

**THE IMPACT OF SUBSIDIZED FERTILIZER ON MAIZE
PRODUCTION AND HOUSEHOLD INCOME IN TANZANIA:
THE CASE OF SUMBAWANGA MUNICIPALITY, RUKWA**

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THE CASE OF SUMBAWANGA MUNICIPALITY, RUKWA**

By

Pascal J. Sanga

**A Dissertation Submitted in Partial Fulfillment of the Requirements for Award of the
Degree of Master of Science in Development policy (Msc. DP) of**

Mzumbe University.

2013

CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by Mzumbe University, a thesis entitled; ‘**The Impact of Subsidized Fertilizer on Maize Production and Household Income in Tanzania: A Case of Sumbawanga Municipality, Rukwa,**’ in partial/fulfillment of the requirements of the award of the degree of Master of Science in Development Policy of Mzumbe University..

.....
Major Supervisor

.....
Internal Examiner

.....
External Examiner

Accepted for the Board of IDS

DIRECTOR, INSTITUTE OF DEVELOPMENT STUDIES

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Due to the fact it is not easy to mention everyone on this page, I would therefore wish to thank everyone who in one way or another contributed towards making this report a reality.

DEDICATION

The dissertation is dedicated to my late loved parents Jeremias Sanga and Oistela Pilla.

ABBREVIATIONS AND ACRONYMS

ACT	Agriculture Council of Tanzania
BOT	Bank of Tanzania
FAO	Food and Agriculture Organization
FSP	Fertilizer Support Programme
IFAD	International Fund for Agricultural Development
KG	kilogram
MAFC	Ministry of Agriculture, Food and Cooperatives
LGTI	Local Government Training Institution
MITM	Ministry of Industries, Trade and Marketing
MOFEA	Ministry of Finance and Economic Affairs
NAFCRED	National Food Crops Credit Programme
NAIVS	National Agricultural Input Voucher Scheme
NAPB	National Agriculture product Board
NBC	National Bureau of Statistics.
NFRA	National Food Reserve
NMC	National Milling Co-operation
NMP	National Maize Project
RALG	Regional Administration and Local Government
SAP	Structural Adjustment program
SMP	Sumbawanga Municipality Profile
TANSEED	Tanzania Seed Company
TFC	Tanzania Fertilizer Company
TZS	Tanzania Shilling
URT	United Republic of Tanzania

ABSTRACT

In the mid-1980s, Tanzania adopted a programme for economic liberalization of the entire economy after pressure from the IMF and the World Bank. It was promised that this economic liberalization would provide a strong stimulus to Tanzanian agriculture. In 1986, Tanzania had to sign with the World Bank and IMF the Structural Adjustment Programme (SAP), where agricultural subsidies were perceived to cause economic inefficiencies, and were completely removed in 1994/95. However, available data show that, this promise was not been fulfilled.

In 2006, Tanzania came back and inaugurated the strategies for the transformation of Tanzania's agriculture under the theme "KILIMO KWANZA". The major aim is to combat poverty and food security through enhanced agricultural productivity via subsidized agricultural inputs. Despite seven years since its inception, little is known about achievement of programme's objectives.

In this regard, this study examined the impact of subsidized fertilizer on maize production and household income. The study used survey research designs and data were collected using questionnaire and interviews. The study employed both qualitative and quantitative approaches.

The findings indicate that post subsidy programme period had an average of 77758 tons compared to 58453 tons of the pre fertilizer subsidy period. Furthermore, findings indicated that there were differences in production between the users of fertilizer and non-users of fertilizer for the year 2012. Lastly, as the logic of subsidy suggests, using year 2012 as a case, it was found that the income for three groups was significantly different suggesting that users of subsidized fertilizers are likely to earn more income than the other two groups of farmers due to low cost of inputs.

Some policy recommendations are given to promote the agricultural sector as one part of the national strategies in reducing income and food poverty. The budget constraints in the agricultural sector can be enhanced through reducing public expenditure on non-productive luxurious goods such as vehicles for bureaucrats and instead such budget should be allocated to agricultural sector which can lead to multiplier effect.

