MALAWI FARM INPUT SUBSIDY PROGRAMME - IMPACT ON INCOME OF SMALLHOLDER FARMERS

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by

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Dedication

To my family, siblings and friends who tirelessly and relentlessly encouraged me to go on even when the going was tough.

Acknowledgement

My deep and profound thanks to my Supervisor who offered the technical guidance to make this work complete. His vast knowledge and experience helped me to acquire the necessary skills to put together pieces of information which could otherwise have been meaningless. I wish to thank my family for the encouragement, availability and allowing me to do my work even when it was very difficult to be away from them. I extend my profound gratitude to my local supervisor who reminded me about the terms and skills which I used throughout this thesis. For my colleagues who tirelessly provided vital information and encouragement all the time when needed I say thank you all. I am also grateful to the National Statistics Office staff for providing me with the 2010 IHS3 data set that was used for the analysis.

Abstract

Agriculture is the single most important sector in Malawi due to its contribution to the economy ranging from employment creation, contribution to GDP growth to source of foreign exchange earnings. These significant contributions have necessitated the Government of Malawi to develop strategies and policies such as the Farm Input Subsidy Programme (FISP), whose main aim is to increase household incomes and reduce food insecurity and ultimately reduce poverty. It is nine years since the introduction of FISP but its results remain mixed. Using the 2009/10 Integrated Household Survey Phase 3 (IHS3) dataset, a logistic regression in a multivariate data analysis approach was used to investigate the impact of FISP on income levels and food security of rural smallholder farmers in Malawi. The analysis showed that about 82 percent of smallholder farmers live in rural areas, about 75 percent of them were males, 71 percent were married, 70 percent did not go to school and 69 percent benefited from FISP. In farming, 68 percent of these smallholder farmers had less than 1 hectare of farms, 70 percent of them had labour force of less than 5 people, 51 percent of them harvest less than 5 bags of 50kgs of maize of which 92 percent sell most of their harvested maize and 89 percent of them receive less than MK5, 000 from sales. In addition, about 99 percent of these smallholder farmers were food insecure as they save less than 1 bag of 50kgs after harvest. Only 1 percent of these smallholder farmers receive remittances and 21 percent had other income generating activities (IGAs). Demographic and socio-economic factors have no impact on these farmers capability to increase income levels and enhance their food security. There is also no statistically significant difference between FISP beneficiaries and non-beneficiaries in

terms of capabilities of increasing incomes and enhancing food security. It is, therefore, concluded that FISP had no significant impact on the abilities of these smallholder farmers to increase their incomes and enhancing their food security. Hence, FISP did not prove to be the best food security and poverty alleviation tool in Malawi.

Key words: FISP, smallholder farmers, income levels, food security, Malawi.

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List of Acronyms and Abbreviations

ADMARC	Agricultural Development and Marketing Corporation
ANOVA	Analysis of Variance
ASAP	Agriculture Sector Adjustment Program
ASWAp	Agriculture Sector Wide Approach
BLUE	Best Linear Unbiased Estimators
CAADP	Comprehensive Africa Agriculture Development Programme
CGE	Computable General Equilibrium
GDP	Gross Domestic Product
CEPA	Centre for Environmental Policy and Advocacy
DFID	Department for International Development
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FISP	Farm Input Subsidy Program
FISPB	Farm Input Subsidy Program Beneficiaries
FISPNB	Farm Input Subsidy Program Non-Beneficiaries
GoM	Government of Malawi
IFPRI	International Food Policy Research Institution
IGA	Income Generating Activities
IHS3	Integrated Household Survey Phase 3
IMF	International Monetary Fund
KG	Kilograms
KM	Kilometres
LHS	Land Holding Size
MDG	Millennium Development Goals

MoAFS	Ministry of Agriculture and Food Security
NEPAD	New Partnership for Africa's Development
NFRA	National Food Reserve Agency
NSO	National Statistical Office
OLS	Ordinary Least Squares
R & D	Research and Development
ReSAKSS - SA	Regional Strategy Analysis and Knowledge Support System for Southern Africa
SAM	Social Accounting Matrix
SPS	Starter Pack Scheme
TAHI	Total agricultural household income
TIP	Targeted Inputs Program
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

This chapter contains the background information for Malawi's economy as well as its structural changes since the introduction of Farm Input Subsidy Program (FISP). In addition, this chapter defines the food security situation in Malawi, as well as identifies the methods to be used to analyze the effects of FISP in its contribution to improving food security and distribution of rural incomes as well as the competitiveness of agriculture sector.

1.1 The contribution of agricultural sector to Malawi's economy

Agriculture is the single most important sector of Malawi's economy. The sector employs about 80 percent of the workforce, accounts for 39 percent of gross domestic product (GDP), contributes more than 80 percent of foreign exchange earnings, supplies more than 65 percent of manufacturing sector's raw materials and provides 64 percent of the total income of the rural people (GoM, 2009a, Mucavele, 2010).

The agricultural sector is divided into a smallholder sub-sector and an estate sub-sector, which contribute about 70 and 30 percent to agricultural output, respectively (GoM, 2006). The smallholder sub-sector is primarily subsistence-oriented. Farmers in this sector mostly grow staple food crops, such as maize, cassava, and sweet potatoes. Estates focus on exportable, high value cash crops, such as tobacco, tea, sugar, coffee, and macadamia nuts. Smallholder agriculture is characterized by small, highly fragmented land holdings under customary land tenure, and by lower yields than the estate sector, in

which most of the land is under freehold and leasehold tenures. Due to the importance of agriculture, Malawi's development strategies and policies have been heavily oriented towards this sector. One such strategy/policy is the Farm Input Subsidy Program (FISP).

The FISP provides inorganic fertilizer to smallholder farmers at below-market rates and is currently receiving a great deal of attention as a sustainable strategy to foster an African Green Revolution (Denning, *et al.,* 2009). Due to FISP, maize production has increased from 26 to 60 percent during the first four years, which occurred during years of good rainfall (Dorward, *et al.,* 2010). Despite the potential benefits, the cost of implementing large scale FISP are high, and can increase substantially when fertilizer and fuel prices rise. For example, in 2008 GoM spent about 70 percent of the Ministry of Agriculture and Food Security (MoAFS) budget or just over 16 percent of government's total budget on FISP (Dorward, 2011). The high cost of FISP means that thorough evaluation of the benefits is warranted.

The stated goals of FISP are often to reduce poverty and boost production of staple crops such as maize (Kelly, *et al.,* 2011). In practice, achieving both goals may be difficult because evidence from Africa suggests that returns to technologies such as hybrid seed and inorganic fertilizer are varied across a population of smallholders (Duflo, *et al.,* 2008; Suri, 2011). Furthermore, Marenya and Barrett (2009) demonstrated that poorer households with low soil organic matter obtain little to no response when they apply inorganic fertilizer to maize on their fields. The findings call for some questions about the

rationale for applying FISP to households with poor soil as they may be unlikely to use fertilizer effectively.

1.2 FISP in Malawian Context

Malawi is one of the poorest countries in sub-Saharan Africa (SSA) with over 80 percent of the population residing in the rural areas. Agriculture is an important sector in the Malawian economy as it accounts for over 30 percent of Gross Domestic Product (GDP), employs about 80 percent of the country's workforce, and accounts for a large share of country's foreign exchange earnings. It is also an important source of livelihood for the rural population with smallholder farmers contributing over 80 percent of the country's agricultural production (World Bank, 2012).

Smallholder farmers in Malawi operate in an environment of omnipresent agricultural risks due to a variety of factors. Agriculture is predominantly rain fed and smallholder agriculture is dominated by poor subsistence farmers who are either net food buyers of produce enough for themselves (Chirwa, 2007; Dorward, *et al.*, 2008b). In general, the low maize production does not meet the annual consumption needs for poor many poor smallholder farmers, with household food stockpiles running out before the following harvest (World Bank, 2007). Labour markets in rural areas are thin, proving few opportunities for off-farm employment that may help households cope with the food insecurity shocks (Wodon and Beegle, 2004).

Malawi is one of the most densely populated countries in Africa. Many smallholder farmers are land constraint and have access to about one hectare of farm land on which to subsist (World Bank, 2007b). As such, few farms are left fallow to replenish the soils while extended soil depletion reduces the productivity of the land. Therefore, producing enough food for a growing rural population, which is growing at the rate of 2 percent, becomes challenging if agricultural growth remains stagnant at levels that do not meet food requirements. Since few rural households are only able to produce enough for sustenance, subsidies can play an important role in alleviating hunger and poverty.

Beginning in the 2005/06 agricultural season, the Malawi government implemented a large scale input subsidy program at national level to subsidize the cost of agricultural inputs for poor smallholder farmers. Progam beneficiaries are intended to comply with three main criteria. They must be (i) fulltime "resource poor" smallholder farmers, (ii) residents in the village, and (iii) own land that will be cultivated in the agricultural season they enter the program. According to FISP implementation guidelines, varying categories of household heads are to be targeted. This includes household heads that are elderly, HIV positive, female, children, orphans, physically challenged household members with only one farmer per household. The program targets over 50 percent of smallholder farmers and it is a coupon based where eligible households receive a number of coupons that can redeem fertilizer and improved seeds at heavily subsidized prices at participating retailers.

Despite the program's acclaim for contributing harvests, the program requires large investments of government resources raising concerns over its fiscal sustainability and opportunity costs. The initial cost of the program in 2005/06 was US $48 million and continued to increase thereafter until 2008 (Mason and Ricker-Gilbert, 2012). Between 2006/07 and 2008/09 agricultural seasons, the Malawian government spent over US $73 million (Ricker-Gilbert, *et al*., 2011) and US $200 million (Chibwana, *et al*., 2012) for the program. In the four years since the implementation of FISP, the program's costs accounted for between 5 and 15 percent of the national budget (Dorward and Chirwa, 2011). In 2008, the program accounted for 70 percent of the agricultural budget and 16 percent of the government budget (Mason and Ricker-Gilbert, 2012). The government paying between 70 and 90 of the program, with external donors supplementing the remaining balance (Chibwana and Fisher, 2011; Dorward, *et al*., 2008a)

. The goals of FISP in Malawi are mainly meant to increase household income, reduce food insecurity and hence reduce poverty. Therefore, assessing the direct impacts of such a program on household income or expenditures on the targeted beneficiaries and reduction of food insecurity becomes a good decision tool for policy makers. By investigating the impact of FISP on the incomes of smallholder farmers, this study shall add an important dimension to the emerging literature on the impacts of FISP in Malawi.

