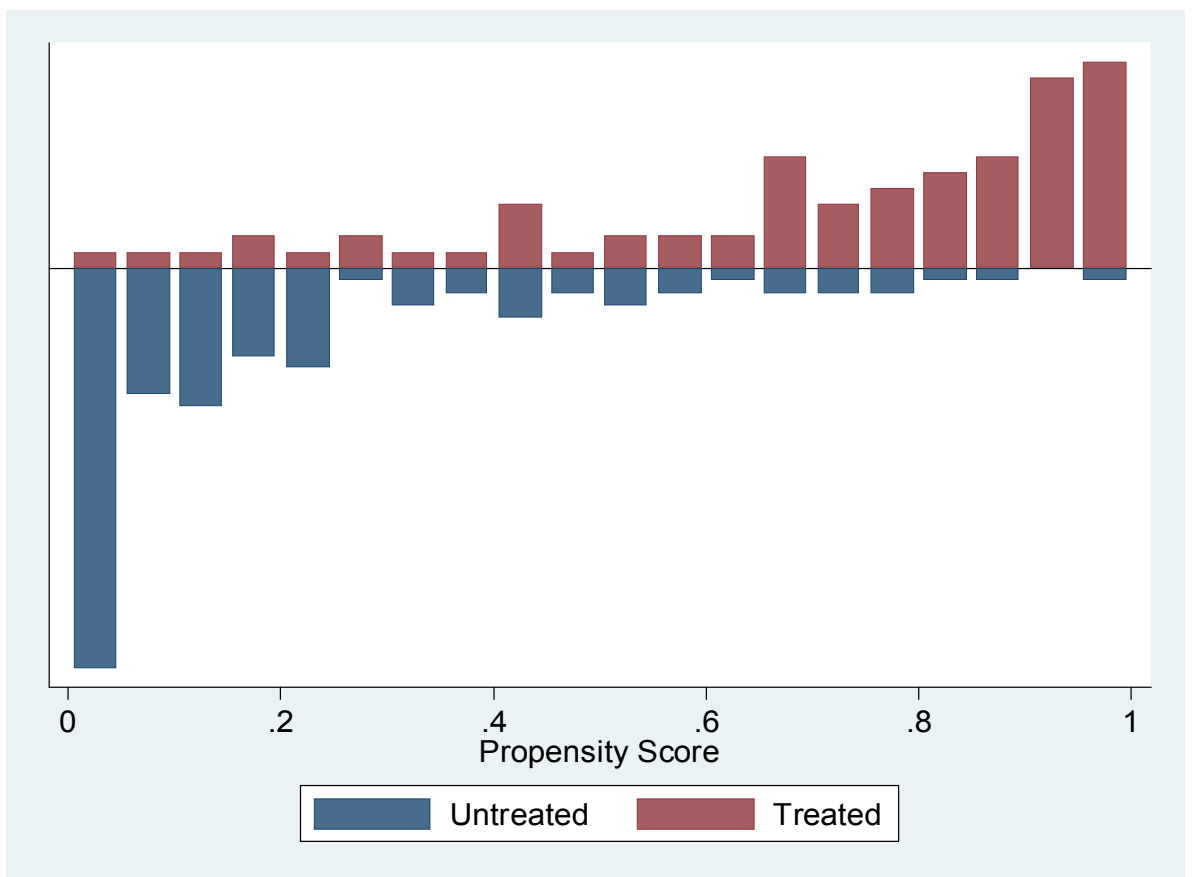


Figure 2. Kernel density of propensity scores

### 4.3.1.2 Matching Program and Non-Program Households

There four important tasks carried out before conducting the matching work itself. First, estimating the predicted values of program participation (propensity score) for all the sample households of both program and control groups (which was done in the previous section) is a primary activity. Second, imposing a common support condition on the propensity score distributions of household with and without the program is another important task. This to identify common area that both cooperative members and non-members that their propensity score fall in side interval. Third, dumping observations whose predicted covariate fall outside the range of the common support region is the next work. Fourth, conducting a sensitivity analysis to check the robustness of the estimation (whether the hidden bias affects the estimated average treatment on treated or not) is the final task.

As shown below in Table 9, the estimated propensity scores for total observation vary between 0.000556 and 0.99994 (0.442). Estimated propensity scores for agricultural cooperative union member households (Treated) vary between 0.044 and 0.99994 (mean= 0.723) and between 0.00056 and 0.952 (mean = 0.245) for non-member of cooperative union (Non-Treated) households. The common support region would therefore, lie between 0.044 and 0.952 which means households whose estimated propensity scores are less than 0.044 and larger than 0.952 are not considered for the matching purpose. As a result of this restriction, 13 households were discarded from observations. In short from all observation respondents rural household totally 13 observation was discarded that their mean covariates out of common support (appendix 7 show this discarded amount observation).

Table 9: Distribution of estimated propensity scores

| Group | Observation | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Total Obs. | 170 | 0.442 | 0.354 | 0.00056 | 0.9998 |
| Treated | 75 | 0.723 | 0.257 | 0.044 | 0.9998 |
| Non-Treated | 95 | 0.219 | 0.245 | 0.00056 | 0.952 |

Source: own survey data, 2016

Figure 3. The distribution of estimated propensity scores, with in the common support area (condition) for the treated and non-treated household respectively. As show above in table 9, from all treated and non-treated some amount out of common support (off-support) that in detail also presented in figure below. That red or dash show distribution of untreated and black line represents treated rural households.
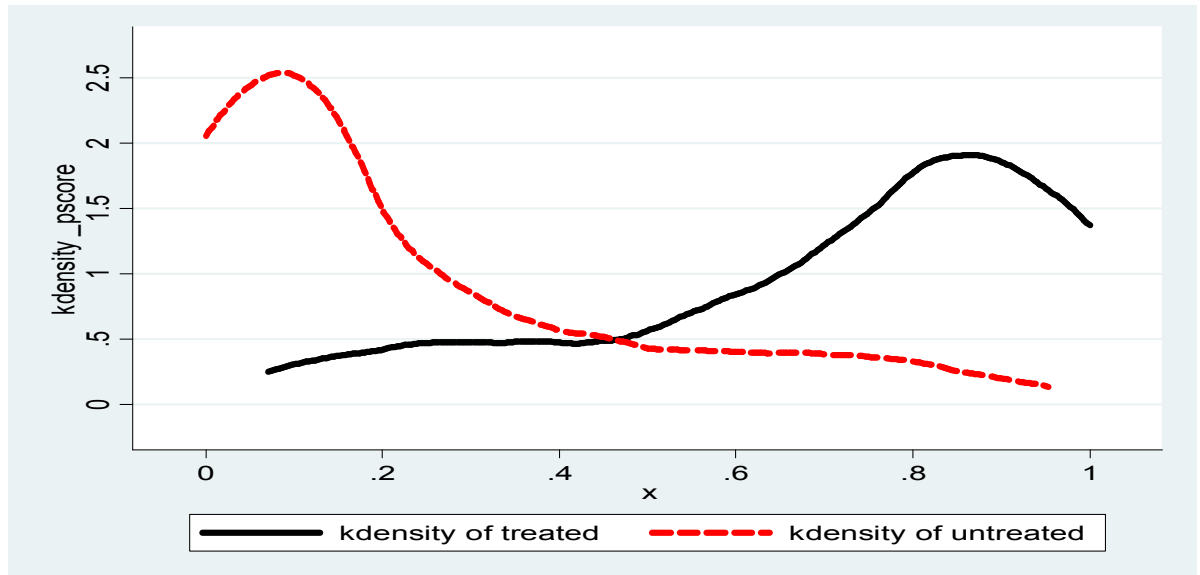


