ASSESSMENT ON THE LIVELIHOOD ACTIVITIES OF RURAL HOUSEHOLDS IN MAGWAY TOWNSHIP

THUZAR NAING OO

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ASSESSMENT ON THE LIVELIHOOD ACTIVITIES OF RURAL HOUSEHOLDS IN MAGWAY TOWNSHIP

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A Thesis Submitted to the Post-Graduate Committee of the Yezin Agricultural University as a Partial Fulfillment of the Requirements for the Degree of Master of Agricultural Science (Agricultural Economics)

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The thesis attached here to, entitled **"Assessment on the Livelihood Activities of Rural Households in Magway Township"** was prepared and submitted by Thuzar Naing Oo under the direction of the chairperson of the candidate supervisory committee and has been approved by all members of that committee and the board of examiners as a partial fulfillment of the requirements for the degree of **Master of Agricultural Science (Agricultural Economics).**

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Dr. Nay Myo Aung	**Dr. Thanda Kyi**
Chairperson	External Examiner
Supervisory Committee	Director
Head of Department (administration)	Department of Planning
Rector's Office	Ministry of Agriculture, Livestock and
Yezin Agricultural University	Irrigation

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Daw Honey Lynn Lynn	**Dr. Aung Naing Oo**
Member	Member
Supervisory Committee	Supervisory Committee
Lecturer	Associate Professor
Department of Agricultural Economics	Department of Soil and Water Science
Yezin Agricultural University	Yezin Agricultural University

Dr. Cho Cho San
Professor and Head
Department of Agricultural Economics
Yezin Agricultural University
Yezin, Nay Pyi Taw

Date ------------------------

This thesis was submitted to the Rector of Yezin Agricultural University and was accepted as a partial fulfillment of the requirements for the degree of **Master of Agricultural Science (Agricultural Economics)**.

Dr. Myo Kywe

Rector

Yezin Agricultural University

Yezin, Nay Pyi Taw

Date ------------------------

DECLARATION OF ORIGINALITY

This thesis represents the original work of the author, except where otherwise stated. It has not been submitted previously for a degree at any other University.

Thuzar Naing Oo

Date ------------------------

DEDICATED TO MY BELOVED PARENTS,

U KYAW MYINT OO AND DAW MOE THU

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ABSTRACT

This study was carried out to investigate the existing socio-economic conditions, livelihood diversification, factors affecting on livelihood diversification and livelihood constraints of sample rural households. A total of 150 sample households were interviewed with purposive random sampling method from five villages in Magway Township in January, 2017. Descriptive analysis, Simpson income diversification index (SDI) and regression model were used to accomplish the research objectives. Research findings indicated that 89% and 11% of the farm households' heads were males and females with the average age of 48 years and the average household size of 3.98. In landless households, 78% and 22% were headed by males and females with average age of 46 years including 3.76 family members on average. Cattle were commonly possessed by farm households while poultry and pigs were reared by landless. More than half of farm and landless households were diversified at different levels. Based on the average value of SDI, the sample households were low level of income diversification index. Moreover, the livelihood diversification was positively and significantly affected by household size and participation in organizations but negatively influenced by farm size. High wage rate of agricultural labor and low crop price were major problems mentioned by majority of farm households and lack of capital investment was major constraint faced by landless households in the study area. Therefore, development of rural community based small and medium enterprises (SMEs) should be encouraged and supported for better job opportunities. Landless households should be given priority to access credit for livestock production to increase their livelihoods diversification. Landless households should be encouraged to cooperate in local organizations so that it will create more employment opportunities by utilizing the strength of organization.

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LIST OF ABBREVIATIONS

DFID	=	Department for International Development
DOA	=	Department of Agriculture
DoP	=	Department of Population
Ha	=	Hectare
HH	=	Household
IHLCA	=	Integrated Household Living Conditions Assessment
JICA	=	Japan International Cooperation Agency
LIFT	=	Livelihoods and Food Security Trust Fund
MADB	=	Myanmar Agricultural Development Bank
MMK	=	Myanmar Kyat
MOALI	=	Ministry of Agriculture, Livestock and Irrigation
UNDP	=	United Nation Development Program

LIST OF CONVERSION FACTORS

1 basket of sesame	=	24.5 kilogram
1 basket of groundnut (pod)	=	11.4 kilogram
1 basket of green gram	=	33 kilogram
1 hectare	=	2.471 acre

CHAPTER I
INTRODUCTION

1.1 Background of the study

The role of land in poverty eradication, land is a basic livelihood asset since it provides shelter and food and all other livelihood activities rely on it (DFID 2002). Rural households in developing countries usually have to cope with both poverty and income variability. However, many developing countries shows an important role of nonfarm activities in the income generation of rural households and the role of land has gradually decreased in rural livelihoods and poverty (Rigg 2006). Now a day the rural economy is not based solely on agriculture but relies on a diverse array of activities and enterprises. Moreover, the impact of risk and seasonality in agriculture activated diversification of rural occupations and income.

Rural livelihood diversification can be defined as the process by which rural household build an increasingly diverse set of activities and assets in order to survive and to improve their standard of living (Ellis 2000). Livelihood diversification as a survival strategy of rural households in developing countries and stabilize their incomes (Ellis 1998). Diversification into the non-farm areas can be categorized into service related activities, income from production related activities, income from trade and that from remittances. It is now well known that peoples' ability to engage in supplementary non-agricultural activities is often governed by their access to a diversity of asset base (Reardon 1997).

Further, the capacity of the food-crop sector alone to continue to sustain the livelihoods of rural households is very much in doubt as dependence upon subsistence farming confronts households with a precarious living, exposing them to adverse contingencies which always make them risk-managers (Dary 2012). It is therefore as a result of the above that non-farm alternative income sources are increasingly becoming important across the rural areas, and income gains at the household level therefore seem to be associated with a shift towards more non-farming wages and self-employment income. Such employment provides vital income diversification and access to cash at key moments especially where the risks of farming are high and rural savings, credit and insurance mechanisms are poorly developed or not available (Reardon 1997). Rural non-farm or alternative livelihoods may among other things;

absorb surplus labor in rural areas, help farm-based households spread risks, offer more remunerative activities to supplement or replace food-crop income, offer income potential during the farming off-season, and provide a means to cope or survive when farming fails (Gordon 2001).

1.2 Conditions of Rural Areas in Myanmar

Around 70% of total population of the country lived in rural areas and engage with agricultural activities, 7% in industry, and 23% in services in Myanmar (World Bank 2016). The economy of Myanmar is still driven by agriculture. Myanmar's agriculture sector is one of the nation's largest industries in terms of output and workforce. Around 26% of the population defined as poor and more than a quarter of the country population lives below the poverty line. Poverty in Myanmar is concentrated in rural areas, where poor people rely on agricultural and casual employment for their livelihoods. In rural areas, around 70% of the population is estimated to live under the poverty line of USD 1.25 a day. About 15% of the population was considered reliant on agriculture for their livelihoods and 92% of Myanmar's women work in subsistence farming. This population mainly consists of landless, farmers who have access to small landholdings. Therefore, rural development is the primacy sector for the national economy. The proportion of rural and urban population in States and Region was presented in Figure 1.1. Ayeyawady Region has the largest proportion of rural population at 86 %, followed by Magway Region at 85%, and Sagaing Region and Rakhine State at 83 % each. There were more populated in rural areas than urban both in State and Region except for Yangon Region. The rural poor households hold significantly smaller landholdings than non-poor (IHLCA 2011). Eighty five percent of the total land areas were formed into small plots (less than 2 ha) and in various uneven forms (Soe 2004).The highest rates of landlessness occur in the Delta region, where rural landlessness range from 50% to 80% of rural households. In the Dry Zone and hilly regions, the share of landless in total rural households ranges between 25% and 45% (Table 1.1). Both men and women work as agricultural wage laborers in Myanmar. Moreover, women account for 45% of agricultural wage labor days, while men supply the remaining 55% (LIFT 2012). The seasonal wage employment of farm and landless households require flexible supplementary income-earning activities to fill in during the slack agricultural seasons. Small business activity such as small-scale trading, basket making and

weaving provide primary income support for 15% of landless households, while another 11% depend primarily on fishing (Table 1.2).

So, the rural development is the best way to support through agriculture and national community driven development programs; build human capital by improving nutrition and expanding access to better health and education; boost private sector-led jobs, by improving access to electricity. This study looked into the existing livelihood conditions among rural households of farmers and landless people in Myanmar.

1.3 Rationale of the study

Myanmar's economy is still mainly relied on the agriculture sector and the majority of the population is rural based. Farming is a major activity of rural Myanmar people, yet who have insufficient assets to produce a surplus from their agricultural activities. Land distribution remains difficult to assemble given acute political sensitivities, location differences in traditional tenure systems and large numbers of unrecorded, informal transactions. The marginal and small holdings, even if having a high productivity levels, are not able to generate sufficient income to sustain the farm households. For other rural households, non-farm activities are inadequately reliable or remunerative to rely on market purchases for adequate food intake. Moreover down to the effects of climate change, agriculture has become more vulnerable and risky investment. Seasonal water scarcity is a particular challenge in Dry Zone areas. The youth population is now more interested to non-agricultural jobs as it give higher income to their job in agricultural sectors. That is a significant changes happening in terms of earning income from different sources as well as livelihoods patterns in rural areas.

