STUDY ON FOOD SECURITY STATUS AND COPING STRATEGIES OF RURAL HOUSEHOLDS IN MYINGYAN TOWNSHIP, DRY ZONE AREA

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STUDY ON FOOD SECURITY STATUS AND COPING STRATEGIES OF RURAL HOUSEHOLDS IN MYINGYAN TOWNSHIP, DRY ZONE AREA

THANDAR WIN MAUNG

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

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The thesis attached hereto, entitled **"Study on Food Security Status and Coping Strategies of Rural Households in Myingyan Township, Dry Zone Area"** was prepared under the direction of the chairman of the candidate supervisory committee and has been approved by all members of that committee and board of examiners as a partial fulfillment of the requirements for the degree of **Master of Agricultural Science (Agricultural Economics).**

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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.

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DEDICATED TO MY BELOVED PARENTS,

U WIN MAUNG AND DAW HLA SAN MYINT

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ABSTRACT

This study was emphasized to estimate the food security status and coping strategies employed to cope with food insecurity and better understanding of major determinants of per capita food expenditure at household level in Myingyan Township, Dry zone area. The survey was conducted from six villages with a sample of 197 households in October, 2014. To examine rural household's access to food, the households were divided into farm and non- farm (landless) households. According to households' daily caloric availability based on minimum per capita daily food requirement 2100 kcal/person/day, food poverty line method and coping strategies method were used to determine household food security situation of the rural households.

The finding of the study revealed that 48.05% of landless household and 45.84% of farm households were food insecure in the study area. The major income of farmers group was from crop production and that of landless from non farm working. Not only average income but also per capita food cost of farmers was higher than that of landless households. The head count percent under the minimum per capita food expenditure was 71.4% for landless and 57.5% for farm households respectively. Landless households used 53% of total income for food consumption and farmers used 35% of total income for food consumption. These points out that landless were more vulnerable than farm households because they spent more than their income mainly for food consumption. About half of the landless and farm households were found in low level of coping strategies for food insecurity. Only 8.49% of landless and 6.01% farm households fall in severity of food poverty.

Total household income, households' rice consumption, households' meat consumption, non- food expenditure were positively and significantly influenced on per capita food expenditure and household size and migration were negatively and significantly influenced on per capita food expenditure. Due to migration, households' size become smaller and households consume more in food expenditure lead to improve food security status. The study recommended that proactive policy in health and nutrition extension services, enhance technology adoption, promote income diversification program, incorporating coping strategy in the regular projects and program and agricultural development program should be integrated to effort food security situation in Myingyan Township, Dry zone area.

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LIST OF ABBREVIATIONS

ACF	= Action Contre La Faim
CS	= Coping Strategy
CSO	= Central Statistical Organization
DoA	= Department of Agriculture
EHNRI	= Ethiopian Health and Nutrition research Institute
FAO	= Food and Agriculture Organization
FIVIMS	= Food Security and Vulnerability information and Mapping System
Ha	= Hectare
HFS	= Household Food Security
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
MOAI	= Ministry of Agriculture and Irrigation
MT	= Metric Ton
NNC	= National Nutrition Centre
NPAFN	= National Plan of Action for Food and Nutrition
UNICEF	= United Nations Children’s Fund
USAID	= United States Agency for International Development
WFS	= World Food Summit
WHO	= World Health Organization

LIST OF CONVERSION FACTORS

1 Hectare	= 2.471 acres
1 Kilogram	= 2.205 pounds
1 Metric ton	= 1000 kilograms
100 Grams of rice milled	= 360 calories
100 Grams oil of sesame seed	= 884 calories
100 Grams of chicken meat	= 122 calories
100 Grams of egg (albumin)	= 49 calories
100 Grams of pig meat	= 326 calories
100 Grams of beef meat	= 150 calories
100 Grams of pork meat	= 220 calories
3.6 Pounds	= 1.633 kilograms
46 Pounds of paddy	= 20.9 kilograms
75 Pounds of rice	= 34.0 kilograms

CHAPTER I
INTRODUCTION

1.1 Background

Myanmar is a resource rich country, with sufficient food availability at the national level, but a very uneven distribution of resources, lack of investment in key sectors (including water, sanitation and hygiene), health, education, and agricultural research and extension), and government policies that frustrate efforts to ensure household food security. Official statistics suggest that one quarter of Myanmar's households live below the national poverty line, and that one in ten households lives below the official food poverty line. Other reports suggest poverty rates were much higher on the order of a minimum of 50% of households. While agricultural development is important for the whole nation, it is especially important for rural areas where some 70% of the country's population reside and depend primarily on agricultural production as their main source of income. Moreover, employment opportunities for landless labor and other rural people depend heavily on agricultural activities (Wilson and Wai 2013).

In terms of food security, Myanmar has accomplished surplus food production at National level, but there were food deficit areas, mostly located in the central dry zones, Shan and Chin States. The groups most vulnerable to food insecurity in Myanmar include landless and near landless households, ethnic minorities, women (especially mothers), and young children. Lack of access to land is clearly a key source of vulnerability to food insecurity. Available evidence also suggests a strong correlation between landlessness and poverty. Poor households hold significantly smaller landholdings than non poor (IHLCA 2011). Likewise, rates of landlessness are much higher among the poor than the non poor. Among the poorest decile of households, 38% are landless. This contrasts with landless rates of only 7% among the richest decile of households. As a result of lower incomes and higher poverty rates, landless households are more likely than large landholders to go hungry and to borrow for food purchases (LIFT 2012).

The World Bank estimates more than 55% of Myanmar's population is landless, compared to just over 45% in Thailand and approximately 5% in Vietnam. The Livelihoods and Food Security Trust Fund (LIFT 2012), which covered across the Dry Zone, Delta, and certain Hilly Regions, found that nearly 72% of rural

households in the Delta/coastal areas are landless, and 43% are landless in the Dry Zone (Table 1.1).

Despite Myanmar's diverse agro ecology, abundant and varied crops, and rich ethnic and cultural diversity, households across the country consider rice is the heart of their diet. Rice is the major source of the energy for the Myanmar people as it contributes about 73 and 80% of the total daily dietary energy requirement in urban and rural households. Two-thirds of household expenditure is spent on food and rice carries the largest weight in the Consumer Price Index with 17% on average and with 27% for low income groups (CSO 2010).

The food security situation of Myanmar applied by FAO from 1990- 92 to 2011- 13 is shown in Table 1.2. It presents the trends of food deprivation and food needs of Myanmar during 1990 and 2013. The number of undernourished person was declined from 44 % of the total population in 1990-92 to 10 % in 2011-2012. Average daily dietary energy requirement for a person was 2,330 kcal in 2011-2013.

Table1.3 presents paddy production and consumption, seed stored for next planting season, losses and surplus and deficit condition (2011/12). The major traditionally rice surplus areas are Ayeyarwady Region, followed by Bago (comprising East and West Bago) and Sagaing Regions. The traditionally deficit areas are Chin State as well as Mandalay and Magwe Regions (MOAI 2012).

Yet national rice self-sufficiency has not translated into food security for the poor. Given a highly skewed distribution of assets and income, rates of poverty and hunger remain stubbornly high. Agricultural income remains low in comparison with its international competitors and neighbors. With per capita farm earnings that average roughly $ 200 per year, Myanmar's farming households earn one-half to one-third of the levels attained by their regional peers (Table 1.4).

According to IHLCA (2011), roughly one-fourth of the national population and 29% of rural households fall below the national poverty line. Because agriculture employs two-thirds of Myanmar's labor force, and because agriculture affects national food supply, the stability and level of food prices and purchasing power of both the rural and urban poor, broad-based agricultural growth offers a singularly powerful instrument for raising rural incomes and reducing poverty, food prices and hunger.

Small and large farms each have a role to play in promoting efficient, rapid income growth. Given Myanmar's current high levels of landlessness and rural

poverty, concerted efforts to promote broad-based small farmer growth offers the likeliest source of broad-based rural poverty reduction, especially in the short term and medium term (Deningerand Derek 2012).

1.2 Rationale of the Study

In Myanmar, the country GDP in 2013-14 was estimated at 856.8 billion. Based on the preliminary population figure of 51.4 million from the national census, the country per capita GDP was around $ 1105- one of the lowest in East Asia and Pacific (World Bank 2015). An estimated 25.6% of Myanmar's households live below the national poverty line. Especially, some of food deficit hilly region and dry zone areas suffers from food insufficient situation. Mandalay Region situated in the Dry zone is one of the poverty- stricken area and food insecurity area in Myanmar. According to IHLCA (2011), the largest number of poor households is concentrated in Ayeyarwady, Mandalay, Rahkine and Shan; 2/3 of total food poverty and over half of total poverty are in these four regions/states.

Regardless of whether the absolute percentages of households living in poverty and food poverty are accurate, there are clearly important differences in the distribution of poverty, food poverty, and other important food security indicators whether one examines secondary data or visits villages around the country. The factors affecting household food security are generally economic such as household income, price of food, market access and performance, investment, job opportunities, etc. Therefore, it is essential to cover and conduct studies, and set up appropriate development programs at the local (sub-district) level to increase living standard of the rural people.

One of the poverty striken areas of Myingyan district is situated in the Mandalay region of central Myanmar. The climate is dry and it is one of the resource poor and drought suffered area. The rural people in this area are high level of landlessness and low acreage of accessible land for those who do cultivate. Almost irrigation schemes have been focused in these areas; there were not enough irrigation facilities for crop production. They rely on market purchase for food access in the context of low, undiversified, agricultural based incomes, high debts and reliance on credit. Lack of data on the relative contribution of households' production versus market purchases to household consumption hinders accurate assessment of household vulnerability to food insecurity. Therefore, food security assessment not

only at household level but also at individual level can enhance the understanding on the real livelihood situation in the Dry Zone. The study would partially provide the current food security situation of the sample rural households, factors influencing per capita food expenditure and their coping strategies of food insecurity in the Dry Zone area.

1.3 Objective of the Study

1. To study the demographic and socio-economic characteristics of the sample farm and non- farm (landless) households in Myingyan township
2. To examine the farm and landless and households' food security status by applying food poverty line method
3. To find out the farm and landless households' coping strategies employed to cope with food insecurity
4. To identify the determinant factors influencing on per capita food expenditure of the sample households
5. To assess the major constraint faced by the sample farm and non- farm households in the study area

Table 1.1 Percentage of landless rural households in Myanmar

Percentage of rural households			
Land own (acres)	Delta/coastal	Dry zone	Hilly regions
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 Food security situation of Myanmar

Indicators	Unit	1990-1992	1995-1997	2000-2002	2004-2006	2007-2009	2009-2011	2011-2012	2011-2013
1. Food deprivation									
(a) Proportion of undernourishment	%	44	34	26	17	-	-	10	-
2. Food needs									
(b) Minimum dietary energy requirement	Kcal/ person/ day	1750	1770	1790	1810	1810	1820	-	1820
(c) Average dietary energy requirement	Kcal/ person/ day	2210	2240	2280	2310	2310	2320	-	2330

Source; www.faostat.org (2013)

Table 1.3 Paddy production and consumption, seed stored for next planting season, losses and surplus and deficit condition (2011/12)

State/ Division	Sown acre	Production (million baskets)	Population (No.)	Consumption (million baskets)	Seed for next season (million baskets)	Losses (million baskets)	Total utilization (million baskets)	Sufficiency based on consumption (%)	Self sufficiency (%) based on total utilization (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)=3/5	(10)=3/8
Nay Pyi Taw	185	16,045	1,161	16,104	370	555	17,029	100	94
Kachin	545	35,418	1,600	22,407	1,090	1,635	25,132	158	141
Kayar	106	6,637	361	5,100	212	318	5,630	130	118
Kayin	652	45,633	1,837	26,658	1,304	1,956	29,918	171	153
Chin	108	4,852	536	8,079	216	324	8,619	60	56
Sagaing	2,181	18,771	26,603	95,337	4,362	6,543	106,242	197	177
Tanintharyi	357	24,718	1,736	24,570	714	1,071	26,355	101	094
Bago	3,055	21,604	76,073	86,670	6,110	9,165	101,945	249	212
Bago(east)	1,911	13,713	53,995	56,676	3,822	5,377	66,231	242	207
Bago(west)	1,144	78,912	2,078	29,994	2,288	3,432	35,714	263	221

Source: MOAI (2011/12)

Table 1.3 (Contd.) Paddy production and consumption, seed stored for next planting season, losses and surplus and deficit condition (2011/12)

State/ Division	Sown acre	Production (million baskets)	Population (No.)	Consumption (million baskets)	Seed for next season (million baskets)	Losses (million baskets)	Total utilization (million baskets)	Sufficiency based on consumption (%)	Self sufficiency (%) based on total utilization (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)=3/5	(10)=3/8
Mgway	1,055	90,368	5,682	82,056	2,110	3,165	87,331	110	103
Mandalay	789	64,491	7,352	102,753	1,578	2,367	106,698	63	60
Mon	911	63,028	3,168	44,424	1,822	2,733	48,979	142	129
Yakhine	1,143	76,826	3,341	48,330	2,286	3,429	54,045	159	142
Yangon	1,383	97,376	7,104	90,312	2,766	4,149	97,227	108	100
Shan	1,513	118,824	5,726	80,802	3,026	4,539	88,367	147	134
Shan(north)	632	42,304	2,117	30,048	1,264	1,896	33,208	141	127
Shan(south)	472	45,334	2,508	35,661	944	1,416	30,821	127	119
East	409	31,186	1,101	15,093	818	1,227	17,138	207	182
Ayeyarwady	4,778	342,371	8,131	117,348	9,556	14,334	141,238	292	242
Union	18,761	1,390,346	60,483	850,950	37,522	2,780,692	944,755	163	147

Source: MOAI (2011/12)

Table 1.4 Comparison of agricultural income and food security among Myanmar's neighbors

Country	Agricultural income per agri. worker ($ per year)	Poverty (% under $1.25 per day)	Malnutrition (% children underweight)
Malaysia	$ 6680	<1	13
Philippines	$1119	18	21
Indonesia	$ 730	18	20
Thailand	$ 706	<1	7
Bangladesh	$ 507	43	41
Cambodia	$ 434	23	29
Vietnam	$ 367	17	20
Myanmar	$ 194	26	32

Source: World Bank Development Indicators (2012)

CHAPTER II
LITERATURE REVIEW

2.1 Concepts and Definitions of Food Security

The definition of food security was developed from the perspective of food-supply to ensure that all people everywhere have enough food to eat. The importance of consumption and access has been put forward through the concept of entitlement (Sen 1981). The food related problems are influenced not only by food production and agricultural activities, but also by the structure and processes governing entire economies and societies. Food insecurity has been caused not only by scarcity but also by institutional failures that led to suboptimal food distribution. Therefore, multisectoral planning was introduced to tackle food insecurity. Within this global strategy, one can distinguish between strategies of growth-mediated security and strategies of support-led security (Braun et al. 1992).

Food security definition has widely established the four pillars of food security: availability, accessibility, utilization and stability. (1) Availability addresses the supply side of the food system, referring to the physical availability within a country, of food supplies sufficient to feed its population. (2) Access addresses the demand side of the food system by requiring that all population groups possess sufficient purchasing power to procure the quantity and quality of food their family requires. (3) Utilization refers to the ability of the human body to absorb and retain required nutrients. Health status, disease burdens, feeding practices and water quality all affect food utilization and hence nutritional outcomes. (4) Stability along all these dimensions requires that all household members and the food system be able to maintain adequate food availability and consumption in all seasons of the year as well as during drought or flood periods that may strain supply systems or the income sources of vulnerable populations. Agriculture governs three of the four determinants of food security. Availability depends on the productivity and efficiency of farmers, traders and food processors. Access depends on incomes and purchasing power (FAO 2012). In a country such as Myanmar, where two-thirds of the population earns its living from agriculture, improved agricultural productivity offers a singularly powerful lever for improving purchasing power of broad groups of vulnerable populations. Stability of food supplies, incomes and purchasing power likewise hinges, in large part, on the flexibility, efficiency and responsiveness of water control, farming and marketing systems (Haggblade 2013).

2.2 Overview of Food Insecurity in Developing Countries

Global food security continues to be a cause for concern and is still a major problem facing the world. Many people around the world do not have enough and safe nutritious food and this has had a negative effect on their livelihood (McDonald, 2010).

The latest FAO estimates indicate that global hunger reduction continues: about 805 million people are estimated to be chronically undernourished in 2012–14, down more than 100 millions over the last decade, and 209 millions lower than in 1990–92. In the same period, the prevalence of undernourishment has fallen from 18.7% to 11.3% globally and from 23.4% to 13.5% for the developing countries. However, about one in every nine people in the world still has insufficient food for an active and healthy life. The vast majority of these undernourished people live in developing countries, where an estimated 791 million were chronically hungry in 2012–14 (FAO 2014).

According to FAO (2006) the Sub-Saharan region has the highest incidents of malnutrition and food insecurity as compared to other regions in the developing world. Thompson (2012) estimated that about 200 million African children are undernourished; 126 million of them are chronically undernourished while 5 million die every year due to hunger. A large number of people living within the regions of East Africa and Southern Africa are not able to consume an average daily calorie intake of 2100 kcal (Boussarad et al. 2006).

Ndobo (2013) indicated that the attainment of household food security is a major concern facing the world at large, including South Africa. South Africa is classified as a middle income country with large inequalities and absolute poverty. Although South Africa is nationally self-sufficient in food supply, many households are vulnerable to food insecurity. Natural disasters, population growth, low agricultural development, food prices, income inequalities, poverty and health issues are the main causes of household food insecurity in the world.

Chaparro et al. (2014) reported poverty in Asia is influenced by food security, population densities, and lack of land ownership; all three of which also impact nutritional status. In many parts of Asia, population density is high, limiting the amount of land a household has access to. Increasing landlessness as a result of increasing population pressure on the land is a significant factor in the changing nature of household food security and poverty. Timor Leste has the greatest

proportion of people (38%) whose food intake falls below minimum energy requirements, a proportion defined as “very high” by FAO. Laos has the next highest proportion (27%), and along with the Philippines (16%), these three countries are not on target to meet Millennium Development Goal 1 of reducing the proportion of people suffering from hunger by 2015 (FAO 2012). Indonesia and Vietnam have the lowest proportions (9% and 8% respectively) of their population who are considered undernourished by FAO standards.

People found to be food insecure generally cannot consume or grow enough food due to limited resources (Boussard et al. 2006). Other instances of food insecurity are found amongst those who have been victims of wars, the urban poor and low-income households, especially in underdeveloped countries. Rudolph et al. (2012) in Johannesburg revealed that there is a strong relationship between employment, income and food insecurity.

Reddy (1999) explained that food security at a national level does not guarantee food security at a household level. Von Braun et al. (1992) alluded that household surveys provide an adequate measure for understanding the problem. Moreover, socio-economic and demographic factors are crucial for assessing changes in household food security. The effects of socio-economic and demographic variables of households are also considered in food security studies, in order to understand the factors that determine the food security status of households. When the issue of food security is addressed; social justice, self-reliance and community economic development should be emphasized among all local and regional leaders (Babu et al. 2009).

2.3 Household Food Insecurity and Income Poverty in Myanmar

Food insecurity has been described as “a condition in which people lack basic food intake to provide them with the energy and nutrients for fully productive lives” (FAO 2003). In Myanmar, household food insecurity is primarily due to differences in the ability of households to access sufficient food throughout the year. According to World Food Program (WFP), in terms of food security status, households without access to land and those with small plot sizes below two acre are more likely to be food insecure.

Household food insecurity depends on; (1) low contribution of household subsistence production to household food needs (livestock ownership and land access

determinants of mothers Body Mass Index), (2) reliance on market purchase for food access, (3) poor economic access to food (Due to small landholdings/high landlessness; limited irrigation/low yields; small stocks), (4) challenges in accessing market may impede food access and (5) potentially, poor intra household food allocation (Sibson 2014).