Figure 3. Kernel density of common support area

### 4.3.1.3 Choice of Matching Algorithm

The decision on the final to choice fitting matching estimator was conducted based on three different criteria as proposed by Dehejia and Wahba (2002). First, equal means test (referred to as the balancing test) which suggests that a matching estimator which balances all explanatory variables (i.e., results in insignificant mean differences between the treated and non-treated groups) after matching is preferred. Second, basically pseudo-$R^2$ value show in logit model significance of independent variable or covariate that its high value indicate high significance and small value also low significance. Therefore, competing by looking into pseudo-$R^2$ value best, the smallest value is preferable because low value show small significance of covariates between treated and untreated household. Third, a matching estimator /algorithm/ that ATT results with largest number of matched sample size is preferred.

Implication is a matching estimator that balances all explanatory variables, with lowest pseudo-$R^2$ value and produces a large matched sample size is preferable. Table 10 below, and the same to that appendix 5 presents the estimated results of tests of matching quality of estimator based on the three performance criteria.

Looking into the result of the matching quality on both table and appendix for given outcome, all those three matching estimators have equal matching sample size. However, different in balancing test and pseudo-$R^2$ result that calliper on radius 0.1, 0.25 and at 0.5 balancing test is seven minimum pseudo-$R^2$ value indicate 0.097 it is not good result compare to others. Kernel matching with band width 0.1, 0.25 and 0.5 matching sample was the same to others algorithms, but pseudo-$R^2$ result indicate minimum 0.053, maximum is 0.079 and 11 balancing test.

The third algorithm nearest neighbour matching (NN) of neighbourhood (1-5) has matching sample size the same to calliper and kernel algorithm. However, balancing test all have11 and pseudo-$R^2$ value best because fail in interval 0.048 and 0.100. Therefore, nearest neighbour matching had best for this data. In both result from nearest neighbour matching estimator neighbourhood 4 is first choose for this data because has small pseudo-$R^2$ value (0.048). Finally table result shows that nearest neighbourhood with neighbour 4 was found to be the best for outcome (impact) indicators variables. Hence, the estimation results and discussion for this study are the direct outcomes of the nearest neighbour matching algorithm with neighbour four.

Table 10: Matching performance of different estimators

| Matching estimator | Sellinco output variable (both crop and livestock) | | | Plantvau and TLU output variable | | | Totassetper output variable | | |
|---|---|---|---|---|---|---|---|---|---|
| | Performance criteria | | | Performance criteria | | | Performance criteria | | |
| | Balancing test | Pseud -$R^2$ | Matched sample size | Balancing test | Pseud -$R^2$ | Matched sample size | Balancing test | Pseud -$R^2$ | Matched sample size |
| **Calliper** | | | | | | | | | |
| **0.1** | 7 | 0.100 | 157 | 7 | 0.100 | 157 | 7 | 0.100 | 157 |
| **0.25** | 7 | 0.097 | 157 | 7 | 0.097 | 157 | 7 | 0.097 | 157 |
| **0.5** | 7 | 0.100 | 157 | 7 | 0.100 | 157 | 7 | 0.100 | 157 |
| **Kernel** | | | | | | | | | |
| **0.1** | 11 | 0.056 | 157 | 11 | 0.056 | 157 | 11 | 0.056 | 157 |
| **0.25** | 11 | 0.053 | 157 | 11 | 0.053 | 157 | 11 | 0.053 | 157 |
| **0.5** | 11 | 0.079 | 157 | 11 | 0.079 | 157 | 11 | 0.079 | 157 |
| **NN** | | | | | | | | | |
| **1** | 7 | 0.100 | 157 | 7 | 0.100 | 157 | 7 | 0.100 | 157 |
| **2** | 9 | 0.063 | 157 | 9 | 0.063 | 157 | 9 | 0.063 | 157 |
| **3** | 11 | 0.052 | 157 | 11 | 0.052 | 157 | 11 | 0.052 | 157 |
| **4** | 11 | 0.048 | 157 | 11 | 0.048 | 157 | 11 | 0.048 | 157 |
| **5** | 11 | 0.053 | 157 | 11 | 0.052 | 157 | 11 | 0.052 | 157 |

Source: own survey data, 2016

The matching performance of those their different estimators provide the same results for the remaining output variable to those that not listed in above matching performance estimators table. Thus, for the purpose of reference it is seated in appendix 5.

Once the best performing matching algorithm is chosen, the next task is to check the balancing of propensity score and covariate using different procedures by applying the selected matching algorithm(NN (4) matching in own case). The main intention of estimating propensity score is to balance the distributions of relevant variables in both groups. The balancing powers of the estimations are ensured by different testing methods

The standardized bias before and after matching, and the total bias reduction obtained by the matching procedure as shown at Table 11, in columns fifth and sixth. Standardized difference in covariates before matching is in the range of 0.00% and 95.8% in absolute value whereas the remaining standardized difference of covariates for almost all covariates lies between 1.00% and 27.4% after matching. This is fairly below the critical level of 20% suggested by Rosenbaum and Rubin (1985). Therefore, the process of matching creates a high degree of covariate balance between the treatment and control samples that are ready to use in the estimation procedure. The same to that, t-values also reveal that all covariates became insignificant after matching while five of them were significant before matching as shown below in table by star symbol.