For landless and near-landless households, income-earning opportunities center primarily on seasonal casual labor working on landowners' farms, supplemented by small business activity (IHLCA 2011). According to the Livelihoods and Food Security Trust Fund (LIFT 2012), half of landless rural households depend primarily on farm labor as their primary source of income. Therefore the question as to whether rural food crop farming alone can help rural households to move out from the claws of poverty still remains a mystery and the study intends to investigate this gap. The above problems account for the increasing inability of the traditional farm sector to sustain rural livelihoods. Hence, there is the need for alternative livelihood
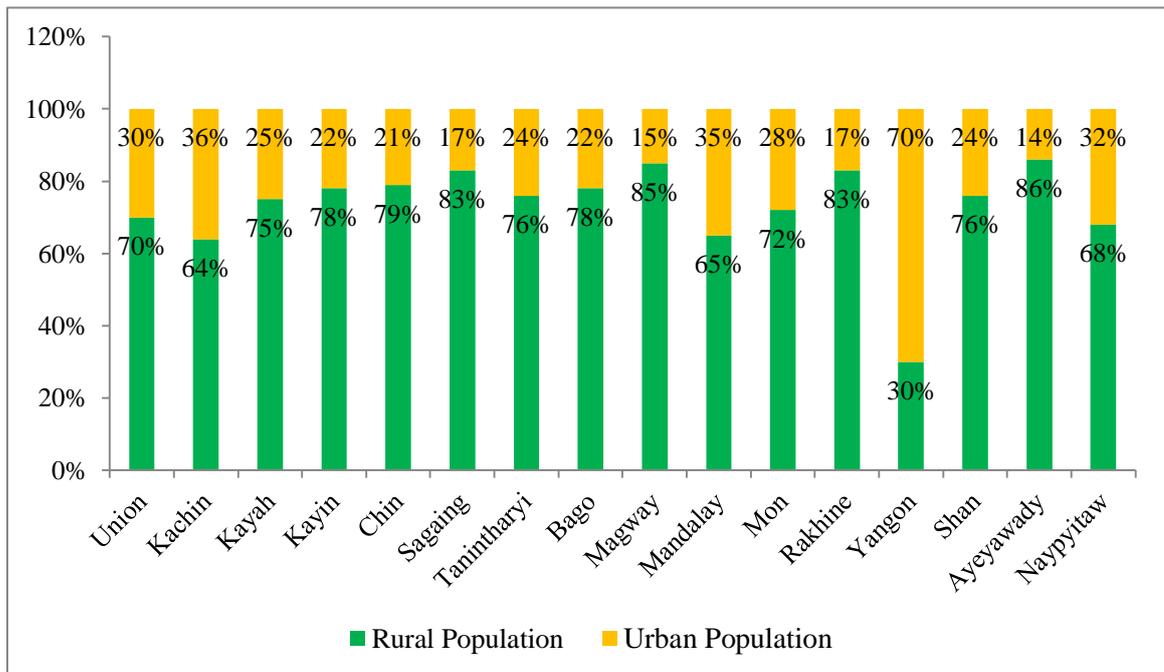
Figure 1.1 Proportion of rural and urban population by State/Region

Source: (DoP 2014)

Table 1.1 Land size distributions in rural Myanmar, 2011

Land own (acres)	Percent of households		
	Delta/coastal	Dry zone	Hilly
0	72	43	26
< 5	7	37	63
5 - 10	9	12	9
> 10	12	8	2
Total	100	100	100

Source: (LIFT 2012)

Table 1.2 Income Sources in Rural Myanmar, 2011

		Income sources	
	Some income*	Most important source	
		All households	Landless
Casual labor	54%	31%	50%
Agriculture	39%	17%	28%
Fishing	17%	8%	14%
Forest products	8%	3%	3%
Other	11%	4%	5%
Crop production	46%	37%	2%
Pulses	19%	9%	
Maize, wheat, barley, sorghum	16%	8%	
Paddy	13%	9%	
Vegetables	10%	4%	2%
Other	15%	7%	
Livestock production	8%	3%	2%
Fish production	12%	9%	11%
Forest and wild food products	3%	2%	
Small businesses	21%	11%	15%
Trading	8%	5%	7%
Manufacturing	7%	4%	5%
Services	6%	3%	45
Regular full-time employment	5%	2%	4%
Regular part-time employment	2%	1%	
Remittances	6%	3%	3%
Other	5%	2%	12%
Total	161%	100%	100%

* Multiple responses allowed.

Source: (LIFT 2012)

strategies that will enhance the wellbeing of the rural poor households. Although farming continuous play as central role in rural development by elevation of complementary engines of rural growth. Thus, sustainable rural development and poverty reduction requires that the incomes of poor households and sources from which they derive their livelihoods must be improved.

In addition, livelihood options for rural poor households will provide new coping strategies that will reduce the impacts of unforeseen contingencies on their means of survival.

1.4 Objectives of the Study

1. To observe the existing demographic and socio-economic conditions of the sample farm and landless households in rural area Magway Township
2. To calculate livelihood diversification of the sample farm and landless households in the study area
3. To examine the factors affecting on the livelihood diversification of the sample rural households in the study area
4. To assess the major constraints faced by the sample farm and landless households in the study area

CHAPTER II
LITERATURE REVIEW

2.1 Meaning of Livelihood

The term "livelihood" is used rather than "job" or even "source of income". First, most rural people work in agriculture (as farmers or farm workers) or get non-farm or off-farm job opportunities only seasonally and often part time. Second, individuals and households create a living from various sources: production (farming, local craftwork, small-scale industries), own labor, trading, transfers (grants and remittances); this last form of entitlement often 10 forms the backbone of rural people's livelihood, especially through old-age pensions (Anseeuw 2001). The most generally quoted definition of livelihoods is that given by Carney (1998) based on the work of (Chambers 1992). "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."

According to the International Centre for development oriented Research in Agriculture (ICRA 2012), a livelihood (making a living) is largely about generating income. But this is really a means to an end, which also includes aspects of: food security (the ability to feed oneself and one's family), providing a home, health, security (reduced vulnerability to climatic, economic or political shocks, and so forth), sustainability (the ability to continue to make a satisfactory living), power (the ability to control one's own destiny), and others.

2.2 The Sustainable Livelihood Approach

According to Chambers and Conway (1992), a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining the natural resource base. The sustainability of livelihood raises many questions and these falls into two groups: whether a livelihood is sustainable environmentally, in its effects on local and global resources and other assets; and whether it is sustainable socially, that is, able to cope with stress and shocks, and

retain its ability to continue and improve. Sustainability is thus a function of how assets and capabilities are utilized, maintained and enhanced so as to preserve livelihoods.

In relation to the above, Chambers and Conway (1992) grouped the sustainability of livelihoods into two as:

- Environmental Sustainability: This concerns the external impact of livelihoods on other livelihoods. Here, the question is whether livelihood activities maintain and enhance or deplete and degrade the natural resource base. On the negative side, livelihood activities may contribute to desertification, deforestation, soil erosion and the like. To this end, livelihood activities can be regarded as environmentally unsustainable if they have a net effect on the claims (demands and appeals which can be made for material, moral or other support) and access (opportunity in practice to use a resource, service or obtain information, material, technology, employment, food or income) needed by others.

- Social Sustainability: This refers to whether an individual or household cannot only gain but maintain an adequate and decent livelihood. Here, two dimensions can be identified based on the work of Chambers and Conway, (1992). The negative dimension relates to coping with stress (pressures which are typically continuous and cumulative, predictable and distressing such as seasonal shortages, rising populations leading to declining farm size or declining resources, indebtedness and others) and shocks (impacts which are typically sudden, unpredictable and traumatic such as storms, floods, wars, droughts, human illness, epidemics of crop pests and so forth) while the positive dimension relates to enhancing and exercising capabilities in adapting to, exploiting and creating change, and in assuring continuity.

According to Sconnes (1998) the ability to pursue different livelihood strategies is dependent on the basic material and social, tangible and intangible assets that people have in their possession. Livelihood resources may be seen as the 'capital' base from which different productive streams are derived from which livelihoods are constructed. Five different types of 'capital' are identified.

- Natural capital – the natural resource stocks (soil, water, air, genetic resources etc.) and environmental services (hydrological cycle, pollution sinks etc.) from which resource flows and services useful for livelihoods are derived.

- Economic or financial capital – the capital base (cash, credit/debt, savings, and other economic assets, including basic infrastructure and production equipment and technologies) which are essential for the pursuit of any livelihood strategy.

- Human capital – the skills, knowledge, ability to labor and good health and physical capability important for the successful pursuit of different livelihood strategies.

- Social capital – the social resources (networks, social claims, social relations, affiliations, associations) upon which people draw when pursuing different livelihood strategies requiring coordinated actions.

- Physical capital – infrastructure such as roads, hospitals and telecommunication is essential ingredients for the integration of remote areas where my poor people live. It's also includes schools, water supply, market place etc.

The sustainable livelihood framework focuses on the rural poor people and these five types of resource endowment which help them to cope up with various shocks by the support of various institutions and national policies. Hence, they can make more income, reduce vulnerability and improve their livelihood.

DFID (1997) has developed a framework of the Substainable Livelihood Approach (SAL) which showed in Figure 2.1.

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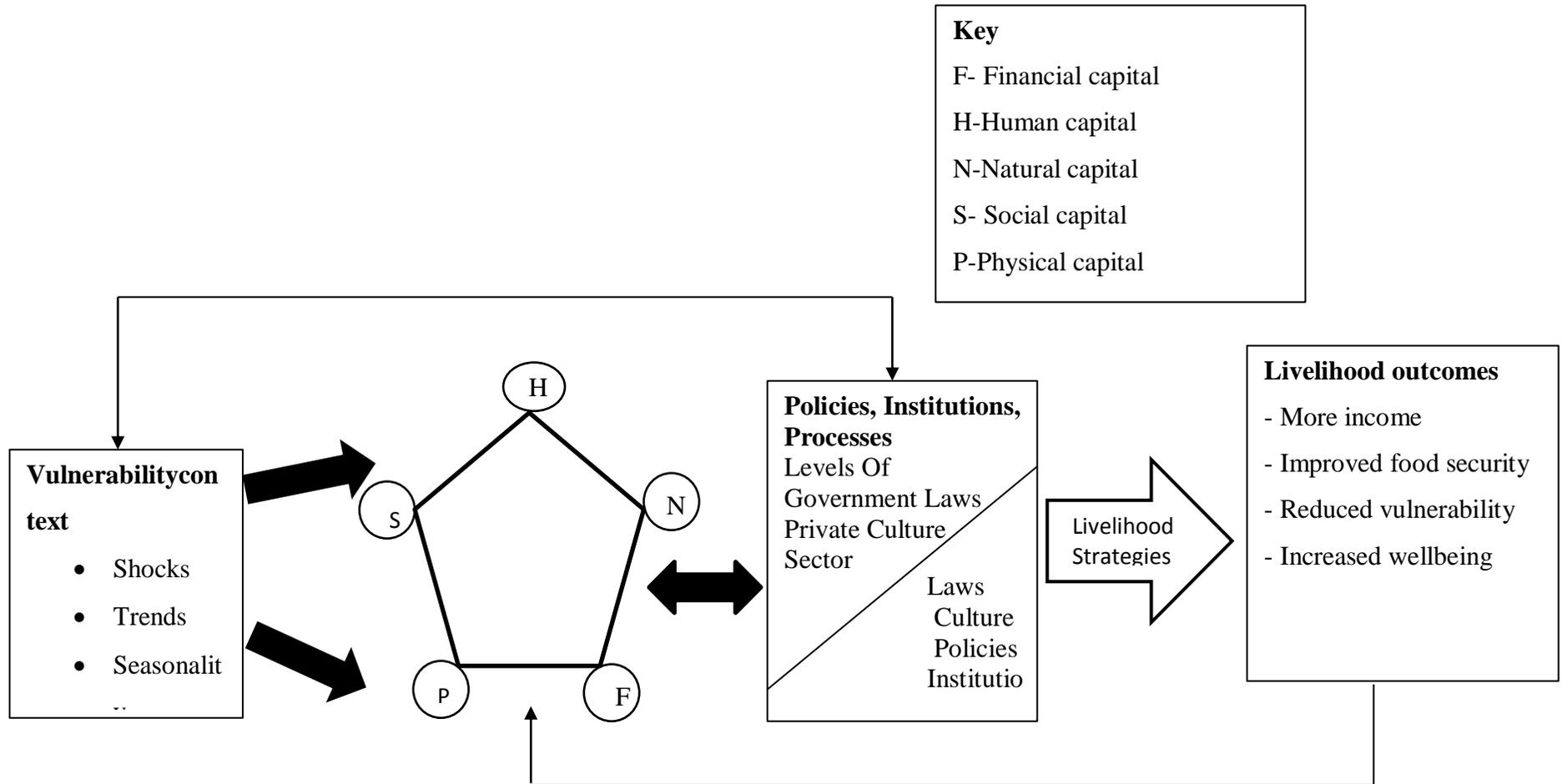
Figure 2.1 Sustainable Livelihood frame work (Source: Farrington et.al., 1999)

2.3 Definition of Livelihood Diversification

According to Ellis (1998), livelihood diversification is more than activity and income diversification. It includes property right, social and kinship networks, and access to institutional support. Livelihood diversification is the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve standards of living. "Livelihood diversification is a pervasive and enduring characteristic of rural survival, reflecting the continuing vulnerability of rural livelihoods. The task of policy is to facilitate rather than inhibit diversity. Diverse livelihood systems are less vulnerable than undiversified ones" (Ellis 2000).