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction to the problem and background information

Tanzania is endowed with enough fertile arable land, diverse climatic zones and plenty of water sources all across the country. Only 24% out of 44 million hectares of the land area suitable for agriculture is utilized, mainly by smallholder farmers cultivating average farm sizes of between 0.9 and 3.0 hectares using traditional cultivation methods and production is determined by rainfall and low use of fertilizer (Skarstein 2005).

Agriculture is one of the leading sectors in Tanzania's economy. It contributes substantially to the gross domestic product (GDP) which accounts for about one fifth of the foreign earnings and supports the livelihoods of more than two thirds of the population (URT, 1997). It has forward linkages with the non-farm sector through agro-processing, consumption and export; provides raw materials to industries and a market for manufactured goods like cotton for textile while agriculture consumes industrial product like fertilizer.

Agriculture is the main contributor to economic development and also offers employment opportunities to majority of Tanzanians, mostly who live in rural areas. However, agricultural productivity is still low, with per capital growth averaging 0.3% during 1994-1999, 2.2% during 2000-2004 and increased to 4.2% in 2010 due to good climate in 2009/2010 season, improvement of infrastructure on agricultural system and government efforts to increase agriculture subsidies through implementation of Agricultural Sector Development Programme-ASDP (URT, 2012). Agriculture has significant performance of the economy and increases in income to farmers who depends on growth of economy particularly in the agricultural sector (URT, 2005).

Tanzania is an agricultural country basically predominated by an agrarian society. Agricultural provides livelihood for more than three quarter of Tanzania people and it is largely performed in the rural areas. Agricultural in Tanzania is characterized with

uncertainty facing small-scale farmers who practice purely subsistence farming with no commercial orientation. Small scale farmers face difficulties to improve on agriculture, one of the reasons being lack of financial capital for farm implements like fertilizer. Most small scale farmers are poor. Financial support are needed to help farmers by providing subsidized agricultural inputs like fertilizer leading to improved agricultural production (IFAD, 1995)

Despite agriculture being dominated by smallholder farmers who lack capital and skills; the use of fertilizer subsidies can help stabilizing agricultural production to improve food security, increase farmers' productivity and incomes, and also to produce higher valued crops (Skarstein 2005), but current application of fertilizers is considered to be much too low in Tanzania lead to low productivity in crops mainly maize.

An external causes of Tanzania's economic troubles started in the early 1980s was payment of loans to internal donors, which reduced economic capacity of country by more than 30 per cent, from US\$701.9 million in 1981 to US\$486.9 million in 1985. This reduction of foreign aid by US\$215 million corresponded to 62 per cent of Tanzania's merchandise exports and was 3.2 times larger than the country's merchandise trade deficit in 1986 and most of debt was allocated to the dead weighty expenditure in the country. The sharp reduction of foreign assistance compounded the crisis of low import, which had a profound negative effect on the supply of implements and inputs to the agricultural sector. (Bryceson, 1993).

The drop in foreign aid in agriculture sector was mainly accounted for by outside The Federal Republic of Germany, The United Kingdom, the Netherlands, Sweden and the World Bank (Havnevik, 1988). These cuts were related to the fact that Tanzania had refused to conclude an agreement with the IMF (International Monetary Fund) on structural adjustment, i.e. a programme of economic liberalization with World Bank and IMF. In October 1985 Nyerere left the presidency, refusing to stand for a new term, as condition to empower economic crisis in the country.

The potential yield of many crops can be increased to farmers by using higher levels in fertilizer with support from the subsidy programme of agricultural inputs in production and improved cultivation techniques (Putterman, 1995 & Lal, 1993). The main rationale for fertilizer subsidies is to reduce the persistence of market imperfections to farmers such as high fertilizer price, cash and credit constraints in the agricultural sector especially to producers, who are most affected with high priced agricultural inputs.