Table 11: Propensity score and covariate balance

| Variable | Sample | Mean | | % bias | % reduction bias | T- test | |
|---|---|---|---|---|---|---|---|
| | | Treated | Non- Treated | | | T | p>/ t/ |
| Pscore | Matched | 0.67 | 0.65 | 7.7 | -80.5 | 0.44 | 0.63 |
| | unmatched | 0.72 | 0.719 | 1.5 | | 0.09 | 0.928 |
| Fmsize | Matched | 2.26 | 2.36 | -15.6 | 29.7 | -0.06 | 0.952 |
| | unmatched | 2.30 | 2.15 | 22.2 | | 1.21 | 0.229 |
| Hhsex | Matched | 0.90 | 0.92 | -4.6 | | -0.31 | 0.755 |
| | unmatched | 0.92 | 0.92 | 0.0 | | 0.00 | 1.000 |
| Hhmartial | Matched | 0.82 | 0.83 | -1.0 | 111.9 | 0.06 | 0.937 |
| | unmatched | 0.84 | 0.61 | 58.1 | | 3.20*** | 0.002 |
| Hhage | Matched | 4.70 | 4.66 | 3.4 | 92.9 | 0.21 | 0.837 |
| | unmatched | 4.72 | 4.27 | 48.2 | | 2.88*** | 0.005 |
| Hhedu | Matched | 2.02 | 1.68 | 27.4 | 37.29 | 1.37 | 0.174 |
| | unmatched | 2.07 | 1.50 | 43.7 | | 2.65*** | 0.009 |
| Mktdist | Matched | 3.98 | 3.93 | 3.4 | 53.4 | 0.18 | 0.854 |
| | unmatched | 4.28 | 4.17 | 7.3 | | 0.44 | 0.662 |
| Offfarm | Matched | 1.94 | 1.91 | 6.5 | -100 | 0.50 | 0.616 |
| | unmatched | 1.95 | 1.95 | 0.0 | | 0.00 | 1.00 |
| Totafert | Matched | 170.55 | 166.87 | 3.6 | 86.6 | 0.26 | 0.798 |
| | unmatched | 189.32 | 217.67 | -27 | | -1.50 | 0.136 |
| Landha | Matched | 1.16 | 1.19 | -4.9 | 94.88 | -0.25 | 0.805 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | unmatched | 1.145 | 1.48 | -95.8 | | -4.3* | 0.098 |
| Othercredac | Matched | 0.145 | 0.22 | -19.4 | 52.09 | -1.10 | 0.274 |
| | unmatched | 0.12 | 0.28 | -40.5 | | -2.88** | 0.021 |
| Impseedus | Matched | 0.79 | 0.89 | -22.6 | -93.6 | -1.45 | 0.127 |
| | unmatched | 0.83 | 0.90 | -1.44 | | -1.4*** | 0.000 |

Source: own survey data, 2016

***, ** and * means significant at 1% 5% and 10% probability levels, respectively.

As shown in Table 12, the values of pseudo after matched is very low compare to unmatched. This low pseudo-$R^2$ value and the insignificant likelihood ratio tests support that both groups have the same distribution in the covariates after matching. These results indicate that the matching procedure is able to balance the characteristics in the treated and the matched untreated groups. Hence, these results can be used to assess the impact of agricultural cooperative union among groups of households having similar observed characteristics. This enables researcher to compare observed outcomes for treatments with those of an untreated groups sharing a common support.

Table 12. Chi-square test for the joint significance of variables

| Sample | Pseudo-$R^2$ | LRchi$^2$ | P>chi$^2$ |
|---|---|---|---|
| **Unmatched** | 0.439 | 102 | 0.000 |
| **Matched** | 0.048 | 8.29 | 0.760 |

Source: own survey data, 2016

## 4.3.2 Average Treatment Effect on the Treated

In order to attain the main and specific stated objectives of this study, this part evaluate the Licha Hadiya farmers' cooperative impacts on poverty reduction indicator outcome variables, after the pre-intervention difference were controlled. Hence, in this section mainly focus to critical evaluate LHFC has brought significant impact in poverty reduction indicator outcome variables on participant household.

### 4.3.2.1 Impact of Cooperative on Household Income

In this portion discus impact of agricultural cooperatives through income increment among its' service users in rural household. Cooperative create income generating opportunities by encourage surplus production since it provide fertilizer on affordable price, time and in credit. Also increase their income by collecting crop product from their members at high price and distribute dividend. In case of income also cooperative increase income by creating job opportunity for the members on their organization and on others cooperative supporting organization as discussed in above descriptive section this bring impact on rural house hold income generation. As revealed below at Table 13, that cooperative have positive and significant impact on household income from crop sells at 5% significance level and also that an average treat effect on treated indicate 2203.03 ETB difference. This result were supported by Getnet and Annulo (2012) in Sidamo zone and Salamatue (2007) in Kaduna local government at Nigeria. But it have no significant impact household income from livestock (include both livestock sells income and livestock product sells). However, cooperative are statistically insignificant, but it has positive relation. This statistical insignificance might because agricultural cooperative perform marketing not actively both livestock products like milk and milk results.

Table 13. Impact of cooperative service use in rural household income (ATT)

| Categories | Outcome | Treated | Untreated | ATT | S.E | T-value |
|---|---|---|---|---|---|---|
| **Household income** | Crop sells | 5132.25 | 2929.23 | 2203.03 | 496.25 | 4.27** |
| | Livestock sells | 3046.77 | 2327.05 | 719.71 | 584.06 | 1.28 |

Source:  own survey data, 2016

Note: ** denote significance at significance level 5%.

### 4.3.2.2 Impact of Cooperative on Household Asset Accumulation

Asset accumulation improvement indicate that economic improvement for those households and bring grant to resist risk that face on their life. Major rural household assets consist in this study include plant assets (perennial crop and stored crop), house durable asset and livestock (ox, cow, sheep, goat, horse, mule, asses and hen) valued in TLU (this TLU conversion factor for the purpose of reference presented in appendix[3], 8). As shown in table 14 below, cooperative service does not give the impression to have impact on plant assets and livestock (TLU) assets. This supports Getnet and Annulo (2012) insignificant impact of cooperative on asset accumulation. However, compline their result since own result show cooperative have positive relation but on their case negative. This insignificant impact of cooperative on rural household livestock assets might be attributed to many factors, such as preference and long-time requirement to accumulate assets.

Rural households' preferences for especially to fulfilling their basic needs like food, clothing, school fee for children, improving house and house durable assets might shift investment away from livestock asset accumulation. Those are reason for poor rural households that their propensity to income consumption is generally high, especially in food and clothing consumption case. Moreover, required long time for those asset creation and purchase new assets. Durable house asset creation in rural house hold that participate in cooperative have significant impact. As revealed in table below, impact of cooperative on durable access accumulation for their members have positive and significant at 10% of significance level that average treat effect treated (ATT) result was 491 in ETB difference. In most cases households living standard reflected by purchasing house material assets amount subsequently when household improved their standard of living purchase material assets for their home.

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[3] (http://www.fao. Org). For tropical livestock conversion unit.