Livelihood systems may include (Ellis 1998):

-farming activities and income

-non-farm activities and sources of income (e.g. gathering from the wild and local trade, food processing, local services –traditional healing, handcrafting)

-off farm activities (e.g. permanent, seasonal or casual external jobs and wages, self-employment in trade, small scale industry and businesses)

-non income related activities (i.e. housekeeping, child/ relative caring, fetching firewood and water for domestic use)

-non activity related sources of income (i.e. remittances, welfare).

2.3.1 Diversification as a livelihood strategy

Livelihood diversification is defined by Ellis (1998) as the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living. Scoones (1998) considers livelihood diversification as a choice to invest in order to accumulate assets or activities aimed at coping with temporal or permanent livelihood adversity. Ross et.al., (2010) considers diversification as the spreading of investment across assets which protect livelihoods from extreme exposures. Ellis (1998) argues that income diversification is not synonymous with livelihood diversification though the former is the most effective measure of diversification. Income diversification comprises of what constitutes household income at a particular point in time while livelihood diversification encompasses other factors like kinships and social networks that are intricate in the survival strategies of the rural poor. Livelihood diversification is broadly determined by necessity culminating from issues surrounding; access to land,

land fragmentation, declining soil fertility, ill health and natural disasters and choice which is represented by proactive initiative to educate household members to position them better for nonfarm job opportunities or to save money to invest in nonfarm business. Livelihood diversification motivated by choice is considered as a luxury that removes such bracket of people from the poor and vulnerable people of the world. Diversification influenced by necessity is often determined by seasonality and its effect on income variability, labor and consumption smoothing problems; risk spreading or coping strategies; credit market failures and; asset endowment strategies (Ellis 1998). Livelihood diversification among smallholder farmers is often seen in three main faculties or portfolios including; on farm diversification comprising of mixed cropping and mixed farming; off-farm and nonfarm activities and a cocktail of activities (Ekow 2011). In a study in Tanzania, Dimora and Sen (2010) concluded that non agriculture-salaried strategy was less diverse compared with agriculture- biased livelihood strategy which was highly diverse. Literature postulates that livelihood diversification is more pronounced among the poor in transition economies whereas in Sub-Saharan Africa diversification is rather the other way round where it is common among well endowed (Kanbur et.al., 2005).

2.4 Measuring Diversification (Simpson income diversification index)

The Simpson index was introduced in 1949 by Edwad H. Simpson to measure the degree of concentration when individuals are classified into types. The same index was rediscovered by Orris C. Herfindahl in 1950. The square of the index had already been introduced in 1945 by the economist Albert O. Hirschman. As a result, the same measure usually known as the Simpson index in ecology, and the Herfindahl index or Herfindahl-Hirschman index (HHI) in economics. This index counts both the number of types and the proportional contribution by each type. Formula for Simpson index is given below:

$$SDI = 1 - \sum_{i=1}^{n} P_i^2$$

Where,

SDI	=	Simpson diversification index
n	=	Total number of income sources and
Pi	=	Income proportion of the i-th income source.

Its value lies between 0 and 1. If there is just one source of income, Pi = 1, so SDI = 0. As the number of sources increase, the share (Pi) decline, as does the sum of the squared shares, so that SDI approaches to 1. Households with most diversified incomes will have the largest SDI, and the less diversified incomes are associated with the smallest SDI.

2.5 Review of Selected Empirical Studies of livelihood diversification

Adebayo (2012) shows educational level, membership of cooperatives and non-farm income while farm size to be the most important determinants of income diversification among farm households in Kaduna. Ahmed (2015) found that gender of the household heads, household size, households' participation in development program, amount of credit, number of migrants, households assets, education of households head, depedency ratio and amount of saving were important factors in level of livelihood diversification. Datta and Singh (2011) in their study based on rural diversification in India showed that training facilities in the adjoining region, availability of access roads to market and level of literacy were statistically significant in determining rural livelihood diversification. Sallawu (2016) analyzed that farm size, age, and occupation were the negative determinants of income diversification. While level of education, farm income, non-farm income, credit use, livestock ownership, household size, and poverty status were the positive determinants of income diversification in Nigeria. Sarah (2013) examined that completing secondary or university education, access to farm capital such as an animal plough, access to transport to other areas, access to markets for farm products, access to mutual or unpaid labor, access to migration opportunities and farm characteristics such as the farm size and irrigation farm area were the key factors in determining the level of income diversification. In particular, access to farm capital such as animal ploughs and irrigation were associated with increased participation in farm activities.

CHAPTER III
RESEARCH METHODOLOGY

3.1. Description of the Study Area
3.1.1. Study area

Magway Region is situated between North Latitude from 18˚ 47ʹ and East Longitude from 93˚ 55ʹ, and has an area of 44,820.6 sq km. It has 5 districts and 25 townships. Rice, beans and pulses, millet, maize, chili, onions, potatoes, sunflower and tobacco are other main crops. Among the important crops found in the region are sesame and groundnut. Edible oil is also produced. Livestock and fresh water fisheries are also important. Thanaka (sandalwood) is also one of the famous products of Magway Region.

Magway Township is situated on the east bank of the Ayeyawady River. It is located in the dry zone area. Its neighboring townships are Natmauk, Taungdwingyi, Myothit, Sinpaungwè, Minbu and Minhla. It has an area of 1,764 square kilometers. There are 14 wards at urban and 61 village tracts and 214 villages at rural. It has 289,247 populations people in 2014 (Table 3.1). The land utilization of Magway Township was showed in Table 3.2. The total land area of Magway township was 436,623 acres (176,698.9 ha). The upland was 188,779 acres (76397.8 ha), the lowland was 4,225 acres (1,715.6 ha) and Kaing/ Kun was 5,646 acres (2,284.9 ha) of the total land of Magway township. The upland covered 43.24% of the total area. The lowland was 0.97%, Kaing/Kyun was 1.29%, reserved forests was 1.26%, cultivated waste land was 0.45% and other land was 52.75% of total area (Table 3.2).

3.2 Data Source and Data Collection

For this study used primary data were collected face to face interview by using well-structured standardized questionnaires during the year of 2017, January. The collected information included demography, land ownership, primary and secondary occupations of household members, migrations and remittances , assets ownership, on farm activities, off farm activities, non-farm activities, credit and saving, income from different sources, and living condition. The field survey emphasized not only on land holding households but also landless households. The survey information gathered from 55 landless households and 95 farm households, total of 150 sample households from 5 villages.

The secondary data of villages and farm household information were obtained from Department of Agriculture (DOA) and other relevant sources. Table 3.3 described information related to number of farm and landless households from five villages in Magway Township. The sample villages were Pho Lay Lone, Chaung Phyu, Kyit Sone Pwe, Kyaung Saung and Nat Kan. Pho Lay Lone and Kyaung Saung villages are lacated between 30 to 32 miles from Magway Township. Kyit Sone Pwe village is located about 12 miles from Magway while Nat Kan and Khaung Phyu are located between 3 to 4 miles from it.

3.3 Data Analysis Methods

3.3.1 Descriptive analysis

Descriptive analysis was carried out of to find and compare the socioeconomic and conditions and the distribution of farm and landless households' income from different sources and their share of rural households. The study used Chi-square test and t-test to present the socioeconomic characteristics of farm household such as age and household composition, farm size and household size, gender, educational standing etc.

Table 3.1 Demographic conditions of Magway Township

Items	Magway
No. of village	216
Population (no.)	289,247
Land area (sq.km)	1764
Cultivated area (ha)	176,698

Source: (DOA, 2016)

Table 3.2 Land utilization of Magway Township

Land Utilization	Acre	Hectare	%
Upland	188,779	76,397.8	43.24
Lowland	4,225	1,715.6	0.97
Kaing/Kyun	5,646	2,284	1.29
Orchard	6	2.4	0.00
Reserved forests	5,519	2,233.5	1.26
Other forest areas	174	70.4	0.04
Cultivated waste land	1,965	795.2	0.45
Other land	230,309	93204.8	52.75
Total	436,623	176,698.9	100

Source: (DOA, 2016)

Table 3.3 Study area and sample sizes of Magway Township

No.	Sample villages	Farm HHs		Landless HHs		Total HH	
		No.	%	No.	%	No.	%
1	Nat Kan	16	16.84	20	36.36	36	24.00
2	Pho Lay Lone	29	30.53	9	16.36	28	25.33
3	Kyit Sone Pwe	30	31.58	8	14.55	38	25.33
4	Chaung Phyu	20	21.05	13	23.64	33	22.00
5	Kyaung Saung	0	0	5	9.09	5	03.33
		95	**100**	**55**	**100**	**150**	**100**

Note: HHs=households

3.3.2 Measuring of livelihood diversification (Simpson diversification index)

The extent of households' livelihood diversification in the literature is commonly quantified by using income diversification index. The most common measure of income diversification used in several studies is the vector of income share associated with the different income sources (Khatun 2012). There are various indicators and indices to measure livelihood diversification like number of income sources and their share, Simpson index, Herfindahl index, Ogive index, Entropy index, Modified Entropy index, Composite Entropy index etc. (Khatun 2012). In this study Simpson index was used because of its computational simplicity, robustness and wider applicability. The formula for Simpson index is given below:

$$\text{SDI} = 1 - \sum_{i=1}^{n} P_i^{\,2}$$

Where,

SDI   =   Simpson diversification index

n   =   Total number of income sources and

Pi   =   Income proportion of the i-th income source.

Its value lies between 0 and 1. If there is just one source of income, Pi =1, so SDI = 0. As the number of sources increase, the shares (Pi) decline, as does the sum of the squared shares, so that SDI approaches to 1. Households with most diversified incomes will have the largest SDI, and the less diversified incomes are associated with the smallest SDI. For least diversified households (i.e., those depending on a single income source) SDI takes on its minimum value of 0. The upper limit for SDI is 1 which depends on the number of income sources available and their relative shares on total household income. The higher the number of income sources as well as more evenly distributed the income shares, the higher the value of SDI. The Simpson index of diversity is affected both by the number of income sources as well as by the distribution of income between different sources (balance). The SDI approaches to 1, if there are more uniformly distributed income from each source.