Since independence 1961, the government of Tanzania had employed a combination of specialized programmes and macro-economic policies aimed at boosting agriculture in general and maize production in particular. This included mass mobilization by their ruling party TANU through resolutions such as food is life, 'Siasa ni kilimo' (meaning politics is agriculture) in Musoma resolution of 1971 and 'kilimo cha kufa na kupona' (i.e. agriculture for survival) of 1973, villagization campaign of 1975 and Arusha declaration revolution of 1976 (Moshi 1997).

The establishment of institutions such as Tanzania Seed Company (TANSEED) in 1974 as an agent responsible for production, processing and marketing of improved seeds; the Tanzania Fertilizer Company (TFC) for fertilizer procurement and distribution, the National Milling Corporation (MNC) for purchasing grain maize, and implementation of several rural support programs such as National Maize Project (NMP) in 1975 (Moshi, 1997).

Interventions in agricultural products (maize in particular) by the government started in 1962 with the enactment of the Agricultural Products Act. The major objective of the intervention was to improve farmers' productivity and household income with establishment marketing system for agriculture products. In 1973, the National Milling Co-operation (NMC) was established. The NMC was vested with the monopoly power to buy and sale. This activity imposed more financial difficulties to the NMC leading to failure to collect produce from farmers, an act that led to low farmers' income (Hella, 1992).

Between the 1970's and 1990's interaction and knowledge building moved the focus on how to improve farmers in agricultural and rural development from the margins to centre stage, this rural development in Tanzania varies from time to time, depending on range of factors including natural resource endowments, political stability, budget and social economical environment.

In 1981, the government launched a National Economic Survival Programme (NESP) in an attempt to mobilize foreign exchange followed by a Structural Adjustment Programme (SAP). In the agricultural sector, SAP aimed at higher producer prices, improved input availability, more efficient marketing and removal of subsidy on the fertilizer and consumer price of maize (Gibbon, 1993).

In October 1982, the government launched a document in National Agricultural Policy (United Republic of Tanzania, 1982), which contained rather detailed analyses of the development of agriculture and its sub sectors, as well as agricultural extension, credit and marketing.

In early 1980s, there were nepotism and rent-seeking by corrupt bureaucrats in the state and the parastatal sector, financial repression and controlled and panterritorial prices which led to price distortions, discouraging agricultural producers from an efficient allocation of resources, and the development of an industrial sector which stagnated due to its inefficiency and import dependency and became increasingly unable to provide agricultural producers with incentive goods (Bevan 2003, Collier 2005 & Gunning 1999).

In 1986, Tanzania had to sign with World Bank and IMF the Structural Adjustment Programme (SAP) to recover economic problems where agricultural subsidies were perceived by World Bank to cause economic inefficiencies, and so the Bank demanded that they should be abolished. The subsidy on fertilizer was completely removed in 1994/95 (World Bank, 1994).

Despite the different strategies taken by government to improve agricultural sector, still targets were not reached with the first serious setback noted in 1973/74 and 1974/75; associated with the villagization campaign of 1975, oil price shocks but also attributed to bad weather, the breakdown of the East African Community in 1977, the cholera epidemic in 1978, and the war with Uganda in 1979 (Skarstein, 2005)

These changes, including the withdrawal of input fertilizer and transport subsidies, led to a sharp decline in the profitability of smallholder cultivation of maize and income, especially in Mbeya, Tabora, Rukwa and Ruvuma regions. These regions for long time were left behind in the development issues, Rukwa being the most affected in the agricultural improvement (Skarstein, 2005).

Tanzania has undergone major changes and reforms for the last 10 years of 1980s-1990s most of them as consequence of structural adjustment programs of 1986. The reforms have reduced governmental intervention and strengthened the role of the private sector in implementation. In spite of liberalization of almost every aspect of the economy with agricultural being most affected, additional reforms are being considered in economy. A recent discussion is about further reforms in the agricultural sector.