Table 14: Impact of cooperative on rural household asset accumulation (ATT)

| Categories | Outcome Variable | Mean | | ATT | S.E | T-Value |
|---|---|---|---|---|---|---|
| | | Treated | Untreated | | | |
| **Assets accumulation** | Plant value | 19740.32 | 18451.61 | 12881.70 | 3627 | 0.36 |
| | Livestock /TLU/ | 6.81 | 5.536 | 1.18 | 0.802 | 1.47 |
| | Durable house assets | 1061.29 | 569.87 | 491.41 | 200.37 | 2.46* |

Source: own survey data, 2016

Note: * denote significance at significance level 10%.

### 4.3.2.3 Impact of Cooperative on Rural Household Saving

Result shown in table 15 below, average treated effect on treated indicate that cooperative has positive impact on saving for rural household at 1% significance level. Average treated effect on treated of cooperative participants (ATT) was 192.67 ETB at t-value 6.22. This own result supported by Getnet and Annulo (2012) result in Sidamo zone. The outcome shows that cooperative promotes and encourage saving habits and probably due to by providing better income generating service.

Mainly by providing agricultural input and collect cereal product at affordable price; this reduces input expenditure and in other side collect cereals then provide dividend, this more promotes high saving habit for rural house hold especially by purchasing share of union. Therefore, those services of cooperative promote in order to produce more and increase production, thus their income increase from agricultural activities. Such improvement in the level of household saving is expected to reduce financial constraint faced in their efforts to adopt modern agricultural technologies to improve their products.

Table 15: Impact of cooperative on rural household saving (ATT)

| Impact indicator outcome | Mean | | ATT | S.E | T-Value |
|---|---|---|---|---|---|
| | Treated | Untreated | | | |
| Saving | 256.84 | 65.31 | 191.52 | 30.99 | 6.18*** |

Source: own survey data, 2016

Note: *** denote significance at significance level 1%.


### 4.3.2.4 Impact of Cooperative on Household Consumption Expenditure

As revealed below in table 16, estimation result and supportive evidence that show agricultural cooperative impact significance on consumption expenditure of rural households. Specifically this indicate Licha farmers' agricultural cooperative participants rural household improved their consumption expenditure rather than non-participants and impact show positive and statistically significant on participants. On table below positive value of average treatment effect on treated was 2689.33 ETB (ATT) and significance indicate that at 10% probability level show food expenditure difference among both group. Own result were similar and supported by Terada (2011) study result in Sidamo zone.

This result articulate that cooperative service brought on their members measureable improvement in living status and make difference among participants and non-participants. Mean difference value of outcome variables between members and non-members households was 2689.33 and statistically significance at 10% level. Basically, consumption expenditure used as proxy outcome variable to estimate food diet on rural household and to estimate impact on its service users. Since amount of birr that household used for food expenditure does not real reflect food diet impact of cooperative on participants.

Table 16: Impact of cooperative on rural household consumption expenditure (ATT)

| Impact indicator outcome | Mean | | ATT | S.E | T-Value |
|---|---|---|---|---|---|
| | Treated | Untreated | | | |
| Household total food expenditure | 11593.45 | 8904.12 | 2689.33 | 1373 | 1.96* |

Source: own survey data, 2016

Note: *denote significance at significance level 10%.

## 4.2.2.5. Impact of Cooperative on Human Capital on Rural Households.

In case of human capital (education and medical access) as shown below in table 17, contribution of agricultural cooperative in participant rural household in both education and medical care have positive relation. However, the impact is statistically insignificant on members. The result does not conforms results that obtain by ILO (2012) in Kenya, Tanzania and Uganda also does not conforms results that found descriptive part of this investigation in case of medical care. This might be education mainly in rural area of Ethiopia have the same expense for all students since government cover those school education expense. Therefore, students' school expense for every house hold and in case of access of school in study area were similar. Medical facility in household level with respect to expense for medical care have no statistically significant difference among matched treated and untreated rural households in study.

It expected that cooperative service bring significant impact difference among treated and untreated household since services reduce extra expense of their members and provide different income generating opportunity. This might increase household medical and school expense improved for treated household than untreated household. However, in opposite way it has revealed no significant impact on education and health facility on their member rural household as shown below in table 16, average treat effect on treated.

Table 17: impact of cooperative on education and health facility

| Outcome | Mean | | ATT | S.E | T-Value |
|---------|------|--|-----|-----|---------|
| | Treated | Untreated | | | |
| Education expense | 2058.06 | 1605.04 | 453.02 | 316.32 | 1.43 |
| Health expense | 595.806 | 480.605 | 115.201 | 82.209 | 1.40 |

Source: own survey data, 2016

**Sensitivity test for estimated average treatment effect on treated (ATT)**

In observation studies, program intervention treatment are not randomly assigned, randomization tests are not generally applicable. Thus, to compensate for the lack of randomization, treated and untreated units are matched on the basis of observed covariates. However, in most case possibilities of bias remain due to residual imbalance in unobservable covariates. Therefore, sensitivity analysis were carried out to check quality of comparison matching among treated and untreated group with observed covariates and mainly to check robustness of unobserved covariates. Sensitivity result indicates that ATT estimate are insensitive for all significant impact indicator outcomes. This implies ATT results are insensitive for unobserved variables. As revealed below in table 18 and in Appendix 9, in all outcome variable the ATT result show insignificant for hidden bias. Since gamma result in table indicate ATT result insignificant from at 2.25 gamma ($\delta$) on average. Thus, estimated ATT is robust to specific failure of CIA.

**Table 18. Sensitivity test for estimated significant ATT results.**

| ATT significant outcome variable | Gamma($\delta$) | Significance level for $\delta^+$ | Significance level for $\delta^-$ |
|---|---|---|---|
| Income | 2.4 | .000021 | 0 |
| Saving | 2.35 | .000017 | 0 |
| House durable assets | 2.25 | .000031 | 0 |
| Food expenditure | 2.24 | .000011 | 0 |

Source: own survey data.

# CHAPTER FIVE

## CONCLUSIONS AND POLICY IMPLICATION

This chapter contain two sub-section, the first part summary and conclusion that include of objective, methods and major findings of research, and second part forward policy implication as recommendation based on results obtained based on specific objective.

## 5.1 Conclusions

In this study the impact of Licha farmers' cooperative union on income, asset accumulation, saving, food expenditure and human capital of rural household in Lemo districts, at Hadiya zone. Descriptive statistics results of study show that Licha Hadiya farmers' agricultural cooperative bring strong improvement on member rural households in case of creation of job opportunities, in medical care, house improving and on status of food diets.