Based on the SDI values, the level of livelihood diversification was defined as following;

1. No diversification (SDI < 0.01)

2. Low level of diversification (SDI = 0.01 - 0.25)

3. Medium level of diversification (SDI = 0.26 - 0.50)

4. High level of diversification (SDI = 0.51 - 0.75)

5. Very high level of diversification (SDI ≥ 0.76)

3.3.3 Econometric analysis (Regression model)

To determine the factors affecting rural on the livelihood diversification of the sample households, multiple regression analysis was used. The dependent variable was applied Simpson diversification index and the independent variables were age and education of household's head, household size, farm size, dependency ratio, migrant of household members, value of household's assets and amount of credit. The dummy variables were gender of household's head and participation in organizations. The following model was employed;

$$SDI = \beta_0 + \beta_{1i} X_{1i} + \beta_{2i} X_{2i} + \beta_{3i} X_{3i} + \beta_{4i} X_{4i} + \beta_{5i} X_{5i} + \beta_{6i} X_{6i} + Ln\beta_{7i} X_{7i} + Ln\ \beta_{8i} X_{8i} + \beta_{1i} D_{1i} + \beta_{2i} D_{2i} + \beta_{3i} D_{3i} + u_i$$

Where,

SDI	=	Simpson diversification index
X_{1i}	=	Age of household's head (Year)
X_{2i}	=	Education of household's head (Year)
X_{3i}	=	Household size (Number)
X_{4i}	=	Farm size (Hectare)
X_{5i}	=	Dependency ratio (Percent)
X_{6i}	=	Migrant of household members (Number)
X_{7i}	=	Value of household's assets (MMK)
X_{8i}	=	Amount of credit taken per year (MMK)
D_{1i}	=	Gender of household head (Male=1, Female=0)
D_{2i}	=	Participation in organization (Yes=1, No=0)
μ	=	Error term
β_0	=	Intercept of the independent variable
β_i & b_i	=	Coefficients of the independent variables

CHAPTER IV
RESULTS AND DISCUSSION

Among the sample households, 95 households were the farm households and the rest of 55 households were landless households engaged not only in agriculture but also in non-agricultural sector that is working as agricultural labor and non-agricultural labor etc. The results of the data analysis consist of the socio economic characteristics of the respondents, comparison between farmer and landless households on their income, livelihoods condition and constraints on their livelihood activities.

4.1 Demographic Characteristics
4.1.1 Gender and education level of the sample rural households' heads

A demographic characteristic of a society is very important for analyzing its livelihood system. So that, a closer find at the socio-demographic characteristics is necessary to assess the livelihoods of the rural households.

In Table 4.1, among the sample farm households 89.47% were headed by male and only 10.53% were headed by female. There were 78.18% of male heads and 21.82% of female in landless households. Thus, male members were dominating the female members in the households as they are the main income earning persons. And then, there was significant difference at 10% level in gender of household head between farm and landless households. The education status showed that landless household heads were comparatively high in illiterate (2.6%) and primary school level (25.5%) when compared with farm household heads. In contrast, higher percentages were found in middle, high school level and graduate level of farm household heads (32.6%), (14.7%) and (5.3%) respectively. There was no university education level in landless headed household (Table 4.1).

Table 4.1 Gender and education level of the sample rural household heads in the study area, 2016

Items	Farm HH heads (n= 95)		Landless HH heads (n= 55)	
	Number	Percent	Number	Percent
Gender of head				
Male	85	89.47	43	78.18
Female	10	10.53	12	21.82
	P = 3.549*			
Education level				
Illiterate	6	6.32	13	23.64
Monastery	13	13.68	14	25.45
Primary	26	27.37	13	23.64
Middle	31	32.63	12	21.82
High	14	14.74	3	5.45
Graduate	5	5.26	0	0.00

Note: HH=household, *= 10% significant level

4.1.2 Household size and age of sample household heads

The average household sizes of the landless and farm households were 3.98 and 3.76 respectively. The t-test showed that household size was not significantly different between farm and landless households. The average household size of the overall household was 3.9 where this study emphasized to understand how importance of income and income sources for household members (Table 4.2).

The eldest of the landless household heads was 80 years old which is older than the farm household heads it was 78 years and the youngest age was 25 and 23 years respectively. The average age of farm and landless household heads was 48.46 and 46.62 years. There was not significant different between age of farm and landless household heads tested by t test (Table 4.2).

4.1.3 Household heads' occupation structure and dependency ratio of sample households

A diversified occupational structure of both household heads was found in all the study villages. The highest percentage of 92.63% of selected household head's primary occupation was farming in farm household and there were other types of primary occupations found in the study area. These were aged person, government staff and migrant labor. It was also found that about 32% of total farm household heads employed as causal labor, own-employed, off-farm labor, service and driver as secondary occupation.

Most of the landless household heads were employed about 47.27% and 21.82% took causal labor and off-farm labor as primary occupation and others landless worked as own-employed, government staff, aged person and migrant labor in the study area. About 22% of total landless household heads are also occupied in causal labor, off-farm labor, own-employed and service as secondary jobs (Table 4.3).

The average dependency ratio was 29.5% in landless households that was slightly higher than farm households (28.9%). The maximum and minimum dependency ratios of farm households were 75% and 0%. In landless households, the maximum and minimum dependency ratios were 66.67% and 0%, respectively (Table 4.4).

Table 4.2 Household size and the sample household heads' age in the study area, 2016

Items	Farm HHs (n=95)	Landless HHs (n=55)	Total HHs (n=150)
Household size (no.)			
Average	3.98	3.76	3.90
Maximum	10.00	7.00	10.00
Minimum	1.00	1.00	1.00
$t = 0.92^{ns}$, $P = 0.359$, $df=148$			
Age of household head (yr)			
Average	48.46	45.62	47.42
Maximum	78.00	80.00	80.00
Minimum	25.00	23.00	23.00
$t =1.23^{ns}$, $P = 0.22$, $df=148$			

ns = non-significant.

Table 4.3 Participation of household heads into different primary and secondary occupations in the study area, 2016

Occupations	Farm HH heads (n=95)				Landless HH heads (n=55)			
	Primary		Secondary		Primary		Secondary	
	No.	%	No.	%	No.	%	No.	%
Farming	88	92.63	0	0	0	0	0	0
Casual labor	0	0	8	8.42	26	47.27	6	10.9
Own-employed	0	0	7	7.37	6	10.9	2	3.64
Government staff	1	1.05	1	1.05	2	3.64	0	0
Off-farm labor	0	0	7	7.37	12	21.82	3	5.45
Service	0	0	4	4.21	0	0	1	1.82
Driver	0	0	3	3.16	0	0	0	0
Aged person	5	5.25	0	0	8	14.55	0	0
Migrant labor	1	1.05	0	0	1	1.82	0	0

Table 4.4 Dependency ratios of the sample households in Magway Township, 2016

Dependency ratio	Unit	Farm HHs (n=95)	Landless HHs (n=55)	Total HHs (n=150)
Average	%	28.99	29.55	29.2
Maximum	%	75.00	66.67	75.00
Minimum	%	0.00	0.00	0.00

4.1.4 Household assets, livestock assets and farm assets of the sampled farm and landless households

Table 4.5 lists the luxury assets of sample households. The majority of farm households possessed mobile phones, motorcycles and gold about 89%, 72% and 56% respectively. Most of the landless households owned mobile phones about 64% but landless households less owned in most of households assets.

Table 4.6 presents livestock assets of the sample households. In the study area, cattle were reared by 72% of sample farm households for animal power. Moreover, pig and poultry were also reared for extra income and meat consumption by 2% and 12% of farm households. The sample landless households in the selected villages reared cattle, pig, poultry and goat. Farmers possess more cattle than landless because they were essential animal for farming. Although rural landless households were more depend on livestock production for extra income.

Table 4.7 shows that farm equipment of the sample farm households. In the selected villages, most of farmers used traditional farming practices and most farm households possessed by 75% of harrow, 73% of plough and 68% bullock cart. But the farm households (8% and 1%) had tractor and thresher machines.

4.1.5 Farm size, farm types and cultivated crops areas and yield of farm households

The upland owner households were occupied by 96% and lowland owner were occupied by 9% of the total farm households. Average farm sizes were 4.69 hectares in upland and 0.7 hectares in upland owner (Table 4.8). Sesame, groundnut and green gram were mostly cultivated in the study areas. About 97% of farmer cultivated sesame on average farm size was 3.52 hectares and the average yield of sesame was 0.15 ton/hectare. About 79% of farmers cultivated groundnut on average farm size of 3.57 hectares and the average yield of groundnut production was 1.04 ton/hectare (Table 4.9).

Table 4.5 Household assets of sample rural households in the study area, 2016

Items	Farm HHs (n=95)		Landless HHs (n=55)	
	No.	%	No.	%
Mobile phone	85	89.47	35	63.64
Motorcycle	68	71.58	26	47.27
Gold	53	55.79	19	35.55
TV	49	51.58	14	25.45
DVD/EVD	45	47.37	14	25.45
Radio	42	44.00	13	23.64
Bicycle	30	31.58	10	18.18
Sewing machine	12	12.63	2	3.64
Car	2	2.11	0	0.00

Table 4.6 Livestock assets of sample rural households in the study area, 2016

Items	Farm HHs (n=95)				Landless HHs (n=55)			
	Frequency	%	Avg.	Range	Frequency	%	Avg.	Range
Cattle	68	71.58	2.63	0 - 11	15	27.27	0.64	0 - 5
Pig	2	2.11	0.03	0 - 2	9	16.36	0.31	0 - 4
Poultry	11	11.58	1.71	0 - 31	9	16.36	1.76	0 - 25
Goat	0	0.00	0.00	-	2	3.64	1.24	0 - 56

Table 4.7 Farm assets of sample farm households in the study area, 2016

Farm assets	Farm HHs (n=95)	
	Number	Percent
Harrow	72	75.79
Plough	69	72.63
Bullock cart	65	68.42
Sprayer	57	60.00
Water pump	15	16.84
Tractor	8	8.42
Trawler jeep	1	1.05
Warehouse	2	2.10
Thresher	1	1.05

Table 4.8 Farm size for different farm types of farm households

Items	Number	Percent	Area (hectare)		
			Average	Maximum	Minimum
Upland owner	91	95.79	4.69	28.33	0.40
Lowland owner	9	9.47	0.70	1.21	0.20
Garden owner	7	7.37	1.40	6.07	0.06
Land rent-in	4	4.21	1.01	2.02	0.40
Land rent-out	7	7.37	4.51	12.14	1.21
Total	95	100	4.65	28.33	0.40

Table 4.9 Cultivated crops areas and yields of farm households

Cultivated crops	Percent of total FHHs	Area (hectare)			Yield (ton/hectare)		
		Average	Maximum	Minimum	Average	Maximum	Minimum
Sesame	97.00	3.52	26.31	0.40	0.15	2.41	0.01
Groundnut	79.00	3.57	20.23	0.40	1.04	9.88	0.02
Green gram	31.58	1.58	5.26	0.40	0.03	0.07	0.01

4.2 Types of Houses, Sources of Energy for Cooking and Drinking Water and Migration Status of the Sample Rural Households

4.2.1 Types of houses and sources of energy for cooking and drinking water

Table 4.10 describes the sample farm and landless households owned various types of houses. About 34% and 44% of farm and landless households' houses built with corrugated sheet roof, bamboo wall and bamboo floor. More than one fourth of total households' houses constructed with wood floor, bamboo wall and corrugated sheet roofing.