According to UNICEF (2012), nutrition security is more than just food security. It is the outcome of good health, a healthy environment, and good caring practices. However, despite good economic growth in several Asian countries, there has been insufficient progress in reducing under nutrition in recent years. One billion people in the world suffer from chronic hunger and two thirds of them live in Asia.

Chronic food and nutrition insecurity is the consequence of a number of situations: unfavorable economic policies, rural underdevelopment, vagaries of weather, and the marginalization of some sectors of the population. The specific causes of chronic food insecurity may include the unavailability of food due to poor production practices or market failures, and/or the inaccessibility of food due to low income (ACF 2012).

At national level, 10% of the populations are considered to live under the food poverty line, although there is great variation between the States and Divisions. This is based on a minimum level of food expenditure on a consumption basket necessary to satisfy the caloric requirements of household members (UNDP 2007).

Dolly Kyaw (2009) reported that despite Myanmar can produce food to meet increasing demand from population growth, low purchasing power resulting from low level of income and high inflation is the major constraint in the reduction of malnourished people. The raising food price has been severely affected on the landless and small farm households who have low level income and a high proportion of budget is used for food.

Access to food depends on whether consumers have enough money to purchase the food they require. It is the ability of a household to secure food in the market place from household income sources or through other sources such as transfers or gifts. This underscores the importance of household purchasing power. Whether households have access to food depends upon factors such as household income, food prices, employment opportunity and working resources, such as labor, capital and capability (Tin Maung Shwe and Thidar Chaw Hlaing 2011).

Sibson (2014) mentioned that there was an absence of evidence of many

significant associations between nutrition outcomes and indicators of food security and poverty revealed in further analyses at the Dry Zone level in Myanmar. Two main reasons are likely: firstly, widespread inadequacy of many indicators across the Dry Zone eg. Low income and high indebtedness and secondly other casual factors are under nutrition risk, e.g. differences in topography between zones will affect food security but also services access and infrastructure.

2.4 General Information for Dry Zone Area in Myanmar

About 23% of the total population lives in the dry zone areas and the majority of population rely on agriculture and allied activities for their livelihoods. Agriculture is heavily dependent on the south-west monsoon but low annual precipitation with an irregular and unpredictable distribution over time and space causes both water shortages and localized flooding. This poses a regular threat to rural, agriculture dominated livelihoods, causing localized crop failures and losses. Consequently, the Dry Zone is one of the most food insecure areas in the country. The Dry Zone in central Myanmar covers large parts of the Magway, Mandalay and lower Sagaing Regions, including 58 townships. The area covers about 13 percent of the country's total area and has a population of roughly 14.5 million - close to a third of the country's population. Typical households contain five to seven people and the land is densely populated (JICA 2010). The Dry Zone, an area regularly affected by climate events. It has different agriculture patterns than other major growing areas in the country and also lack of updated food security data for the Dry Zone (WFP 2014).

Female-headed households were more disadvantaged than male-headed households in the Dry Zone in terms of poverty measures (headcount, poverty gap and squared poverty gap indices) and poverty related indicators (land holding size, earned income, capital amount, rice sufficiency period, number of children death under five years old, frequency of visiting the doctor, primary education enrolment, literacy, access to safe drinking water, access to electricity supply, access to production technology information, and participation in decision makings, etc (Dolly Kyaw 2006).

The categorization does not attempt to distinguish gender or age as a separate category of vulnerability; however, certain sources of vulnerability (e.g., disease) appear to disproportionately affect young children and possibly women. Many sources of vulnerabilities – including lack of access to affordable financial services,

climate change, and natural disasters –cut across agro-eco zones, and affect both the landless and poorest farmers. Others are unique to particular geographic areas, for example, the seasonal water shortages that confront households in the Dry Zone (Walison et al. 2013).

2.5 Indicators for Measuring Household Food Security (HFS)

It is essential to have a clear understanding of the potential usefulness of each indicator to enhance understanding of food security. Table 2.2 provides a grouping of potential indicators at each level of society, an important first step in identifying appropriate food security indicators in Myanmar. Due to the multi-sectoral and multi-disciplinary nature of food security, indicators should be selected based on the needs of users at national, sub-national and individual level. Different groups and institutions may choose to utilize different indicators according to the role they play in informing different food insecurity decisions (Tin Maung Shwe and Thidar Chaw Hlaing 2011).

Indicator should be chosen in such a way that they meet a range of desirable properties. Some of the properties are based on the policy relevance of the indicators while others are based on scientific criteria (Eele 1994). Hadded et al. (1991) indicated that a number of different indicators can be used for delineating HFS. These are divided into process indicators that reflect both food supply and food access, and outcome indicators which serve as proxies for food consumption. Consensus has still not been reached on acceptable indicators and methods of measuring HFS.

Indicators that reflect food supply include inputs and measures of agricultural production, access to natural resources, institutional development and market infrastructure, and explore to regional conflict and its consequences. Indicators that reflect food access are the various means or strategies used by household to meet their HFS needs. Outcome indicators can be grouped into direct and indirect indicators. Direct indicators of food consumption include those that are closet to actual food consumption rather than marketing cannel information or medical status (eg. household consumption surveys). Indirect indicators are generally used when direct indicators are either unavailable or too costly (in terms of time and money) to collect (eg. storage estimates, nutritional status assessments). The indicators that are used will depend upon the financial, Human, institutional and infrastructural resources available (Frankenberger 1992).

An indicator can be labeled undernourishment, a measure commonly identifies with the FAO. This FAO begins with the estimate of per capita dietary food energy supply, derived from aggregate food supply data. Assumptions regarding this distribution of this supply across households are made based on income or consumption distribution or other available data. The proportion of undernourished in the total population is then defied as that part of distribution lying below a minimum energy requirement level (Naiken 2003). The FAO measure is useful for comparison of energy deficiencies across countries and overtime.

2.5.1 Household coping strategies index (CSI)

The coping strategy index is a group of questions that are asked in a household to find out how they manage to cope with the shortage of consuming enough food. The coping strategy index is estimated by measuring behavior, such as the things individual household do when they cannot acquire sufficient food (Maxwell et al. 2003). The coping strategies are often identified by the person who is responsible for preparing or consuming the food. Thus the coping strategies observed are usually linked to food practices in the short-term (Maxwell 1995). Several studies have used the coping strategy index to measure the extent of household food insecurity. Maxwell (1996) observed that the most common short-term coping strategies employed by households are: eating foods that are less preferred, limiting portion size, borrowing food or money to buy food and skipping meals.

Oldwage et al. (2006) in Gauteng (Vaal triangle) revealed that the majority of female-headed households experienced incidences of money shortfall in their quest to consume food during the month preceding the study. The coping strategies employed by these households were cooking limited variety of foods during the previous month and limiting portion sizes. One way to identify food insecure households or regions is to determine the coping strategies they use to offset threats to food and economic resources in the event of hardship, and the frequency with which they have recourse to them (Corbett 1988).

Among coping strategies are relying on less preferred/inexpensive food; borrowing food, or relying on help from friends or relatives; gathering wild food, hunting or harvesting immature crops; consuming seed stock held for the next season; sending household members to eat elsewhere; limiting portion size at meal times; restricting adult consumption in favor of small children; reducing the number of meals

eaten in a day; skipping entire days without eating and begging from neighbors or friends (Mjonono et al. 2009).

FSIN (2012) in Myanmar recommended that the Reduced Coping Strategies Index (CSI) is one of an indicator of household food security. This index results in a score that reflects current and perceived future food security status. Changes in the index provide a rapid indication of whether food security is getting worse or the situation is improving – a higher score indicates a greater level of coping, and hence increased food insecurity. The reduced CSI captures information on five standard coping strategies listed are:(1) eating less preferred food,(2) borrowing food/ money from friends or relatives,(3) limiting portions at mealtimes,(4) limiting adult intake and(5) reducing the number of meals per day.

Table 2.1 Key sources of vulnerability in Dry Zone

Dry Zone	
Farmers	Landless
• Price vitality • Seasonal water shortage • Lack of access to affordable financial services • Disease • Climate change • Sudden loss of access to land	• Underemployment • Seasonal water shortage • Lack of access to affordable financial services • Disease • Climate change

Source: Wailson et al. (2013)

Table 2.2 Identifying food security indicators in different level of society

National and Sub-National Context Indicators		
Demographic Conditions	Environmental Conditions	Economic Conditions
Socio-Cultural Conditions	Risk & Hazards Conditions	Emergency & Shocks
Household Context Indicators		
Care & Feeding Practices	Household Characteristics	Health & Sanitation
Individual Outcome Indicators		
Food Consumption status	Health Status	Nutrition Status

Source: FIVIMS Tools and Tips, FAO (2002)

CHAPTER III
RESEARCH METHODOLOGY

3.1 Conceptual Framework of the Study

The present study examines the socio-economic issues and the food security status of farmers and landless in the Myingyan township of the dry zone area. Food security has three components viz., food availability, access, and utilization (Herwig 2000). Food security was defined as "access by all people at all times to enough food for an active and healthy life"- as a guiding principle for designing interventions in rural areas because poverty is the major determinant of food insecurity and achievement of food security is the goal of development (World Bank 1986). Households' production potential or ability to acquire income may seriously worsen by drastic changes in environmental conditions such as during periods of drought or social conflict also threatens the food security situation of the residents. These conditions not only compromise households' access to food temporally but also have severe implications for the future productive potential of households and, in turn, their long term food security. In this case, households may become food insecure and their caloric intake can be lower than minimum level of international normative reference recommendation rate of an average 2100 kcal per person/per in adult equivalent for the average person needs to lead a healthy life (WFP 1998).

Figure 3.1 depicts a simplified causal model of linking food security status with socio economics determinants at household level. Herwig (2000) stated that food availability referred to the physical existence of food, be it from own production, purchase from markets or from transfer and Riely et al. (1995) elaborates that food access is ensured when all households and all individuals within those households have sufficient resources to obtain appropriate foods for a nutritious diet. Food access is a function of the physical, social and policy environment which determine how effectively households are able to utilize their resources to meet their food security objectives.

In this conceptual framework, the food security status is an outcome of food intake and so called caloric intake. Given a certain basic level of food acquirement, a household's food security level would be influenced by the following factors. During the drastic changes in these factors, may seriously disrupt production potential or ability to acquire income thereof threaten the food access of affected households.

These shocks not only compromise households' access to food temporally but often lead to the loss of productive assets and they also have severe implications for the future productive potential of households and, in turn, their long-term food security. This idea implies that when these conditions become worsened, the rural households can be separated into food secure and insecure households groups which have been depicted in different boxes due to their consumption less than or greater than 2100 kcal /person per day.

Herwig (2000) has described about utilization as, it has a socio-economic and a biological aspect. Adequate food utilization is realized when food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition, health and sanitation services exist (United States Agency for International Development (USAID 1992). However, food also has an important social role keeping families and communities together. In situations of food insecurity, this role of food security can be achieved only when sufficient culturally adapted food is available within households and communities to meet its biological and social needs). Food security is a dynamic phenomenon: its impact varies depending on its duration, its severity, and the local socioeconomic and environmental condition.

There are two types of food insecurity such as chronic and transitory food insecurity. Chronic food insecurity means that a household runs a continually high risk of inability to meet the food needs of household members. Transitory food insecurity occurs when a household faces temporary decline in the security of its entitlement and the risk of failure to meet food needs of short duration. When facing both cases, households respond in different ways to reverse the situation commonly known as copping strategies (Tefera 2014). As a result, the food security status of the households can be improved. But if the frequency of the problems increases overtime, a negative outcome on food security can follow. Riely et al. (1999) described this reality as "over time, as a crisis deepens, household responses become increasingly costly, leading to the loss of productive assets (e.g. land degradation, loss of cattle, etc.) which can ultimately undermine future livelihoods and, again, their long-term food security status".

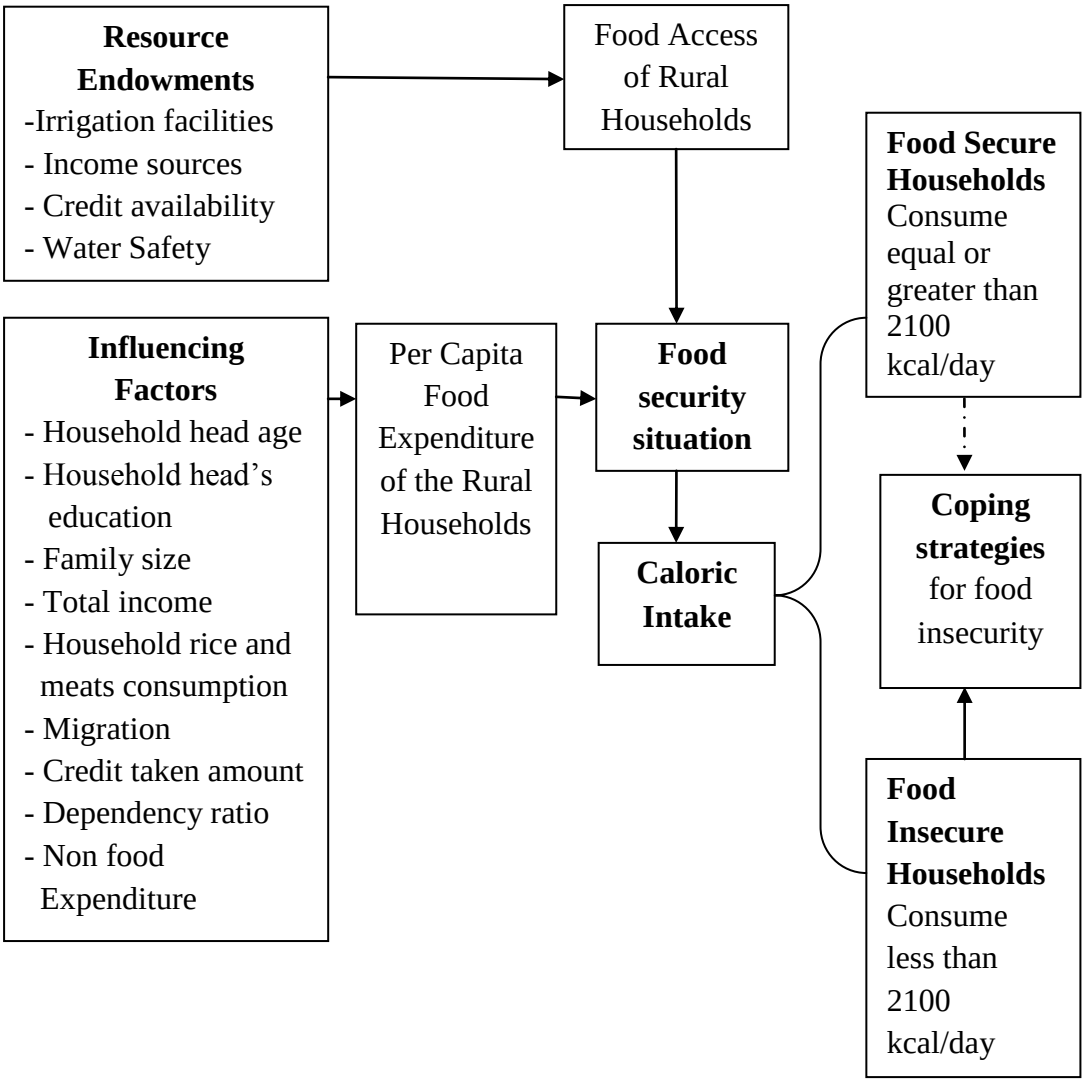


Figure 3.1 Conceptual framework of food security developed for the study

Note: The broken line indicates that food secured households satisfy their daily calories requirement despite they also faced food deficit over the year and forced to employ coping strategies

Adopted from Tefera et al. (2014)

3.2 Study Area Profile

Myingyan Township is situated in Mandalay Region and one of the central economic situation areas in Mandalay region. Agriculture and services are the major livelihoods in the study area. The total area of Myingyan district is about 969.398 sq km and situated between 60- 400 meter of the sea level. It lies in the valley of the Ayeyarwady River, to the south of Mandalay, on the east bank of the river. The climate is dry and the annual rainfall averages about 35 inches. The temperature varies between 43 and 11.4 C (DoA, Myingyan Township 2014). It is one of the resource poor and drought suffered area. The rural people in this area are high level of landlessness and low acreage of accessible land for those who do cultivate. Although most irrigation schemes have been focused in the dry zone and in food deficit areas, there were not enough irrigation facilities in this area. They rely on market purchase for food access in a context of low, undiversified, agriculture-based incomes, high debts and reliance on credit. The ordinary crops are millet, sesame, cotton, maize, rice and a great variety of peas and beans. The major livelihood is agriculture and services and the main cultivated crops such as pulses, oil seed crops and onions are imported to the lower Myanmar.

It has 186 villages including about 66 village tracts, 56,150 total households and the populations are about 272,965 people in 2014. The sample villages in Myingyan Township were purposively selected and the households were randomly selected to fulfill the objective of the study. Firstly, six village tracts were selected among the sixty six village tracts in Myingyan Township in Dry zone area. One of the poverty stricken areas, Myingyan Township in Mandalay region was selected for the sample area due to the following criteria,

(i) Drought suffered area

(ii) The most fragile and resource poor area

(iii) One of the rice deficit area in Myanmar

The six villages such as (1) Shwe Paw Kyun, (2) Taung Shae, (3) Chay Say, (4) Kan Chaw, (5) Thit Yone and (6) Nat Htar were selected among six village tracts. The five villages in Myingyan Township have easy access to road but Chay Say village is far away from Myingyan Township. In Shwe Paw Kyun, although the villages are not situated in the remote area of the Township, transportation is very poor to go to this village. Half of the sample villages are near the dams but do not receive irrigation water for their land.

The landless households in these villages engage as casual labors, carpenters, odd jobs etc. Some of the family members in the sample households are rolling cigarettes for their extra income. Livestock such as goats and sheep are mainly raise in all villages. Almost all villages have primary schools and medical clinics.

3.2.1 Shwe Paw Kyun village

Shwe Paw Kyun village is situated in Na Bu I village tract. Total population is 269 with 100 males and 169 females. There are 45 households in this village in which 35 households are male-headed households and the rest of 10 are female- headed households. The major livelihood relies on agriculture and there are 24 lowland farm households, 35 upland – farm households and 17 landless households in the village. According to land utilization, 15 acres are lowland, 5 acres are alluvial soil and 15 acres are area of residents. There is a dam near the village, one common well and 10 private tube- well in it.

The village of Shwe Paw Kyun possesses a primary school but there was no access to electricity. Although villagers received credit from the cooperative, there are no existing microfinance services.

3.2.2 Taung Shae village

Taung Shae village is situated in Gway Pin Yo village tract. Total population is 1,144 with 700 males and 444 females. There are 204 households in this village in which 109 households are male-headed households and the rest of 5 are female-headed households. The major livelihoods consist of agriculture, livestock and handicraft. There are 80 farm households, 30 livestock and 60 landless households in the village. According to land utilization, 300 acres are upland and 750 acres are area of residents. There are three lakes near the village, five common well, four common tube- wells and two private tube- wells in the village.

The village of Taung Shae has only a secondary school and a medical clinic. The village has access to electricity. Although the villagers received credit from the cooperative, there are no existing microfinance services.

3.2.3 Chay Say village

Chay Say village is situated in Chay Say village tract. Total population is 1,189 with 585 males and 604 females. There are 236 households in this village in

which 198 households are male-headed households and the rest of 38 are female-headed households. The major livelihoods consist of agriculture, livestock and handicraft. There are 125 farm households, 47 livestock and 15 landless households in the village. According to land utilization, 1700 acres are upland and 60 acres are area of residents. There is a dam near the village, a lake, three common well, two private well, four common tube- wells and four private tube- wells in it.

The village of Chay Say has a primary school and a medical clinic but access to electricity. Although the villagers receive the credit from the cooperative, there were no existing microfinance services.