1.3 Problem Statement

The potential contribution of agriculture to economic growth has been a subject of much controversy among development economists in recent. While some contend that agricultural development is a precondition to industrialization, others strongly disagree and argue for a different path. Despite much debate and quantitative analyses of the contribution of agriculture to economic growth and development, there is lack of consensus on this issue decades (Hazel, *et al.*, 2007; WDI, 2008).

Agricultural expenditure has been increasing on yearly basis in the past decade with an aim of achieving poverty reduction and food security (MGDS I and II – GoM, 2002, 2006). Unfortunately, rising expenditure has not transformed to meaningful economic growth through poverty reduction and food security, as Malawi still ranks among the poorest countries in the world (World Development Report – World Bank, 2012). Many Malawians continue to wallow in abject poverty, while more than 50 percent live on less than a dollar per day (Human Development Index – World Bank, 2012). Though Malawi has so far satisfied the commitments made by African Heads of State and Government in the 2003 Maputo declaration of allocating at least 10 percent of national budgetary resources to agricultural sectors, there is an information gap on the contribution of FISP on growth and poverty reduction in Malawi. In spite of huge government expenditure that has been devoted to enhance poverty reduction and food security, no noticeable success has been achieved as poverty levels remain high and majority of Malawians still depend on food handouts and cash transfers through government "Money for Work" programmes. The income levels of most smallholder farmers have not been improved despite

implementing the FISP for over five years. It is against this background that this research is set out to empirically investigate the actual impact of FISP on small-holder farmers' incomes in Malawi. Among several question that need to be addressed in this thesis are:

1. Which socio-economic factors affect smallholder farmers' incomes in Malawi?
2. How has the FISP contributed to smallholder farmers' incomes and food security in Malawi?
3. Is there any significant difference in income levels and food security between beneficiaries and non-beneficiaries of FISP in Malawi?

1.4 The Aim of the Study

The main objective of this study is to investigate how FISP has impacted on income levels and food security of smallholder farmers in Malawi. Using the 2009/10 Integrated Household Survey Phase 3 (IHS3) dataset, specifically, the study wants to:

1. Identify socio-economic factors associated with incomes of smallholder farmers in Malawi.
2. Assess the impact of FISP on smallholder farmers' incomes and food security in Malawi.
3. Compare smallholder farmers' incomes and food security situations between beneficiaries and non-beneficiaries of FISP in Malawi.

1.5 Hypotheses tested in this study

The research objectives above have led to the testing of the following hypotheses:

1. There is no association between smallholder farmers' income levels and social-demographic factors.
2. FISP has no impact on smallholder farmer's income levels.
3. FISP has no impact on smallholder farmer's food security.
4. There is no significant difference in the income levels and food security between FISP beneficiaries and non-beneficiaries.

1.6 Justification of the study

Fan and Rao (2003) showed that government spending on agriculture has provided a strong contribution to economic growth in Asia. Diao & Dorosh (2003) showed that spending on infrastructure and productivity enhancing investments in agricultural export crops and livestock has the most promise for growth in income and food consumption in Africa. However, few studies have been carried out on the contribution of FISP on income growth and poverty reduction in Malawi. It is essential for the country to be aware of the returns of the agriculture investments and to be informed about the policies which will improve productivity of the agriculture sector. Moreover, it is imperative to know the spending options towards agriculture and non-agriculture which will enable the country to meet the Millenium Development Goal 1 MDG1 which is to halve poverty by next year (2015). This may not be achievable.

1.7 Structure of the Dissertation

This thesis consists of five chapters. Chapter one gives a background and motivation of the study that includes the contribution of the agricultural sector to Malawi's economy, the problem statement, aims of the study, research questions, hypotheses to be tested in the study, justification of the study and chapter summary. Chapter two gives the literature reviewed on the in line with the role of agriculture in economic growth and development, an overview of public expenditure on agricultural sector in Malawi, agricultural growth trends and poverty reduction and ended with agricultural policies being implemented in Malawi. Chapter three gives the methodological approach to the analysis of data. Chapter four gives the analysis results and their discussions. Chapter five gives the conclusions and recommendations drawn from the results of the analysis.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews relevant literature in line with the role of agriculture in economic growth and development, the history of FISP in Malawi and agricultural growth and poverty reduction and an overview of public spending on agricultural sector in Malawi. These reviews give the relevance of government policies in increasing public spending in this sector through FISP with an aim of increasing national food security and income sources of majority of the population that rely heavily on this sector. In doing this, the study uses appropriate methodology to evaluate the benefits of FISP as a result of increased sector budgets.

2.1 The role of agriculture in economic growth and development

Agriculture has been playing a significant role in the development of nations for centuries (WDI, 2008). The World Development Index Report (2008) stated that agriculture can produce faster growth, reduce poverty and sustain the environment if it is made to work in concert with other sectors of the economy (World Bank, 2007:2). The report stipulated three ways in which agriculture contributes to development: 1) as an economic activity, 2) as a livelihood and 3) as a provider of environmental services.

As an economic activity, agriculture helps the rural poor to achieve food security since majority of them derive their incomes from agricultural production. Specially, this

contribution becomes vivid in the case of Sub-Saharan Africa where majority of the people experience highly variable domestic production, limited tradability of food staples and foreign exchange constraints. As a source of livelihood, agriculture provides shelter to 86 percent of the rural poor. In fact, nearly half of the world population lives in rural areas and most of these depend on agriculture. Interestingly, the decline in poverty rate of developing countries from 28 to 22 percent in 2002 is mainly attributed to falling poverty in rural areas; and 80 percent of the decline in rural areas is related exclusively to better conditions in rural areas. Despite the negative environmental outcomes-such as underground water depletion, soil exhaustion and agrochemical change, associated with agriculture, it is being recognized now that agriculture can positively affect the environment by sequestering carbon, managing watersheds and preserving biodiversity.

Given the realities that about half of the world's population lives in rural areas and most of these rural dwellers depend on agriculture for livelihoods, "agriculture is likely to be central to rural development and rural poverty alleviation" (Hazel et al., 2007:vii). Hazel et al., (2007) further stated that "farming has high potential to create jobs, to increase returns to the asset that the poor possess- labor and land, and to push down the price of food staples". The role of smallholder agriculture in poverty reduction and economic growth is very significant in light of the current realities that 1.5 billion farm households live in rural areas of the developing world (World Bank, 2007).

The World Development Report 2008 stated that the largest proportion of farmers in developing countries is smallholders and about 85% of them are farming in less than two

hectares of land (World Bank, 2007). According to this report, in countries such as China, Egypt, Bangladesh and Malawi, smallholder farms with less than two hectares of farm land account for 95% of the total. Therefore, "the potential of agriculture to contribute to growth and poverty reduction depends on the productivity of small farms" (World Bank, 2007:90). In Africa, for instance, smallholder agriculture serves as the main engine of rural growth and livelihoods improvement given the limited resources available for rural industrialization (Govereh et al., 1999). The contribution of smallholder farms as the engine of rural growth and livelihoods improvement depends on their level of transformation from subsistence oriented to market oriented production systems. In Tanzania, for example, most successful farmers who have managed to escape poverty were those who diversified their production to food crops and cash crops; in Uganda, going commercial and improving land productivity have become tools for escaping from poverty; and similarly, in Vietnam, the poverty rate of two-thirds of the small-scale farmers who got out of subsistence farming and took advantage of the market fell drastically as compared to those who remained in subsistence farming (World Bank, 2007:73).

2.2 Public investment and poverty

Public investment affects rural poverty through many channels, as depicted in Figure 2.1. For example, public investment in agricultural research, rural education, and infrastructure increases agricultural productivity, which directly increases farmers' incomes and in turn reduces rural poverty (Fan *et al.,* 2008). Moreover, indirect impacts come from higher agricultural wages and improved non-farm employment opportunities induced by growth

in agricultural productivity. Increased agricultural output from rural investment often leads to lower food prices, again helping the poor indirectly because they are often net buyers of food grains.

Furthermore, public investments in rural education, health, and infrastructure not only have indirect effects on wages, non-farm employment, and migration through increased productivity, but also directly promote rural wage increases, non-farm employment, and migration, thereby reducing rural poverty (Fan *et al.*, 2009). For example, improved infrastructure access will help farmers set up small rural non-farm businesses such as food-processing and marketing enterprises; electronics repair shops, transportation and trade, and restaurants. Public spending plays a critical role in anti-poverty interventions in terms of influencing the resource allocation by providing physical and social infrastructure which would help to accelerate growth and/or to direct the benefits of growth to the poor (Datt and Ravallion, 2002).

Several studies have estimated the effect of public expenditure, including public investment expenditure, on poverty. Using cross-country data, Gomanee *et al.,* (2003) and Mosley et al., (2004) have estimated the effects of government expenditure in different sectors on the US$1 a day poverty headcount, holding the level of GDP per capita constant. Gomanee *et al.,* (2003) and Mosley *et al.,* (2004) found that higher government expenditure on education, agriculture, and housing and amenities (water, sanitation and social security) all reduced poverty, presumably by shifting the distribution of income in a

pro poor direction, since the level of aggregate income is held constant in their regressions.

Other studies used cross-state data, particularly in India where state-level data are of high-quality and stretch far back in time. Fan *et al.,* (2009), for instance, estimated the effect of public expenditure on levels of rural poverty across Indian states, distinguishing between expenditure on rural education, targeted rural development, public health, irrigation, power generation, agricultural R&D, and rural roads. Fan *et al*., (2009) found that agricultural R&D, rural roads, rural education and targeted rural development expenditure all reduced rural poverty. Of these, spending on agricultural R&D and rural roads has by far the largest impacts on both growth and poverty reduction. Fan *et al.*, (2002) conducted a similar analysis of the effects of public expenditure on rural poverty across Chinese provinces, distinguishing between expenditure on rural education, targeted poverty alleviation, telecommunications, irrigation, power generation, agricultural R&D, and rural roads. They found that spending on rural education has a positive and largest impact on poverty, followed by spending on agricultural R&D and then by spending on rural roads.