This different reform, also discussed in the literature, is the application of fertilizer subsidies to stimulate agricultural production with regard to the maize productivity and rise on household income (URT, 2012)

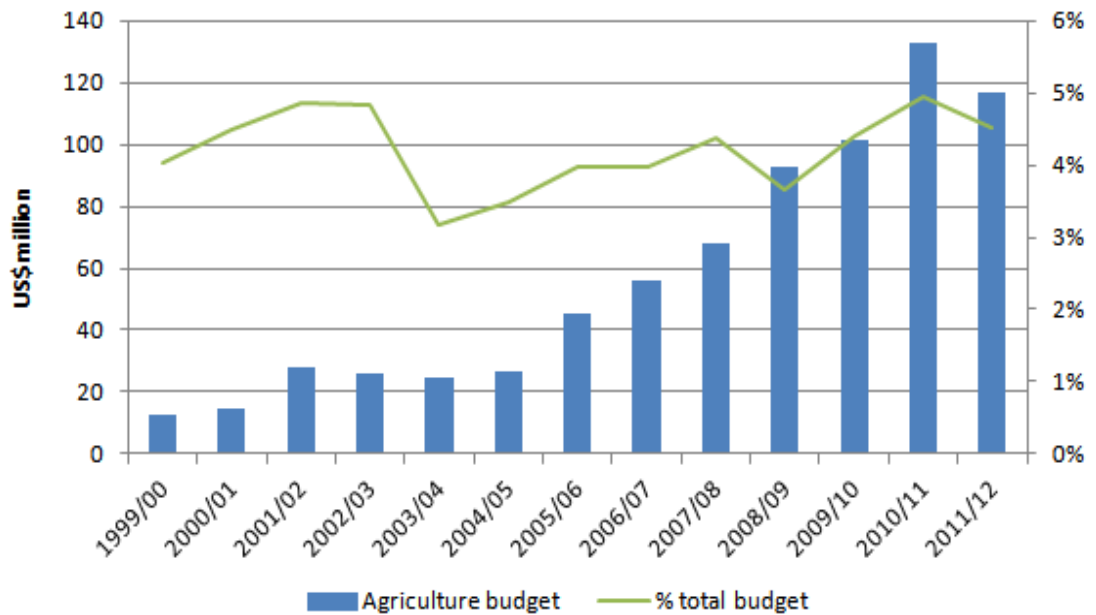
Earlier studies (URT, World Bank, 2000) found that Tanzania despite that of low levels of technology has comparative advantage in its import agricultural inputs, and in several of main fertilizer input. It also found that there are significant linkages between production with fertilizer use and overall farmers' incomes and growth. Hence, the issue of how to increase agricultural production through fertilizer and incomes is crucial to development of national.

The agricultural sector has been largely underfunded despite its potential to deal with both rural and urban poverty, create employment and support economic growth in

Tanzania. On average, the information available indicates that government of Tanzania spending on agriculture and natural resources has remained below 2 percent of Gross Domestic Products (GDP) (Guardian, 2012). This is far below compared to other countries in the region like Kenya with an average of 2.5 percent, Rwanda 6.6 percent, Uganda 5.5 percent of GDP between 1999 and 2012.

This is clearly inadequate especially in the light of the importance of agriculture in the economy to Tanzania (URT, 1997). Figure 1.1, 1.2 and 1.3 below show agricultural sector budget allocations for three East African countries, i.e.; Uganda, Rwanda and Kenya. The percent shown in the figure below are from 1999 to 2012.