Among the sample five villages, one village had public electricity. Table 4.11 presents the sources of energy for cooking in the selected villages. About 87.37% of farm households and 83.64% of landless households used firewood for cooking and 12.63% and 14.55 % of farm and landless households' electricity energy and 1.81 % landless household's cooked with charcoal. According to sources of drinking water, 76.84% and 70.91% of farm and landless households used well water for drinking. About 13% of total rural households acquired drinking water from public pipe and 1% of total rural households' used purified water.

4.2.2 Migration status of the sample rural households

Table 4.12 shows the labor migration to internal (within district and other district) and international. Labor migration to international was 3.16 % of farm households and 1.82% of landless household which migrated to Thailand and Malaysia. About 12.73% of landless households and 9.48% of farm households migrated internal such as Aunglan (near township), Yangon and Mandalay.

Table 4.10 Housing types of sample rural households in the study area, 2016

Items	FHHs (n=95)		LHHs (n=55)		Total HHs (n=150)	
	No.	%	No.	%	No.	%
Corrugated sheet+ Wood wall+ Wood floor	10	10.53	0	0.00	10	6.67
Corrugated sheet+ Wood wall+ Bamboo floor	1	1.05	0	0.00	1	0.67
Corrugated sheet+ Brick wall+ Concrete floor	6	6.32	1	1.82	7	4.67
Corrugated sheet+ Brick wall+ Wood floor	15	15.79	2	3.64	17	11.33
Corrugated sheet+ Bamboo wall+ Wood floor	24	25.26	20	36.36	44	29.33
Corrugated sheet+ Bamboo wall+ Bamboo floor	32	33.68	24	43.64	56	37.33
Corrugated sheet+ Bamboo wall+ Concrete floor	2	2.11	0	0.00	2	1.33
Corrugated sheet+ Wood wall+ Bamboo floor	2	2.11	0	0.00	2	1.33
Corrugated sheet+ Wood wall+ Concrete floor	1	1.05	0	0.00	1	0.67
Thatch roof+ Bamboo wall+ Bamboo floor	2	2.11	2	3.64	4	2.67
Thatch roof+ Bamboo wall+ Wood floor	0	0	6	10.91	6	4.00
Total	95	100.00	55	100.00	150	100.00

Table 4.11 Sources of energy for cooking and drinking water of sample rural households in the study area, 2016

Sources of energy	Farm HHs (n=95)		Landless HHs (n=55)		Total HHs (n=150)	
	No.	%	No.	%	No.	%
For cooking						
Firewood	83	87.37	46	83.64	129	86.00
Electricity	12	12.63	8	14.55	20	13.33
Charcoal	0	0.00	1	1.81	1	0.67
For drinking water						
Well	73	76.84	39	70.91	112	74.67
Public pipe	8	8.43	11	20.00	19	12.67
Pond/lake	8	8.42	3	5.45	11	7.33
Rainwater	5	5.26	1	1.82	6	4.00
Purified water	1	1.05	1	1.82	2	1.33

Table 4.12 Migration status of sample households in Magway Township, 2016

Types of migration	Farm HHs (n=95)		Landless HHs (n=55)		Total HHs (n=150)	
	No.	%	No.	%	No.	%
Within district	3	3.16	5	9.09	8	5.33
Another district	6	6.32	2	3.64	8	5.33
Foreign country	3	3.16	1	1.82	4	2.67
No Migration	83	87.37	47	85.45	130	86.67

4.3 Credit and Participation in Organization of Sample Rural Households

4.3.1 Sources of credit availability and amount of credit in the sample households

The figure 4.1 showed the sources of credit availability of sample households. The sample farm households received credit from different sources. There are five credit sources i.e. Myanmar Agricultural Development Bank (MADB), private money lender, Co-operative, United Nation Development Program micro-credit provider (UNDP) and PACT Myanmar cooperation. Farm households (32.39%) took credit from MADB, (26.76%) from private money lender, (16.9%) from Co-operative, (15.49%) from UNDP and (8.45%) from PACT Myanmar, respectively. In the landless households, the sample households took 34.15% of the credit from UNDP. And private money lender, PACT and ever green village project had (34.15%), (21.95%) and (9.76%) of households, respectively.

The amount of credit received from different credit sources by the sample households were in Table 4.13. In the farm households, average amount of private money lender was 1.01 million kyats, this credit amount was the largest for the landless households. MADB's average credit amount was 0.18 million kyats. MADB was the major credit sources of the farmers and also lowest credit amount. The average credit amount of PACT Myanmar, Co-operative and micro-credit provider was 0.5 million kyats, 0.36 million kyats and 0.93 million kyats, respectively. The credit taken mainly used for their crop production and also their households expenditures. In the landless households, micro-credit provider (UNDP)'s credit amount was the highest, the average credit amount was 0.34 million kyats. Ever green village project's was smallest amount for landless households, the average amount was 0.19 million kyats. PACT Myanmar and private money lender's average credit amount for landless households was 0.32 million kyats and 0.32 million kyats respectively.

4.3.2 Participation in organization of sample rural households

In the study area, there were many kinds of organizations with different activities to increase the livelihood of rural people. The results for participation in organization show that 85% of farm households and 20% of landless households were involved in rural religious group. In welfare association, 67% of farm households and 35% of landless households were included. In village administrative board, 9% of landless households and 25% farm households were participated. Thus, farm

households were more actively participated in their rural community activities. About 35% of farm and 32% landless households were integrated in microfinance cooperative. In the farm households, 33%, 16%, 13% and 2% were participated in Farmer's group, political groups, JICA irrigation project and labor's group, respectively. And 4% and 13% of landless households were involved in political group and labor's group (Table 4.14).
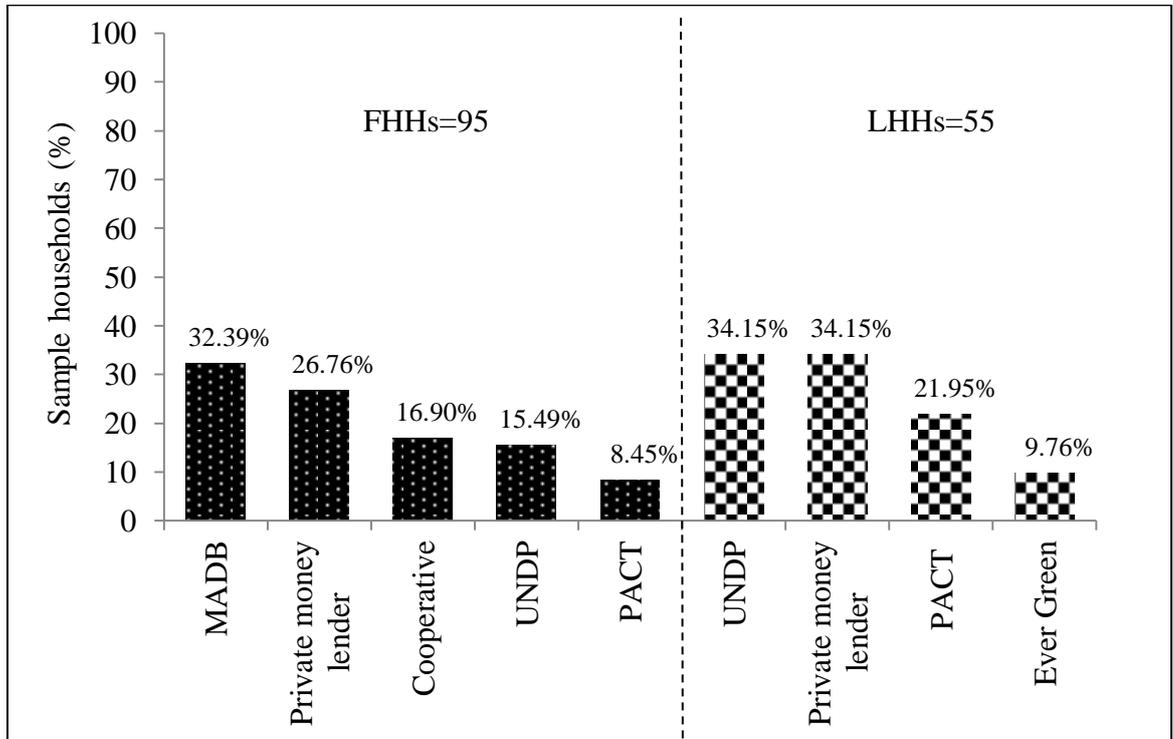
Figure 4.1 Sources of credit availability of sample households in the study area, 2016

Table 4.13 Amount of credit access of sample households in Magway Township, 2016

Items	Unit	Amount of credit ('000 MMK/year)		
		Average	Maximum	Minimum
FHHs=95				
Myanmar agricultural development bank (MADB)	MMK	189	410	40
PACT Myanmar	MMK	500	1,000	100
Cooperative	MMK	364	500	60
Micro credit provider (UNDP)	MMK	937	5,000	100
Private money lender	MMK	1,018	4,000	50
LHHs=55				
Ever green village project	MMK	190	310	150
PACT Myanmar	MMK	322	500	100
Micro credit provider (UNDP)	MMK	339	600	200
Private money lender	MMK	322	2,000	30

Table 4.14 Participation of sample rural households in organizations in the study area, 2016

Organizations	Farm HHs (n=95)		Landless HHs (n=55)		Total HHs (n=150)	
	No	%	No	%	No	%
Rural religious groups	47	85.45	11	20.00	58	38.67
Rural welfare association	37	67.27	19	34.55	56	37.33
Microfinance cooperative	19	34.55	18	32.73	37	24.67
Farmer's group	18	32.73	0	0.00	18	12.00
Village administrative board	14	25.45	5	9.09	19	12.67
Political groups	9	16.36	2	3.64	11	7.33
JICA irrigation project	7	12.73	0	0.00	7	4.67
Labor's group	1	1.82	7	12.73	8	5.33

4.4 Income Sources, Income Composition and Amount of Income per Annum of the Sample Households

4.4.1 Income sources and composition of sample households

The sources of income from sample households are demonstrated in Figure 4.2. All farm households depended on crop production as their main income source. About 40% of farm households' income received from seasonal farm labor employment. About 34.74% of farm households' obtained from non-farm which were own business, mason, tailor, carpenter, vendor and causal labor, etc. The rest 15.79% earned from livestock rearing (cattle, poultry and goats, etc.) and 3.16% of farm households income received from remittances. The majority of landless households obtained their income of 89% from seasonal farm labor. The landless households' incomes were 65.45% from non-farm and 0.18% from livestock. The other income earned from remittances 7% of landless households in the study area.