Similarly, Datt and Ravallion (2002) estimated the determinants of differences in the rate of reduction of the poverty headcount across Indian states over the period 1960–94. They concluded that state government development spending had a large and statistically significant effect on poverty reduction, even when controlling for changes in agricultural and non-agricultural productivity and a time trend.

2.3 Agricultural growth and Poverty reduction

Datt and Ravallion (1996) showed that rural sector growth in India reduced poverty in both rural and urban areas, while economic growth in urban areas did little to reduce rural poverty. Furthermore, Warr (2001) provided evidence that growth in agriculture in a number of South East Asian countries significantly reduced poverty; however, this was not matched by growth in manufacturing. Gallup *et al.,* (1997) showed that every 1 percent growth in per capita agricultural GDP led to 1.6 percent growth in the incomes of the poorest 20 percent of the population.

Several other studies reveal similar results, but emphasize the important qualification that the degree to which agricultural growth reduces poverty is usually conditional upon the initial distribution of assets, particularly, land and the initial level of inequality (de Janvry and Saddoulet, 1996; Timmer, 1997; Bourgignon & Morrison, 1998). The importance of equitable access to productive assets is highlighted by the fact that without this access the poor have less economic flexibility, and as a consequence they have to accept low paid jobs and therefore tend to suffer from poor health and low levels of education and training. This further consolidates them in the poverty trap, and prevents the community from building the social capacity necessary to implement public participation in economic development (Timmer, 1997).

Thirtle *et al.*, (2001) concluded from cross country regression analysis that, on average, every 1 percent increase in labour productivity in agriculture reduced the number of

people living on less than a dollar a day by between 0.6 and 1.2 percent, in terms of the role of agricultural productivity in reducing poverty. No other sector of the economy shows such a strong correlation between productivity gains and poverty reduction.

Moreover, Juana & Mabugu (2005) quantified the smallholder agriculture's true contribution to the economy in general and poverty reduction in particular. The study used the traditional impact analyses to measure the incidence of a sector specific policy on the economy. The results provide evidence that investment in smallholder agriculture should be seen as investment in the entire economy since they produced about 85 percent of agricultural output. The study clearly shows that smallholder agriculture promotes sustainable development and the inclusion of rural communities especially the poorest in economic activities will lead to reduction of poverty.

2.4 Summary of literature Review

Studies have been done in different areas touching different aspects of impacts of farm inputs on household food security and incomes. Most studies have alluded to household food insecurity as a result of lack of economic empowerment to produce and acquire sufficient food, hence setting a strong link between food insecurity and economic growth. This implies that farm inputs play a vital role in providing rural households with economic empowerment to produce and obtain sufficient food for their productive life. Given the fact that farm inputs are critical to food security and programs which aim to bring about economic independence to rural households such as FISP in place, it was important to verify if indeed such programs are achieving the stated objectives hence filling the

information gap. How to verify if indeed FISP is achieving its intended purposes, the following Chapter gives an outline of methods of how to measure the effects.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This chapter describes the research methodology used to accomplish the aims of this study. A methodological research approach and design is a framework that binds research together so that the research questions can be analyzed effectively (Edmunson & McManus, 2007). Identification of research method is important because it makes the collection of data easier and gives a clear idea about the required information (Trochim & Donnelly, 2006). This chapter gives a detailed methodological approach that has been followed to achieve the main goal of this study. The chapter is structured in the way that the first section describes the study area, the second section outlines the data collection method/source, the third section gives the sample size and study design and lastly data analysis plan is going to be described starting with a description of the variables/data to be used in this study.

3.1 Study Area and Data Collection

This study was done in Malawi. It is one of the poorest countries in the world where the majority of the poor people live in rural areas and agricultural sector is the most significant source of livelihoods. The study used secondary data from 2010 Third Integrated Household Survey Phase 3 (2013 IHS3) conducted by the National Statistics Offices (NSO). This is a nationally representative survey conducted during the 2010/11 growing seasons that covers 26 districts. The survey is a Living Standards Measurement

Survey – Integrated Surveys on Agriculture (LSMS-ISA) that incorporates extensive agricultural content in addition to the standard LSMS components of a household survey. This multi-topic survey contains a large, nationally representative data consisting of 12, 271 households in 768 enumeration areas, of which over 80 percent are agricultural households. It contains both types of households; those which benefited (recipients) from FISP to be categorized as FISPB in this study and those who did not benefit to be categorized as FISPNB. Using these reference groups, within group and between group analyses was done to comprehensively analyze the impacts of FISP. From this data set, the following categorized variables were considered: demographic (age, gender, marital status, etc.), social (access to social amenities such as roads, markets, etc.) and economic (remittance, sales of farm related outputs, etc). Total Agricultural household income (TAHI) is a dependent variable, whereas, others are explanatory variables.

3.2 Sample Size and Sample Design

This is a retrospective study that aimed at evaluating the impact of FISP on smallholder farmers' income in Malawi. The study used panel data collected under 2010 IHS3 by NSO. The survey collected information from a sample of 12, 271 households statistically designed to be representative at both national, district, urban and rural levels enabling the provision of reliable estimates for these levels. Data from IHS have, among other insights, provided benchmark poverty and vulnerability indicators to foster evidence-based policy formulation and monitor the progress of meeting the Millennium Development Goals (MDGs) as well as the goals of the Malawi Growth and Development Strategy (MGDS).

The data contained in this survey is ideal for this study as it contains information on key welfare and socio-economic indicators and meets special data needs for the review of the MGDS II and at international level, MDGs.

3.3 Analytical techniques

The data analysis involved the use of both descriptive and inferential statistics. Simple descriptive statistics was used in order to have a summary description of the data collected. This involved the use of percentages, means, frequency distributions and standard deviations to describe socio-economic characteristics parameters and institutional factors but also compare within and between impacts of FISP on those who benefited and those who did not benefit.

Income is a transitory character through the process of earning and consumption. After harvests, households receive large amount of cash, but smaller or no amount during the rest of the year. Comparing to income, expenditure is a more stable indicator through the inclusion of consumption and thus, a measure of welfare over time with constantly income spending and consumption (Benson et al., 2004:4). However, both are accepted indicators for welfare analysis of households: “Consumption and expenditure can be viewed as realized welfare, whereas income is more a measure of potential welfare” (Benson et al., 2001:14). Another reason for the consideration of agricultural income is that it is rarely explained in spatial analysis.

3.3.1 Analysing factors associated with success of rural smallholder farmers in Malawi

Success of a smallholder farmer in this study was measured by total agricultural household income (TAHI) (including off-farm income). This variable was then used as a dependent variable (Y_{ij}) that was analyzed to find out if there were any other independent variables (demographic, social and economic) that were associated with its behavior. Regression analysis is a commonly used statistical method for explaining the association between a dependent variable and independent variable(s) and in this study, multiple linear regression analysis was applied. Beneficiaries and non-beneficiaries were analyzed using the following general formula. Multiple regression models characterizing TAHI by the sampled beneficiary households was specified as: If we let y_{TIHAi} be the total agricultural income for the i^{th} smallholder farmer (i = 1 for beneficiaries and i = 0 for non-beneficiaries), then the models would be specified as:

$$y_{TAHIi} = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k; \quad (1)$$

where β_0 is a constant, $\beta_1 + \cdots + \beta_k$ are coefficients (or weights) attached to covariates and $X_1 + \cdots + X_k$ are covariates (independent variables – categorical/continuous). Table 3.1 gives variables assessed in the model:

Table 3.1: Variables used in the model

Variable	Description
AGE	Age of the household head in years
GENDER	Gender of the household head: 1 if the household head is male and 0 if the household head is female
MSTATUS	Marital Status of respondents: 1 if the respondent is married and 0 otherwise
LABOUR	Number of adult members in a household
HHSIZE	Family Size of the household
EDUCS	Education Status of the respondents: 1 = None, 2 = Primary, 3 = Secondary, 4 = Tertiary and 5 = Others
FSIZE	Land holding size in hectares
FISP	1 if the household is a beneficiary and 0 if the household did not benefit from FISP
IGA	Income Generation Activity: 1 if the household has an IGA and 0 otherwise
R	Remittance: 1 if the household get some form of money transfer from outside the family and 0 if the household does not get some form of money transfers
LOCATION	Residential area of farmers; 1 if urban, 0 Otherwise
DM	Distance to Market; 1 if the market is less than 1 KM, 0 Otherwise
QH	Quantity Harvested; 1 if more than 10 bags and 0 otherwise
IL	Income Level; 1 if a house hold accrue above MK50, 000 for sales of harvests and 0 for values less than MK50. 000
FS	Food Security; 1 if a household stores more than 10 bags of maize each weighing 50 KGs and 0 if a household stores less than 10 bags of maize
QS	Quantity Stored; 1 if more than 10 bags and 0 otherwise

Note: *There were some beneficiary farmers in the urban area; distance to market is a key determinant for selling produce; average smallholder farmer harvests 10 or less bags per hectare; most smallholder farmers store 10 bags or less for sale as well as for consumption*

3.3.2 Analysing the impact of FISP on smallholder farmer's income in Malawi

For this study, a model that reflects the observed status of the impact of FISP on smallholder farmer's income acquisition was required. Such observations reflect a dichotomous variable, increased income or not. Since they cause certain problems, linear probability models estimated by ordinary least squares are thus not applicable. Instead, the logit model was applied. According to Pindyck and Rubinfeld (1998:311), "the use of probit and logit models, that give maximum likelihood estimates overcome most of the problem associated with linear probability models and provide parameter estimates which are asymptotically consistent, efficient and Gaussian so that the analogue of the regression *t*-test can be applied".

Logistic models are popular statistical techniques in which the probability of a dichotomous outcome (such as beneficiary or non-beneficiary) is related to a set of explanatory variables that are hypothesized to influence the outcome (Neupane, *et al.*, 2002). Therefore, logistic regression model which is computationally easier to use than the other types of models was used in this study.