Average treatment effect on treated result show that Licha farmers' agricultural cooperative had significant positive impact on the participants. Agricultural cooperative had positive and statistically significant impacts on durable home asset in case of asset accumulation. However, in livestock (TLU) and plant asset it had no statistically significant impact on its' members. This insignificant impacts of cooperative might be because of rural households preference for fulfil basic needs specifically for smoothing food consumption, clothing, school fee for children, improving house and house durable asset. With respect to house hold income agricultural cooperative had significant positive impact on their participants. This significant impact of cooperative is only on income from crop sells but insignificant on income from livestock sells. Agricultural cooperatives on their members also had statistically significant and positive impacts on saving. As shown in discussion part Licha farmers' cooperative had positive and significant impact on rural house hold food consumption on their members. This implies significant contribution of agricultural cooperative on participant rural households in food diets rather than non-participants. However, in human capital improvement on members both in education and medical care Licha farmers' cooperative had brought no significant impact on their service user members. Finally, LHFCU have positive and significant contribution on income from crop sells,

house durable asset, saving and food expenditure (food diet) for the participant households. This indicates that Licha farmers' agricultural cooperative have uplifting capacity to reduce rural household all dimension of deprivation (poverty).


## 5.2 Policy Implication

The policy implication of the study straight forward. It is clear that depending on the both inferential statistics and econometric estimation result Licha farmers' cooperative union have significant impact on rural households.

Licha farmers' agricultural cooperative contribution in improving the living standard of the rural households when to compare cooperative participant with non-participant households in study area. Income and saving was high for agricultural cooperative participants compare to non-participants. Poverty profiles in case of food status also indicates that participant households were less poor than non-participant households. Access to cooperative participation through promotion and good extension must be ensured to increase income and saving, hence to reduce and alleviate poverty in study area.

Licha farmers' cooperative have significantly improve participant rural household in food consumption condition, accessing job opportunity, capacity to improve their house, in building home durable asset and in meal per week. Specifically this indicate that agricultural cooperative have significant contribution in living standard of members. Therefore, strengthening and expanding the existing agricultural cooperative for rural households in zone and region would be appropriate economic policy

Licha farmers' agricultural cooperative have no statistically significant contribution on participant rural households at asset accumulation for instance plant and livestock (TLU) asset. Similarly, have no significant impact for service user household on human capital such as education and medical access. Thus, program planner and implementers at high and low level should design and implement additional service in order to support cooperative. Also union manager and boards should strengthen and expanding existing service for rural house hold in woreda and in zone would be appropriate to change living status of households.

Finally, in order to reduce rural household bottlenecked poverty problem through improving livelihood providing sufficient agricultural cooperative service for all households. In view of such evideces, further promotion, deepening, strengthen and supporting of agricultural cooperative and its service recommended

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# APPENDIX

## APPENDIX 1

**Table 1. Basic demographic and socio-economic characteristics respondent household**

| No | Description | | Categories | % | No | Description | | Categories | % |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Household head sex | Treated | male | 92 | | Land size | Treated | Below 0.5 ha | 4 |
| | | | female | 8 | | | | Between0.5-1 ha | 55.99 |
| | | Untreated | male | 78.95 | | | | Between 1.01-2.5 | 29.34 |
| | | | female | 21.05 | | | | Above 2.5 ha | 10.67 |
| 2 | Household size | Treated | Below 4 family size | 14.67 | | | Untreated | Below 0.5 ha | 4.16 |
| | | | Between 4 - 6 | 42.33 | | | | Between 0.5-1 ha | 71.63 |
| | | | Above 6 | 43 | | | | Between 1.01-2.5 ha | 21.05 |
| | | Untreated | Below 4 | 17.89 | | | | Above 2.5 ha | 3.16 |
| | | | Between 4-6 | 48.43 | 4 | Household head education | Treated | Illiterate and read, and write | 50.67 |
| | | | Above 6 | 33.68 | | | | Primary | 30.67 |
| 2 | Household head age | Treated | Below 35 | 6.67 | | | | Secondary and above | 18.66 |
| | | | Between 35-55 | 72 | | | Untreated | Illiterate and read, and write | 80 |
| | | | Above 55 | 21.33 | | | | Primary | 11.58 |
| | | Untreated | Below 35 | 14.73 | | | | Secondary and above | 8.42 |
| | | | Between 35-55 | 63.16 | | | | | |
| | | | Above 55 | 22.11 | | | | | |

*Source: own survey data, 2016*

Appendix - 2

Table 2. Multicollinearity test for continuous explanatory variables that included in model.

```
. vif

    Variable |       VIF       1/VIF
-------------+----------------------
    totafert |      1.53    0.652449
      landha |      1.46    0.684815
       hhage |      1.15    0.868046
      fmsize |      1.14    0.876520
     mktdist |      1.09    0.915140
       hhedu |      1.07    0.930907
-------------+----------------------
    Mean VIF |      1.24
```

Appendix 3.

Table 3. Contingency coefficient for discrete explanatory variables included in model

| variables | Total sample size | $X^2$ | Value of C |
|---|---|---|---|
| Hhsex | 170 | 5.51 | 0.389 |
| hhmartial | 170 | 0.70 | 0.077 |
| Offfarm | 170 | 13.27 | 0.245 |
| othcredacc | 170 | 6.77 | 0.077 |
| impseedus | 170 | 21.21 | 0.076 |

Source; own estimation result

**Appendix 4**

Table 4.logit regression result of model

```
Logistic regression                          Number of obs   =        170
                                             Wald chi2(11)   =      64.73
                                             Prob > chi2     =     0.0000
Log pseudolikelihood = -65.344212            Pseudo R2       =     0.4399
```

| Treatm | Coef. | Robust Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hhsex | 3.350115 | 1.575316 | 2.13 | 0.033 | .2625509 | 6.437678 |
| hhmartial | -1.445588 | 1.453066 | -0.99 | 0.320 | -4.293545 | 1.40237 |
| fmsize | -.0430873 | .4671609 | -0.09 | 0.927 | -.9587058 | .8725313 |
| hhage | .0849905 | .3082579 | 0.28 | 0.783 | -.5191839 | .6891649 |
| hhedu | .2937306 | .1588899 | 1.85 | 0.065 | -.0176879 | .605149 |
| mktdist | .6544358 | .1654134 | 3.96 | 0.000 | .3302315 | .97864 |
| offfarm | -1.529807 | .9055346 | -1.69 | 0.091 | -3.304622 | .2450085 |
| totafert | .0142505 | .0056582 | 2.52 | 0.012 | .0031607 | .0253404 |
| landha | -.9390184 | .5670024 | -1.66 | 0.098 | -2.050323 | .172286 |
| othcredacc | -1.344344 | .5782321 | -2.32 | 0.020 | -2.477658 | -.2110299 |
| impseedus | 1.625186 | .4646199 | 3.50 | 0.000 | .7145476 | 2.535824 |
| _cons | -6.773047 | 1.728561 | -3.92 | 0.000 | -10.16096 | -3.385131 |