About 46% of farm households and 84% of landless households had two income sources which were the highest in both households. One income source was found in 33% of farm households and 59% of landless households. The left 16% and 5% of farm households had three income sources while 29% of landless households had three income sources (Figure 4.3).

The income composition of farm and landless households were illustrated in Figure 4.4 (a) and (b). The maximum share (71.9%) in total incomes of farm households was crop production, followed by non-farm income (21%), off-farm income (5.01%), livestock (1.6%) and remittances (0.17%) respectively. The highest share (55.2%) in total incomes of landless households was off-farm income and non-farm income (36.4%) was in second. Livestock income and remittances were accounted for 4.25% and 4.11% of total yearly household income share, respectively

4.4.2 The annual amount of income in the sample households

Table 4.15 describes amount of incomes per annum earned in farm and landless households. The average annual income of farm households from crop, livestock, off-farm, non-farm and remittances were 4.6, 0.6, 0.8, 3.9 and 0.3 million kyats respectively. The main income for farm households was crop income. The average income for landless households were off-farm (1.3 million kyats), non-farm (1.2 million kyats), livestock rearing (0.5 million kyats) and remittances (1.3 million kyats) per annum respectively. Off-farm and remittance incomes were main incomes for landless households. Total average income of farm households was higher than

landless households. Total maximum income was 7.9 million kyats per annum in farm households and 1.08 million kyats per annum in landless households. Total minimum income was 0.3 million kyats and 0.19 million kyats per annum in farm and landless households respectively.

4.5 Different Level of Household Income Diversification and Average Value of Simpson Diversification Index of Sample Households

Majority of the rural households diversified their livelihoods into several activities and earned significant amount of incomes from multiple sources. Table 4.16 shows that 66% of the total sample households pursued some level of diversification in their livelihoods. About 33.7% and 34.6% of both farm and landless households had zero Simpson index, which mean they earned income from just one source for their livelihoods. In the sampled farm households, 21% of low, 32.6% of medium and 12.6% of high level livelihood diversification were found. In landless households, livelihood diversification was found as 18.1%, 41.8% and 5.5% in low, medium and high level respectively.

Analysis showed that, the average SDI value in landless households had (0.21) while the farm household was average value of SDI (about 0.23). Thus, the study found that the average value of SDI for both households was 0.22. There were non-significant differences in the average value of SDI among farm and landless households (Table 4.17).
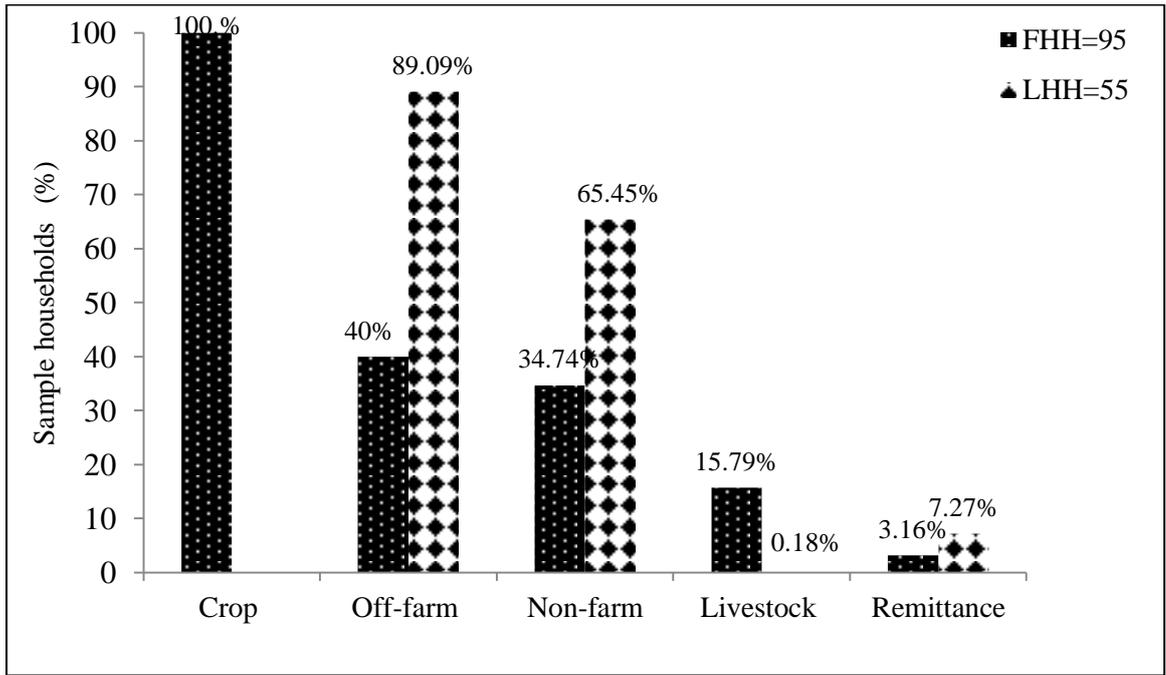
Figure 4.2 Income sources of the sample households in Magway Township
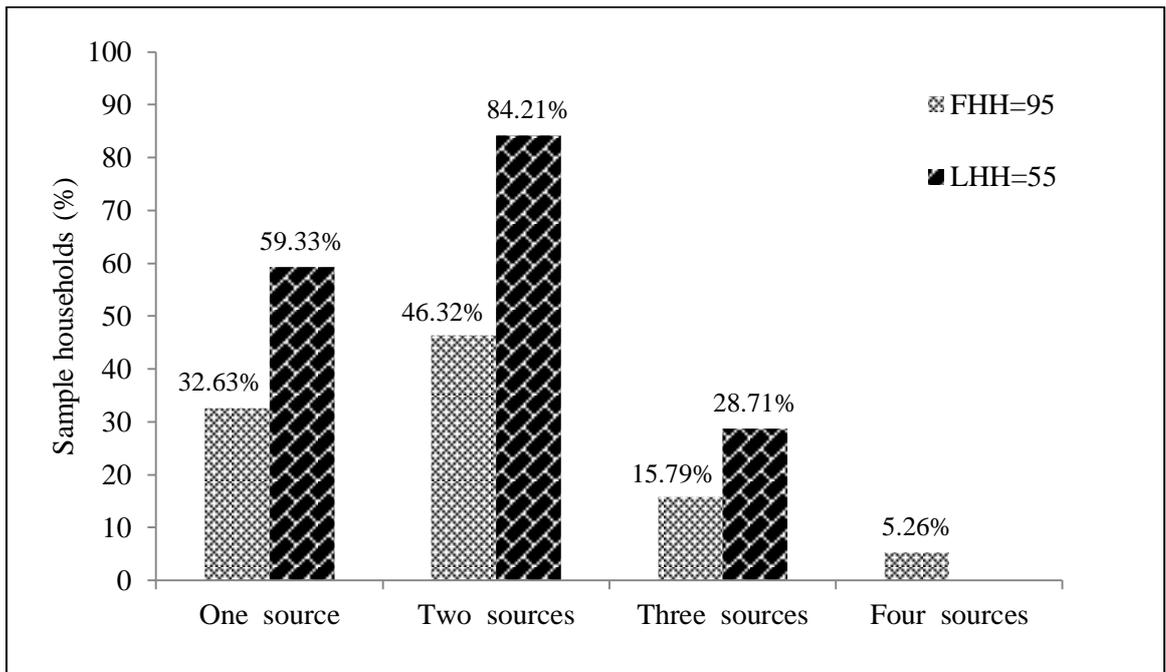

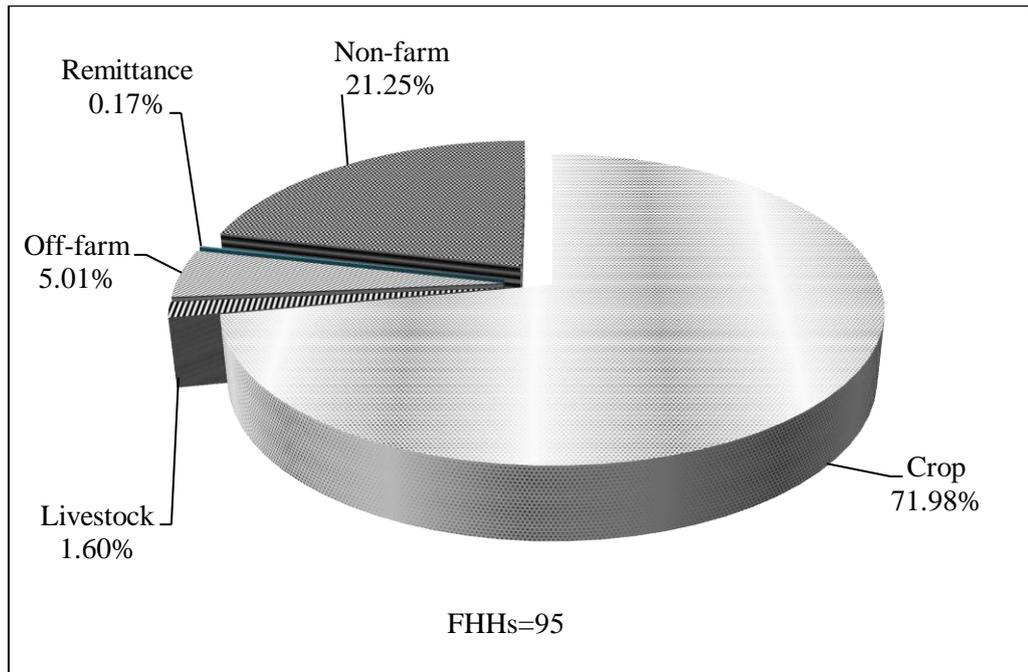**Figure 4.3 Number of income sources of the sample households in Magway Township**