Following Gujurati (1999), the logistic regression model characterizing benefits by the sample households is specified as: If we let y_i be the fact that the i^{th} smallholder farmer benefits from FISP and 1-y_i be the contrary fact that the i^{th} farmer does not benefit from FISP. The dependent variable is the natural log of the probability of benefiting from FISP (P) divided by the probability of not benefiting (1-P). If the

probability of y_i, P(y_i=1) = π_i and P(1-y_i=0) = 1-π_i, then; the Logistic Regression Model is given as:

$$logit(\pi_i) = log\left[\frac{\pi_i}{1-\pi_i}\right] = \frac{e^u}{1-e^u} = u = \alpha + \beta_1 X_1 + \cdots + \beta_k X_k \quad (2)$$

Where

$u = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k$

β_0 = constant (the log odds of a FISP beneficiary without any effect from the covariates), $\beta_1 + \cdots + \beta_k$ = coefficients (or weights) attached to covariates and $X_1 + \cdots + X_k$ = covariates (independent variables – categorical/continuous as shown in Table 3.1).

It should be noted that the estimated coefficients do not directly indicate the effect of change in the corresponding explanatory variables on probability (P) of the outcome occurring. Rather the coefficients reflect the effect of individual explanatory variables on its log {ln[P/(1-P)]}. The positive coefficient means that the log odds increase as the corresponding independent variable increases (Neupane, *et al.*, 2002). The coefficients in the logistic regression are estimated using the maximum likelihood estimation method.

3. 33 Compare smallholder farmers' success between FISP beneficiaries and non-beneficiaries in Malawi.

The means of the TAHI for the two groups was compared to see if there was any significance difference between them. This difference was tested using the analysis of variance (ANOVA) analysis approach.

3.3.4 Estimation techniques

3.3.4.1 Regression Modelling - Ordinary Least Squares (OLS)

Regression is a commonly used statistical method for explaining the association between independent variable and independent variable(s). Association between variables could be linear, cubic, quadratic, exponential, etc, but in this study the association between variables is assumed to be linear and that the residual error is constant (homoscedastic) (Kleinbaum and Kupper, 1986). Therefore, linear regression model (LRM) was adopted as an estimation technique. The method of Ordinary Least Squares (OLS) was used in the determination of the regression coefficient and other statistical parameters required in analysis. This method gives Best Linear Unbiased Estimates (BLUE) that is efficient (Gujarati, 1999). Simple multiple linear regression model was used to analyze the distribution of income acquisition in each group of farmers (beneficiaries and non-beneficiaries of FISP). Interpretation of parameters was also essential to analyze the contribution of each of the proposed variables to income acquisition.

3.3.4.2 Coefficient of determination

Coefficient of determination is a measure which was employed to ensure the goodness fit of the regression equation to the data. The better the fit of the line, the closer the R^2 will be to 1. In other words, if the regression line provides a perfect fit, the variance in the data will be completely explained (Gaynor & Kirkpatrick, 1994). If the variables in the model correctly predict the changes in real income acquisition then R^2 will be close to 1.

3.3.4.3 Test Statistic (*t* – Statistic)

The *t*-statistic was used to determine whether the estimated coefficients of individual explanatory variables used are statistically significant or not. A statistic is said to be statistically significant if the value of the test statistic lies in the critical region, that is absolute value of more than 2 (Gujarati, 1995). In this case the null hypothesis is rejected. By the same token, a test is said to be statistically insignificant if the value of the test statistic lies in the acceptance region. In this case the null hypothesis is not rejected. If the level of significance is set at 0.05, then the null hypothesis can be rejected if the t-value computed exceeds 2 in absolute value as depicted by the rule of thumb (Gujarati, 1995). This means that if the *t*-value computed for a variable such as EDUCS exceeds 2 then the variable will be significant in explaining changes in real income acquisition at 5% level of significance.

3.3.4.4 Probability value (*p* – Value)

The *p*-value was used to compliment the *t*-statistic. It has the advantage that it gives the level of significance of estimated coefficients of variable in explaining income acquisition. In significance testing, the probability value (sometimes called the *p*-value) is the probability of obtaining a statistic as different or more different from the parameter specified in the null hypothesis as the statistic obtained in the experiment (Gaynor & Kirkpatrick, 1994). If the probability value is below the significance level then the null hypothesis is rejected. Traditionally, the null hypothesis is rejected if the probability value is below 0.05 (Gujarati, 1995). If the *p*-value of a variable such as EDUCS is less than 0.05 then the variable will be significant to predict variations in income acquisition at 5% level of significance.

CHAPTER 4

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

In this chapter, the data analysis, study findings/results and discussions of the results are presented. The chapter is structured according to the aims and it starts with the results of the description of the study population and Logistic modelling was done as the main analysis tool.

4.2 Descriptive statistical analysis of explanatory variables

The aim of the study was to investigate the impact of FISP on the income levels of smallholder farmers in Malawi using the 2009/10 IHS3 dataset. The dataset comprised 12, 271 households in Malawi covering both FISP beneficiaries and non-beneficiaries. In this study, few of indicators/variables have been used to achieve the objective of the study and Table 4.1 gives the summary of the selected variables used in the analysis.

Table 4.1: Distribution of characteristics of the study population

Variable	**Category**	**Frequency**	**Percent**
Gender	Male	9 210	75.1
	Female	3 061	24.9
	Total	**12 271**	**100.0**
Age	0 - 18 Years	78	0.6
	18 - 50 Years	8 898	72.5
	Over 50 Years	3 295	26.9
	Total	**12 271**	**100.0**
Marital Status	Never Married	438	3.6

	Married	8 767	71.4
	Divorced	1 439	11.7
	Widowed	1 627	13.3
	Total	**12 271**	**100.0**
Education	None	8 556	69.7
	Primary	1 197	9.8
	Secondary	2 101	17.1
	Tertiary	417	3.4
	Total	**12 271**	**100.0**
FISP Beneficiary	Yes	8 465	69.0
	No	3 806	31.0
	Total	**12 271**	**100.0**
Household Size	0 - 5 People	8 637	70.4
	Over 5 People	3 634	29.6
	Total	**12 271**	**100.0**
Household Labour Force	0 - 5 People	9 977	81.3
	Over 5 People	2 294	18.7
	Total	**12 271**	**100.0**
Land Holding Size (Hectares)	Less than 1	8 379	68.3
	1 - 5	3 873	31.6
	6 - 10	9	0.1
	Over 10	10	0.1
	Total	**12 271**	**100.0**
Harvested Quantity (Maize)	Less than 1	454	3.7
(50 Kg Bags)	0 - 5	6 285	51.2
	6 - 10	1 355	11.0
	Over 10	4 177	34.0
	Total	**12 271**	**100.0**
Sold Quantity (50 KG Bags)	Less than 1	157	1.3
	0 - 5	574	4.7
	5 – 10	254	2.1
	Over 10	11 286	92.0
	Total	**12 271**	**100.0**
Value for Sales (MK '000)	0 – 5	10 873	88.6
	5 – 10	331	2.7
	10 – 50	633	5.2

	Over 50	434	3.5
	Total	**12 271**	**100.0**
Quantity Stored (50 KG Bags)	Less than 1	12 123	98.8
	0 - 5	75	0.6
	6 - 10	28	0.2
	Over 10	45	0.4
	Total	**12 271**	**100.0**
Distance to Market	Less than 1KM	11 852	96.6
	1 - 2KM	192	1.6
	Over 2KM	227	1.8
	Total	**12 271**	**100.0**
Income Generating Activities	Yes	2 592	21.1
	No	9 679	78.9
	Total	**12 271**	**100.0**
Remittance	Yes	127	1.0
	No	12 144	99.0
	Total	**12 271**	**100.0**
Geographic Area	Urban	2 233	18.2
	Rural	10 038	81.8
	Total	**12 271**	**100.0**

Table 4.1 shows that of the 12, 271 households interviewed in the survey, 9, 210 (representing 75.1 percent) were male headed while 3, 061 households (about 24.9 percent) were female headed. This shows the dominance of male heads in the study. The other issue of importance to be described is the marital status of these households. Table 4.1 shows that of the interviewed households, 438 of them (about 3.6 percent) were unmarried, 8, 767 of them (about 71.4 percent) were married, 1, 439 (about 11.7 percent) had divorced while 1, 627 (about 13.3 percent) were widowed.

Table 4.1 shows the distribution of ages of the interviewed households mainly in three categories taking into account the main demographic divisions of young (0 – 18), young adults (18 – 50) and adults (above 50). From the table, only 78 households (about 0.6 percent) were in the age range of 0 to 18, while majority (8, 898) of the households representing about 72.5 percent were in the young adults category (18 to 50) with 3, 295 households (about 26.9 percent) being in the adult category of above 50 years of age.

Education is another supplement of agricultural activities as far as following instructions is concerned. Worldwide campaign of migrating from traditional to modernized farming relies mainly in educational background of those involved in agricultural activities. To understand educational background of the interviewed households, Table 4.1 unfortunately shows that majority (8, 556) of the interviewed households (representing about 69.7 percent) were uneducated, 1, 197 of the households (about 9.8 percent) had primary education, 2, 101 households had secondary education while only 417 households (about 3.4 percent) went beyond secondary education.

Land is an important agricultural factor and as such is there enough land for farming in Malawi? Despite modern farming methods can do on limited resources such as land, but combined with other limit factors such as poor education this can be an obstacle as far as farming is concerned. Land in Hectares was another variable described in this study and Table 4.1 gives the description of land holding sizes (LHS) of the interviewed households. The table reveals that majority of the households (8, 379) representing about 68.3 percent had LHS of less than 1 Hectare, 3, 873 households (about 31.6 percent) had LHS of

between 1 and 5 Hectares, 9 households (about 0.1 percent) had LHS in the range of 5 to 10 Hectares while only 10 households had LHS of above 10 Hectares.

Labour is another ingredient in farming. Adult household members was used as proxy to labour in this study was also described by categorizing in two groups (0 – 5 and above 5). Traditional farming as mainly practiced in Malawi is labour intensive and this is crucial to maximizing agricultural production. As summarized in Table 4.1, 9, 977 households (about 81.3 percent) comprised of members in the range of 0 to 5 people while 2, 294 households (about 18.7 percent) comprised of more than 5 members.