3.2.4 Kan Chaw village

Kan chaw village is situated in Kan Chaw village tract. Total population is 380 with 180 males and 200 females. There are 101 households in this village in which 82 households are male-headed households and the rest of 19 are female- headed households. The major livelihoods depend on agriculture and livestock. There are 38 farm households, 22 livestock and 45 landless households in the village.

According to land utilization, 200 acres are upland, 3 acres lowland and 50 acres are area of residents. There is a dam near the village, a lake, one common well, fourteen private well, two common tube- wells and two private tube- wells in it. Kan Chaw village assets a primary school and a medical clinic but there was no access to electricity. Although the villagers received credit from the cooperative, there were no existing microfinance services.

3.2.5 Thit Yone village

Thit Yone village is situated in Thit Yone village tract. Total population is 2,343 with 1,109 males and 1,234 females. There are 502 households in this village in which 487 households are male-headed households and the rest of 15 are female-headed households. The major livelihoods depend on agriculture and livestock. There are 329 farm households, 69 livestock and 123 landless households in the village. According to land utilization, 2,069 acres are upland, 114 acres lowland and 56 acres are area of residents. There is a lake near the village, three common wells, seventeen private wells, two common tube- wells and eighty five private tube- wells in it. The village of Thit Yone possesses a secondary school and a medical clinic but there is no access to electricity in the village. The villagers received credit from the cooperative and existing microfinance service (Pact Myanmar).

3.2.6 Nat Htar village

Nat Htar village is situated in Nat Htar village tract. Total population is 1,153 with 549 males and 604 females. There are 225 households in this village. The major livelihoods are agriculture, livestock and handicraft. There are 77 farm households, 5 livestock and 143 landless households in the village. According to land utilization, 730 acres are upland, 33 acres are lowland and 50 acres are area of residents. There was a lake near the village, four common well, one hundred and thirty private tube-wells in it. The village of Nat Htar has a primary school, a secondary school and a medical clinic but there was no access to electricity. Although villagers received the credit from the cooperative, there were no existing microfinance services.

= Sample village

Figure 3.2 Survey areas in Mingyan Township with selected sample villages in 2014

3.3 Percentage of Rice Self-sufficiency in Myingyan Township

Rice production, estimated population, consumption, production and self-sufficiency ratio in Myingyan Township are shown in Table 3.1. The analysis was focused on rice because of its importance not only as a source of energy but also a source of income especially for the majority of rural population. The rice consumption per capita per year in rural area was 510 kg and in urban area was 408 kg in 2013. The rice self- sufficiency percentage in Myingyan Township was calculated at 5.82 % (DoA 2014).

3.4 Percentage of Oil Self-sufficiency in Myingyan Township

In the dry zone area, majority of farmers used to depend mainly on crop income. Oilseed crops and pulses are major growing crops in the dry zone area. Improving in agricultural sector increases not only farmers' income but also crop production. In order to increase crop production, expansion of area and technology of oilseed crops is needed for local consumption and to generate more surpluses for the increase of export earnings.

According to the official data on oil production, consumption, production and self- sufficiency ratio in Myingyan Township is showed in Table 3.2. The oil consumption per capita per year was 9.84 kg and oil self- sufficiency percentage in Myingyan Township was estimated at 176.66 % (DoA 2014).

Table 3.1 Percentage of Rice self-sufficiency in Myingyan Township

No.	Item	Unit	2012-13
1.	Population	No.	270985
2.	Rice consumption per capita per year		
	In rural area	Metric ton	0.31
	In urban area	Metric ton	0.25
3.	Amount of rice requirement	Metric ton	115134.63
4.	Total rice production acre	ha	1686.36
	Yield	Metric ton	1.61
	Production	Metric ton	6710.30
	Excluded production	Metric ton	497.21
5.	Use of production	Metric ton	115134.63
6.	Deficit production	Metric ton	-108424.33
7.	Rice self-sufficiency	Percentage	5.82

Source: DoA, Myingyan Township (2014)

Table 3.2 Percentage of Oil self-sufficiency in Myingyan Township

No.	Item	Unit	2012-2013
1.	Population	No.	270985
2.	Oil consumption per capita per year	kg	9.80
3.	Amount of oil requirement	Metric ton	2648.00
4.	Total oil production	Metric ton	4677.85
5.	Use of production	Metric ton	2648.00
6.	Deficit production	Metric ton	+2030.85
7.	Oil self-sufficiency	Percentage	176.66

Source: DoA, Myingyan Township (2014)

3.5 Data Collection

The main survey was carried out in October, 2014. Both primary and secondary sources of data were used in this study. Almost two hundred respondents were interviewed by using structured questionnaires. Number of selected households cover 4.63 % of the total households in the six village tracts.

As the field survey focused on not only land holding households but also landless households, the randomly sample landless households constitute about 39 percent of the total sample households reflecting the landless households' contribution in the study area. The survey collected information from 77 non-farm (landless) households and 120 farm households. In order to identify and compare the various characteristics (such as demographic, social, economics and institutional characteristics, sources of income) and food security status of farm and non- farm households, this study focuses on household level analysis and it is not based on village level. Table 3.3 described sample villages, households and sample size of the selected households in the study area.

3.6 Method of Analysis

The study was based on both quantitative and qualitative data. Some qualitative data were given numerical codes to continue data processing. These coding and responses were recorded into Microsoft excel program 2007. Sets of primary data from the household survey were processed by using the Statistical Packages for Social Science (SPSS version 16) software. In order to compare the demographic and socio-economic characteristics and food security status of different rural households, Pearson Chi- square test, t- test, F- test were used to compare the demographic and socio- economic characteristics of the different rural households. Regression analysis was used to determine the influencing factors of per capita food expenditure. According to WFP (1998), food poverty line was constructed according to the minimum daily requirement of food (2100 kcal) intake per person per day. Data was based on the amount of purchasing for the minimum consumption bundle in the study area.

Table 3.3 Sample villages, number of households and sample size

No.	Village tracts	Sample villages	Total households	No. of Sample households
1.	Na Bu I	Shwe Paw Kyun	45	34 (17.27%)
2.	Gway Pin Yo	Taung Shae	204	36 (18.27%)
3.	Chay Say	Chay Say	236	31 (15.74%)
4.	Kan Chaw	Kan Chaw	101	32 (16.24%)
5.	Thit Yone	Thit Yone	102	32 (16.24%)
6.	Nat Htar	Nat Htar	225	32 (16.24%)
			913	197

3.7 Analysis of Food Security Status

Household calorie availability was computed from each food item consumed and commonly consumption of food items in the study area. These food items are rice, pluses, meats and fish, oil, eggs, fruits and vegetables and beverages. The net daily calorie availability was divided by household members to obtain the daily calorie availability per adult equivalent of the households. Households with daily calorie consumption greater than or equal to 2100 kcal per day were categorized as 'food secure', and those households whose calorie intake fallen below this food security threshold grouped as 'food insecure' based on an average minimum per capita daily food requirement of 2100 kcal per person/per day recommended by the World Health Organization (WFP 1998) . Based on Ethiopian Health and Nutrition Research Institute EHNRI (2000) recommendation, the formula used to convert into kcal is given as follows.

$$HFS_i = \frac{\text{Total net calorie consumed by a household daily}}{\text{Household size measured by adult equivalent}}$$

Where: HFS_i is Household Food Security of the ith household and i=1, 2, 3…197.

Therefore, based on the HFS_i value, the households' food security status was determined that those households whose HFS_i is greater or equals to 2100 kcal per day were generalized as food secured and the others were concluded as food insecure. But according to data limitation, average household size was used instead of adult equivalent household size measurement in the conversion of kcal in this study.

3.8 Foster–Greer–Thorbecke Indices

In order to compute food poverty incidence, (Foster- Greer Thorbecke 1984) class of poverty measure was used. The consumption data available from the sample households were analyzed to compute food poverty incidence (headcount ratio, food poverty gap and food severity).

3.8.1. Headcount index

By far the most widely-used measure is the headcount index, which simply measures the proportion of the population that is counted as poor, often denoted by P_0. Formally,

$$P_0=N_p/N$$

Where N_p is the number of poor and Nis the total population (or sample).

3.8.2. Poverty gap index

A moderately popular measure of poverty is the poverty gap index, which adds up the extent to which individuals on average fall below the poverty line, and expresses it as a percentage of the poverty line. More specifically, define the poverty gap (G_i) as the poverty line (z) less actual income (y_i) for poor individuals; the gap is considered to be zero for everyone else. Using the index function, we have

$$G_i = (z - y_i) \, I (y_i < z)$$

Then the poverty gap index (PG) may be written as

$$PG = 1/N \sum_{i=1}^{N} Gi/z$$

3.8.3. Squared poverty gap (Poverty Severity) index

To construct a measure of poverty that takes into account inequality among the poor, use the squared poverty gap index. This is simply a weighted sum of poverty gaps (as a proportion of the poverty line), where the weights are the proportionate poverty gaps themselves. A poverty gap of (say) 10% of the poverty line is given a weight of 10% while one of 50% is given a weight of 50%; this is in contrast with the poverty gap index, where they are weighted equally. Hence, by squaring the poverty gap index, the measure implicitly puts more weight on observations that fall well below the poverty line. Formally;

$$PG = 1/N \sum_{i=1}^{N} (Gi/z)^2$$

3.9 Coping Strategies Index- (CSI)

The CSI is actually an indicator of overall food security status, rather than dietary diversity. Studies have shown however that this indicator is an effective proxy of household dietary diversity. It is recommended that the reduced CSI be used only to compare across geographic areas, rather than to assess severity of food insecurity amongst households within a given area, as it is does not capture a wide enough array of behaviors to accurately capture severity.

In this study, the CSI was calculated on the ten standard coping strategies. The Reduced CSI captures information on ten standard coping strategies such as;

(i) Reduced meal
(ii) Substitute with cheaper food
(iii) Borrowing food from others
(iv) Selling animals
(v) Migration to other places
(vi) Dropping out of children
(vii) Selling jewels
(viii) Replacing with other food
(ix) Pawning properties
(x) Selling land plots

The respondents are asked to inform on the frequency of use of each strategy, over a week (30 days recall). Firstly, the number of different strategies used by the households is summed and the more food insecure household would get the high score. A weight is also allocated to each strategy. Calculate the weighted sum of these different coping strategies that reflects the frequency and severity of their food insecure problems. If the household never use a particular strategy, it is counted as 1, rarely or use as 1-2 times is counted as 2 and from 3 to 10 times is counted as 3, respectively. CSI are then obtained by multiplying the score to the frequency for each strategy and then adding all the strategies scores.

3.10 Regression Model

The following regression model was applied for examining the influencing factors of per- capita food expenditure.

$$LnY = \beta_0 + \beta_{1i}LnX_{1i} + \beta_{2i}LnX_{2i} + \beta_{3i}LnX_{3i} + \beta_{4i}LnX_{4i} + \beta_{5i}LnX_{5i} + \beta_{6i}Ln\ X_{6i} + \beta_{7i}LnX_{7i} + \beta_{8i}LnX_{8i} + \beta_{9i}Ln\ X_{9i} + \beta_{10i}Ln\ X_{10i} + \beta_{1i}D_{1i} + \upsilon\ i$$

Where,

Y is per capita food expenditure and also a dependent variable.

Independent variables;

X_{1i} = Age of the household's head (years)

X_{2i}= Household head's education

X_{3i} = Total household member (no.)

X_4i = Total income of the households (MMK)

X_5i = Household rice consumption (kg)

X_{6i} = Household meat consumption (kg)

X_7i =Credit taken amount (MMK)

X_{8i} = Dependency ratio

X_{9i} = Non-food expenditure (MMK)

X_{10i}= Total land (ha)

D_{1i} = Migration (yes =1)

υ = Residual term.

β_0 is the intercept and β_i are coefficients of the independent variables.

CHAPTER IV
RESULTS AND DISCUSSION

4.1 Characteristics of the Sample Rural Households

In sample villages, about 60% of the total households were engaged in farming activities and the rest of 40% was landless households. Among the sample households, 120 households were the farm households and the rest of 77 households were landless households engaged in not only agriculture but also non-agricultural sector (working as agricultural labor and non agricultural labor, odd job, etc.) (Table 4.1).

4.1.1 Classification of land size of sample farm households in the study area

The land size of the farm households are related to productive assets and income. The farm sizes were classified into three groups. The farm size which less than 2 hectares identified small farm size, between two to four hectares identified medium farm size and above four hectares identified large farm size respectively. There were 19.17% in small, 47.5% in medium, 33.33% in large farm size respectively. Therefore, the mostly farm size was found in medium farm size in the study area. The F- test showed that there was a significant difference in farm size among the rural farm households (Table 4.2).

4.1.2 Household size, age of the household's head and dependency ratio

The average household sizes of the landless and farm households are 4.85 and 5.64, respectively. The t- test showed that there was a significant difference between the household sizes of landless and farm households. The average household sizes were 5.04, 5.68 and 5.92 in small, medium and large farm household respectively. Most of the rural households were found in extended family living but there was no significant difference in household size among the farm households. The average household size of the overall household was 5.33 and the study targets to collect food consumption patterns of the household members who were currently living within the household in the village (Table 4.3).

Table 4.1 Livelihoods of sample rural households in selected villages

No.	Sample villages	Farm HH (No.)	Landless HH (No.)	Total (No.)
1	Shwe Paw Kyun	25 (20.83)	9 (11.69)	34 (17.27)
2	TaungShae	20 (16.67)	16 (20.78)	36 (18.27)
3	Chay Say	16 (13.33)	15 (19.48)	31 (15.74)
4	Kan Chaw	23 (19.17)	9 (11.69)	32 (16.24)
5	Thit Yone	24 (20.00)	8 (10.39)	32 (16.24)
6	Nat Htar	12 (10.00)	20 (25.97)	32 (16.24)
		120 (100)	77 (100)	197 (100)

Note: Numbers in the parentheses represent percentage.

Table 4.2 Classification of land size of the sample farm households

Types of Farm	Range (ha)	Household(N=120)
Small Farm	< 2	23 (19.17)
Medium Farm	2 – 4	57 (47.50)
Large Farm	Above 4	40 (33.33)
	F= *72.656, P = < 0.001****, *df = 2*	

Note: **** is significant difference at 1% probability level.

Table 4.3 Household size and the sample rural households' head age

Item	Landless HH (N= 77)	Farm HH (N= 120)	Total (N= 197)
Household size(no.)			
Mean	4.85	5.64	5.33
Minimum	1	2	1
Maximum	10	11	11
	*t = 2.86 , P = 0.005****, *df = 195*		
Age of household head (years)			
Mean	48	54	51
Minimum	27	29	27
Maximum	81	80	81
	t = 3.27, P = 0.873^{ns}*, df = 195*		

Note: ***, ** and * are significant difference at 1% probability level and ns = non significant.

The average age of the total household head was 51 years with the minimum of 27 years and maximum 81 years. The average age of farm households were older (average 54 years) than landless households (average 48 years) among the sample households. But, t test showed that the age of households' head was not significantly different between landless and farm households. Among the farm households, the average age of household head was 54 years and also F test showed that there was not significant different in household head age among the farm households (Table 4.4).

Although IHLCA (2011) pointed out that the higher the dependency ratio value, the higher the 'dependency burden' on the household. Most of the landless and farm households have the dependency ratio between 20 to 39% and no dependency burden was found in the study area. The average dependency ratio of farm households has 27.2% and those of landless have 28.1%. Therefore, t test showed that there was no significantly difference in the dependency ratio between farm and landless households in this study (Table 4.5 and 4.6).

Among the farm households, the average dependency ratio was 30.4%, 26.7% and 26.2% in small, medium and large farm households, respectively. F test showed that there was no significantly different in the dependency ratio between the farm households.

Table 4.4 Household size and sample age of farm households' head by size of land holdings

Item	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Household size (no.)				
Mean	5.04	5.68	5.92	5.64
Minimum	2	2	3	2
Maximum	8	11	10	11
F = *1.6, P = 0.206*^{ns}*, df = 119*				
Age of household head (years)				
Mean	49	54	56	54
Minimum	29	32	30	29
Maximum	78	78	78	80
F = *2.688, P = 0.072*^{ns}*, df = 119*				

Note: ns = non significant

Table 4.5 Dependency ratios of the sample rural households

Dependency ratio	Landless (N=77)	Farm HH (N=120)	Total (N=197)
0 -19%	22 (28.57)	40 (33.33)	62 (31.47)
20 -39%	31 (40.26)	44 (36.67)	75 (38.07)
40 – 59%	20 (25.97)	28 (23.33)	48 (24.37)
60% & above	4 (5.20)	8 (6.67)	12 (6.09)
Average ratio	28.1	27.2	27.6
t = -0.29, P = 0.773 ^{ns}*, df = 195*			

Note: Numbers in the parentheses represent percentage. ns = non significant

Table 4.6 Dependency ratios of the sample farm households by size of land holdings

Dependency ratio	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
0 -19%	4 (17.39)	20 (35.00)	16 (40.00)	40 (33.33)
20 -39%	12 (52.17)	18 (31.60)	14 (35.00)	44 (36.67)
40 – 59%	6 (26.09)	14 (24.60)	8 (20.00)	28 (23.33)
60% & above	1 (4.35)	5 (8.80)	2 (5.00)	8 (6.67)
Average ratio	30.4	26.7	26.2	27.2
F *= 0.37, P = 0.69*^{ns} *, df = 119*				

Note: Numbers in the parentheses represent percentage. ns = non significant.

4.1.3 Demographic characteristics and major occupation of the sample rural households

Firstly, demographic characteristic and the major occupation for landless and farm households are shown in Table 4.7. There were 80.5% of male headed households in landless and 90.8% of male headed households in the farm households. Thus, male headed household were mostly found in both farm and landless households. There was a significantly difference in gender of household head between landless and farm households. And then, there was also no significant difference in gender of head among the different farm households.

About 92.21% of landless households' head reached monastery and primary school level. In farm households, 80.83% of head of farm household reached monastery and primary level. There were 9.17% of the head of farm households and 2.6% of landless households' head reached at the high and above level. But, t-test showed that there was not significantly different in literacy status of household head between farm and landless households. In farm households, large, medium, small households' head reached 72.5%, 85.97%, 82.6% of monastery and primary schooling level. Only 10% of large, 8.77% of medium, 8.7% of small farm households' head have high school and above level. F-test showed that there was no difference in literacy status of households' head among the different farm household's group. Although education is one of the important things to improve rural development, most of the rural households reached only monastery and primary level.

According to the livelihood status, the majority of landless households worked as the casual labors in both farm and non-farm sectors. The others landless engaged as own- employment as street vendors, grocery shop, etc in the study area.

Table 4.7 Demographic characteristics and major occupation of sample rural households

(Number of household)

Demographic & Employment of Head	Landless (N=77)	Farm HH (N=120)	Small (N=23)	Medium (N=57)	Large (N=40)
Gender of head					
Male	62 (80.52)	109 (90.83)	21 (91.30)	50 (87.72)	38 (95.00)
Female	15 (19.48)	11 (9.17)	2 (8.70)	7 (12.28)	2 (5.00)
	*t = -2.10, P = 0.037***		F = *0.743, P = 0.478*^{ns}*,df = 119*		
Literacy status of the household's head					
Illiterates	-	2 (1.67)	1 (4.35)	1 (1.75)	-
Monastery	30 (38.96)	37 (30.83)	7 (30.43)	20 (35.09)	10 (25.00)
Primary	41 (53.25)	60 (50.00)	12(52.17)	29 (50.88)	19 (47.50)
Secondary	4 (5.19)	10 (8.33)	1 (4.35)	2 (3.51)	7 (17.50)
High school and above	2 (2.60)	11 (9.17)	2 (8.70)	5 (8.77)	4 (10.00)
	t = 1.798, P = 0.074^{ns}		F= *1.097, P = 0.337*^{ns}*,df = 195*		
Household head's Occupation					
-Farmer	0	120(100)	23(100)	57(100)	40(100)
-Casual Labor	56 (72.70)	0	0	0	0
-Own - employed	21(27.30)	0	0	0	0
-Govt/company worker	0	0	0	0	0

Note: Numbers in the parentheses represent percentage.