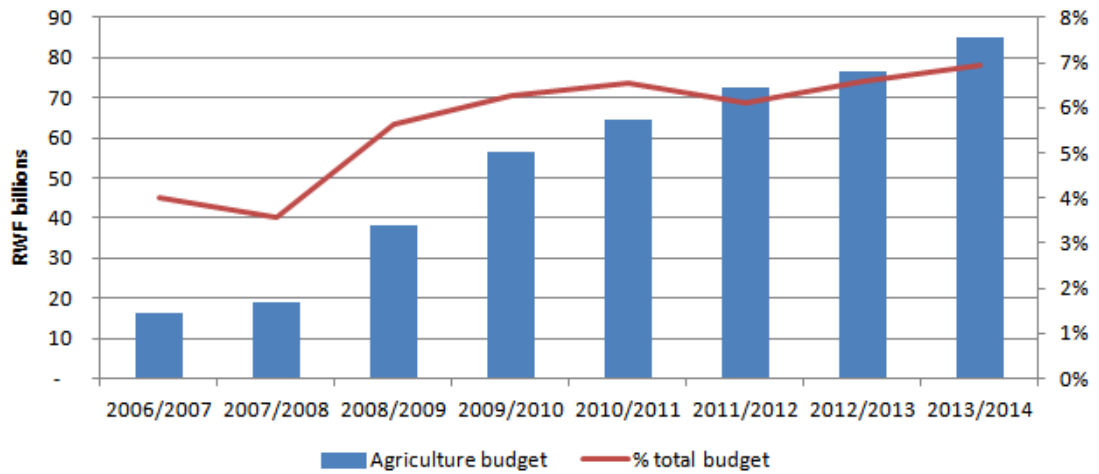
Figure 1.1: Uganda agricultural sector budget allocations from 1999 to 2012.



Source: Uganda Ministry of Finance, 1999

Figure 1.1 above indicates that the agricultural budget trend in Uganda for a period of 13 years is average of 3 percent.

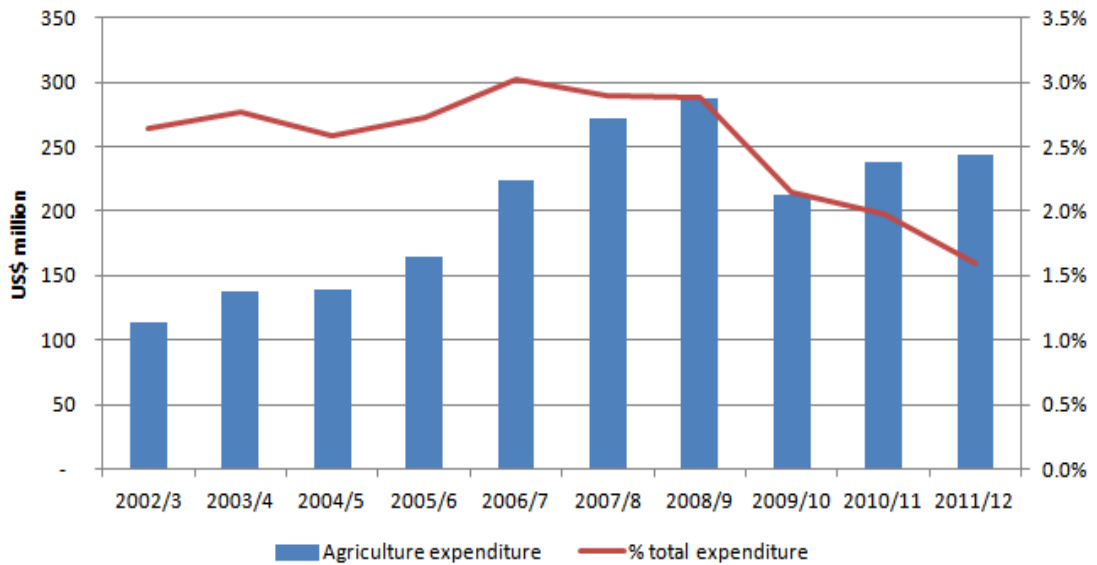
Figure 1.2: Rwanda agricultural sector budget allocations 2006-2014



Source: Rwandan National Budget Outlays, 2006

Figures 1.2 above indicate that the agricultural budget trend in Rwanda for a period of 8 years is average of 5 percent.

Figure 1.3: Kenya agricultural sector budget allocation 2002-2012.



Source: Kenyan ministry of finance 2002

Figure 1. 3 above indicate that the agricultural budget trend in Kenya for a period of 10 years 2.5 percent.