Number of people in a family (household) has an effect as well in the household well-being. Despite that fact that this contributes to labour force, but this is beneficial if the members are in the working age group. If most of members are unproductive, then increased household size impinges household welfare. Grouping household size in two categories of 0 – 5 and above 5 people, Table 4.1 gives a summary of the distribution. Of the interviewed 12, 271 households, 8, 637 of them (representing 70.4 percent) comprised of members in the range of 0 to 5 people while 3, 634 households (about 29.6 percent) had above 5 people.

As this study wanted to determine the impact of FISP on food security among others, whether the households benefited from FISP or not was another variable of interest, which was later used as dependent variable in the determination whether households can be food secure or not. Table 4.1 gives the distribution of households by whether they benefitted or not from FISP. The table shows that of the interviewed 12, 271 households, 8, 465 of them

(about 69 percent) benefitted while 3, 806 households (about 31 percent) did not benefit. Quantity and value of the harvests are some of the common measuring mechanism of FISP that has been used in this study and maize being the staple food and mainly at the centre of FISP, its harvested quantity (in 50KG bags) and sold values (in Malawi Kwacha) that have been categorized have been isolated for the purpose of the analysis. On harvested quantity, Table 4.1 shows that of the interviewed 12, 271 households, 454 of them (about 3.7 percent) harvested less than 1 bag, 6, 285 households (about 51.2 percent) harvested between 1 and 5 bags, 1, 355 households (about 11 percent) harvested between 5 and 10 bags while 4, 177 households (about 34 percent) harvested over 10 bags.

As some households sell the harvested crops as source of income for other money demanding issues, Table 4.1 also gives the distribution of the quantity sold out of the harvested. It is revealed from the table that 157 households (about 1.3 percent) sold less than 1 bag of their harvested maize, 574 households (about 4.7 percent) sold between 1 and 5 bags of their harvested maize, 254 households (about 2.1 percent) sold between 5 and 10 bags of their harvested maize while 11, 286 households (about 92 percent) sold over 10 bags of harvested maize. Having sold most of the food, households were asked if they at least kept something to keep them going until the next harvesting time. Table 4.1 also gives the distribution of how the households stored their harvested maize. Of the interviewed 12, 271 households, 12,123 of them (about 98.8 percent) stored less than 1 bag, 75 of them (about 0.6 percent) stored between 1 and 5 bags, 28 of them (about 0.2 percent) stored between 5 and 10 bags while only 45 households (about 0.4 percent) stored over 10 bags.

Market availability and access is another ingredient of farming that helps in the development and growth of farmers as farmers need to buy inputs and sell their products. In this study, distance to the market in KM is used as a measure of access and availability of markets. Table 4.1 gives the distribution of market access as reported by household. Of the interviewed 12, 271 households, 11, 852 (about 96.6 percent) reported to have availability and access to the market within less than 1 KM, 192 households (about 1.6 percent) reported having markets available and accessible within 1 to 2 KM while 227 households (about 1.8 percent) reported having markets available and accessible over 2 KM away. This indicated that most households had available markets which were also accessible for their agricultural production.

One way to avoid selling farm produce such as maize is availability and access to other money sources that one can use for other money demanding issues. In this case, other sources of money such as Income Generating Activities (IGAs) and Remittance have been described in Table 4.1. On whether the households have income generating activities, Table 4.1 shows that of the interviewed households, 2, 592 of them (about 21.1 percent) had IGAs while 9, 679 (about 78.9 percent) did not have any IGAs. The households were asked if they receive any remittance and Table 4.1 also gives the remittance distribution. Of the 12, 271 interviewed households, 127 of them (about 1 percent) reported to have received money from other sources while majority of them (12, 144) representing 99 percent did not receive any money from other sources.

Finally, geographical setting of households has been summarized in Table 4.1. This reveals that majority of the interviewed household (10, 038 representing 81.8 percent) were in rural areas while 2, 233 households (about 18.2 percent) were in urban. On describing further those who either benefitted on FISP or not, this study further wanted to determine the benefit by geographic area. Figure 4.1 gives the distribution of the FISP benefits by geographical area.

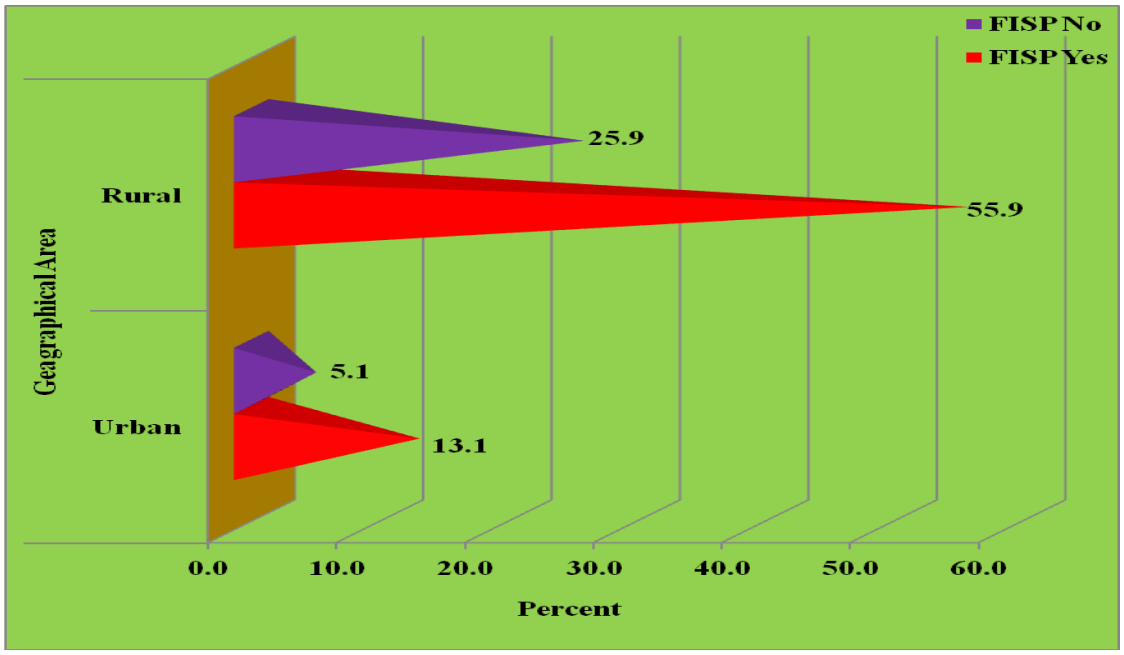

Figure 4.1: Distribution of smallholder farmers by Geographical Area

Figure 4.1 shows that majority (6, 855) of smallholder farmers representing 55.9 percent (6855/12271) were in rural Malawi while 1, 610 of smallholder farmer households (about 13.1 percent) were in urban areas. For non-beneficiaries, who were 3, 806, and 25.9 percent of them live in rural areas while only 5 percent live in urban areas across Malawi.

Further on the description of the households by FISP beneficiaries or not, the study wanted to find out on the distribution by LHS.

Post harvest period is mainly followed by the decision of how to use the harvested products. For staple food, the first priority is to safeguard the relialized harvests. Financial contraints might force someone to sell even the staple food as long as there is no other sources of money. After whatever decision, the stored maize harvested is an indicator of food security. In this study, the distribution of the households (FISP beneficiaries and non-beneficiaries) is indicated by the number of stored 50KG bags of maize.

The study also wanted to find out if how much one realizes after selling farm products is it equivalent to what is sold. This study examined the effect of what was sold in terms of financial sustainability. Figure 4.5 gives the distribution of the values in Malawi Kwacha (MK) after selling farm products mainly maize.

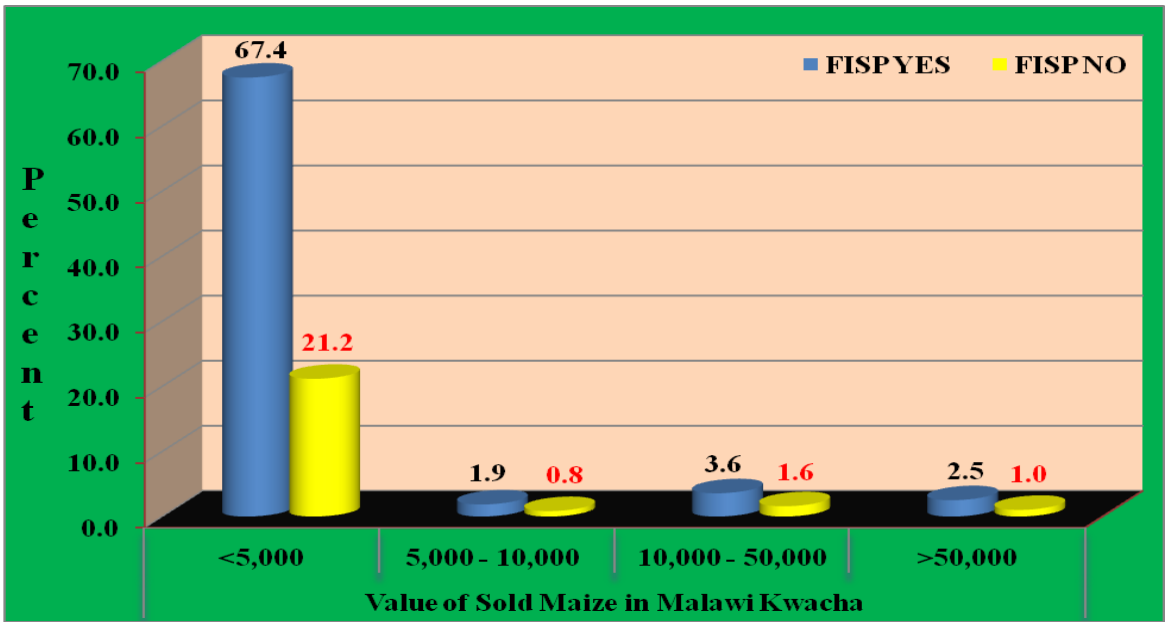

Figure 4.2: Distribution of FISP beneficiary and non-beneficiary by value of sold maize

Note: Exchange Rate in 2010 was US$1 = MK150

The amount of money realized after selling maize as a result of financial challenges faced by most households as shown by the graph in Figure 4.2 shows that most households got less than K5, 000. This is for both FISP beneficiaries and non-beneficiaries. Maybe the benefits that are accrued during the farming season might be attributed to the education status of the households. For this reason, Figure 4.3 gives the distribution of FISP beneficiaries and non-beneficiaries by their educational background.