** is significant difference at 5% probability level and ns = non significant

Govt is government staff.

4.2 Income Diversification of the Sample Rural Households

It was obvious that there were 22.07% of landless engage as farm worker, 14.29% of landless engage as non farm worker only. There were 1.3% of landless worked as fishery and 2.6% of livestock only. The rest of the households have two to three sources of income (Table 4.8).

Income diversifications of different levels of land holding for farm households are described in Tables 4.9, 4.10 and 4.11, respectively. In the farm households, there were 7.5% of large farm households, 10.53% of medium farm households, 13.04% of small farm households get their income from crop production only and the left of the farm households have two or three sources of income. Awotide (2012) revealed that diversification into other non-farm income sources significantly reduced income inequality. It was obvious that not only farm households but also landless households rely on two or three sources of income than one income source in the study area.

4.3 Assets and Type of Houses of the Sample Rural Households

The productive assets, luxury assets and types of houses of sample households are shown in Table 4.12. Landless households have significantly less owned in most of the household assets such as bullock cart, motorcycles, bicycles, mobile phones and televisions. Most of the farm household especially large and medium households possessed bullock carts for crop transportation. Therefore, there was a significant difference in bullock cart assets among the farm households. The majority of the farm households are rich and own motorcycles, mobile phones. T-test showed that there was a significant different in assets of motorcycles, bicycles and mobile phones, solar and television between landless and farm household. According to source of energy for light, 44.17% of the farm households and 28.57% of the landless households possess solar and 7.5% and 3.89% of farm and landless households possess generators. There was no significant difference in assets of solar and generators among the farm households.

More than half of the total households' houses building with bamboo wall and the majority of the total households possessed houses building with corrugated roofing. Especially, 50.8% of the farm households and 63.63% of landless possessed the houses building with bamboo wall. And then, 97.5% and 81.82% of farm and landless households respectively possessed houses building with corrugated roofing.

Table 4.8 Income diversification of landless households

Sources of income	Landless (%)
Farm worker	22.07
Farm worker + Own employment	1.30
Farm worker + Non farm worker	6.49
Farm worker + Remittance	5.19
Farm worker + Livestock	10.39
Farm worker + Non farm worker + Remittance	2.60
Fishery	1.30
Non farm worker	14.29
Non farm worker + own employment	10.39
Non farm worker + Remittance	6.49
Non farm worker + Livestock	7.79
Non farm worker + Salary	2.60
Livestock	2.60
Farm worker + Non farm worker + Livestock	2.60
Farm worker + Non farm worker + Own employment	1.30
Own employment	2.60

Note: Salary= working as a permanent worker with a fixed salary

Table 4.9 Income diversification of small farm households

Sources of Income	Small farmers (%)
Crop production only	13.04
Crop production +Farm worker	4.35
Crop production + Livestock	8.69
Crop production+ Livestock + Salary	4.35
Crop production + Non farm worker	47.82
Crop production + Non farm worker + Remittance	4.35
Crop production + Non farm worker + Own employment	4.35
Crop production + Own	8.70
Crop production + Remittance	4.35

Note: Salary= working as a permanent worker with a fixed salary

Table 4.10 Income diversification of medium farm households

Sources of income	Medium farmers (%)
Crop production only	10.53
Crop production + Farm worker	21.05
Crop production + Livestock	3.51
Crop production + Farm worker + Livestock	1.75
Crop production + Farm worker + Remittance	3.51
Crop production + Farm worker + Own employment	1.75
Crop production + Farm worker+ Non farm worker + Remittance	3.52
Crop production + Non farm worker	26.32
Crop production + Non farm worker + Livestock	3.51
Crop production + Non farm worker + Remittance	8.77
Crop production + Non farm worker + Own employment	1.75
Crop production + Own employment	5.26
Crop production + Own employment + Remittance	3.52
Crop production + Salary + Remittance	1.75
Livestock + Own employment	1.75
Crop production + Fishery	1.75

Note: Salary= working as a permanent worker with a fixed salary

Table 4.11 Income diversification of large farm households

Sources of income	Large farmers (%)
Crop production only	7.50
Crop production + Farm worker	17.50
Crop production + Livestock	2.50
Crop production + Farm worker + Livestock	2.50
Crop production +Farm worker + Own employment	2.50
Crop production + Farm worker + Non farm worker + Remittance	2.50
Crop production + Farm worker + Salary	5.00
Crop production + Non farm worker	20.00
Crop production + Non farm worker + Remittance	5.00
Crop production + Non farm worker + Own	2.50
Crop production + Non farm worker + Salary + Remittance	2.50
Crop production + Own employment	17.50
Crop production + Salary	7.50
Crop production + Salary + Remittance	5.00

Note: Salary= working as a permanent worker with a fixed salary

Table 4.12 Assets possessed by sample rural households

Own Assets	Landless (N=77)	Farm HH (N=120)	Small (N=23)	Medium (N=57)	Large (N=40)
Bullock cart	0	79 (65.83)	6 (26.08)	38 (66.66)	35 (87.50)
	*t = 11.28, P = <0.001****		*F = 14.35, P = 0.000****		
Motorcycle	46(59.74)	96 (80.00)	16 (69.56)	45 (78.94)	35 (87.50)
	*t = 4.36,P = <0.001****		*F =10.55, P = 0.000****		
Bicycle	25 (32.47)	64 (53.33)	8 (34.78)	32 (56.14)	24 (60.00)
	*t = 2.80 , P = 0.006****		*F = 1.81, P = 0.165*^{ns}		
Mobile phone	19 (24.67)	71 (59.16)	10 (43.48)	28 (49.12)	33 (82.50)
	*t = 4.93,P = <0.001****		*F = 10.05, P = 0.001****		
Solar	22 (28.57)	53 (44.17)	9 (39.13)	26 (45.61)	18 (45.00)
	*t = 2.216, P = 0.028***		*F = 0.15, P = 0.862*^{ns}		
Television	17 (22.08)	56 (46.67)	10 (43.48)	23 (40.35)	23 (57.50)
	*t = 3.58, P = <0.001****		*F =1.45, P = 0.235*^{ns}		
Generator	3 (3.89)	9 (7.50)	0	4 (7.01)	5 (12.50)
	t = 1.13, P = 0.305^{ns}		*F =1.67, P = 0.193*^{ns}		

Note: Numbers in the parentheses represent percentage.

Thus, there was a significant different in type of roof between farm and landless households (Table 4.13). Among the farm households, there were 65.22% of bamboo wall and 95.65% of corrugated roofing in small farm households, 57.89% of bamboo wall and 96.5% of corrugated roofing in medium farm households and 50% of wooden wall and 100% corrugated roofing were founded in large farm households. There was no significant difference in dwelling condition (wall and roofing) among the farm households (Table 4.14)

4.4 Irrigation Facility, Type of Land Ownership and Productive Assets of the Sample Rural Households

It is important to ask the farm households whether they are receiving irrigation water or not for crop production because irrigation water is one of the requirements to improve crop production. There were 88.33% of the farm households did not receive irrigation for crop production. Only 26.09%, 7.02% and 10% of small, medium and large farm households received irrigation water for their crops in the study area. F test showed that there was a significant difference in irrigation facility among the different farm households (Table 4.15).

In the study area, the majority of farm households owned upland only. Then, 21.74% and 13.04% of small farm households owned lowland and lowland with upland, respectively. F-test showed that there was a significant different in upland with lowland holding size among the farm households (Table 4.16).

The medium and large farmers who were receiving irrigation water in the study area usually grow rice- rice cropping pattern and rice – rice - chickpea (or) pigeon - pea pattern. On the other hand, farmers who were not receiving irrigation water grew rice - oilseed and rice - pluses cropping pattern. Only one small farmer grew summer rice as mono crop.

The upland was suitable to grow oil seed crops and pluses that can provide the farmers the high income because of relatively higher demand and prices. In upland land, the majority of large and medium farmers grow pigeon pea- groundnut, groundnut- sesame cropping patterns. The majority of large and medium farm households practice vegetables such as tobacco and thatnatkar. It can provide considerable income for the farm households.

Table 4.13 Types of wall and roofing of sample rural households

Types of wall and roof	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Bamboo wall	49 (63.63)	63 (52.50)	112 (56.85)
Wooden wall	24 (31.17)	41 (34.16)	65 (33.00)
Brick wall	4 (5.20)	16 (13.34)	20 (10.15)
	t = 1.27, P = 0.206^{ns}, df = 195		
Types of roof	Landless (N=77)	Farm HH (N=120)	Total(N=197)
Bamboo roof	2 (2.60)	2 (1.67)	4 (2.03)
Palm frond roof	12 (15.58)	1 (0.83)	13 (6.60)
Corrugated roof	63 (81.82)	117 (97.50)	180 (91.37)
	*t = 4.10, P =<0.001***, df = 195*		

Note: Numbers in the parentheses represent percentage.

*** is significant difference at 1%probability levels and ns = non significant.

Table 4.14 Types of wall and roofing of sample farm households by size of land holdings

Types of wall and roof	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Bamboo wall	15 (65.22)	33 (57.89)	15 (37.50)	63 (52.50)
Wooden wall	6 (26.09)	15 (26.32)	20 (50.00)	41 (34.16)
Brick wall	2 (8.69)	9 (15.79)	5 (12.50)	16 (13.34)
	F= *0.38, P = 0.68^{ns}, df = 119*			
Types of roof	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Bamboo roof	1 (4.35)	1 (1.75)	0	2 (1.67)
Palm frond roof	0	1 (1.75)	0	1 (0.83)
Corrugated roof	22 (95.65)	55 (96.50)	40 (100)	117 (97.50)
	F=*1.73, P = 0.18^{ns}, df =119*			

Note: Numbers in the parentheses represent percentage.

Table 4.15 Land size distribution and irrigation water received by the sample rural farm households

Type of farm household	Not receiving irrigation	Receiving irrigation
1.Small Farm (< 2ha)	17 (73.91)	6 (26.09)
2. Medium Farm (2 to 4 ha)	53 (92.98)	4 (7.02)
3. Large Farm (above 4 ha)	36 (90.00)	4 (10.00)
Total Farm households	106 (88.33)	14 (11.67)
	F =*3.05, P =0.05****,df = 119*	

Note: Numbers in the parentheses represent percentage.

** is significant difference at 5%probability levels and ns = non significant.

Table 4.16 Classification of land owned by the sample farm households by size of land holdings

Type of Land	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Low land only	5 (21.74)	1 (1.75)	0	6 (5.00)
	F= *3.62, P =0.03**,df = 119*			
Upland only	15 (65.22)	40 (70.18)	30 (75.00)	85 (70.83)
	F= *5.23, P =0.007***,df = 119*			
Low + Upland	3 (13.04)	14 (24.56)	7 (17.50)	24 (20.00)
	F= *0.90, P =0.04**,df = 119*			
Upland + garden	0	2 (3.51)	2 (5.00)	4 (3.33)
	F= *0.56, P =0.57*^{ns}*,df = 119*			
Low + Upland + garden		0	1 (2.50)	1 (0.84)
	F= *2.05, P =0.13*^{ns}*,df = 119*			

Note: Numbers in the parentheses represent percentage.

***and **are significant difference at 1% and 5% probability levels, respectively and ns = non significant.

F-test showed that there was a highly significant difference among the farm households in total land size. The average lowland size was 0.14 ha, 0.24 ha and 0.23 ha for small, medium and large farm respectively. In upland, the medium farm households own 4.8 times of the land size than small farms and the large farm households own 2.69 times that of medium farm households. The medium and large farm households owned average size of 0.04 and 0.05 ha of garden respectively in the study area (Table 4.17).

Most of sample households in the selected village reared cattle, pigs and poultry. But farmers possess more cattle than landless because cattle were essential animal for farming. Thus, t- test showed that there was a significant difference in assets of cattle and sheep between landless and farm households. Although livestock production can provide more income for the rural households, it was not popular among the selected villages (Table 4.18).

Table 4.17 Land assets of the sample farm households by size of land holdings

Productive Assets	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Average size of land	0.78	3.22	8.06	4.32
	F = *72.656, P = <0.001****			
Average size lowland land	0.14	0.24	0.23	0.22
	F = *0.345, P = 0.709*^{ns}			
Average size upland land	0.6	2.88	7.77	4.08
	F = *66.225, P = <0.001****			
Average size garden	0	0.04	0.05	0.03
	F = *0.607,P = 0.547*^{ns}			

Note: *** is significant difference at 1%probability levels and ns = non significant

Table 4.18 Livestock assets of the sample rural households

Livestock assets	Landless (N=77)	Farm HH (N=120)	Small (N=23)	Medium (N=57)	Large (N=40)
Average number of cattle	0.40	3.06	3.00	2.71	3.60
	*t = 5.008, P = <0.001****		F = *0.44, P = 0.643*^{ns}		
Average number of pig	0.50	0.31	0.20	0.52	0.07
	t = 0.761, P = 0.448^{ns}		F = *0.91,P = 0.402*^{ns}		
Average number of poultry	1.20	2.96	3.30	2.54	3.37
	t = 1.430, P = 0.154^{ns}		F = *0.092,P = 0.912*^{ns}		
Average number of goat	2.40	3.30	4.70	2.83	0
	t = 0.505, P = 0.614^{ns}		F = *1.879,P = 0.157*^{ns}		
Average number of sheep	3.03	0.20	1.26	0	0
	*t = 2.456, P = 0.015***		F = *2.310,P = 0.104*^{ns}		

Note: *** and **are significant difference at 1% and 5% probability levels and ns = non significant.

4.5 Different Per Capita Income Levels of the Sample Rural Households

Household income is defined as material return in cash or kind earned in exchange for goods and services by all the household members and is related to the reference period for the survey. Farm household income is defined as income from interest, dividends, earnings from agricultural activities, business, commercial and industrial establishment, land property, rent, gift and assistance and insurance benefits, including other special types of receipts by household members are estimated on yearly basis (UN 1984).

Table 4.19 shows the different per capita income levels of the landless and farm households. The landless household income was sum of the income received from all sources. The average annual per capita income of landless household was 356,463 MMK and farm household was 489,223 MMK in the study area. The average annual per capita income of small and medium farm household was 330,712 MMK and 392,307 MMK respectively. But the large farm households receive 2.1 times of annual per capita income than small farm and 1.8 times than medium households. Therefore, there was no significant difference in annual per capita income between landless and farm households.

There were 50.65% of landless found in lowest per capita income group, 37.66% in low income group, 7.79% found in middle per capita income group and only 3.9 % found in high per capita income group. In the farm households, there were 40% of farm households fall in lowest income group, 35.84% fall in low income group. But 13.33% and 10.83% of farm households were found in middle and high income groups. On the other hand, more than half of the small farm household fall in low income group and no high income group were found in small farm household. There were 50.89% of lowest income group and 7.01% of high income group were found in medium farm households. In large farm households, there were 25% in lowest income group and 35% in low income group but 17.5% in middle and 22.5% in high income group were found in large farm households. There was a highly significant different in annual per capita income level among farm households at 1% level (Table 4.20).

Table 4.19 Different per capita income levels of sample rural households

Income levels	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Lowest income group (< 300000 MMK/year)	39 (50.65)	48 (40.00)	87 (44.16)
Low income group (300001-600000 MMK/year)	29 (37.66)	43 (35.84)	72 (36.55)
Middle income group (600000- 900000 MMK/year)	6 (7.79)	16 (13.33)	22 (11.17)
High income group (above 900000 MMK/year)	3 (3.90)	13 (10.83)	16 (8.12)
	*t =2.76, P = 0.006***,df = 195*		
Ave. per capita income/ year	356,463	489,223	424,754

Note: Numbers in the parentheses represent percentage.

*** is significant difference at 1%probability level.

Table 4.20 Different per capita income levels of sample farm households by size of land holdings

Income levels	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Lowest income group (< 300000 MMK/year)	9 (39.13)	29 (50.89)	10 (25.00)	48 (40)
Low income group (300001-600000 MMK/year)	12 (52.17)	17 (29.82)	14(35.00)	43 (35.84)
Middle income group (600000- 900000 MMK/year)	2 (8.70)	7 (12.28)	7 (17.50)	16 (13.33)
High income group (above 900000 MMK/year)	-	4 (7.01)	9 (22.50)	13 (10.83)
	F *= 7.719, P = 0.001***,df = 119*			
Ave. per capita income/year	330,712	392,307	718,472	489,223

Note: Numbers in the parentheses represent percentage.

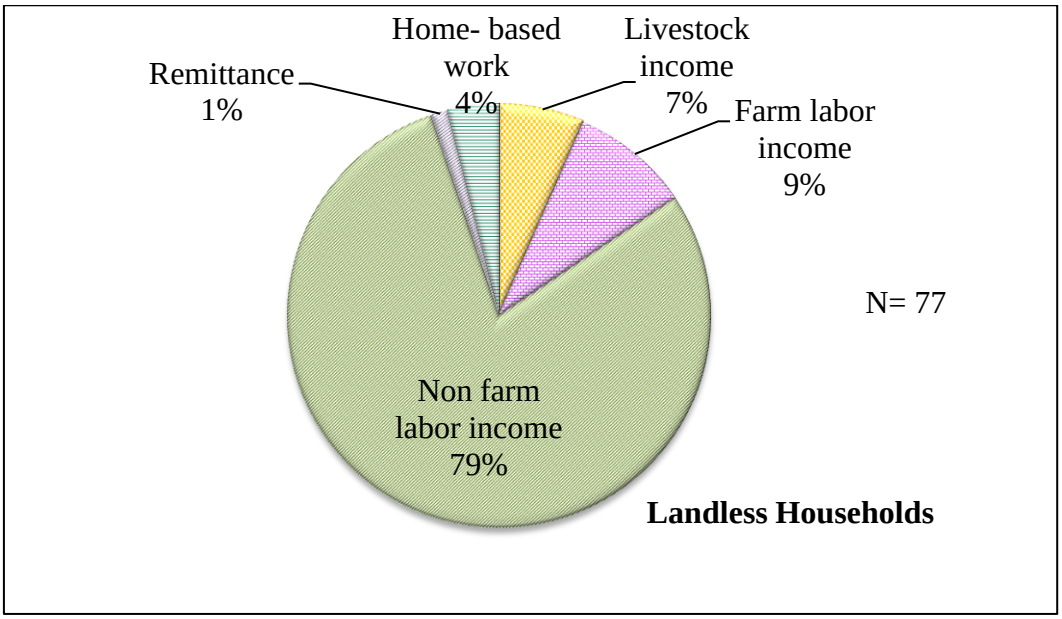
*** is significant difference at 1%probability level.

4.6 Income Diversification of the Sample Rural Households

The income diversifications of the sample households are illustrated in (Figure 4.1 and 4.2). The majority of landless households received their income of 79% from non- farm working. The left of incomes earned from farm labor 9%, livestock production 7%, and home- based work 4% and remittance 1%, respectively. In the farm households, the major income earned from crop production 55% (groundnut, sesame, rice, cotton, pigeon pea, green gram, etc.). About 14% and 9% of incomes earned from remittance and livestock in the study area.

The small farm households received 31% of income from crop production and 26% from livestock production (goats and sheep, etc.). The left 43% of income earned from remittance, non farm working, farm labor and services. The medium farm households also received 65% of major income from crop production and 9% of income from remittance. And the left 26% of income earned from home- based work, services, non- farm labor, farm labor working and livestock production. The large farm households received the major income from crop production of 55% and 20% from remittance in the study area. The left 25% of income earned from home- based work, services, non- farm and farm labor working and livestock production.