Source : own field survey

**APPENDIX. 5**

Table 5. Matching performance of different estimators

| Matching estimator | SavTotal output variable | | | Medschexp output variable (both education and health) | | | Food and non-food exp output variable | | |
|---|---|---|---|---|---|---|---|---|---|
| | Performance criteria | | | Performance criteria | | | Performance criteria | | |
| | Balancing test | Pseudo-$R^2$ | Matched sample size | Balancing test | Pseudo-$R^2$ | Matched sample size | Balancing test | Pseudo-$R^2$ | Matched sample size |
| Calliper | | | | | | | | | |
| 0.1 | 7 | 0.100 | 157 | 7 | 0.100 | 157 | 7 | 0.100 | 157 |
| 0.25 | 7 | 0.097 | 157 | 7 | 0.097 | 157 | 7 | 0.097 | 157 |
| 0.5 | 7 | 0.100 | 157 | 7 | 0.100 | 157 | 7 | 0.100 | 157 |
| Kernel | | | | | | | | | |
| 0.1 | 11 | 0.056 | 157 | 11 | 0.056 | 157 | 11 | 0.056 | 157 |
| 0.25 | 11 | 0.053 | 157 | 11 | 0.053 | 157 | 11 | 0.053 | 157 |
| 0.5 | 11 | 0.079 | 157 | 11 | 0.079 | 157 | 11 | 0.079 | 157 |
| NN | | | | | | | | | |
| 1 | 7 | 0.100 | 157 | 7 | 0.100 | 157 | 7 | 0.100 | 157 |
| 2 | 9 | 0.063 | 157 | 9 | 0.063 | 157 | 9 | 0.063 | 157 |
| 3 | 11 | 0.052 | 157 | 11 | 0.052 | 157 | 11 | 0.052 | 157 |
| 4 | 11 | 0.048 | 157 | 11 | 0.048 | 157 | 11 | 0.048 | 157 |
| 5 | 11 | 0.053 | 157 | 11 | 0.053 | 157 | 11 | 0.053 | 157 |

Source: own survey data, 2016

**Appendix - 6**

Table 6. Average treatment effect of treated (ATT) result for all output in the model.

| Variable | Sample | Treated | Controls | Difference | S.E. | T-stat |
|---|---|---|---|---|---|---|
| cropsell | Unmatched | 5196 | 2892.10526 | 2303.89474 | 314.043767 | 7.34 |
| | ATT | 5132.25806 | 2948.99194 | 2183.26613 | 511.35606 | 4.27 |
| livsells | Unmatched | 3044 | 2178.73684 | 865.263158 | 333.782297 | 2.59 |
| | ATT | 3046.77419 | 2295.96774 | 750.806452 | 588.077816 | 1.28 |
| plantvau | Unmatched | 20356 | 21502.1053 | -1146.10526 | 1734.4547 | -0.66 |
| | ATT | 19740.3226 | 18451.6129 | 1288.70968 | 3627.84547 | 0.36 |
| TLUmes | Unmatched | 6.58786667 | 6.87442105 | -.286554386 | .392981088 | -0.73 |
| | ATT | 6.81983871 | 5.63681452 | 1.18302419 | .802378468 | 1.47 |
| durmatrpric | Unmatched | 1006.4 | 281.894737 | 724.505263 | 107.74439 | 6.72 |
| | ATT | 1061.29032 | 568.185484 | 493.104839 | 200.735622 | 2.46 |
| savTotal | Unmatched | 263.306667 | 53.4526316 | 209.854035 | 20.3522676 | 10.31 |
| | ATT | 256.83871 | 65.3145161 | 191.524194 | 30.9959079 | 6.18 |
| totafdexp | Unmatched | 11329.52 | 8840 | 2489.52 | 970.009184 | 2.57 |
| | ATT | 11593.4516 | 8904.1129 | 2689.33871 | 1373.06992 | 1.96 |
| mediexp | Unmatched | 608.533333 | 375.052632 | 233.480702 | 56.4090805 | 4.14 |
| | ATT | 595.806452 | 480.725806 | 115.080645 | 82.469731 | 1.40 |
| schooexp | Unmatched | 2150.66667 | 1875.57895 | 275.087719 | 162.885468 | 1.69 |
| | ATT | 2058.06452 | 1605.04032 | 453.024194 | 316.323067 | 1.43 |

Source own survey data, 2016

**Appendix 7**

Table 7- **Support and off-support region of respondent households**

```
psmatch2:  │   psmatch2: Common
Treatment  │        support
assignment │ Off suppo  On suppor        Total
───────────┼───────────────────────┼──────────
 Untreated │     0          95             95
   Treated │    13          62             75
───────────┼───────────────────────┼──────────
     Total │    13         157            170
```

Appendix- 8

Table 8- Conversion factors used to estimate tropical livestock units (TLU)

| Species | TLU conversion factor |
| --- | --- |
| Camel | 1 |
| Ox | 0.7 |
| cow | 0.7 |
| ship | 0.1 |
| goat | 0.1 |
| horse | 0,8 |
| asses/donkey | 0.5 |
| mule | 0.7 |
| chicken | 0.01 |

Source: FAO,1987.  ( http://www.fao. Org

Appendix – 9:

Table 9. Sensitivity test for output variable

```
. rbounds rho, gamma(1(0.25)5)

Rosenbaum bounds for rho (N = 62 matched pairs)

Gamma       sig+      sig-     t-hat+    t-hat-       CI+       CI-
-----------------------------------------------------------------
    1      2.8e-11   2.8e-11    187.5     187.5       151     227.5
 1.25      2.7e-09   9.1e-14    175.5     202.5   135.125      245
  1.5      5.9e-08   3.3e-16      165       214       125      260
 1.75      5.4e-07         0      155       225       115      275
    2      2.9e-06         0  146.125      235     106.5      290
 2.25      .000011         0    137.5       245       100      305
  2.5      .00003          0  130.625      250        92   317.875
 2.75      .000071         0      125   258.125        85   327.875
    3      .000145         0      121       265     76.25      340
 3.25      .000268         0  118.125      270      67.5      350
  3.5      .000455         0      115       275      62.5     362.5
 3.75      .00072          0    110.5       280    55.625      375
    4      .001079         0    107.5       290        50      390
 4.25      .001543         0      105       295     46.25    396.25
  4.5      .002124         0   101.25       300      42.5      405
 4.75      .00283          0      100       305        40   412.875
    5      .003669         0     97.5       310        35      425


* gamma  - log odds of differential assignment due to unobserved factors
  sig+   - upper bound significance level
  sig-   - lower bound significance level
  t-hat+ - upper bound Hodges-Lehmann point estimate
  t-hat- - lower bound Hodges-Lehmann point estimate
  CI+    - upper bound confidence interval (a=  .95)
  CI-    - lower bound confidence interval (a=  .95)
```