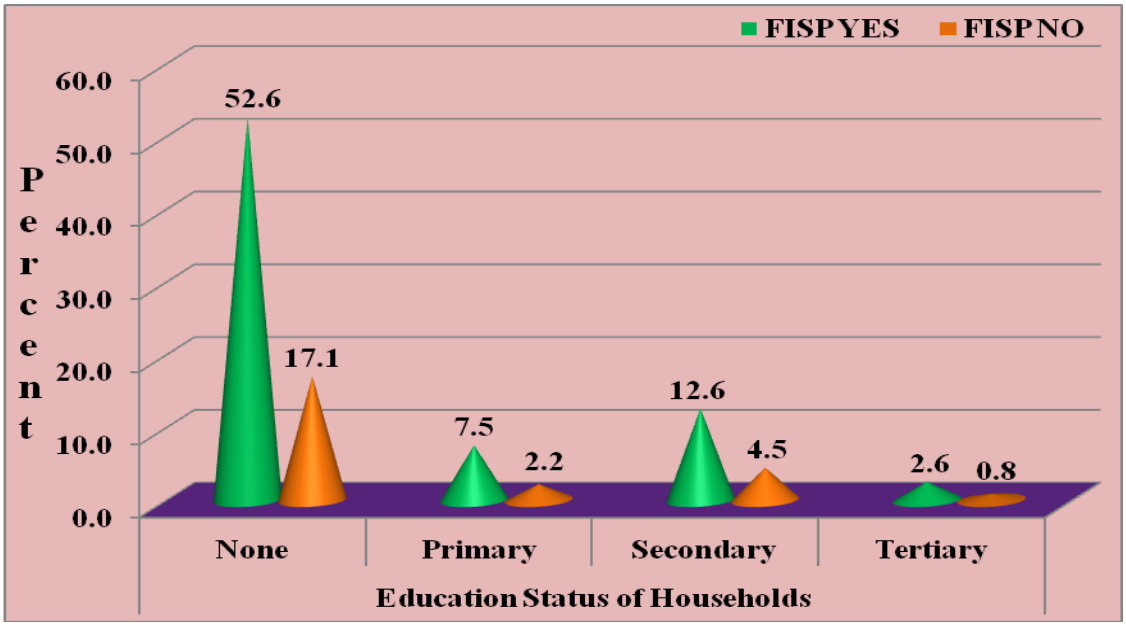

Figure 4.3: Distribution of FISP beneficiary and non-beneficiary by educational background

The graph in Figure 4.3 clearly shows that most households whether beneficiary or not are uneducated. Modern farming that can help develop Malawian households will be a

challenge to implement taking into account the educational demands associated with this type of farming.

These variables and indicators (demographic and socio-economic) that have been described in this section have been included in a regression modeling to determine their influence in determining smallholder farmers' incomes and food security, which is presented in the next section.

4.3 Demographic and Socio-economic factors associated with smallholder farmers' incomes in Malawi.

There are several factors that are associated with one's productive capability. Using logistic regression analysis, variables described and discussed in the previous section have been included as independent variables to explain their influences in how much households receive as one of their benefits of farming. Table 4.2 gives the result of a regression analysis where total values obtained after selling maize (1 for those who got over MK50, 000 and 0 for those that got less than MK50, 000) is used as proxy for income levels and as a dependent variable.

Table 4.2: Logistic Regression analysis results of determining factors of incomes levels of smallholder farmers' households

Variables	**Coefficients**	***Wald***	***p*-value**
Constant	-3.516	176.204	0.000
Income Generating Activity	0.059	0.254	0.614
Remittance	0.143	0.097	0.756
Age	0.022	0.016	0.898
Labour	0.320	3.739	0.053*
FISP	-0.297	6.936	0.008**
Farm Size	0.204	3.283	0.070
Gender	0.508	11.462	0.001**
Household size	-0.414	10.143	0,001**
Distance to the market	0.121	1.456	0.228
Residential Area	0.043	0.116	0.733
Education Status	0.012	0.012	0.912
Marital status	-0.264	2.507	0.151

Dependent Variable: Food Security, Pseudo R-Square (CS = 0.003, N = 0.011), N = 12721, Classification = 96.5 Note: * = significant at 0.05; ** = significant at 0.01

Income levels of smallholder farmers as shown in Table 4.2 clearly shows that household size, which has a coefficient of -0.414 and a Wald test statistic of 10.143 with *p*-value of 0.001, gender of household head, which has a coefficient of 0.508, a Wald test statistic of 11.462 and a *p*-value of 0.001, FISP coupons, which has a coefficient of -0.297, a Wald test statistic of 6.936 and a *p*-value of 0.008 and labour force, which has a coefficient of 0.320, a Wald test statistic of 3.739 and a *p*-value of 0.053 are the determining factors. No other demographic factor is attached to smallholder farmers' ability to acquire income.

4.4 Demographic and Socio-economic factors associated with smallholder farmers' food security in Malawi

There are also several factors that are associated with one's capability of being food secure. Using logistic regression analysis, variables described and discussed in the previous section have been included as independent variables to explain their influences in how households can become food secure. Table 4.3 gives the result of a logistic regression analysis where food security (yes = 1 for those who harvest more than 10 bags and no = 2 for those with less than 10 bags) and this was used as proxy for food security and as a dependent variable.

Table 4.3: Logistic Regression analysis results of determining factors of food security of smallholder farmers' households

Variables	**Coefficients**	***Wald***	***p*-value**
Constant	-1.596	0.144	0.000
Income Generating Activity	0.072	1.330	0.249
Remittance	0.208	0.742	0.389
Age	0.028	0.106	0.745
Labour	-0.098	1.108	0.292
FISP	-0.321	28.841	0.000**
Farm Size	0.232	15.402	0.000**
Gender	-0.059	0.715	0.398
Household size	-0.164	3.392	0.046*
Distance to the market	-0.050	0.627	0.428
Residential Area	-0.241	11.537	0.001**
Education Status	-0.112	3.765	0.052*
Marital Status	0.319	10.353	0.001**

Dependent variable = Total value of maize sales (1 for sales over MK50, 000 and 0 for sales below MK50, 000), N = 12271, H-L = 4.737, Pseudo R-Squared (CS = 0.003, N = 0.011). Note: ** = significant at 0.001

Food security of smallholder farmers as shown in Table 4.3 clearly shows that farm size, which has a coefficient of 0.232 and a Wald test statistic of 15.402 with *p*-value of 0.000, household size, which has a coefficient of -0.164 and a Wald test statistic of -3.392 with *p*-value of 0.046, education status of household head with a coefficient of -0.112, Wald test statistic of 3.765 and a *p*-value of 0.052, marital status of household head with a coefficient of 0.319, Wald test statistic of 10.353 and a *p*-value of 0.001 and residential area with coefficient of -0.241, a Wald test statistic of 11.537 and a *p*-value of 0.001 are the only determining factors. No other demographic factor is attached to smallholder farmers' ability to be food secure. Having determined factors associated with food security, the study further wanted to analyze the impact of FISP on income levels of these smallholder farmers as presented in the following section.

4.5 Impact of FISP on smallholder farmers' income levels in Malawi

Since the implementation of FISP, mixed views and opinions have been portrayed by both who are for and those who are against. Using factual evidence, this study wanted to analyze and quantify the impact of FISP on the income levels of smallholder farmers during the farming period under consideration (2009/2010). Using total values obtained after selling maize (coded as 1 for those who got more than K50, 000 and 0 for those who got K50, 000 and below) as proxy for income levels and as a dependent variable and considering FISP beneficiaries and non-beneficiaries, a logistic regression analysis was performed. Table 4.4 presents the result of the logistic regression analysis done.

Table 4.4 Logistic Regression results on Income Levels of FISP Beneficiaries and Non-FISP Beneficiaries

Variables	FISP Non-Beneficiaries				FISP Beneficiaries			
	B	**Wald**	***p*-Value**	**Odds Ratio**	**B**	**Wald**	***p*-Vale**	**Odds Ratio**
Farm Size	0.19	1.04	0.31	1.21	0.19	1.77	1.84	1.21
Gender	0.24	0. 78	0.38	1.27	0.62	11.99	0.00*	1.86
Household Size	-0.36	1.82	0.18	0.70	-0.19	1.77	0.18	1.21
Income Generating Activity	0.08	0.14	0.71	1.09	0.06	0.21	0.65	1.07
Labour	0.07	0.05	0.82	1.07	0.43	4.68	0.03*	1.53
Remittance	0.03	0.00	0.98	1.03	0.19	0.13	0.72	1.21
R-Area	0.39	3.07	0. 08	1.48	-0.10	0.44	0.51	0.90
Marital Status	0.04	0.01	0.92	1.04	-0.38	3.10	0.08	0.68
Education	0.01	0.00	0.98	1.00	0.00	0.00	0.97	1.00
Age	-0.19	0.32	0.57	0.83	0.11	0.29	0.51	0.90
Distance to Market	0.04	0.05	0.83	1.05	0.16	1.81	0.18	1.17
Constant	-3.38	52.84	0.00	0.03	-3.87	147.97	0.00	0.02
Pseudo R-Squared	**Cox & Snell = 0.003**				**Cox & Snell = 0.003**			
	Nagelkerke = 0.012				**Nagelkerke = 0.011**			
Hosmer-Lemeshow Test	**10.67**				**7.91**			
Classification Table	**95.8**				**96.7**			
Observations	**3, 020**				**9, 251**			

Note: * = 0.05; ** = 0.01

Table 4.4 shows the results of estimation of logistic models of non-beneficiaries of FISP and FISP beneficiaries with the Wald values and the factor change – the odds ratios. The constant, which is the intercept, shows when all variables are zero; the coefficient for beneficiaries of FISP is -3.87 while that of FISP non-beneficiaries is -3.38. For FISP non-beneficiaries model, no any demographic factor that determines one's capability to increase his or her income levels. This means that at local level, if poverty strikes, people have no other means of coping with shocks rather than waiting for hand-outs. For those who benefit from FISP, labour, which has a coefficient of 0..43, a Wald test statistic of 4.68 and a p-value of 0.03 and an odds ratio of 1.53 and gender of household head, which has a coefficient of 0.62, a Wald test statistic of 11.99, a p-value of 0.00 and an odds ratio of 1.86 are the only determinants of income levels of those who benefit from FISP.