(a)



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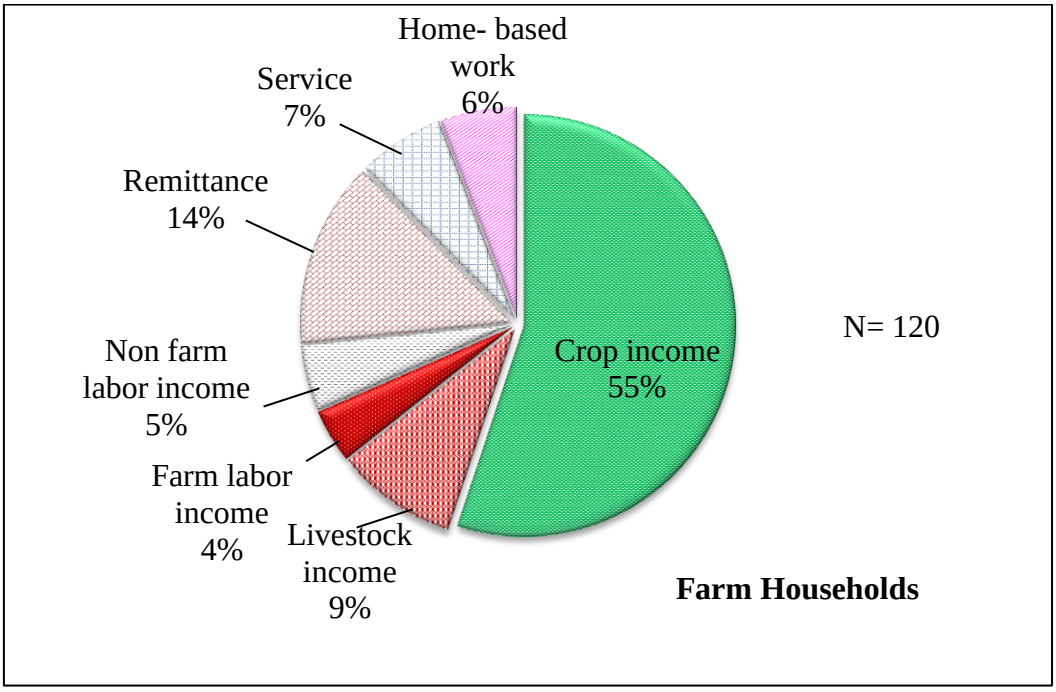
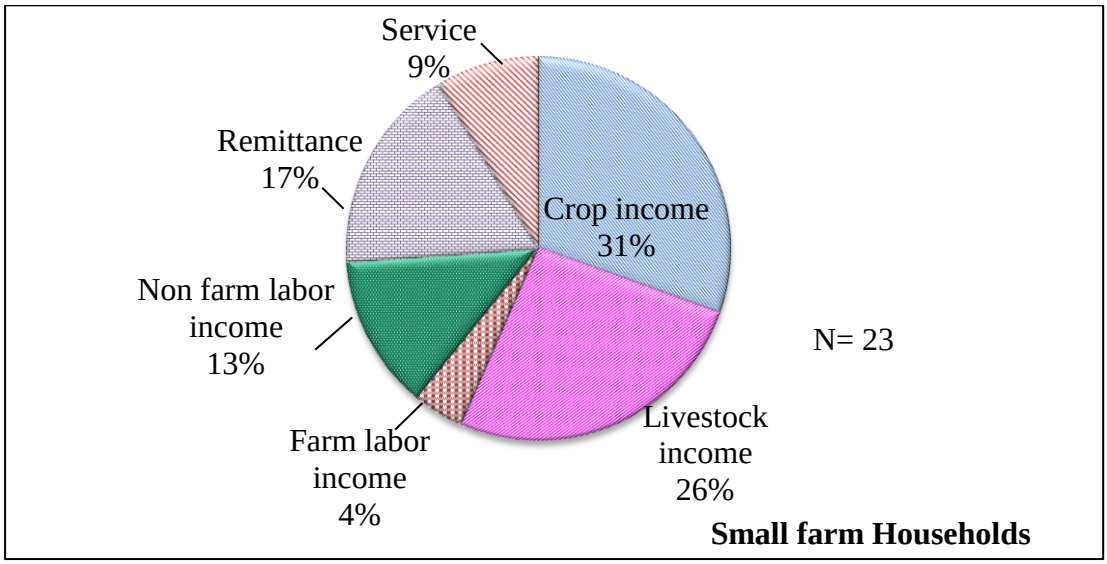


Figure 4.1 Income diversifications of landless and farm households

(a)



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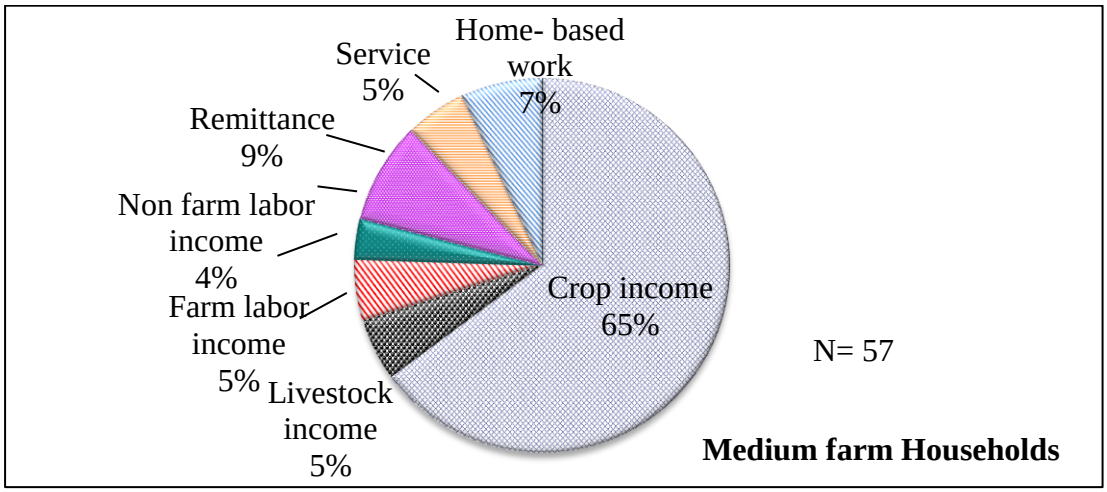

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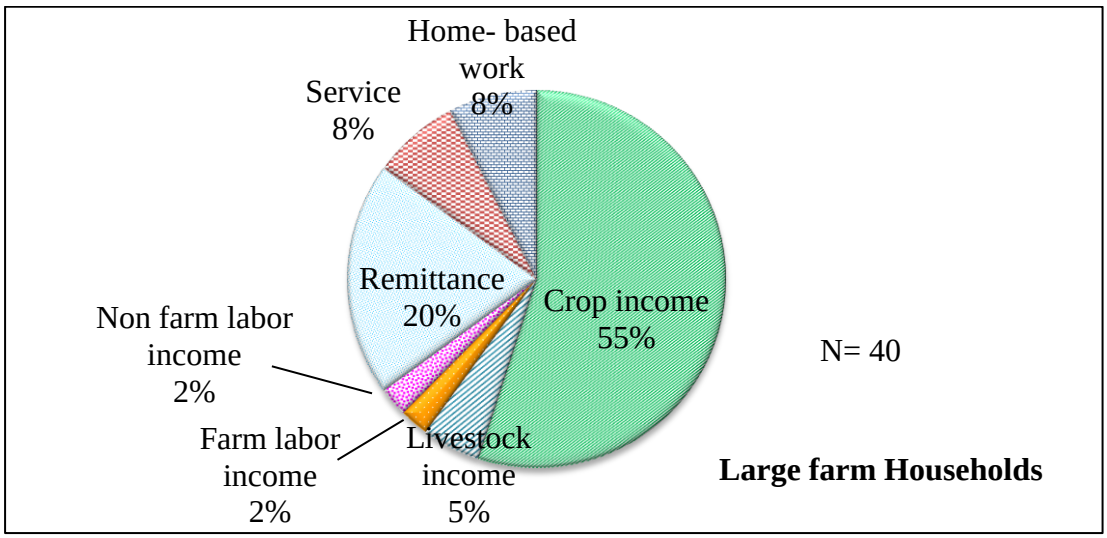


Figure 4.2 Income diversifications of sample farm households by size of landholdings

4.7 Sources of Lightening, Credit and Migration of the Sample Rural Households

Generally, the sample villages in the study did not have public electricity. There were 34.01% of total households get the electricity from common generator in the village and 31.98% from solar plates. In the landless households, there were 29.87% of light get from the use of solar plates and 27.28% get from private electricity and the left of light 42.85% get from the candle and battery in the village. In the farm households, 38.34% of light get from private electricity and 33.33% get from the use of solar plates.

The left of light 28.33% get from the usage of candle and battery. T-test showed that there was no significantly different in source of lighting between landless and farm households (Table 4.21).

Among the farm households, the small farmer groups obtain 56.53% of light from private electricity and 30.43% from solar plates. In the medium farmer groups, 38.59% of light obtains from private electricity, 33.33% from solar plates and that of 28.08% from the use of candles and batteries. In the large farm, 35% of light obtains from the use of solar plates and 27.5% from private electricity and that of 37.5% obtain from the use of candle and battery (Table 4.22).

There were 69.54% of the total households in the study area were in indebtedness for their survival. About 53.25% of the landless households were in indebtedness because their income was primarily use in household's daily consumption, clothing and shelter. The landless households took 32.47% of the credit from the Co-operative, 11.69% from private bank and Pact Myanmar cooperation and 9.09% from the money lenders. Farm households received credit significantly higher than landless households in the study area. And the left of 46.75% of landless and 20% of farm households did not take credit and worked with their own capital (Table 4.23).

The majority of the farm households took the credit from the Myanmar Agricultural Development Bank (MADB) and Co- operative. There were 20% of farm households worked with their own capital. The majority of farmers receive the credit for crop cultivation from MADB. According to the land size classification, there were 69.56% of small farmers, 77.2% of medium farmers and 90% of large farmers take credit from not only private but also government credit sources in the study area (Table 4.24). There was a highly significant different in sources of credit between

landless and farm households and also significantly difference in source of credit among the farm households. The farm households have the highest credit taken from MADB with 1.5% of interest rate in 2014 and pay back after six months. Most of the farmers took credit for their crop production and a few of farmers used credit for home consumption.

Labor migration to international and nearby township becomes their survival strategy. There were 20.78% of internal migration and 10.39% of international migration in landless households and 20.5% of internal migration and 11.16% of international migration in farm households. It was found that the farm households more migrated to other places than landless households in the study area. But t- test shows that there was no significantly difference between landless and farm households. Most of the sample household's members migrated to Yangon and Mandalay as internal and a few migrated to Malaysia and Korea for job. There were internal and international migration of 56.52%, 33.33%, and 37.5% in small, medium and large farm households, respectively (Table 4.25).

Table 4.21 Sources of lightening of sample rural households

Sources of Light	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Candle	5 (6.49)	4 (3.33)	9 (4.57)
Battery	28 (36.36)	30 (25.00)	58 (29.44)
Solar	23 (29.87)	40 (33.33)	63 (31.98)
Private electricity	21 (27.28)	46 (38.34)	67 (34.01)
t = 1.255, P = 0.211^{ns}, df = 195			

Note: Numbers in the parentheses represent percentage.

ns = non significant.

Table 4.22 Sources of lightening of sample farm households by size of land holdings

Sources of Light	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Candle	-	2 (3.52)	2 (5.00)	4 (3.33)
Battery	3 (13.04)	14 (24.56)	13(32.50)	30 (25.00)
Solar	7 (30.43)	19 (33.33)	14 (35.00)	40 (33.30)
Private electricity	13 (56.53)	22 (38.59)	11 (27.50)	46 (38.30)
F *= 2.182, P = 0.0941^{ns},df = 119*				

Note: Numbers in the parentheses represent percentage.

*is significant difference at 10%probability level.

Table 4.23 Sources of credit of the sample rural households

Sources of credit	Landless (N=77)	Farm HH (N=120)	Total (N=197)
MADB	-	25 (20.83)	25 (12.69)
Cooperative	25 (32.47)	41 (34.16)	66(33.50)
Private Bank	1 (1.30)	1 (0.83)	2 (1.02)
Pact Myanmar	8 (10.39)	-	8 (4.06)
MADB + Cooperative	-	21 (17.50)	21 (10.66)
MADB + Pact Myanmar	-	2 (1.67)	2 (1.02)
Co + Money lender	-	2 (1.67)	2 (1.02)
MADB +Co + Private-bank	-	2 (1.67)	2 (1.02)
Money lender	7 (9.09)	2 (1.67)	9 (4.56)
Received credit	41 (53.25)	96 (80.00)	137 (69.54)
Own capital(do not take credit)	36 (46.75)	24 (20.00)	60 (30.46)
*t = 4.662, P = <0.001***, df = 195*			

Note: Numbers in the parentheses represent percentage.

*** is significant difference at 1% probability level.

Table 4.24 Sources of credit of the sample farm households by size of land holdings

Sources of credit	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
MADB	2 (8.70)	9 (15.8)	14 (35.00)	25 (20.83)
Cooperative	12 (52.17)	18 (31.58)	11 (27.50)	41 (34.16)
Private Bank	-	1 (1.75)	-	1 (0.83)
MADB + Cooperative	-	14 (24.56)	7 (17.50)	21 (17.50)
MADB + Pact Myanmar	-	1 (1.75)	1 (2.50)	2 (1.67)
Co + Money lender	1 (4.35)	-	1 (2.50)	2 (1.67)
MADB + Co + Private-bank	-	-	2 (5.00)	2 (1.67)
Money lender	1 (4.35)	1 (1.7)	-	2 (1.67)
Received credit	16 (69.56)	44 (77.20)	36 (90.00)	96 (80.00)
Own capital (do not take credit)	7 (30.43)	13 (22.80)	4 (10.00)	24 (20.00)
	F = *4.552, P = 0.013****,df = 119*			

Note: Numbers in the parentheses represent percentage.

** is significant difference at 5%probability level

Table 4.25 Migration of the sample rural households

Migrated place	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Internal	16 (20.78)	33 (27.50)	49 (24.87)
International	8 (10.39)	14 (11.67)	22 (11.17)
No Migration	53 (68.83)	73 (60.83)	126 (63.96)
	t = 1.032, P = 0.124^{ns}*, df = 195*		

Migrated place	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Internal	10 (43.48)	15 (26.32)	8 (20)	33 (27.50)
International	3 (13.04)	4 (7.01)	7 (17.5)	14 (11.67)
No Migration	10 (43.48)	38 (66.67)	25 (62.5)	73 (60.83)
	F *= 1.302, P =0.278*^{ns}*, df = 119*			

Note: Numbers in the parentheses represent percentage.

ns = non significant.

4.8 Composition of Food Items to Total Food Consumption of the Sample Rural Households

In the selected villages, 20.8% of households involved in rice farming and most of farm households bought rice from the market for rice consumption. The sample farm households used average 18 baskets of rice per year for their home consumption. The farm households consumed rice and meats significantly higher than that of landless households. Other foods such as pluses, fruits, oil, eggs and vegetables consumption were not significantly different between farm and landless households. The average daily households' rice consumption of landless and farm households were 1.76 kg and 2.09 kg, respectively (Table 4.26). The farm households, the small farm households consumed rice significantly lower than medium and large farm households. Most of the landless and small farm households consume low quantity and quality of rice than the medium and large farm households. Although there was no significantly difference in other food quantity, but there was a highly significant difference in rice consumption among the farm households (Table 4.27).

The contributions of rice, meats, oil, fish, pluses and eggs for the total food cost of sample households are illustrated in (Figure 4.3 and 4.4). In the landless households, the contributions of rice, meats, oil, fish, pluses and eggs constitute about 39 %, 17%, 14%, 5%, 4% and 6% of the daily food costs respectively. On the other hand, the contribution of rice, meats, oil, fish, pluses and eggs constitute about 32%, 24%, 15%, 6%, 3% and 5%, respectively in the farm households. Among the farm households, the contribution of large and medium farm households' rice consumption percentage was higher than that of the small farm households. But the other food contribution percentages were not different among the farm households. The small farm households have higher percentage in the contributions of pluses, eggs than the medium and large farm households in the study area.

Rice is the most important food item in the comparison of food composition (in terms of quantity) in both landless and farm households. Rice is the major food item and the rice consumption was the highest in food composition of the sample households. The small farm households' rice contribution percent in the total food cost was the lowest in the rural households. But the small farm households can consume meats like the other farm households and the meat consumption percentage of landless was the lowest when compare with the farm households. There was a significant different in rice and meats consumption between landless and farm

households in the study area. Generally, the farm households have higher food composition quantity than that of landless households.

The landless and farm groups do not differ from each other on several strategies for acquiring food at low cost (e.g., vegetable gardening, hunting and fishing, and receiving free eggs, milk, and meat from friends or relatives or as in-kind pay for agricultural work). But most of the landless and small farm households borrowed rice from the village grocery and pay after one month. Although they have always in debt for rice the whole year, there was no interest rate for their rice bought. Generally, most of the households in the sample villages bought the meats from the street vendors in their village because of poor market infrastructure and being far away to go to the market.

Table 4.26 Composition of food items to total food consumption of the sample rural households

Daily consumption of food and provision of food items to total food consumption	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Rice (kg)	1.76	2.09	1.96
	*t = 2.479, P = 0.007***, df = 195*		
Meats (kg)	0.16	0.23	0.17
	*t = 4.748, P = <0.001***, df = 195*		
Oil (kg)	0.17	0.20	0.20
	t = 1.850, P = 0.066^{ns}, df = 195		
Pluses (kg)	0.16	0.15	0.15
	t = -0.543, P = 0.588^{ns}, df = 195		
Fish (kg)	0.06	0.11	0.09
	*t = 3.305, P = 0.001***, df = 195*		
Eggs (no.)	1.08	1.37	1.26
	t = 1.745, P = 0.083^{ns} ,df = 195		
Fruits &Vegetables (kg)	0.55	0.69	0.63
	t = 1.745, P = 0.086^{ns}, df = 195		

Note: ***and ** are significant difference at 1%, 5% probability levels, respectively
ns = non significant.