The application of fertilizers in agriculture for food production is considered to be too low in Tanzania. Today, Africa accounts for less than one percent of global fertilizer consumption. The average fertilizer rate per hectare in Africa is about 20 kg per hectare and in Tanzania is 9 kg per hectare (Putterman, 1995).

The average usage per hectare in other regions in the world is as follows: 41kg in Latin America, 85 kg in Asia and 225 kg in Western Europe (FAO, 1996; URT, 2010). Fertilizer, when used per scientific technical recommendations has potential of increasing yield and income of household (Lal, 1993).

Hawassi(1999: 76) observed that, in Tanzania, chemical fertilizer is used mostly in the growing of maize, tobacco, coffee and cotton, with more than 70 per cent of total fertilizer consumption used on maize where half of total fertilizer use in Tanzania is in five regions of Rukwa, Ruvuma, Iringa, Mbeya and Tabora. As part of the structural adjustment programme, the government started to phase out the subsidy in 1990/91 (70 per cent), reducing it to 55 per cent in 1991/92, 40 per cent in 1992/93, 25 per cent in 1993/94, and zero in 1994/95 (World Bank 1994, p.79–80). It is argued that agricultural input and output prices as well as the fertilizer subsidy were removed on advice from the World Bank and the IMF (Dorward&Chirwa, 2011).

Later on, the Tanzanian government gradually started to promote fertilizer use from year 2006 through intervention of direct subsidies that reduced prices of fertilizer and other agricultural inputs. The subsidy has been implemented and managed through the voucher system that is used in the distribution of fertilizer throughout the country. It started gradually in regions which produce maize like Rukwa, Mbeya, Ruvuma and Iringa but later to the region with tobacco like Tabora (Denning, 2009).

In 2006, President Kikwete of the United Republic of Tanzania launched a national strategy and slogan called “Kilimo Kwanza” (which means agriculture first).The programme emphasizes on increase of production in agricultural products so as to reduce poverty as stipulated in the national strategy for growth and eradication of

poverty (MKUKUTA) in its first cluster of growth and reduction of income poverty in Tanzania. It has three clusters to tackle in realization and have link with agriculture infrastructures and channels.

The National Vision 2025 has the goal of high quality live hood and increasing income to all Tanzania. In order to attain this goal, the implementation of agricultural sector though Kilimo Kwanza should go together with revitalizing the input subsidy programme started in year 2006. The agricultural sector is mainly sector in country which may reduce poverty and raise living standard of majority people. The secondary objective is to reduce famine. Famine can be reduced by improving the production of food crops where the government makes incentives to subsidize the agricultural inputs to promote production and income of small farmers though fertilizer use. The primary objective is to increase the income of the society which would also increase their purchasing power and meet daily basic needs. To meet these challenges, production of food crops will have to register an annual growth rate of at least 4 percent (URT, 1997).

The objective of food crop production is to facilitate the entrance of some of these crops into the export market on a regular basis. This objective is more important for Ruvuma, Iringa, Mbeya and Rukwa regions which are located at a great distance from the main domestic markets in Dar-es-salaam, allow the exportation of maize to reduce the distance from producer (URT, 1997).

1.2 Statements of problem

The objectives of using fertilizer are to improve the fertility of soil so that to increase production and hence increase farmer's income (Amani and Ndulu, 1987, Ellis, 1982). However, the importance of fertilizer in maize production and generating household income has been for long neglected (Aune, 1997).

Although, Tanzania has undergone recent reforms of subsidy in fertilizer distribution using voucher system; several constraints and limitations have been pointed out on how they are organized, delay in voucher of redemption, very poor are not reached, farmers

do not have an easy access to fertilizer, misuse of voucher, government bureaucracy, how effective they are; and the final impact of the voucher system to the input prices in agriculture (Skarstein, 2005).

Kilimo Kwanza as Tanzania's Green Revolution launched in August 2009 by President Kikwete aimed at transforming agriculture into a modern and commercial sector and was integrated into the government machinery to ensure its successful implementation in mobilizing and increasing resources towards the realization and enhanced financing for agriculture (LGTI, 2009).