Figure 4. Show k-density distribution treated, untreated and after matched.
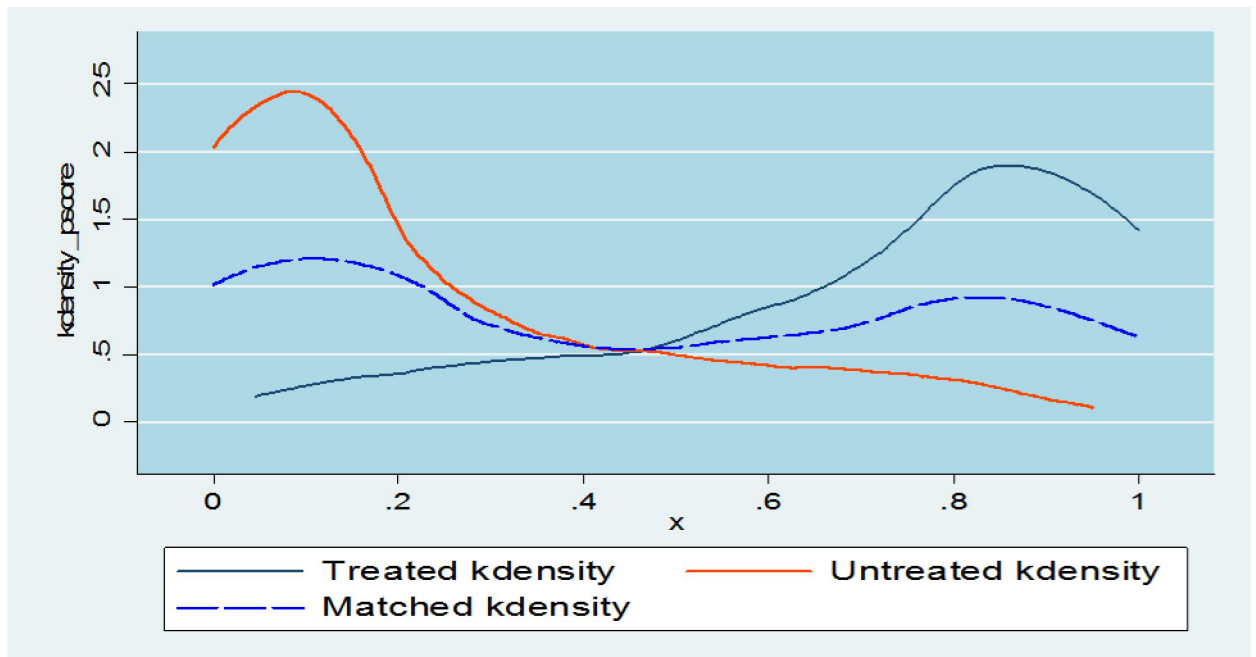


Source; own estimation results, 2016.

# QUESTIONNAIRE

**JIMMA UNIVERSITY**
**COLLEGE OF BUSINESS AND ECONOMICS**

**Department of Economics**

Questionnaire designed for the survey on "The impact of Cooperative on Poverty Reduction: The case of Licha Hadiya farmers' multi-purpose cooperative union in Lemo Woreda, Hadiya Zone, South Nation Nationality Regional State, Ethiopia". The data shall be used for academic purposes only and will be treated with strict confidence. Your participation in facilitating the study is highly appreciated. All information in this questionnaire will remain absolutely confidential and will be seen only by academic researchers involve in this study

NAME OF INTERVIEWER: _____ SIGNATURE:_____

TYPE OF RESPONDENT: _____KEBELE: _____

1. PERSONAL & HOUSEHOLD DATA

1.1 Name: _____Sex: 1M   [__]  .2F  [__]

1.2 Marital Status of household head: 1Single  [__]   .2 Married  [__]  .3Divorced  [__]   .4Widowed   [__]

1.3 Sex of household head:   1M  [__]   .2F  [__]

1.4 Family sizes:  1. 1-3    2. 4-6   3. 7-above

1.5 Age of household:    1. Below 18   [__]          2. 18-25     [__]

3. 26-35    [__]                   4.    36-45  [__]

5. 46-55   [__]                   6. Above 55    [__]

1.6 Household head education status, tick appropriately on box (√): -

1 Illiterate  [__],          2 Read and write  [__],          3.grade 1-4  [__],

4.grade 5-8  [__],        5. grade 9-12  [__],        6.grade 12 complete        [__]

7. grade 12 $^+$   [__].

1.7 Are you cooperative member in our kebele?   1. Yes  [__]             2.No  [__]

1.8. Do you have credit access in your kebele?  1)   Yes [__]     2)   No [___]

1.9. If answer for above Q1.8 is yes, where do you get credit for your agricultural activities when it is necessary? 1)_____

2)_____ 3)_____

4)_____

*2*. HOUSEHOLD INCOME INFORMATION*:*

2.1.What is the average  income from crop sells (in birr) for the last 12 months?

1) 1000-3000     2) 3001-6000              3) 6001-9000              4) 9001-12000

5) other please specify _____

2.2.Do you have market access near to our home for agricultural output for last 12

month?             1. Yes        [__]     2.No       [__]

2.3 How far the market place to our home in km _____

2.3 For the last 12 months, what has been the trend in the level of your crops sells

income?

a) Increased significantly [__]                    b) Increased   [__]

c) Remained the same   [__]                    d) Decreased  [__]

e)Decreased significantly     [__]

2.3.What is the average income from livestock sell (in birr) for the last 12 months?

1) 1000-3000 (in birr)     2) 3001-6000            3) 6001-9000

4) 9001-12000            5) other please specify_____

2.4. For the last 12 months, what has been the trend in the level of your livestock sells

income?  a) Increased significantly [__]                    b) Increased   [__]

c) Remained the same [__]                    d) Decreased  [__]

e)Decreased significantly     [__]

 2.5.If increased your income Why did? By ticking appropriately (multiple choose

possible).

a) Able to buy inputs   [__]                    b) Got credit in cash   [__]

c) Got credit in kind     [__]               d) Got jobs by cooperative        [__]

e)Good market access for improved agricultural input     [__]

f)Good market access for crop produce sells            [__]

(g)Good market access for livestock sells          [__]

h) Others (specify) _____

2.6 What is the major type of activities you engaged for the last 12 months?

a) Agricultural activities    [__]               b) Animal husbandry       [__]

c) Food production          [__]               d) Local drink preparation     [__]

e) Retail trade           [__]

f) Others (specify) _____

2.7 Does the cooperative create job opportunities in our household in last 12 month ?

1. Yes     [__]            2. No       [__]

## 3. HOUSEHOLD ASSETS INFORMATION

3.1 Do you have livestock?    1. Yes    [__]         2. No        [__]

3.2 If yes, list their type, number and average price per unit as follows:

 Type                No                 Price per unit

a) Oxen _____ , _____

b) Milk Cows _____, _____

c) sheep      _____, _____

d) Goats_____, _____

e) Donkey _____, _____

k) Horse _____, _____

l) hen_____, _____

3.3 Does the number of your livestock for the last 12 months is:-

a) Increased significantly?   [__]              b) Increased?   [__]

c) Remained the same? [__]              d) Decreased?   [__]

e) Decreased significantly?     [__]