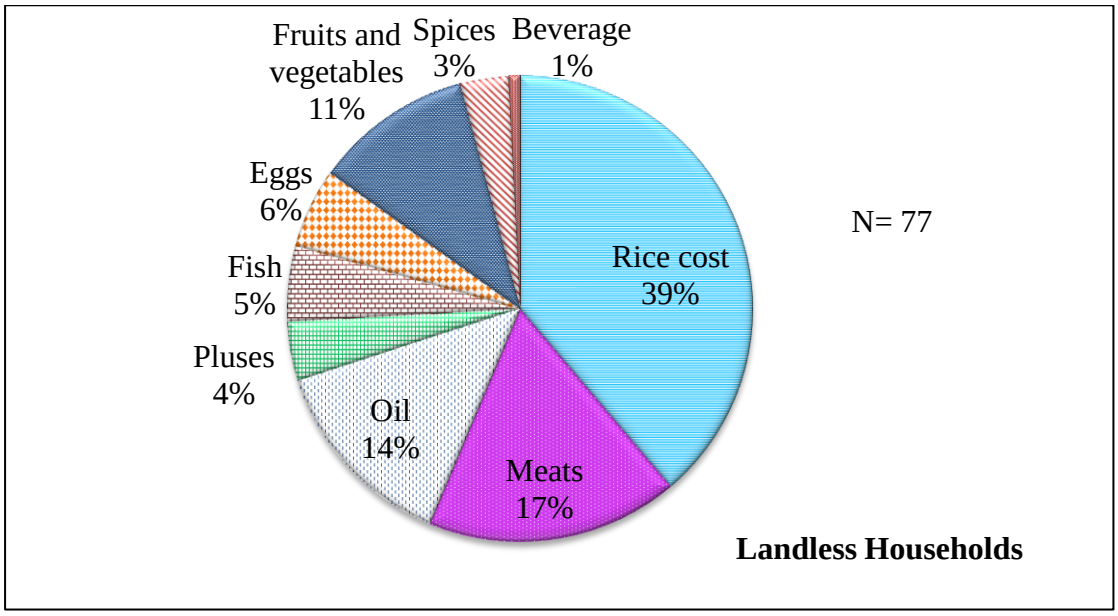
Table 4.27 Composition of food items to total food consumption of sample farm households by size of land holdings

Daily consumption of food and provision of food items to total food consumption	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Rice (kg)	1.6	2.19	2.24	2.09
	F = *6.022, P = 0.003***,df= 119*			
Meats (kg)	0.18	0.22	0.26	0.18
	F = *0.692, P = 0.535*^{ns}, *df = 119*			
Oil (kg)	0.18	0.21	0.2	0.2
	F = *0.503, P = 0.606*^{ns}, *df = 119*			
Pluses (kg)	0.19	0.13	0.15	0.15
	F = *1.391, P = 0.253*^{ns}, *df* = 119			
Fish (kg)	0.14	0.11	0.09	0.11
	F = *0.928, P = 0.398* ^{ns}, *df = 119*			
Eggs (no.)	1.62	1.13	1.56	1.37
	F = *2.103, P = 0.127*^{ns}, *df = 119*			
Fruits &Vegetables (kg)	0.39	0.72	0.78	0.69
	F = *2.478, P = 0.088*^{ns}, *df = 119*			

Note: ***, **are significant difference at 1% and 5% probability levels, respectively

ns = non significant

(a)



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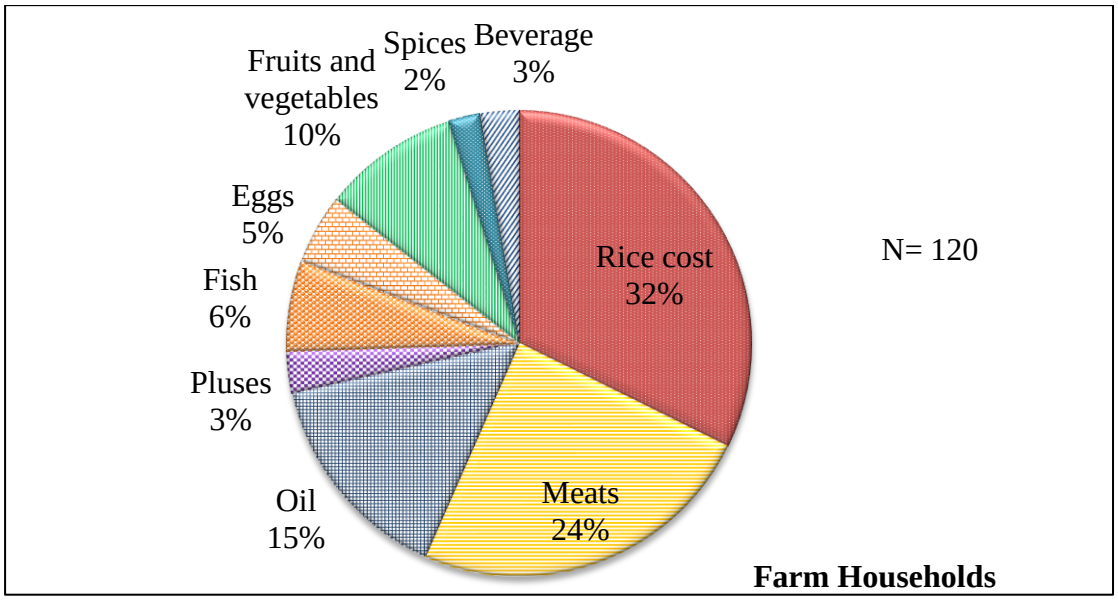
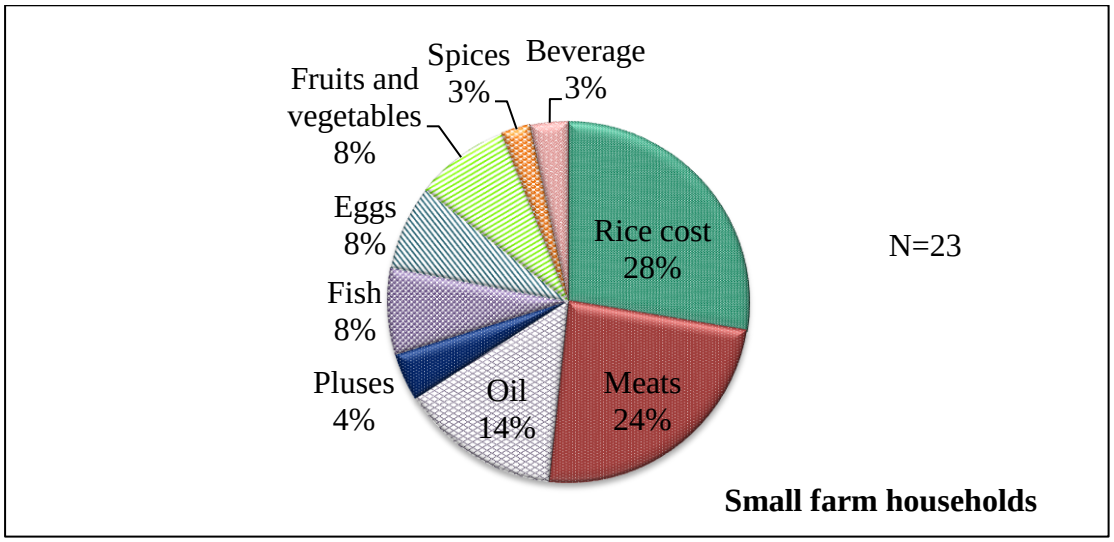


Figure 4.3 Composition of food items to total food cost of the sample rural households

(a)



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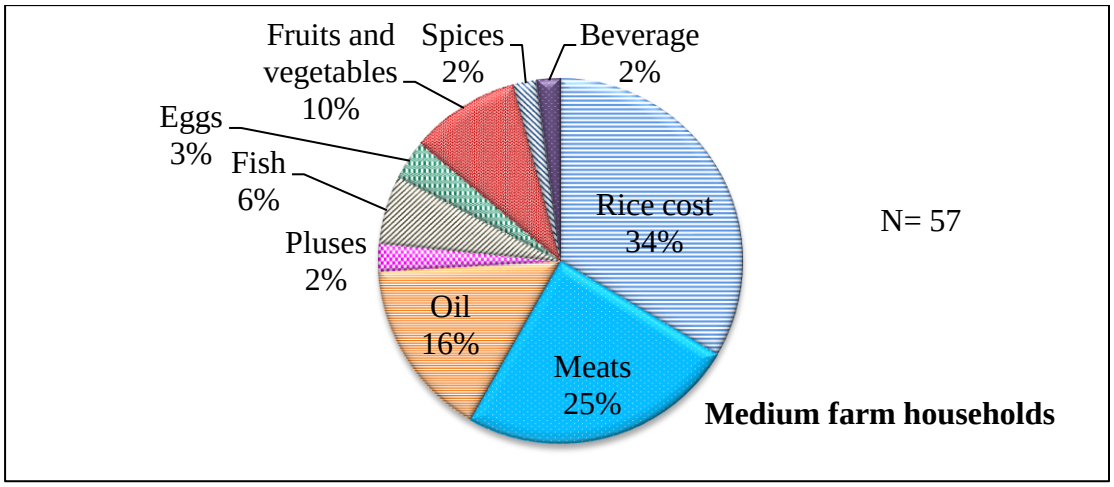

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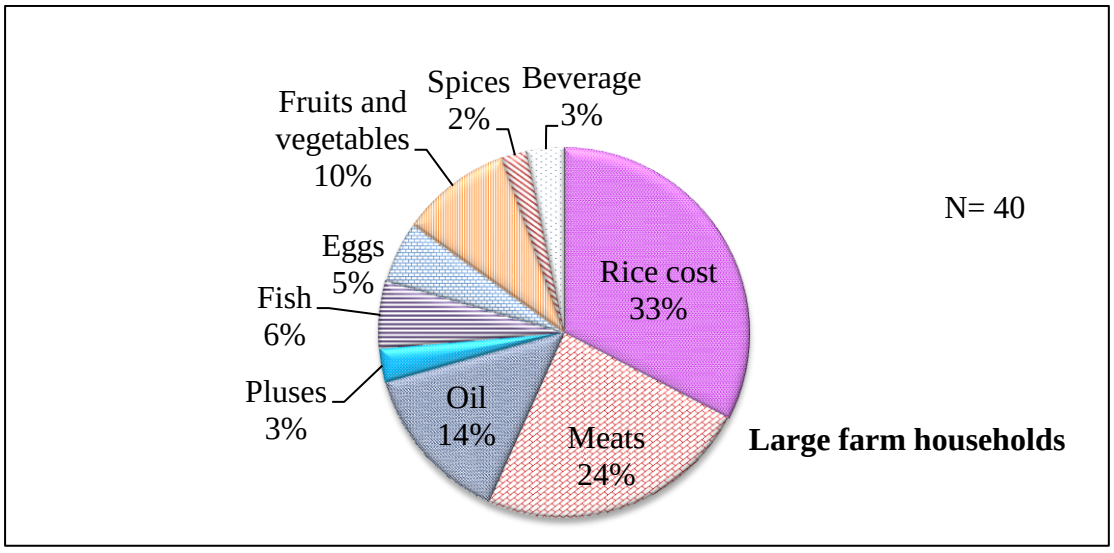

Figure 4.4 Composition of food items to total food cost of the sample different farm households

4.9 Daily Per Capita Caloric Intake of the Sample Rural Households

Household calorie availability was computed from each food item consumed and commonly consumption of food items. These food items were rice, pluses, meats and fish, oil, eggs, fruits and vegetables and beverages. The net weekly calorie availability was divided by household members to obtain the daily calorie availability of the households. Then, the sample rural households were categorized into four groups based on their daily caloric intake.

The landless and farm groups did not differ from each other on acquiring low quantity of foods because of their daily per capita caloric intake were not significantly different between landless and farm households. Although landless households have lesser food intakes in meats and fish than farm households, they have other food items such as vegetables, pluses, and eggs to fill up their basic food needs. About 22.08% of landless households fall in the lowest caloric intake and 40.26% fall in the low caloric intake, respectively. On the other side, there were 25% of farm households fall in lowest caloric intake and 41.67% of farm household fall in low calorie intake, respectively. The average calories were 2127 kcal and 2181kcal in landless and farm households, respectively. There was no significant different in caloric intake between landless and farm households (Table 4.28).

In the farm households, about 26.01%, 26.32% and 22.5% of small, medium and large farm households fall in the lowest caloric intake, respectively. On the other side, 12.5% of large and 7.01% of medium farm households fall in the high caloric intake. But, there were no small farm households in the high caloric intake. The average caloric intake of large farm was the highest among the farm households but there was not significantly different in caloric intake (Table 4.29).

Table 4.28 Classification of daily per capita calories of the sample rural households

Amount of caloric intake	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Lowest calorie intake (1050- 1699 kcal/day)	17 (22.08)	30(25.00)	45 (22.84)
Low calorie intake (1700- 2349 kcal/day)	31(40.26)	50(41.70)	83 (42.13)
Medium calorie intake (2350- 2999 kcal/day)	19 (24.67)	31(25.80)	51 (25.89)
High calorie intake (above 3000 kcal/day)	10 (12.99)	9 (7.50)	18 (9.14)
Average calorie	2127	2181	2171
t = 0.623, P = 0.534^{ns}, df = 195			

Note: Numbers in the parentheses represent percentage.

ns= not significant

Table 4.29 Classification of daily per capita calories of the sample farm households by size of land holdings

Amount of caloric intake	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Lowest calorie intake (1050- 1699 kcal/day)	6 (26.09)	15 (26.32)	9 (22.50)	30 (25.00)
Low calorie intake (1700- 2349 kcal/day)	9 (39.13)	24 (42.11)	17 (42.50)	50 (41.67)
Medium calorie intake (2350- 2999 kcal/day)	8 (34.78)	14 (24.56)	9 (22.50)	31 (25.83)
High calorie intake (above 3000 kcal/day)	-	4 (7.01)	5 (12.50)	9 (7.50)
Average calorie	2147	2153	2239	2181
F *= 0.293, P = 7.47^{ns}, df = 119*				

Note: Numbers in the parentheses represent percentage.

ns= not significant

4.10 Minimum Capita Daily Requirement of Food in the Study Area

The average minimum energy requirement of 2100 kcal recommended by world health organization (WFP 1998) for developing countries is used as a parameter in the study area. To fill up the minimum per capita daily requirement of calorie, the required value per capita was estimated at 586 MMK for the study area. The minimum per capita daily requirement of food was calculated by using the local available food and commonly eaten by local family based on the local market price (Table 4.30).

In the calculation of caloric intake, the highest calories were obtained from the eating of rice. Normally, the rural farmer is able to eat three plates of rice per day which was equivalent to 1434 kcal and costs 150 MMK. The second highest calories were obtained from pluses which were abundant in the study area. If they eat 0.4 tins of pluses give 357 calories and costs 80 MMK. Four tickles of vegetables contain 134 kcal and costs 40 MMK. Each of 69 kcal, 42 kcal, 49 kcal, 5 kcal, 3 kcal and 7 kcal obtained from meats, oil, eggs, fishes, onion, garlic and pepper, respectively. Therefore, the minimum cost requirement for food was 586 MMK per day to reach 2100 kcal capita per day.

4.11 Daily Capita Food Cost of the Sample Rural Households

Food is essential for life and one of the most basic needs. Food security is adequate access to food at all times, through the year and from year to year. Food assess is ensured when all households and all individuals with those households have sufficient resources to obtain appropriate foods for a nutritious diet.

In general, it can be said that the average daily per capita food cost of farm households were above the minimum per capita daily food requirement of 586 MMK/day and landless were below this food requirement in the study area. It was obvious that the majority of farm households (53.33%) were above the minimum per capita requirement of food (586 MMK/day). But on the other hand, the majority of landless households (59.74%) were below the minimum per capita food requirement (586 MMK/day). There was a significantly different in food cost between landless and farm households (Table 4.31).

The majority of small farm households (65.21%) were below the minimum per capita daily food requirement of 586 MMK/day. But the majority of medium farm households (57.89%) and the large farm households (57.5%) were above the food

requirement of 586 MMK/day. The large farm group has the highest average food cost of 623MMK than small and medium farm households of 542 MMK and 560 MMK and it was not significantly different in daily per capita food cost among the different farm households (Table 4.32).

Although there were more than one source of income diversification in landless households, low per capita income, low opportunity to receive credit for income generating and lack of productive access makes them low food consumption levels. On the other hand, the entire farm household's primary economic activity based on farming and no alternative means of getting additional income make them substitute with other foods to increase their low level of caloric intake because farmers' major food consumption depends on their own farm. Although the landless households' average food cost was lower than the estimated food cost (586 MMK per day) that is they have lesser food intakes in meats and fish than farm households, they have other food items such as vegetables, pluses, and eggs to fill up their caloric intake. The daily capita food expenditure and caloric intake were illustrated in (Figure 4.5).

4.12 Percentage of Food Share in Total Expenditure and Income among the Sample Rural Households

The food share percentage for the sample households was showed in Table 4.33 and 4.34.The food share in the household total expenditure and income should be estimated to examine the well- being of different rural households (Dolly Kyaw 2009). About 59% and 40% of food cost contributed in the total expenditure and total income of sample households respectively. Landless household use more food cost 53% than that of farm households 35% in their total household income and the highest food cost ratio in total expenditure was founded in landless households.

Only large farm households were using 26% of their income for food consumption. Small farm households' food share percentage in total income was higher than the other farm households groups. Therefore, it was obvious that the majority of landless and small farm households were vulnerable in the study area as more than half of their income was mainly used for food consumption.

Table 4.30 Estimated minimum per capita daily food requirement

No.	Items	Amount	(kg)	Calories(kcal)	MMK
1	Rice	1.5-tins	0.40	1434	150
2	Oil	2- ticals	0.03	42	66
3	Pluses	0.4-tins	0.1	357	80
4	Meat	1.5-ticals	0.02	69	90
5	Fish	2-ticals	0.03	5	40
6	Eggs (no.)	1	0.1	49	110
7	Vegetables	4-ticals	0.06	134	40
8	Onion	0.5- ticals	0.008	3	2
9	Garlic/Pepper	0.3-ticals	0.004	7	8
				2100	**586**

Note: Calculated by the use of local available food and common food of the local households with the local market price in Oct, 2014.

Table 4.31 Classification of daily capita food cost of the sample rural households

Classification of groups	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Lowest per capita food cost (230-350 MMK/day)	15 (19.48)	17 (14.17)	32(16.24)
Low per capita food cost (351-500 MMK/day)	31 (40.26)	39 (32.50)	70(35.53)
Medium per capita food cost (501-1000 MMK/day)	28 (36.36)	51 (42.50)	79(40.10)
High per capita food cost (above 1000 MMK/day)	3 (3.9)	13 (10.83)	16(8.13)
Ave. per capita food cost (MMK)	508	596	562
	*t = 2.410, P = 0.017**, df = 195*		

Note: Numbers in the parentheses represent percentage.

** is significant difference at 5% probability level.

MMK is Myanmar Kyat.

Table 4.32 Classification of daily capita food cost of the sample farm households by size of land holdings

Classification of groups	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Lowest per capita food cost (230-350 MMK/day)	7 (30.43)	8 (14.03)	2 (5.00)	17 (14.17)
Low per capita food cost (351-500 MMK/day)	8 (34.78)	16 (28.07)	15 (37.50)	39 (32.5)
Medium per capita food cost (501-1000 MMK/day)	6 (26.09)	25 (43.87)	20 (50.00)	51 (42.5)
High per capita food cost (above 1000 MMK/day)	2 (8.70)	8 (14.03)	3 (7.50)	13 (10.83)
Ave. per capita food cost (MMK)	542	560	623	596
	F = *0.652, sig = 0.523*^{ns}*, df = 119*			

Note: Numbers in the parentheses represent percentage.

ns= not significant

MMK is Myanmar Kyat

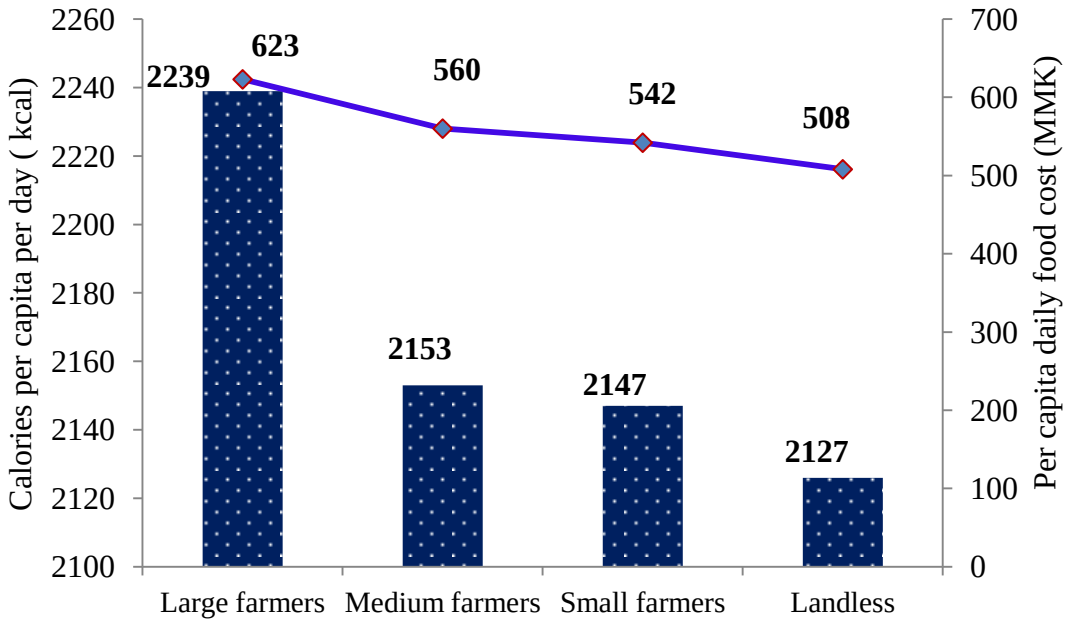

Figure 4.5 Daily capita food expenditure and caloric intake

Table 4.33 Percentage of food share of sample rural households

Food Share	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Total expenditure	1,192,959	1,774,766	1547,359
Total food cost	863,906	947,123	914,596
Ratio of Food cost in total Expenditure (%)	72	53	59
	*t = -5.562, P = <0.001****		
Total household income	1,641,987	2,678,078	2,273,108
Total food cost	863,906	947,123	914,596
Ratio of food cost in Households' income (%)	53	35	40
	t = -1.498, P = 0.136^{ns}		

Note: ***is significant difference at 1% probability level and ns= not significant

Table 4.34 Percentage of food share of sample farm households by size of land holdings

Food Share	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Total expenditure	1,716,546	1,575,366	2,092,389	1,774,766
Total food cost	908,848	874,649	1,072,405	947,123
Ratio of Food cost in total expenditure (%)	53	56	51	53
	F = *0.566, P = 0.575*^{ns}			
Total household income	1,605,975	2,130,674	4,074,587	2,678,078
Total food cost	908,848	874,649	1,072,405	947,123
Ratio of food cost in Households' income (%)	57	41	26	35
	F = *3.503, P = 0.033***			

Note: ** is significant difference at 5% probability level and ns= not sign

4.13 Food Security Status of the Sample Rural Households

Figure 4.6 illustrates the food poverty threshold line for the sample households. The average minimum energy requirement of 2100 kcal was used to consider the food security status of the study area. Based on this energy requirement, households' food poverty line can be constructed to diverse food secure and insecure households in selected villages. Households with daily calorie consumption greater than or equal to 2100 kcal per day were categorized as food secure and those households whose caloric intake fallen below food security threshold grouped as food insecure households.