On the overall, both models (for FISP non-beneficiaries and beneficiaries) have the same explanatory power of somewhere between 0 (zero) (Cox and Snell R Squared) and 1 percent (Nagelkerke R Squared) of the variance of probability of increasing income levels. This means that smallholder farmers have little or no coping strategies in times of income level shocks. The only source of hope is mainly hand-outs from well-wishers including the government.

4.6 Impact of FISP on smallholder farmers' food security in Malawi

Using quantity of harvested maize stored (1 for those with more than 10 bags and 0 for those with 10 bags and below) as proxy for food security and as a dependent variable and considering FISP beneficiaries and non-beneficiaries, a logistic regression analysis was performed. Table 4.5 presents the result of the logistic regression analysis done.

Table 4.5 Logistic Regression results on Food Security of FISP Beneficiaries and Non-FISP Beneficiaries

	FISP Non-Beneficiaries				**FISP Beneficiaries**			
Variables	**B**	**Wald**	***p*-Value**	**Odds Ratio**	**B**	**Wald**	***p*-Value**	**Odds Ratio**
Farm Size	-0.07	0.47	0.49	1.07	0.31	17.3	0.00**	1.37
Gender	-0.18	1.87	0.17	0.84	-0.02	0.05	0.83	0.98
Income Generating Activity	0.35	9.17	0.00**	1.41	-0.03	0.05	6.66	0.97
Labour	-0.42	4.72	0.03*	0.66	0.00	0.00	0.99	1.00
Remittance	0.45	0.92	0.34	0.57	0.12	0.19	0.66	1.13
R-Area	0.09	0.44	0.51	1.09	-0.35	16.66	0.00**	0.71
Marital Status	0.41	5.06	0.02*	1.50	0.29	0.12	0.01*	1.34
Education	-0.06	0.32	0.57	0.94	-0.14	4.39	0.04*	0.87
Age	-0.09	0.32	0.57	0.91	0.07	0.42	0.52	1.07
Distance to Market	-0.00	0.00	0.99	0.99	-0.05	0.41	0.52	0.95
Constant	-1.74	47.44	0.00	0.17	-1.91	121.74	0.00	0.15
Pseudo R-Squared	Cox & Snell = 0.007 Nagelkerke = 0.012				Cox & Snell = 0.0.008 Nagelkerke = 0.014			
Hosmer-Lemeshow Test	15.27				4.759			
Classification Table	83.0%				86.3			
Observations	**3, 020**				**9, 251**			

Table 4.5 shows the results of estimation of logistic models of non-beneficiaries of FISP and FISP beneficiaries with the Wald values and the factor change – the odds ratios. The constant, which is the intercept, shows when all variables are zero; the coefficient for beneficiaries of FISP is -1.91 while that of FISP non-beneficiaries is -1.74. For FISP non-beneficiaries, the only factors that can help boost their food security status are IGA, which has a coefficient of 0.35, a Wald test statistic of 9.17, p p-value of 0.00 and an odds ratio of 1.41, labour, which has a coefficient of -0.42, a Wald tests statistic of 4.78, a p-value of 0.03 and an odds ratio of 0.66 and marital status, which has a coefficient of 0.41, a Wald test statistic of 5.06, a p-value of 0.02 and an odds ratio of 1.50. For those who benefit from FISP, there are several factors that can help boost the food security level. These include farm size, which has a coefficient of 0.31, a Wald test statistic of 17.3, a p-value of 0.00 and an odds ratio of 1.37, residential area, which has a coefficient of -0.35, a Wald test statistic of 16.66, a p-value of 0.00 and an odds ratio of 0.71, marital status of household head, which has a coefficient of 0.29, a Wald test statistic of 0.12, a p-vale of 0.00 and an odds ratio of 1.34, education status of household head, which has a coefficient of -1.14, a Wald test statistic of 4.39, a p-value of 0.04 and an odds ratio of 0.87. This means that there are no significant difference between beneficiaries and non-beneficiaries as there are other factors that can help people absorb food insecurity shocks other than being beneficiaries of FISP.

To strengthen further the impact of FISP to beneficiaries, comparison of the mean income levels and mean harvested quantities of the two groups is done applying analysis of variance (ANOVA) approach and this is presented in the following section.

4.7 Compare smallholder farmers' incomes between beneficiaries and non-beneficiaries of FISP in Malawi

To further strength the impact of FISP on beneficiaries, an analysis of variance (ANOVA) was done to test if there is a significant difference between the mean income levels of FISP beneficiaries and non-beneficiaries. The results of the ANOVA analysis are presented in Table 4.6.

Table 4.6: ANOVA results on the difference between mean income levels of FISP Beneficiaries and Non-FISP Beneficiaries

Source of variation	***Sum of Squares***	***df***	***Mean Square***	***F***	***Sig.***
Between Groups	129163585.1	1	129163585.1	0.002	0.962
Within Groups	1.19346E+14	2122	56242458724		
Total	**1.19347E+14**	**2123**			

The results of ANOVA analysis as shown in Table 4.6, *F*-test statistic is 0.002 with significance level of 0.962, which is greater than 0.05. From these values, it can be concluded that there is no statistical evidence to disregard that income levels of the two groups are the same. This means that income levels of FISP beneficiaries and non-beneficiaries are the same. Being a FISP beneficiary does not help one to have an increased income level compared to those who are non-beneficiary.

4.8 Compare smallholder farmers' food security between beneficiaries and non-beneficiaries of FISP in Malawi

Apart from income levels, the comparison was also done on food security situation between these two groups of smallholder farmers. The results of the analysis using ANOVA approach are presented in Table 4.7.

Table 4.7: ANOVA results on the difference between mean stored food of FISP Beneficiaries and Non-FISP Beneficiaries

Source of variation	***Sum of Squares***	***df***	***Mean Square***	***F***	***Sig.***
Between Groups	0.31	1	0.31	0.122	0.727
Within Groups	31215	12269	2.544		
Total	**31215.3**	**12270**			

The results of ANOVA analysis as shown in Table 4.7, *F*-test statistic is 0.122 with significance level of 0.727, which is greater than 0.05. From these values, it can be concluded that there is no statistical evidence to disregard that food security situation of the two groups are the same. This means that food security situation of FISP beneficiaries and non-beneficiaries are the same. Being a FISP beneficiary does not help one to be food secure compared to those who are non-beneficiary.

4.9 Discussion of the results

The purpose of this study was to assess the impacts of FISP on small-scale agribusinesses in Malawi during the 2009/10 farming season using IHS3 dataset. The analysis was preceded by summarizing the household heads' characteristics such as age, education attainment, gender, marital status, household size, farm size, labour force, location, market access and availability, distance to the market, income generating activities, remittance, quantity harvested, quantity sold, quantity stored and FISP status. The analysis of these characteristics shows that these respondents have mixed and varied characteristics.

On location, it was found out that most households (10, 038 representing 81.8 percent) were in the rural areas while the remaining 2, 233 (about 18.2 percent) were from the urban area. This makes the usability of this data to analyze the impact of FISP ideal as the main targets of FISP are rural based households. These households are the most vulnerable when it comes to both food security and income levels. The gender composition was in favour of males with 9, 210 of the interviewed households (75.1 percent) being males farmers while 3, 061 (about 24.9 percent) were females. According to FISP implementation guidelines, varying categories of household heads are to be targeted. This includes households that are elderly, HIV positive, female, children, orphans and physically challenged (GoM, 2007). The distribution of FISP beneficiaries was a bit fair as more households had access to the services. For instance, 8, 465 (about 69 percent) of the households had access to the service while 3,806 households (about 31 percent) did not have access to the service. However, the distribution of FISP

beneficiaries by age shows that out of 9, 251 households, 67 of them (about 1 percent) are child-headed households and 2, 502 households (about 27 percent) were elderly households. With this distribution of the targets, the whole goal of FISP might be compromised.

Unmarried beneficiaries might be more vulnerable than those married. The distribution of households by marital status shows that majority (8, 767) about 71.4 percent were married, 1, 627 (about 13.3 percent) widowed, 1, 439 (about 11.7 percent) were divorced while 438 (about 3.6 percent) were never married. With this in mind, the distribution of households by marital status shows that there were more married beneficiaries (6, 613) representing about 71 percent with the remaining percentage distributed across the remaining categories. It would meet the FISP selection criteria if these married majority household heads are having or keeping one of the vulnerable groups such as HIV positive, elderly or physically challenged.

Education, which helps to understand issues better was the other analyzed variable in this study and it transpired that majority of the households (8, 556) about 69.7 percent did not go to school; 1, 197 (about 9.8 percent) went as far as primary school; 2, 102 (about 17.1 percent) went as far as secondary school while 417 (3.4 percent) went beyond secondary education. Modernized agriculture is literacy oriented such that using and/or applying farm inputs needs some knowledge. The number of low literacy households may mean that the use of inputs was compromised.

Malawi is one of the densely populated countries in Africa and many smallholder farmers are land constrained and have access to about one hectare of farmland on which to subsist (World Bank, 2007b). The land holding size (farm) is another factor (an input) of farming. Its size can determine the productiveness of a farmer. The distribution of the farms show that 8, 379 households (about 68.3 per cent) had farms of less than 1 hectare, 3, 873 (about 31.6 percent) had farms of between 1 and 5 hectares, only 9 households had farms between 5 and 10 hectares while 10 had farms of more than 10 hectares. With majority of households having farms of less than 1 hectare, there is no way food security is going to be achieved taking into account that most farms in Malawi follow traditional farming. In poor agrarian economies like Malawi, the performance of small farm agriculture has long been understood to play a central role in determining the scale of national poverty, and the pace at which it can be reduced through economic growth.