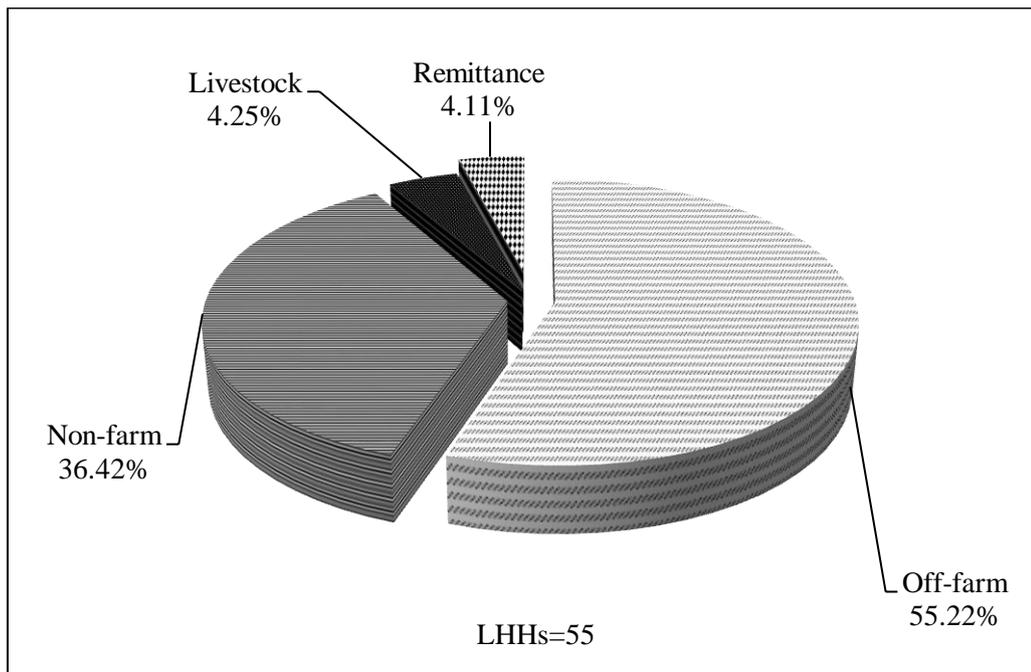**Figure 4.4 (a) Income composition of the farm households**

Figure 4.4 (b) Income compositions of the landless households

Table 4.15 Annual income amount of the sample households in the study area, 2016

Sources of income	Income ('000MMK per annum)	
	Farm HHs (n=95)	Landless HHs (n=55)
Crop income		
Average	4,626	-
Maximum	47,783	-
Minimum	110	-
Livestock income		
Average	650	518
Maximum	1,000	4,000
Minimum	50	15
Off-farm income		
Average	804	1,375
Maximum	4800	9,616
Minimum	10	160
Non-farm income		
Average	3,930	1,234
Maximum	73,920	3,960
Minimum	125	45
Remittance		
Average	353	1,253
Maximum	500	3,600
Minimum	160	15
Total income		
Average	6,427	2,218
Maximum	79,040	10,816
Minimum	320	192

Table 4.16 Different level of income diversification in Magway Township, 2016

SDI range	Level of income diversification	Farm HH (N=95)		Landless HH (N=55)		Total HH (N=150)	
		No.	%	No.	%	No.	%
< 0.01	No	32	33.68	19	34.55	51	34
0.01 - 0.25	Low	20	21.05	10	18.18	30	20
0.26 - 0.5	Medium	31	32.63	23	41.82	54	36
0.51 - 0.75	High	12	12.63	3	5.45	15	10

Table 4.17 Average value of SDI of sample households in Magway Township, 2016

Items	Average value of SDI
Farm HH	0.2302
Landless HH	0.2108
All	0.2232
	$t = 0.534^{ns}, P = 0.594$

4.6 Factors Affecting on the Livelihood Diversification of Sample Households

To determine the factors affecting on the livelihood diversification of sample households, multiple regression function was used. The Simpson diversification index value was employed as the dependent variable. The explanatory variables of the model were age of household heads, education level of household head, household size, farm size, dependency ratio, migrant of household members, value of household assets and credit taken amount. The dummy variables were included gender of household head and participation in organization.

In the results of descriptive statistics, average value of SDI was 0.22. The average age of household heads was 47 years and their education level was 5.45 years. The average household size (3.9 persons), average farm size (4.65 hectare), average dependency ratio (29.20 percent), average number migrant of household members (0.24 persons), the average value of household's assets (1,796,795 MMK), average amount of credit taken (457,440 MMK), the percentage of male household heads (85.33%) and female household heads (14.6%) and 68.67% participated in organizations were descried in Table 4.18.

According to the results described in Table 4.19, the farm size of sample households was negatively and significantly correlated with level of livelihood diversification of sample households at 5% level. The result indicated that one unit increases expressing the livelihood diversification index was expected to be decreased by 0.023. It means that farmers who owned larger farm size can have lesser livelihood diversification index. The household size was positively and significantly related with household livelihood diversification at 5% level. These result indicated that one unit increases in household size revealing livelihood diversification index will be increased by 0.06. It means that if the family who had large family size and households will be increased in household livelihood diversification. The participation in organizations of rural households was positively and significantly related with livelihood diversification index at 5% level. This dummy variable, participation in organization of households (yes=1, no=0) specified that household livelihood diversification index of rural household who has participated in organizations was 0.11 more than that farmers who did not participated in organizations. The education level was negatively affected with livelihood diversification index but not significantly related. Also, the dummy variable of gender of household heads was negatively affected with livelihood diversification index but not significantly

correlated. This dummy variable, gender of household heads (male=1, female=0) indicated that household livelihood diversification index of gender of household heads that female household heads was 0.039 more than the male household heads. The livelihood diversification of sample households were positively influenced by age of household heads, household size, dependency ratio, migrant of household members, value of household's assets and credit taken amount but not Overall, the F value revealed that the model was significant at 5% level. The R^2 value points out the model was significant and it can explain that variation in households' livelihood diversification was 25%.

Table 4.18 Descriptive statistics of dependent and independent variables

Variables	Units	Mean	Percent
SDI	Index	0.22	-
Age of household head	Year	47.00	-
Education of household head	Year	5.45	-
Household size	Number	3.90	-
Farm size	Hectare	4.65	-
Dependency ratio	Percent	29.20	-
Migrant of household members	Number	0.24	-
Value of household assets	MMK	1,796,795	-
Amount of credit taken	MMK	457,440	-
Gender of household head (Dummy)	-		
1 = male		-	85.33
0= female		-	14.67
Participation in organization (Dummy)	-		
1 = Yes		-	68.67
0 = No		-	31.33

Note: Dependent variable - Simpson income diversification index (SDI)

Table 4.19 Factors affecting on the livelihood diversification of sample rural households in Magway Township, 2016

Independent variables	Unstandardized Coefficients	Standardized Coefficients	t - value	Sig.
	B	β		
Constant	-0.429[ns]		-1.192	0.238
Age of household heads	0.003[ns]	0.155	1.258	0.213
Education of household heads	-0.006[ns]	-0.088	-0.726	0.471
Household size	0.060**	0.311	2.555	0.013
Farm size	-0.023**	-0.329	-2.294	0.025
Dependency ratio	0.001[ns]	0.072	0.598	0.552
Migrant of household members	0.012[ns]	0.023	0.200	0.842
Value of household assets	0.018[ns]	0.126	0.987	0.327
Amount of credit taken	0.008[ns]	0.046	0.385	0.701
Gender of household heads	-0.039[ns]	-0.065	-0.515	0.608
Participation in organizations	0.111**	0.226	1.961	0.054

R^2 = 0.249, F = 2.124**

Note: Dependent variable: Simpson income diversification index, ** are significant at 10% probability levels and ns is not significant.

4.7 Livelihood Constraints of Sample Households

The livelihood constraints of farm and landless households were separately demonstrated in Figure 4.6 (a) and (b). There were ten constraints perceived that farm households in the study area, such as high wage rate of agricultural labor, low crop price, diseases infestation on crop, uneven rainfall, inadequate capital, diseases of livestock, poor cultivation soil, poor health of household members, lack of irrigation water and lack of availability of quality seed. The seven constraints faced by landless households were lack of capital investment, poor health of household members, lack of cultivated land, transportation difficulties, low labor wages, scarcity of employment and diseases of livestock.

The majority of farm households indicated that high wage rate of agricultural labor, low crop price and diseases infestation on crop were the main constraints in the study area. The livelihood constraints mentioned by farmers were uneven rainfall (58.95%), inadequate capital investment (52.63%), diseases of livestock (41.05%), poor cultivation soil (28.42%), poor health of household members (26.32%), lack of irrigation water (20%) and lack of availability of quality seed (2.11%). Among the livelihood constraints 29.09%, 27.27%, 21.82%, 18.18%, 7.27%, 5.45% and 1.82% of landless households respectively faced by lack of capital investment, poor health of household members, lack of cultivated land, transportation difficulties, low labor wages, scarcity of employment and diseases of livestock.
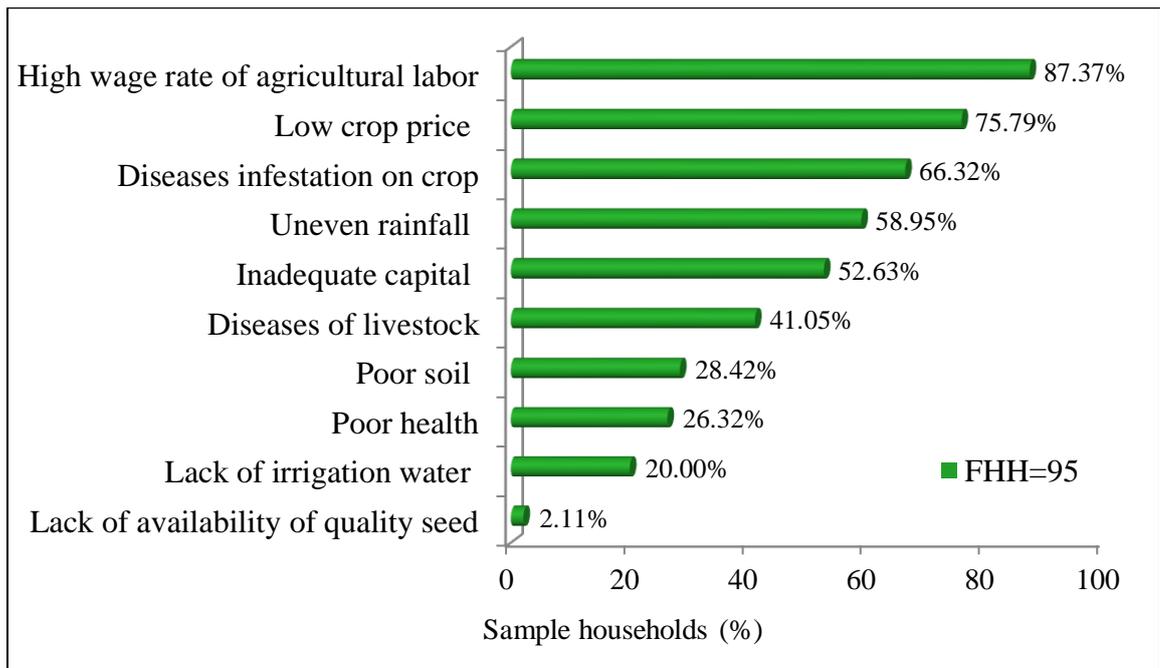
48