The resulting food security status of the respondent households was presented in Table 4.35. About 46.71% of the total households face food insecurity which means that 92 households in the study area living below food poverty threshold line. There were 48.05% of food insecure and 51.95% of food secure households in the landless households. There were 45.84% of food insecure and 54.17% of food secure farm households in the study area.

Among the farm households, 52.17% of small farm households, 45.61% in medium and 42.5% of large farm households experience the food insecurity situation (Table 4.36).

Because periods of drought reduce production potential, low or lack of productive assets such as livestock, poor access to inputs and credit, low or lack of job opportunity such as seasonal unemployment causes minimum level of income situation leads to attain food insufficiency for landless and the farm households.

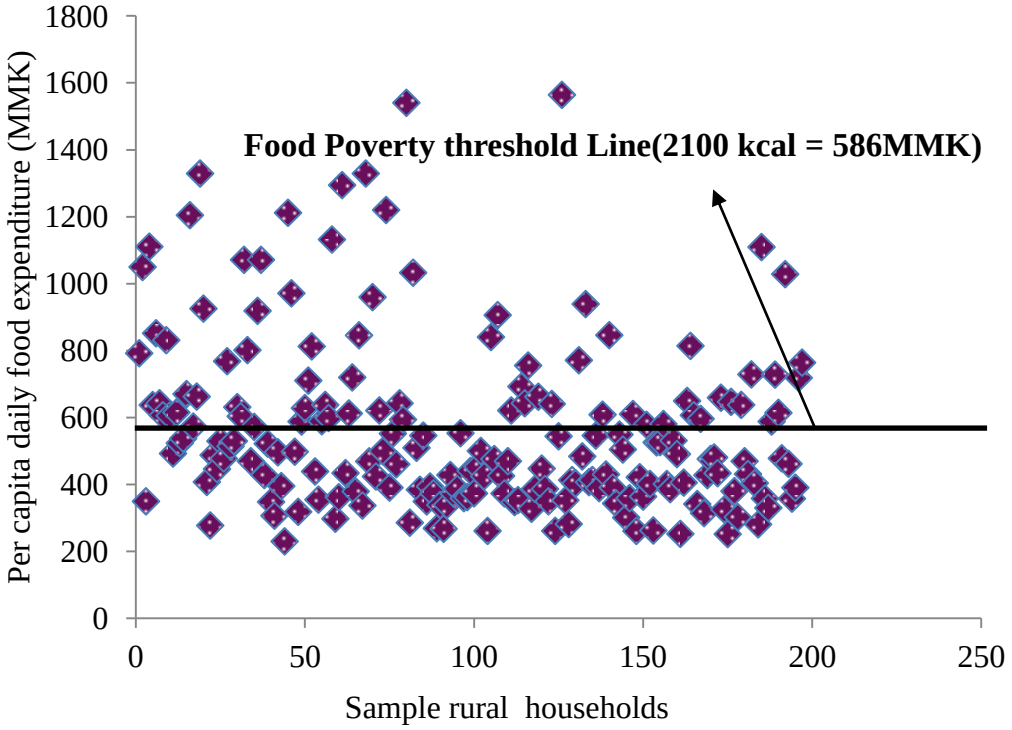

Figure 4.6 Food poverty threshold line (2100 kcal = 586 MMK) of the sample rural households

Table 4.35 Food security status of the sample rural households

Food Security Status	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Food insecure	37 (48.05)	55 (45.84)	92 (46.71)
Food secure	40 (51.95)	65 (54.17)	105 (53.29)

Note: Food insecure= below food poverty threshold line 2100 kcal/person/day

Numbers in the parentheses represent percentage

Table 4.36 Food security status of the sample farm households by size of land holdings

Food Security Status	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Food insecure	12 (52.17)	26 (45.61)	17 (42.5)	55 (45.83)
Food secure	11 (47.83)	31 (54.39)	23 (57.5)	65 (54.17)

Note: Food insecure= below food poverty threshold line 2100 kcal/person/day

Numbers in the parentheses represent percentage

4.14 Demographic and Socio Economic Characteristics of the Food Secure and Insecure Sample Rural Households

The average age of the respondent households was 51 years while the food insecure and food secure households average age was 52 and 50 years respectively and there was no statistical difference in age between the two groups. The average family sizes of the food insecure and secure households were 5.96 and 4.77 respectively. The observed difference in family size between the food insecure and secure was significant at 1% level. The average dependency ratios of the households were 27.58% while the food insecure and secure households' dependency ratios were 26.38% and 28.62%, respectively and there was no significant difference in dependency ratio between the two groups. The average total food expenditure of food insecure group was 897,240 MMK per year and food secure group was 989,810 MMK per year, respectively. The average farm income of food insecure group was 600,860 MMK per year and food secure group was 753,120 MMK per year and the average non-farm income of food insecure group was 1,676,900 MMK per year and food secure group was 1,158,600 MMK per year and there was no statistical difference in both farm and non- farm income between the two groups. The average credit taken amount of food insecure group was 139,510 MMK per year and food secure group was 114,760 MMK per year and there was also no statistical difference in non- farm income between the two groups. The average land hectare of food insecure group was 2.64 and food secure group was 2.67 and there was no observed statistical difference in total land hectare between the food insecure and secure group (Table 4.37).

Table 4.38 reveals that in most of categorical variables such as sex, migration, drinking water safety and credit availability of food insecure and secure households. Although there was no significantly difference in the distribution of households according to sex, drinking water safety and credit availability. About 42.6% of food insecure households and 48.2% of food secure households mentioned that they got safe drinking water for household consumption. The majority of respondents in both food insecure and secure households migrated to other places for their livelihoods despite the proportion difference significantly different in migration at 1% level.

Table 4.37 Demographic and socio economic characteristics of the food secure and insecure households

Variables	Food insecure (N=92)	Food secure (N=105)	Total (N= 197)
	Mean	Mean	Mean
Age of household head (years)	52	50	51
	t = 1.633, *P= 0.104*^{ns}		
Family size (No)	5.96	4.77	5.32
	*t = 4.520, P = <0.001****		
Dependency ratio (%)	26.38	28.62	27.58
	t = 0.7922, P = 0.426^{ns}		
Total food expenditure (MMK)	897,240	989,810	946,580
	t= 0.868, P = 0.368^{ns}		
Farm income (MMK)	600,860	753,120	682,010
	t= -0.838^{ns}, *P = 0.394*^{ns}		
Non- farm income (MMK)	1,676,90	1,158,600	1,400,700
	t = 1.686, P = 0.103^{ns}		
Amount of credit taken (MMK)	139,510	11,4760	126,320
	t = 1.238, P = 0.22^{ns}		
Total land(ha)	2.64	2.67	2.66
	t = -0.05, P = 0.960^{ns}		

Note: ***is significant difference at 1% probability level and ns= not significant

MMK is Myanmar Kyat

Table 4.38 Percent of sample rural households by categorical variables (%)

Variables	Score	Food Insecure (N=92)		Food Secure (N= 105)		Total (N= 197)	
		No.	(%)	No.	(%)	No.	(%)
Sex of HH	1(male)	81	41.1	90	45.7	171	86.8
	0 (female)	11	5.6	15	7.6	26	13.2
Pearson chi square		*P = 0.63^{ns}, df = 1*					
Migration	1(migrate)	43	21.8	13	6.6	56	28.4
	0 (not migrate)	49	24.9	92	46.7	141	71.6
Pearson chi square		*P = <0.001***, df = 1*					
Drinking water safety	1 (yes)	84	42.6	95	48.2	179	90.9
	0 (no)	8	4.1	10	5.1	18	9.1
Pearson chi square		*P = 0.840^{ns}, df = 1*					
Credit availability	1 (yes)	65	33.0	72	36.5	137	69.5
	0 (no)	27	13.7	33	16.8	60	30.5
Pearson chi square		*P = 0.930^{ns}, df = 1*					

Note: *** is significant difference at 1% and ns = non significant.

4.15 Food Poverty Incidence of the Sample Rural Households

The measures of poverty depth and poverty severity provide complementary information on the incidence of poverty (Reyes 2005). Food consumption data available for the households were analyzed by using FGT (1984) poverty measurement to determine the welfare of the households by computing the food poverty incidence (headcount ratio, food poverty gap and food severity).

The highest values of food poverty incidence in Mandalay region was 16% according to IHLCA survey in 2011. Dolly Kyaw (2006) revealed that the absolute poverty line at 252 MMK per person per day in order to reach the recommended level of 2100 kcal in the dry zone area during the period of 2006. Aye Thida Khant (2004) indicated that the rice growing farmers required 302 MMK as minimum per capita daily food requirement for the delta region in the year of 2004.

In this study, the minimum income requirement for food and food expenditure was 586 MMK per capita per day. Based on this food expenditure requirement, the level of food poverty for sample households could be calculated. The head count ratio estimated in landless was 71.42% and farm households was 57.5%, respectively means that 71.42% of landless and 57.5% of the farm households fall in food poverty. The food poverty gap ratio for landless and farm households have 22.2% and 16.64%, respectively. Then, square food poverty gap ratio or severity of the food poverty for landless and farm households were 8.49 and 6.01, respectively. It was obvious that the households in landless and small farmers were in hunger than others and the majority of the poorest of the poor were founded in landless and small farm households in the study area (Table 4.39).

Head count ratio for small, medium and large farmers were 69.56%, 57.89% and 50% respectively. It means that 69.56% of the small farm households, 57.89% of the medium farm households and 50% of the large farm households fall in the food poverty. Food poverty gap ratio for small, medium and large farm households was 22.85, 15.58 and 14.57 respectively. Square food poverty gap ratio or severity of the food poverty for small, medium and farm households was 9.41%, 5.4% and 4.94% respectively and the majority of the poorest of the poor were found in small farm households (Table 4.40).

Table 4.39 Food poverty incidence of sample rural households

Food Poverty	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Head count ratio (%)	71.42	57.50	62.94
Food poverty gap ratio (%)	22.20	16.64	18.81
Severity of poverty (%)	8.49	6.01	6.98

Table 4.40 Food poverty incidence of sample farm households by size of land holdings

Food Poverty	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
Head count ratio (%)	69.56	57.89	50.00	57.50
Food poverty gap ratio (%)	22.85	15.58	14.57	16.64
Severity of poverty (%)	9.41	5.40	4.94	6.01

4.16 Coping Strategies to Food Insecurity of the Sample Rural Households

The level of the food shortage problem varies from household to household and food insecure households use different strategies to cope with the food shortage (Habtewold et al.1998). The index of coping strategy has three advantages: it is easy to implement; it directly captures notions of adequacy and vulnerability: and the questions asked are easy to understand by both respondents and analysts (Hoddinott 2001.

Unlike in many other food insecure countries, households report that they rarely reduce the size or number of meals when faced with household food shortages. LIFT (2012) founded that households more commonly switch to less expensive and less preferred foods, and/or eat more wild foods than usual. Among the poorest households, it seems common practice to take out consumer debt to finance food purchases. WFP (2014) reported that the most frequently reported coping strategy in the Dry Zone area was reduction of rice portion size in the previous seven days practiced by households with a problem to meet their food needs.

Then, there were about 10 strategies being practiced by the households for food insecurity in this study. About 40.21% and 23.81% of the food insecure and secure households were reducing the number of meals, respectively. Substitute with cheaper foods was employed as coping strategy by 30.43% and 19.04% of food insecure and secure households, respectively. Borrow food was used as third coping mechanism employed by 19.56% of food insecure and 8.57% of food secure households. Sale of livestock was used as fourth coping mechanisms by 7.60% and 6.66% of the insecure and secure households. Household members migrated to other towns or foreign was practiced by 6.52% and 0.95% in food insecure and secure households. And dropped out of children from the schools was also one of the coping strategies used by 5.43% and 1.90% respectively for food insecure and secure households. Another coping strategy was selling jewels which were 4.35% and 1.9% in food secure and insecure households, respectively. There were 3.26% and 1.9% in food insecure and secure households who replace rice with other foods which was used as one of the coping strategy among the sample households. Pawing properties and selling lands was equally practiced as coping mechanism by 1.08% in food insecure households and 3.8% and 0.95%, respectively in food insecure households in the study area (Table 4.41).

4.17 Classification of Coping Strategies of Food Insecurity of the Sample Rural Households

Table 4.42 and 4.43 represents classification of coping strategies of food insecurity of the sample rural households. Coping strategy index provides a good indication on the severity of the household food security status (FSIN 2012). Firstly, the respondents were asked whether they have enough rice in the last 30 days. The households who have inadequate amount of rice or inadequate income to buy rice were then asked how to cope with this problem. The level of coping strategies was classified as low, medium and high index of coping strategies. According to food poverty line method and the coping strategies, about 51.95% of the farm households were categorized as food secure households. The rest of the households were food insecure accordance with their level of coping strategies index. There were only 1.29% of the landless households and 1.67% found in high levels of coping strategies for food insecurity. And then, 4.16% and 3.89% of medium coping mechanisms were found in landless and farm households respectively. About 42.86% of the landless and 41.66% of the farm households were found in low level of coping strategies for food insecurity. Fortunately, there were 51.95% and 54.17% of landless and farm households have no coping strategies.

Due to the land size classification of the farm households, there was no medium and large farm households found in using high index of coping strategies. There were only 8.69% of small farm households, 1.75% of medium farm households were using medium index of coping strategies and large farm households were not found in using medium index of coping strategies.

Table 4.41 Coping strategies to food insecurity of sample rural households

Coping Strategies to food insecurity	Food insecure Households (N=92)		Food secure Households (N=105)	
	No.	%	No.	%
Reduce meal	37	40.21	25	23.81
Substitute with cheaper foods	28	30.43	20	19.04
Borrow from others	18	19.56	9	8.57
Selling animals	7	7.60	7	6.66
Migration to other places	6	6.52	1	0.95
Dropping out of children	5	5.43	2	1.90
Selling jewels	4	4.35	2	1.90
Replacing rice with other foods	3	3.26	2	1.90
Pawning properties	1	1.08	4	3.80
Selling lands	1	1.08	1	0.95

Table 4.42 Classification of coping strategies of food insecurity of the sample rural households

Coping Strategy Index	Landless (N=77)	Farm HH (N=120)	Total (N=197)
No need to use coping strategy	40 (51.95)	65 (54.17)	98 (49.75)
Low index of CS	33 (42.86)	50 (41.66)	90 (45.68)
Medium index of CS	3 (3.90)	3 (2.50)	6 (4.06)
High index of CS	1 (1.29)	2 (1.67)	1 (0.51)
Pearson chi square test	*P = 0.488^{ns}, df = 3*		

Note: Numbers in the parentheses represent percentage

ns = non significant

Table 4.43 Classification of coping strategies of food insecurity of sample farm households by size of land holdings

Coping Strategy Index	Small (N=23)	Medium (N=57)	Large (N=40)	Total (N=120)
No need to use coping strategy	10 (43.49)	23 (40.35)	32 (80.00)	65 (54.17)
Low index of CS	9 (39.13)	33 (57.90)	8 (20.00)	50 (41.66)
Medium index of CS	2 (8.69)	1 (1.75)	-	3 (2.50)
High index of CS	2 (8.69)	-	-	2 (1.67)
Pearson chi square test	*P = <0.001***, df = 6*			

Note: No coping strategies Index (CSI) = weighted sum score of 11

Low CSI = weighted sum score between 12-15

Medium CSI = weighted sum score between 16- 18

High CSI= weighted sum score above 18

*** is significant difference at 1% probability level

Numbers in the parentheses represent percentage

4.18 General Constraints of Sample Rural Households

The general constraints of landless and farm households were separately derived in Table 4.44. There were fourteen constraints perceived that households in the rural area such as, landlessness, low income, high dependency, lack of employment, lack of credit for production, high indebtedness, vulnerable to natural disaster, low crop production, inadequate water for crop production, lack of technical knowledge, increase food prices, poor transportation, lack of social support, and degraded land.

The landless households provide the perceived causes of constraints such as 35.38% of low income/wage, 20% of high indebtedness, and 55% of increase food prices, lack of social support, poor transportation and poor health care at 18.33%. The constraint of low income 51.95%, vulnerable to natural disaster for crop production 63.33%, low crop production 56.67%, increase food prices 45.45% and land degradation 25.83% was mentioned by farm households. The majority of farmers complained that vulnerable to natural disaster for crop production and low crop production was the main constraints for the study area.

Thus, landless households' major constraints was low or no income and the farm households' major constraints was decrease crop production due to natural disaster. Overall, the sample rural households in the study area were suffering from the constraints of low income and increase food prices. Therefore, the participatory approach to poverty and technology adoption for crop production can provide additional causes of household poverty such as low income, low crop production.

Table 4.44 General Constraints of Sample Rural Households

Items	Landless (N=77)	Farm HH (N=120)	Total (N=197)
Landlessness	12 (10.00)	26 (33.77)	38 (19.29)
Pearson chi square test	*P = 0.000****		
Low or no income	43 (35.83)	40 (51.95)	83 (42.13)
Pearson chi square test	*P = 0.025***		
High dependency	12 (10.00)	12 (15.84)	24 (12.18)
Pearson chi square test	*P = 0.242^{ns}*		
Lack of employment	12 (10.00)	24 (31.16)	36 (18.27)
Pearson chi square test	*P = 0.000****		
Lack of credit for production	17 (14.17)	12 (15.58)	29 (14.72)
Pearson chi square test	*P = 0.784^{ns}*		
High indebtedness	24 (20.00)	18 (23.37)	42 (21.32)
Pearson chi square test	*P = 0.572^{ns}*		
Vulnerable to natural disaster for crop production	0 (0.00)	76 (63.33)	76 (38.57)
Pearson chi square test	*P = 0.000****		
Low crop production	0 (0.00)	68 (56.67)	68 (34.52)
Pearson chi square test	*P = 0.000****		
Lack of social support	22 (18.33)	17 (22.08)	39 (19.80)
Pearson chi square test	*P = 0.52^{ns}*		
Poor transportation	22 (18.33)	15 (19.48)	37 (18.78)
Pearson chi square test	*P = 0.841^{ns}*		
Increase food prices	66 (55.00)	35 (45.45)	101 (51.27)
Pearson chi square test	*P = 0.181^{ns}*		
Inadequate water	12 (10.00)	0 (0)	12 (6.09)
Pearson chi square test	*P = 0.291^{ns}*		
Land degradation	0 (0.00)	31 (25.83)	31 (15.73)
Pearson chi square test	*P = 0.000****		
Lack of technology knowledge	0 (0.00)	25 (20.83))	25 (12.69)
Pearson chi square test	*P = 0.000****, df = 1*		
Poor health care	22 (18.33)	10 (12.98)	32 (16.24)
Pearson chi square test	*P = 0.429^{ns}, df = 1*		

Note: ***, ** Significant difference at 1% and 5% probability level and ns= not significant

4.19 Factors Influencing Per Capita Food Expenditure of the Sample Rural Households

As it depicted in the Table 4.45 out of 11 variables fitted in the regression model 6 of them significantly influenced per capita food expenditure of the sample households in the study area. These were total household member, total income, household rice consumption, meat consumption in kilograms, dummy variable of go to migration and other expenditure of the households.