The program has faced challenges whereby some politicians and scholars perceive it as a paper work with limited research on the implementation and low allocation of fund (Coulson, 2010), management of agriculture in Tanzania have been left to farmers thus lead to low production and income, The government just made policy in agriculture without strategies for implementation.

In spite of the reforms in fertilizer distribution, average agricultural yield still remains low in Tanzania and there is no improvement in household income especially for small farmers (Skarstein, 2005). The reforms were well published inception time and implementations have no monitoring and evolutions in programme.

The Voucher System has been in place over the last ten years, but it got new impetus in 2007/2008 following food shortage and rapid increase in food prices. The voucher system facilitates 50% subsidy on selected type of fertilizer and other agricultural inputs. The total input subsidy through the voucher systems totaled around Tshs 300 billion every year, equivalent to US\$ 200 million which can raise production and income if properly managed (URT, 2010). Hence, this study examines the impact of subsidized fertilizer on maize production and household income.

1.3 Research Objectives and Questions

1.3.1 Overall Research Objective

The main objective of the study was to find out whether the fertilizer subsidies from 2006 onwards have led to increase in the yield of maize production and household income.

1.3.2 Specific Research Objectives

The study intends to accomplish the following four specific objectives

- i. Assess the trend and pattern of maize production in the pre and post fertilizer subsidies in Sumbawanga Municipal.
- ii. To assess the difference in price between a subsidized and non-subsidized kilo of fertilizer in Sumbawanga Municipal
- iii. To test the difference in household's productivity per acre of maize between users and non-users of fertilizer.
- iv. To test the difference in household's income generated from maize between users of subsidized fertilizer, users of market price fertilizer and non-users of fertilizer.

1.4 Research Questions

The study was guided by the following four research questions

- i. What is the trend and pattern of maize production in the pre and post fertilizer subsidies in Sumbawanga Municipal?
- ii. What is the difference in price between a subsidized and non-subsidized kilo of fertilizer in Sumbawanga Municipal for a period between 2006 and 2012?
- iii. Is there a significant difference in household's productivity per acre between users and non-users of fertilizer in Sumbawanga Municipal?
- iv. Is there a significant difference in household's income generated from maize between users of subsidized fertilizer, users of market price fertilizer and non-users of fertilizer assuming the cost of fertilizer only and that price of output is fixed and market-determined?

1.5 Justification of the problem.

This study is related with Tanzania agriculture national policy and strategy of Kilimo kwanza launched on 2009 which insists on increase of production in agricultural products in order to reduce income poverty and increases quality livelihood to all through reducing income famine. The famine can be reduced by improving the production of food crops especially maize where the government makes incentives by subsidizing the agricultural inputs like fertilizer and improved seeds. This was needed to know the impact of subsidized fertilizer in the production of maize and household income.

1.6 Limitations of the study

This study though was successful, there were some limitation observed in the study like most people afraid to cooperate with researcher due to the fact that there were cases about misuse of vouchers from agents, farmers and government officers in the court. The limitation may have contributed towards limited information given by respondents. Another limitation in the study area was absence of proper data base for secondary sources. This consumed time and delay in collecting the same information from other sources such as Ministry of Agriculture.

CHAPTER TWO

LITERATURE REVIEW

2.1. Defining key concepts

2.1.1. Subsidy

Todaro (2009) defines subsidy as assistance to a business or economic sector for producers. Most subsidies are set in place by the government for producers or are distributed as subventions in an industry to prevent the decline of that industry. For example, as a result of continuous unprofitable operations; subsidies may be given on some foods to keep down the cost of living, especially in urban areas; and to encourage the expansion of farm production and achieve self-reliance in food production.

Although the term “subsidy” is widely used in economics, it is rarely defined. Often it is used as an antonym to a tax, i.e. a government transfer of money to an entity in the private sector. This seems, for instance, to be the case in the Oxford Dictionary where a subsidy is defined as a sum of money granted from public funds to help an industry or business keep the price of a commodity or service low.