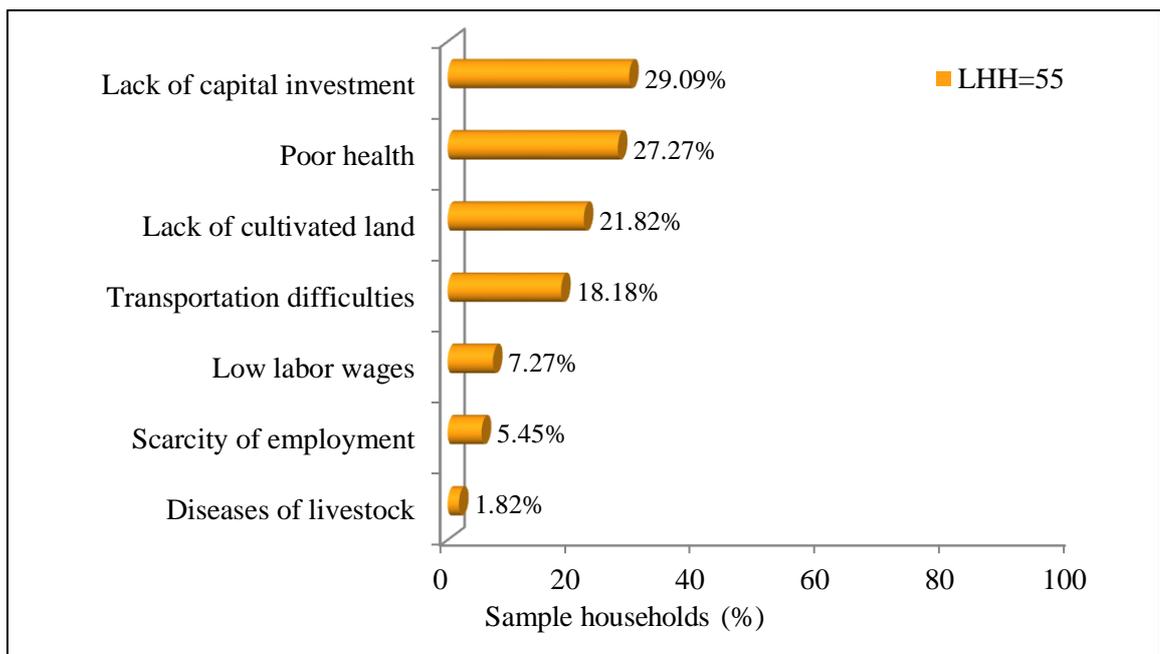**Figure 4.6 (a) Livelihood constraints of sample rural farm households in the study area, 2016**

Figure 4.6 (b) Livelihood constraints of sample rural landless households in the study area, 2016

CHAPTER V
SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary and Conclusion of the Study

This study emphasized to access household livelihood diversification and to determine factors affecting the rural livelihood diversification and to describe livelihood constraints in Magway Township, Dry Zone area. A total of 150 randomly selected households from five villages were involved as source of information. The respondents of rural households were divided into two groups such as farm households and landless households. Thus, 95 households were farm households and 55 households were landless households.

Both of farm and land less households were mostly headed by male. The education status of farm household heads' was slightly higher than landless household heads at middle, high school and graduate level. The average household size of farm and landless households was around four persons that were mostly found in the study area. The average age of farm household heads' was 48 years and the landless household heads was about 46 years old. The average dependency ratio of both farm and landless households were round about thirty percent. The majority of farm household heads employed farming for their primary income and most of landless household heads occupied causal labor and off-farm labor. Farm households more possessed luxury assets than landless. Both farm and landless households were interested in livestock rearing. Most of farm households owned upland and the average acre was 4.7 hectare where cultivated crops were sesame and groundnut.

The sample rural household's housings were mostly built with corrugated sheet, bamboo wall, bamboo floor or wood floor. Among the sample villages, only one village had electricity and well water was the main source for drinking. More than half of farm and landless households were in indebtedness form different sources. Most of farm households received credit from MADB for the use of farm inputs and landless households' credit money mostly used for their household consumption expenditures. Farm households were actively participated in the organizations rather than landless in study area.

Farming (71.9%) was the highest income source of farm households followed by non-farm (21%), off-farm (5%), livestock (1.6%) and remittances (0.2%). The largest income source of landless households was off-farm (55.2%) followed by non-

farm (36.4%), livestock (4.3%) and remittances (4.1%), respectively. The average value of SDI for farm and landless households were 0.23 and 0.21 respectively. Furthermore, the average value of sample households (0.22) showed that they had diversified their livelihood activities at low level. The average values of SDI were not significantly different between farm and landless households.

The result of regression model indicated that farm size had negative effect on the livelihood diversification at 5% significant level. It means that the larger the farm size they had, the lower the livelihood diversification index because their source of income mainly depend on their crop production from family labor inputs rather than other sources. The household size had positive and significant influence on the household livelihood diversification at 5% level. Participation in organizations of household also had positive and significant influence on household livelihood diversification at 5% level. If the participation of rural households in organizations had increased, the household livelihood diversification would have increased because rural households will get more information about recent technologies through communities and available credit from micro-finance cooperatives.

According to the livelihood constraints of the rural households, high wage rate of agricultural labor was the main constraints of farmers because of labor migration and scarcity of labor during peak season in Magway while lack of capital investment constraints was mostly responded by landless households.

5.2 Recommendation of the Study

According to the results, the following recommendation could be made.

In the study area, farm households actively participated in organizations than landless households. Participation in organization has positive relation to household livelihood diversification. In fact, landless households need more credit requirement than farmers. Therefore, organizations should give more emphasis on landless households to access credit to increase their livelihoods diversification. Landless households should be encouraged to cooperate in local organizations so that it will create more employment opportunities by utilizing the strength of organization.

Household size was found positively related to the level of diversification. It means that the larger the household size, the greater the household livelihood diversification.

The largest source for farm households comes from crop production but farmers are facing with high labor wage and low crop price. Therefore, farm households should be provided by rent or deposit selling of farm machineries to reduce high labor wage rate and scarcity of labor to get more profit with reduced costs.

Off-farm income was the largest share of landless households and most of landless were seasonal farm labor. Therefore, non-farm sectors become an important source of employment for landless.

The study suggests that development of rural community based small and medium enterprises (SMEs) should be encouraged and supported for better job opportunities.

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Appendix 1 Survey areas in Magway Township with selected sample villages in 2016
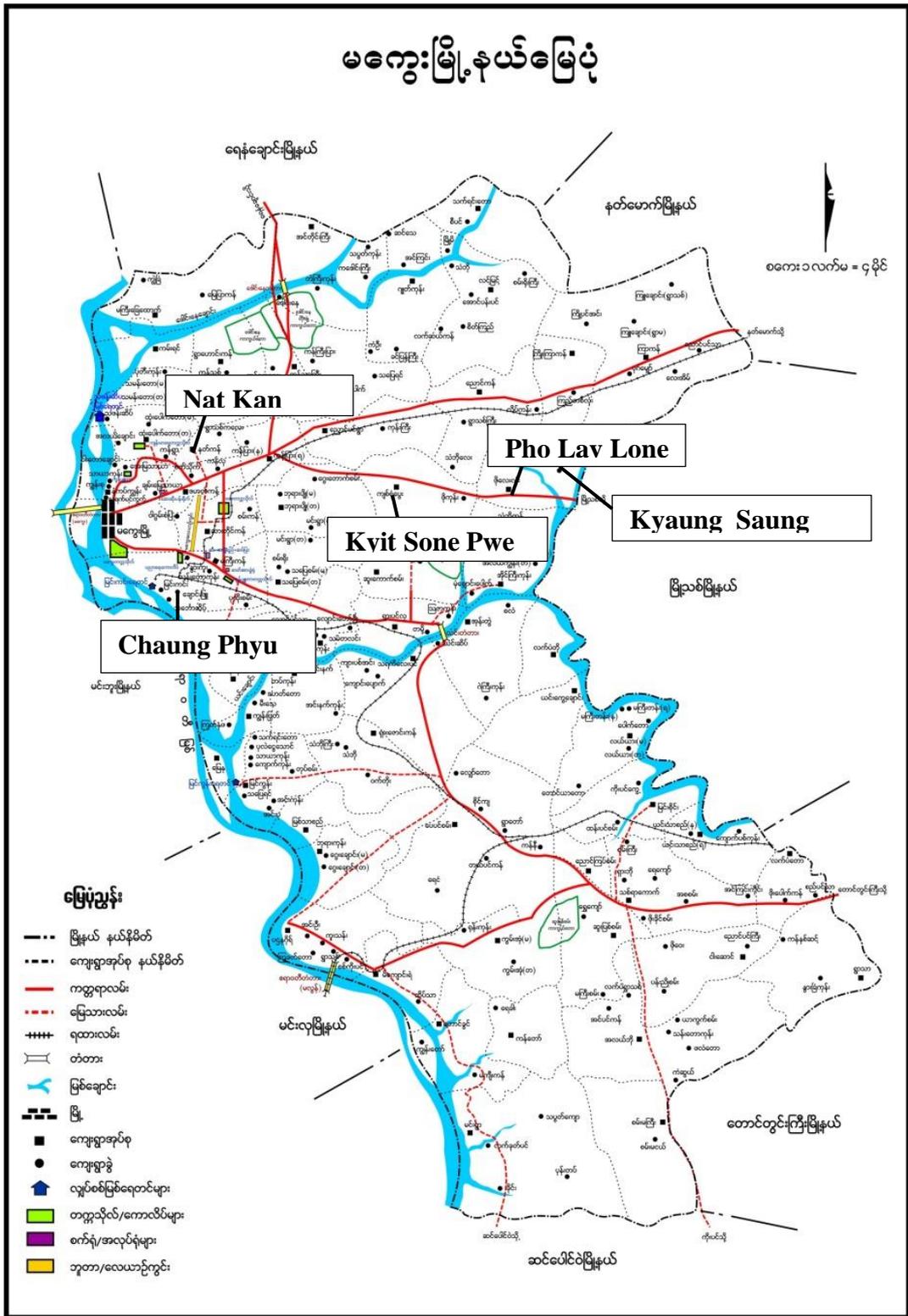
Appendix 2 Measuring of Livelihood Diversification (Simpson diversification index) in the study area, 2016

Items	FHHs		LHHs	
	Income proportion (Pi)	Pi^2	Income proportion (Pi)	Pi^2
Crop	0.76	0.66	-	-
Livestock	0.02	0.00	0.02	0.01
Off-farm	0.09	0.04	0.60	0.50
Remittances	0.00	0.00	0.03	0.02
Non-farm	0.12	0.07	0.35	0.26
ΣP_i^2	0.98		0.23	
SDI $(1 - \Sigma P_i^2)$	0.79		0.21	
Average SDI	0.22			
	$t = 0.534^{ns}, P = 0.594$			

Note: Pi = income proportion of the i-th income source and ns = not significant