3.4 Do you have plants/perennial and annual crop/ now?  1. Yes      [__]         2. No
[__]

3.5 yes, list their type, number and average estimated values as follows:

   Type        hectare      Estimated value (in Birr)

a) Coffee _____, _____

b) Banana _____, _____

c) Enset _____, _____

d) Chat _____, _____

e)  crop stored in house   by kg  _____

f) Others (specify) _____

3.6 Do you use improved agriculture seeds last 12 month? 1. Yes [__]   2. No [__]

 3.7 If Yes for above Q 3.6 how much amount you used in kilo gram_____

 3.8 Do you use fertilizer for the last 12 month from cooperative?

1.  Yes [_]   2. No [_]

3.9 If above Q3.8 is yes, how DAP_____ Urea _____ amount in bag

3.10 For last 12 month what trend on your crop production?

a) Increased significantly  [__]                    b) Increased   [__]

c) Remained the same   [__]                    d) Decreased  [__]

e) Decreased significantly     [__]

3.11 If increase, why? By ticking appropriately (Multiple chooses possible).

a) Access of credit in cash                [__]            b) Access of credit in kind  [__]

c) good market access for fertilizer           [__]

d) good access for improved agricultural input    [__]

e) others (please specify) _____

3.12 Do you have own land?     1.  Yes       [__]         2. No        [__]

3.13 If yes, for Q13 land in hectares (ha) is_____

3.14 If your own land was under cultivated or rented, why? by ticking appropriately (Multiple answers is possible)

a) Unable to work    [__]      b) Lack of working capital  [__]

c) Excess land     [__]        d) Unable to buy agricultural inputs    [__]

e) lack of market access to sell their produce  [__]

f) others (please specify) _____

3.15 For last two years what like your cultivation farm land in size?

a) Increased significantly [__]      b) Increased   [__]    c) Remained the same  [__]

d) Decreased  [__]                e) Decreased significantly     [__]

3.16 If it increases, by how much hectors (ha)_____

3.18 Did you have a house for the last 12 month?  1. Yes    [__]        2. N0  [__]

3.19 If yes, what type of house do you have for the last 12 month?

a) Roof with iron sheet  [__]     b) Roof with grass    [__]

c) Others (specify)_____

3.20 Did you make improvement of your type of house (from grass roof to iron sheet roof) for the last 12 months?  1. Yes        [__]                2. No           [__]

3.21 What are the types, numbers and estimated value of your purchases assets for the last twelve months?

Type                    No            Total value in Birr

Chair _____ _____

Shelf _____

Table _____ _____

GPS _____ _____

TV _____ _____

Radio _____ _____

Tape-recorder _____ _____

3.21 How you see purchasing capacity to buy these items over the last two years improvement?  a) Increased significantly [__]           b) Increased   [__]

c) Remained the same   [__]                          d) Decreased   [__]

e) Decreased significantly     [__]

4. HOUSEHOLD SAVINGS INFORMATION

4.1 Do you have a personal saving account for last 12 month?  1. Yes  [__]   2.  No [__]

4.2 If yes, for above Q4.1 what type of savings? By ticking appropriately (multiple answers is possible)

i) Voluntary saving on cooperative     [__]

ii) Other Saving and credit association     [__]

iii)  Iqqub     [__]       iv)  Iddir          [__]

v)  Others _____

4.3 Specify the average monthly saving amount in Ethiopia Birr:-

Voluntary cooperative _____others specify_____

4.4 what have been your major uses of savings during the last twelve months? By ticking appropriately (multiple answers is possible).

a) Agricultural activities  [__]          b) Household expenditure     [__]

c) Ceremonies (weeding, holidays,)  [__]          d) Urgent needs     [__]

e)  Made improvement to the house   [__]          f) Buy animals   [__]

g) Others please specify_____

4.5 Do you sell cereal products for agricultural cooperative union?

1. Yes  [___]      2.  No [___]

4.6. If answer for Q.4.5 is yes, did you get dividends for cooperative union?

1. Yes [___]     2.  No  [___]

4.7. If answer for Q 4.6 is yes, amount of dividends in birr_____

4.8. For what purpose used that income dividend through year?

A. To buy share of cooperative   [__]      B. To smooth food consumption [__]

C. To buy agricultural inputs   [__]           D.  To improve house   [__]

E. Other please specify_____


5. HOUSEHOLD CONSUMPTION EXPENDITURE INFORMATION

5.1 How many times does your house hold eat meals in a day last two week?

1.  Once   2. Twice   3. Three time   4. Other please specify_____

5.2 Does the number of types of your meals for the last 12 month?

a) Increased significantly  [__]               b) Increased   [__]

c) Remained the same   [__]                    d) Decreased   [__]

e) Decreased significantly     [__]

5.3 In last seven day totally how much money use at household for food expenditure?

1) 100-300 birr         2) 301-500 birr         3) 501-800 birr         4) 801-1000 birr

5) other please specify _____

5.4 In last seven day how much money use at household for non-food expenditure?

1) 100-300 birr         2) 301-500 birr         3) 501-800 birr         4) 801-1000 birr

5) other please specify _____

5.5 Is there an increase in food expenditure or household diet of your household

for the last 12 months?  1.  Yes    [__]               2.  No        [__]

5.6 Have you faced shortage of food for the last 12 months?  1. Yes    [__]     2. No
[__]

If yes, for what is the reason?(specify) _____

6. ACCESS TO EDUCATION INFORMATION

6.1 If you have children and other school-age family dependents, how many of them
are currently attending school?_____

6.2 Does the number of your family attending school for the last two years is

increased    [__]     stayed same              [__]              decreased    [__]

6.3) If answer for Q 6.2 above is increased, why? by ticking appropriately (more than
one answers is possible).

a) Income improvement     [__]                b) Building school       [__]

c) Others _____

6.4 what is your average education expenditure per year? Amount in Ethiopian birr

_____

7. MEDICAL FACILITIES INFORMATION.

7.1 Could you respond yourself financing to get medical facilities to your family for the last two years?   1.  Yes      [__]            2.  No  [__]

7.2 If yes, for question 7.1 above what trend have been see on improvement response. It does? Increase  [__]    decrease     [__]        stayed the same        [__]

7.3 what is the average annual household medical expenditure for the last twelve months? Amount in birr _____

7.4 In the last twelve months, was any ill or injured member of the household not taken for medical attention or treatment because the household lacked the money to pay for it?  1. Yes     [__]       2.  No     [__]

7.5 Do you think that your access to medical facilities or your responsiveness has been improved for the last two years?   1. Yes     [__]     2.  No      [__].