Using these small farms, harvested quantities of maize in 50kg bags have also been analyzed. As noted by Gurara and Salami (2012), most smallholder farmers operate on tiny plots of land (1.2 hectares per household or 0.33 hectares per capita on average), this results in low yields per hectare. According to Makoka (2008) and World Bank (2010), Malawi is ranked as one of the most risk countries in the world from the effects of climate change. This risk has been attributed to the population's reliance on rain-fed agriculture to support their livelihoods. This factor is neglected when thinking of FISP by the implementers who only think of having positive results by distributing farm inputs. This could be one of the contributing factors as far as harvesting is concerned. The distribution

of harvested quantities shows that food security is far from being achieved. For instance, majority of these households (6, 2685) representing about 51.2 percent harvested between 1 and 5 bags of 50kgs, 4, 177 (about 34 percent) harvested over 10 bags of 50kgs, 1, 355 (about 11 percent) harvested between 5 and 10 bags of 50kgs and 454 (about 3.7 percent) harvested less than 1 bag of 50kgs. These maize production figures defeat the whole essence of subsidies such as FISP. As reported by Holden and Lunduka (2010), very few farmers are willing to buy a full package of inputs at the market prices to supplement the input short fall for their farms and rely on FISP as their main source of inputs. Taking the cost of production including FISP into consideration, these quantities are insufficient to off-set food security and poverty levels mainly in rural Malawi. These quantities also mean that feeding the growing population which is growing at an annual rate of 2.8 becomes a challenge. These constraints are among others that explain the long-standing and often contentious policy of subsidizing inputs in Malawi.

On top of FISP, households were asked if they receive cash – remittance from any other source outside the household. Majority (12, 144) of the households representing 99 percent did not receive anything in form of remittance while only 127 households (about 1 percent) admitted having received something. To supplement cash needs, income generating activities were also analyzed to determine cash alternative channels. Unfortunately, only 2, 592 households (about 21.1 percent) were operating other activities that can generate income for them. With large number of households who are prone to hunger, poor and labour constrained, the nearest alternative to access cash is to sell some if not all of their harvests. Though poverty official figures show that the country has

registered a rapid decrease in the incidence of poverty, declining from 53 percent to 39 percent between 2004 and 2009, poverty remains deep, widespread and severe (Anderson, 2011).

According to 2013 IHS3 report, poverty is predominantly rural with about 94 percent of the poor living in rural areas. The distribution of sold quantities of harvested maize shows that 11, 286 households (about 92 percent) sold more than 10 bags of 50kgs maize, 574 (about 4.7 percent) sold between 1 and 5 bags of 50kgs maize, 254 (about 2.1 percent) sold between 5 and 10 bags of 50kgs maize and only 157 (about 1.3 percent) sold less than 1 bag of 50kgs. As also noted by Anderson (2011), 10 percent of maize growers are net sellers, with as high as 60 percent being net buyers. As more maize is sold out, the chances of achieving one of the aims of FISP – food security is less likely to be met.

Even if all harvested maize is sold, the chances of satisfying cash quench of increasing income levels is far from being realized as the amounts realized from these sales are very little. The distribution of the amounts of money from the sales shows that most of households, about 88.6 percent received less than MK5, 000, and only 3.5 percent realized more than MK50, 000. Considering the inputs applied in the production, these amounts are far from meeting cash demands of these poor rural households. However, there are others who manage to keep some of their harvested maize that can sustain them for a few days from the harvest period. The distribution of stored quantity shows that 12, 123 of the households (about 99.8 percent) only managed to keep less than 1 bag of 50kgs with a few

that kept more than 1 bag of 50kgs of maize. This undermines the fight for food security being pursued by the advocates of FISP.

Demographic and socio-economic factors may influence someone's ability to meet basic needs of life. On this note, the study wanted to find out the impact of these factors on smallholder farmer's food security and income levels. Unfortunately, none of the demographic and socio-economic factors have any impact on these farmers capability of being food secure and having improved income levels. However, the quantity of sold harvests (maize) has an impact on both food security and income levels while amount of the sold harvests has an impact on the income levels of these farmers.

The analysis discussed above was considering all households regardless of whether they were FISP beneficiaries or not. To find out the impact of FISP, the households were split into two groups; beneficiaries and non-beneficiaries. Using these groups as dependent variables while demographic and socio-economic factors as independent variables, independent impact assessment of these factors on income levels and food security was done. On income levels, the results of the analysis shows that farm size, sold quantity of harvested maize and family size are the only variables having an impact on FISP beneficiaries' capabilities of increasing their income levels while for non-beneficiaries, only sold quantities of the harvested maize had an impact on households capabilities of increasing their incomes. On food security capabilities, there are no factors that impact on either FISP beneficiaries or non-beneficiaries capabilities of improving their income levels and food security.

Apart from demographic and socio-economic factors having an impact on either FISP beneficiaries or non-beneficiaries, the study further wanted to know if there is any significant difference between the mean income levels and food security of these two groups. The analysis of variance (ANOVA) also proved that there is no statistical significant difference between these groups, i.e. it doesn't matter whether one benefits or not from FISP when it comes to improved food security and increased income levels. Based on these results, it can be statistically concluded that FISP is not the best tool of alleviating poverty and enhancing food security in Malawi.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study and the route to conclusion and recommendations. Summary has been given first followed by the conclusion drawn from the results of the analysis, some limitations of the analysis results and recommendations drawn from the results are given lastly.

5.2 Summary of the work done

The aim of the study was to investigate the impact of Farm Input Subsidy Programme on the income levels of smallholder farmers in Malawi using the 2009/10 IHS3 dataset. Chapter One gave the background and motivation to the study, objectives of the study, research questions that guided the data collection process. Chapter Two gave the literature associated with agriculture such as its role in economic growth and development, history of FISP in Malawi and the impact of public investment and poverty alleviation. It also gave some clues of possible links of agricultural growth and poverty reduction in Malawi. Chapter Three gave the layout of methodological approach that led to the achievement of the study objectives. In this chapter, the main source of data used in the study was described and its suitability for this study was highlighted. Type of analysis to achieve the

aims of the study was given. Chapter Four gave the analysis done and results of the findings and their discussions presented. Chapter Five gave the conclusion that was made based on the results of the findings and recommendations drawn in relation to the findings.

5.3 Summary of the findings

It has transpired from the results of the findings that most smallholder farmers were from rural areas compared to urban areas. In terms of gender compositions, it was discovered that there were more men compared to women who were the beneficiaries of FISP and most of them did not go to school. Most of these smallholder farmers benefitted from FISP and had less than 1 hectare of farms and with less than 5 people who can work in the farms. Majority of these smallholder farmers harvested between 1 and 5 bags of maize, with little earnings being realized from the sales. These smallholder farmers reserve little out of their total harvests for food for future use. In terms of means to boosting their economic base, very few of them get remittances from outside their households and very few others have income generating activities.

On the impact of FISP on these farmers in terms of increasing their food security and income levels due to demographic and socio-economic factors, the results shows that there is no significant impact of demographic and socio-economic on the capability of FISP beneficiaries and non-beneficiaries in terms of increasing their income levels and food security capabilities. Even in the mean income levels and amount of stored food, there is no significant difference between FISP beneficiaries and non-beneficiaries that can

suggest that FISP is beneficial in alleviating poverty and enhancing food security in Malawi.

5.4 Conclusion

The aim of the study was to investigate the impact of FISP on the income of smallholder farmers in Malawi using the 2009/10 IHS3 dataset. Using frequency distributions, tables, charts and logistic regression analysis, the analyzed results were presented. Based on these results, there several challenges associated with implementation of FISP in Malawi. Some of the challenges are limited farmland, beneficiary choice criteria, labour, and amount of inputs being distributed on top of natural phenomenon associated with rain-fed agriculture. It might seem FISP is unproductive program due to circumstances surrounding its implementation strategy.

Among other unforeseeable factors that are overlooked when thinking of programs like these that partly depend on nature are the contribution and their impacts. For instance, even if the implementation is done perfectly, but if the rains are not good during that farming year, then realizing the goodness of FISP would be compromised.

5.5 Recommendations

Poverty alleviation and food security is at the heart of government planners and policy makers. However, paper work might not necessarily be turned into practical work. With these observations in mind, the researcher is making the following recommendations:

1 Much as understanding the constraints limiting agriculture and livelihoods developments is an essential starting point for understanding FISP's potential, scarcity of farm lands needs to be effectively addressed. As some smallholder farmers have bigger farm lands, the distribution of farm inputs in FISP should consider giving out according to the farm sizes rather than the universal single coupon for all beneficiaries to maximize the production.

2 As commented by the World Bank (2010), the adverse climatic conditions and variability in Malawi are skewed disproportionately towards agriculture; Malawian subsistence farmers suffer from climate related stressors in different ways through droughts, dry spells and floods, erratic and unreliable rainfalls, programming and implementation of FISP should thus take climate change in consideration so as to reap benefits from it. It is strongly recommended that there should be a policy shift by adopting those policies that are less prone to weather or price risks. These could be policies within the broader sphere of agricultural policy (e.g., irrigation and rural infrastructure, market linkages and development, credit provisioning and insurance, or research and extension services) or those outside the traditional ambit of agricultural policy (e.g., cash transfers or public works).

3 FISP has proved to be not a viable tool of food security and poverty alleviation, the government should diversify and try other avenues of using huge sums of money associated with this program. The Malawian government faces a unique challenge of finding itself in a "public spending trap" where reduced spending on FISP is politically and socially risky. However, as long as FISP crowds out other socio-economic spending, it could have detrimental consequences for growth and

welfare outcomes in the long term. These opportunity costs and outcomes under policy alternatives need to be better understood and quantified.

4 The success of any social programme lays in its design therefore design and implementation issues of FISP need to be reworked in order for it to be sustainable and beneficial to the intended population. Political economy considerations, subsidy scope and scale beneficiary targeting, procurement and logistics, corruption and fertilizer diversion need to be revisited in implementation of FISP in subsequent years.

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