Household size measured in the number of household members was found to negatively and significantly influence per capita food expenditure at 1% probability level. If all other things were held constant, an increase in the size of family by one person decreases per capita food expenditure by a factor of 0.8%. Family size has negative impact on the state of food security, in such a way that households with large family size have high per capita food cost than those with small numbers of family members. Sekhampu (2013) also reported that larger household sizes were associated with a negative food security status as larger household sizes require increase food expenditure and competition for limited resources.

Household total income have positively and significantly impact on per capita food expenditure whether an income of the households in off- farm or non- farm. It means that other things being kept constant, in favor of per capita food expenditure increases by a factor of 0.088% as one unit increase in total income of the households.

Rice is the major food item and thus it has positively and highly significant on per capita food expenditure at 1% level. This means the households who consume more rice (kg) increase per capita food expenditure within the households. In this study, all other factors kept constant, as the rice consumption of the households increased by 1 percent, in favor of per capita food expenditure increased by a factor of 0.49%. The rural households mainly consume rice rather than other foods to fill up their basic food needs.

The consumption of meats were directly associated with the per capita food expenditure. Other things being equal, one percent in intake of meats could be increased by 0.065 %. Generally, it is seldom to eat meat once for a couple of week in the selected area. And the prices of meats were higher than rice. Hence, if the households can consume more meats, their food cost and also daily per capita caloric intake will be higher in the sample households.

Migration is one of the coping strategies for food insecurity. Not only farm

households but also landless were migrated for work to other places for food sufficiency and then it has negatively and significantly correlated with per capita food expenditure at 5% level. If the households migrated to other places, then the per capita food expenditure will be reduced significantly about 0.081%. So, food expenditure for each member can be reduced by migrated workers.

Household's consumption on other expenditure has highly significant and positively influence on per capita food expenditure at 5% level. The finding reveals that the daily per capita food cost will be increased by 0.069% as one percent increase in non- food expenditure in the households.

Overall, F value revealed that the model was significant at 1% level. The adjusted R squared points out that the model was significant and it can explain that variation in daily per capita food expenditure was 44%.

Table 4.45 Factors influencing per capita food expenditure of the sample rural households

Coefficients					
Explanatory variables	Unstandardized Coefficients		Standardized Coefficients	t	P
	B	Std. Error	Beta		
(Constant)	4.313***	.607		7.101	.000
Household head age	.013	.104	.008	.121	.904
Household head's education level	.016	.031	.030	.510	.611
Total households member (No)	-.833***	.086	-.749	-9.669	.000
Total income(MMK)	.088***	.031	.191	2.845	.005
Household rice consumption (kg)	.490***	.070	.506	7.035	.000
Meat consumption (kg)	.065**	.025	.146	2.593	.010
Migration (yes=1)	-.081**	.038	-.133	-2.145	.033
Credit taken amount (MMK)	-.003	.005	-.036	-.602	.548
Dependency ratio (%)	-.018	.017	-.063	-1.081	.281
Non-food expenditure	.069**	.027	.172	2.604	.010
Total land (ha)	.001	.031	.002	.033	.974
R^2= 0.443, F= 13.380, P = 0.000***					

a. Dependent Variable: Per capita food expenditure per day, *** and ** are significant difference at 1% and 5% probability levels, respectively.

CHAPTER V
SUMMARY AND CONCLUSION

5.1 Conclusion of the Study

This study was emphasized to estimate the food security status and their coping strategies of food insecurity in Myingyan Township, Dry zone area. A total of 197 randomly selected households from six villages were involved as source of information. The survey was done during the period in October, 2014.

The respondents of rural households were divided into two groups such as farm households and non farm (landless) households. In order to clarify the food security status of the farmer groups, those were stratified into small, medium and large farm groups according to their land holding size. Thus, in the view of livelihoods of the sample households, 77 households were landless and 120 households were farm households in which 23 households, 57 households and 40 households were small, medium and large farm households respectively.

The average household size of landless and farm households have round about five persons and mostly were founded in extended family living. The average age of landless have 48 years and farm households have 54 years. Male headed households were mostly found in both landless and farm households. Although education is one of the important things to improve rural livelihood, most of the landless households' head and farm households' head reached only monastery and primary school level. The majority of landless got their income from non - farm working and farm households received their income from crop production. There were 69.54% of the total households in the study area were in indebtedness for their survival. About 53.25% of the landless households were indebtedness because landless households were struggle for daily consumption, clothing and shelter. About 80% of farm households were in indebtedness and farm households mainly receive credit from MADB for the use of crop production.

It was obvious that the majority of the rural households except large and medium farm households were vulnerable in the study area as more than half of their income was mainly used for food consumption. The average annual per capita income of landless household was 356,463 MMK and farm household was 489,223 MMK in the study area. The average annual per capita income of small, medium and large farm household was 330,712 MMK, 392,307 MMK and 718,472MMK, respectively. The

large farm households receive 2.1 times of annual per capita income than small farm and 1.8 times than medium households.

Landless household use more food cost 53% than that of farm households 35% in their total household income and the highest food cost ratio in total expenditure was founded in landless households. Only large farm households were using 26% of their income for food consumption. Small farm households' food share percentage in total income was higher than the other farm households groups. Therefore, it was obvious that the majority of landless and small farm households were vulnerable in the study area as more than half of their income was mainly used for food consumption.

The major food items in the study area were rice, pluses, meats and fish, oil, eggs, fruits and vegetables and beverages. The consumption expenditure analyses on total food, food-items and per capita food expenditure by these three groups have provided an insight into the strengths and weaknesses of food security in Myingyan Township. Among all the food items, the per-capita expenditure based provision of food items to total food cost have been found the highest in rice and meat consumption than others. Thus, the food expenditure inequality has been found high inequality in the consumption of most of rice and meats, except for some low-value food items, such as oil, pluses, eggs, vegetables and fishes. The farm households consume rice and meats significantly higher than landless households. The average daily per capita rice consumption (adult equivalent) of farm and landless households were 1.76 kg and 2.09 kg, respectively. In the farm households, the small farm households consume rice significantly lower than medium and large farm households.

Landless households have lesser food intakes in meats and fish than farm households, but they have other food items such as vegetables, fish, and eggs to fill up their basic food needs. And also there was no significant different in caloric intake between landless and farm households. It was obvious that the average calories of landless and farm households have 2127 kcal and 2181 kcal respectively. The medium farm households have the highest average caloric intake than the other the farm households but there was not significantly different in caloric intake among them.

But the rural people average daily per capita food cost in the study area was 508 MMK in landless and 596 MMK in farm households, respectively. The large farm group has the highest average food cost of 623 MMK than small and medium farm households of 542 MMK and 560 MMK. The food poverty threshold line was

determined to the relevant WFP (1998) recommended minimum per capita food requirement of 2100 kcal per day. To fill up the minimum per capita daily requirement of calorie, the required value per capita was estimated at 586 MMK. The person who's per capita for food below 586 MMK per day was referred to as food insecurity. It was obvious that the sample households' caloric intake in the study area was above WFP calorie recommended rate. But there were also the households who fall below food poverty line. Because, the head count ratio was estimated at 62.94% for total households that means 62.94% of the total sample households fall below food poverty threshold line in the study area. It was estimated that head count ratio of the landless was 71.42% which means that 71.42% of the landless fall in food poverty. Head count ratio for small, medium and large farmers were 69.56%, 57.89% and 50% respectively which means that 69.56% of the small farm households, 57.89% of the medium farm households and 50% of the large farm households fall in the food poverty.

It was obvious that the households in landless and small farmers were in food security situation than others and the majority of the poorest of the poor were founded in landless and small farm households in the study area. Food poverty gap ratio for total households was estimated at 18.81% which means that 18.81% of the total income needed to be transferred from the poor to the non- poor households to lift them above food poverty line. Food poverty gap ratio of landless was 22.85% and farm households were 16.64% in which 22.85% for small, 15.58% for medium and 14.57% for large farm households respectively. Moreover, 8.49% of the landless and 6.01% of the farm households fall in the severity of the poverty. If the families do not satisfied average caloric needed in terms of 586 MMK per capita per day, the rural people cannot break the vicious cycle of poverty. The root cause of food insecurity is poverty and this in order to appreciate the contradiction between food self sufficiency on the one hand and prevailing malnutrition on the other. Food insecure groups are characterized by larger family size, low total food cost per day and minimum annual income per capita per day. Therefore, food insecurity was one of the important problems in the study area and the people should try to escape the food poverty trap by raising their income level.

On the other hand, the result of this study showed that 46.71% and 53.29% of the sample households were found to be food insecure and food secure respectively. In the study area food secure groups were characterized by smaller family size, higher

total food cost per capita per day, and low migration percentage compared to the food insecure group. Food secure group produce relatively larger share of food and earn larger annual income than food insecure groups.

According to the major constraints of the rural households, the constraints of low income and increase food prices were mostly responded by both household groups. Therefore, the participatory approach to poverty can provide additional causes of household poverty such as low income, low crop production.

The result of regression model indicated that household a family size has a strongly negative effect on the per capita food expenditure at $P < 1\%$ level. Total income had positive and significant influence on per capita food expenditure at $P < 5\%$ level. Household rice consumption and meat consumption had positive coefficient and influences food expenditure per capita significant (at $P < 1\%$ and $P < 5\%$ level respectively). Migration to other places had negatively influenced per capita food expenditure significantly at $P < 5\%$. Household non food expenditure also had positive and significant influence on the probability ($P < 1\%$ level) on per capita food expenditure.

In the study area the coping strategies of the households to food insecurity have been computed in different ranks in order of importance of food security in food insecure and secure households. Accordingly, the study showed that the most important coping strategies which were practiced by sample household's food insecurity were the following. Reducing number of meal, substitute with cheaper foods, to borrow cash and foods from relatives or others, sales of animals and migration.

5.2 Policy Implication of the Study

On the basis of the study findings the following recommendations were made in order to benefit those who need to intervene in improving household food security. Household income or consumption expenditure directly correlated with food security status and also measures how the rural households can obtain their food needs. Household size has direct and negative relation to per capita food expenditure of household .The study suggests that households to be targeted for food security programs should include family planning, health and nutrition extension service, and awareness raising and adult education provision. By implementing various income opportunities, not only households' food self-sufficiency but also living standard

would be increased because food expenditure and welfare are related to each other. Household rice consumption and meat consumption was found to be related directly and positively to the per capita food expenditure in the study area. It was observed that most of the rural households have poor access to food. The success in food and nutritional security could be achieved through lower staple food prices, and reduce food price volatility, through investments in improved food market performance to increase food access to market, it is suggested that the government influence the market price through structural policy interventions (i.e., roads, storage facilities, etc.). Rice is the basic and highest cost item for food and food cost ratio in the total expenditure indicate low living standard and food insecure therefore, impact of consumption pattern on livelihood would be shown in the long term, and it would be intervention area for rural development.

Migration to other places was found to be negatively related to per capita food expenditure of households in the study area. Due to migration, households can consume more in food expenditure lead to improve food security in short run but not pledge in the long run.

Improvement of food security in the rural areas should be perceived within the context of rural development. One of the reasons to increase incomes must be activities that support diversification away from casual labor and much less profitable crop production as primary sources of income which is the livelihood options for landless involve some combination of casual farm labor, non-farm income through small businesses (markets and distribute farm products, textile weaving, vending) in rural areas. Therefore, policy makers need to consider promoting income diversification through cash cropping, subsistence food crops, and nonfarm activities. Diversification of income sources including products with a high price elasticity of demand can mitigate the income effect on food security.

The findings of this study have revealed that an increase in household income might reduce food poverty incidence and increase in consumption expenditure (including high-nutritive/quality food), but that would not be sufficient to maintain good health and nutritional food-security because the educational attainment of the head of the household was important in explaining the variations in household food security. Thus food programs such as participating in food for work programs should focus not only to increase food security but also encourage rural households to

consume nutritious food with their minimum income.

In conclusion, due to low level of income, supply and knowledge constraints, the nutritional food-basket for a large population in the dry zone area in Myingyan has not yet diversified towards pulses, fish, fruits and livestock products. The sectoral development within agriculture should be accorded high priority with multiple objectives, viz. diversifying agriculture production and consumption, raising income and employment of the poor, providing knowledge on nutritional food commodities to make the poor food secure and to attain nutritional food-security of the people from the study area and the country as a whole. This study encourages government to adopt policies that (a) improve people's access to food, by continuing to enhance technology adoption capacity, (b) protect farmers' welfare through stabilizing the market price, and (c) incorporating coping strategy in the regular projects and agricultural development program included development of land resources, provision of irrigation water and utilization of high yield quality seeds. In addition, the study suggests that households to be targeted for food security programs should include those with smaller land holdings of poor quality, improved technology adoption, and households with large family size and limited access to market. This study emphasized only on food poverty situation in selected Myingyan Township of dry zone area. So, further studies should investigated to absolute poverty lines represented to dry zone area based on several criteria to give a better picture of sustained growth in poverty reduction from the regional level towards the national level as a whole.

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APPENDICES

Appendix 1. Regression Results for Food Secure and Insecure Households

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.678[a]	0.460	0.428	0.31768

Predictors:(Constant),source of income, dependency ratio, meat (kg),credit taken, household rice consumption, household head age, migration, other food expenditure, total land (ha), total income(MMK) , total household member

AVOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.893	11	1.445	14.316	.000[a]
	Residual	18.670	185	0.101		
	Total	34.563	196			

Predictors:(Constant), source of income, dependency ratio, meat (kg), credit taken, household rice consumption, household head age, migration, other food expenditure, total land (ha), total income(MMK) , total household member

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	4.313	.607		7.101	.000
Household head age	.013	.104	.008	.121	.904
Household head's education level	.016	.031	.030	.510	.611
Total households member (No)	-.833	.086	-.749	-9.669	.000
Total income(MMK)	.088	.031	.191	2.845	.005
Household rice consumption (kg)	.490	.070	.506	7.035	.000
Meat consumption (kg)	.065	.025	.146	2.593	.010
Migration (yes=1)	-.081	.038	-.133	-2.145	.033
Credit taken amount (MMK)	-.003	.005	-.036	-.602	.548
Dependency ratio (%)	-.018	.017	-.063	-1.081	.281
Non-food expenditure	.069	.027	.172	2.604	.010
Total land (ha)	.001	.031	.002	.033	.974

a. dependent variable : per capita food expenditure/day, R^2= 0.443, F= 13.380, sig= 0.000***

Appendix 2. Questionnaire for household survey

Identification Information

1. Survey Date …….
2. Village Tract ……..
3. Village ……..
4. Name of Interviewer ……
5. Name of Interviewee ……
6. Name of Household Head ……
7. Type of Household ……

Q1. Household Information

No.	Name of Family Members	Sex (M/F)	Age	Relationship to HH head	Education	Live together (Y/N)	Current Occupation			Remittance amount	Remarks
							1.	2.	3.		

Q2. Non Agricultural Income Sources (Construction, Carpenter, etc.)

No.	Name of Person	Working in Village? (Y/N)	If no, Where?	Type of work or income source	Annual working days?	Daily or monthly wage (MMK)	Annual Earning (MMK)	Remarks

Q3. Working as Seasonal/ Permanent Laborers for Farming

No.	Name of person	Contract period		Details of rewards			
		Type (Monsoon, Summer, Permanent)	Duration (months)	In cash	In paddy	No. of meals per day	Average meal value/day

Q4. Experience of Internal and International Migration

No.	Name	Where	When to when?	Cost of migration	How to finance it?	Remittance

Q5. Homestead Land and Housing

(1) Homestead land Area ( ) m^2 Owned? (Y/N) If no, whose land?

Q6. Dural Goods and Transportation Means

No.	Items	No.	Year of purchase	Unit of price when purchase	Current Unit Value
1	Radio- cassette				
2	Television				
3	Sewing machine				
4	Generator				
5	Fan				
6	Mobile phone				
7	Bullock cart				
8	Bicycle/ Motor cycle				
9	Tawlargyi				

Q7. Ownership of agricultural Machines

No.	Items	No.	Year of purchase	Unit of price when purchase	Current Unit Value
1	Power tiller				
2	Tractor				
3	Threshing machine				
4	Water pump				
5	Sprayer				
6	Rice mill				
7	Oil mill				

Q8. Land Holding

No.	Type of land	Acres	Usage of land		
			Owned	Rent in	Rent out
	Lowland				
	Upland				
	Others				
	Total				

Q9. Income from Own Farm

Crop	Owned or rented land?	Sown acres	Cropping season	Variety	Type of irrigation	Yield (bsk/acres)	Average selling price	% of home consumption

Q10.Livestock Holding

Items	Current stock		Sale of purchase during 2014		
	No.	Current value per animal	No. sold	No. purchase	Average price per animal
Bullock					
Cow					
Pig					
Chicken					

Q11. Household food Expenditure

Items	Number	Per week (Household)		Price	Total	Items	Number	Per week (Household)		Price	Total
		Owned	Bought					Owned	Bought		
Rice						Eggs					
Pluses						Fruits & vegs					
Cooking oil						Spices					
Chicken						Beverages					
Pork						Others					
Beef											

Q11. Household Expenditure (2014)

Items	Per month (MMK)	Per year (MMK)	Items	Per month (MMK)	Per year (MMK)
Fuel and light			Religious expenses		
Cloths			Social expenses		
Education			Remittance		
Medical expenses					
Transport					
Telephone					

Q12.Debt from Formal and Informal Institutions

Name of loan sources	Type of loan	Provision		Amount (MMK)	Interest rate (%)	Collateral	Repaid		Outstanding amount	Actual Usage
		Month	Year				Month	Year		

Q13. Coping Strategies for Food Insecurity

No.	Items	Never/ month	1-2 times/ month	4-5 times / month	Over 5 times/month
1	Borrow foods from others				
2	Reduce meals				
3	Substitute with cheaper foods				
4	Replacing rice with other foods				
5	Drop out of children				
6	Selling lands				
7	Planning to transfer				
8	Selling animals				
9	Selling jewels				
10	Pawning things				
11	Others				

Q14.Type of Rice Purchase (From whom) (√)

From village shop		From rice miller		From relatives		From Town		Others	

Q15. Any borrow rice or rent in this year?

	Y/N	Frequency/month	How much (once)	From whom	Duration	Interest rate (%)
Borrow						
Rent						

Q16. Constraints of rural households (Y/N)

Items	Y/N	Items	Y/N
Landless		Vulnerable to natural disaster (drought/flood)	
Low or no income		Low crop production	
High dependents		Lack of social protection/supports	
Lack of employment		Increased food prices	
Lack of technical knowledge for production		Inadequate water	
Lack of credit for production		Degraded land	
High indebtedness		Low skill	
Poor health care & poor health status		Others	
Female-headed household			