Pindyck, Rubinfeld, Samuelson, Nordhaus, and Grant (2000) point out that subsidy may be regarded as an opposite of taxes. They normally take the form of payments by governments to producers and the effect of a subsidy is to reduce the costs of a product to the buyer. With a subsidy, the sellers’ price exceeds the buyers’ price, and the difference between the two is the amount of the subsidy.

2.1.2 Kilimo Kwanza

“Kilimo kwanza” which means “agriculture first in Kiswahili” is a programme adopted in 2009 as a recognition that agriculture can do much more than it has in the recent past, in the right conditions and with the right support (Corta, 1993). It did not come out of the blue. Tanzania adopted an Agricultural Sector Development Strategy in 2001 and the Agricultural Sector Investment Programme in 2005 though in both cases progress in implementation was slow. Kilimo Kwanza was adopted by the government of Tanzania

in order to implement various program in the Agricultural Sector through investment, financing, infrastructure development and establishing standard measure for sales and purchases. Control price for inputs to farmers like subsidized fertilizer and other agricultural inputs through the Voucher system. Farmers who are the beneficiaries of these subsidies were expected to increase productivity and production level and hence increase their income (Guardian 2009)

2.1.3 Productivity

Productivity is an average measure of the efficiency of production. It is a ratio of production output to what is required to produce it (inputs). The measure of productivity is defined as a total output per one unit of a total input. A production model is a numerical expression of the production process that is based on production data, i.e. measured data in the form of prices and quantities of inputs and outputs (Courbois, 1975).

Productivity is an economic measure of output per unit of input. Inputs include labor and capital, while output is typically measured in revenues and other GDP components as a clue for predicting future levels of GDP growth such as business inventories. Productivity measures may be examined collectively (across the whole economy) or viewed industry by industry to examine trends in labor growth, wage levels and technological improvement.

2.2 The history of Kilimo Kwanza and input subsidy coupons (voucher) in Tanzania

The slogan of Kilimo Kwanza in Tanzania started in August, 2009 with vision of modernizing and commercializing agriculture for peasant, small, medium and large scale producers. Increase government budgetary allocation to Kilimo Kwanza and establish the Tanzania Agricultural Development Bank (TADB). This Institutional reorganization for Kilimo Kwanza identifies priority areas and modalities for production of crops that can transform agriculture quickly with minimal financial and technological requirements, growing domestic/external market demand and employment creation

potential, increase of fertilizer production and utilization; and improve seeds (MAFC, 2009).

The “Implementation Framework” for Kilimo Kwanza is built around ten pillars:

- i. A national vision
- ii. A mobilization of financial resources – including a Rural Development Bank
- iii. Institutional reorganization - good governance, good co-ordination
- iv. “Paradigm shift” - production of the right crops
- v. Land titles, and use of land “to promote harmonious exploitation”
- vi. Better incentives, including removal of market barriers
- vii. Industrialisation – processing (forward linkages), fertilizers, seeds, machinery and tools (backward linkages)
- viii. Science, technology and human resource development – using an increased percent of government income
- ix. Infrastructure – irrigation, storage, ports, airports, roads, markets, etc
- x. Mobilization of all Tanzanians (LGTI, 2009)

Nationwide disbursement of heavily subsidized fertilizers and seeds to large numbers of beneficiaries represents a significant logistical achievement and substantially increased national maize production and productivity, contributing to increased food availability, higher real wages, wider economic growth and poverty reduction.

The core of programmes has been their use of vouchers (or coupons) to target approximately 80 per cent of farmers in the country to receive fertilizers for maize production. Maize fertilizers have been provided in a package of one voucher for a 50kg bag of DAP fertilizer and one voucher for a 50kg bag of UREA and 10 kg bags of maize seeds. Coupons are distributed to district, then local council in the area within district, in two rounds of October and February (Balter, 2012). Council has had varying roles in coupon allocations in ward. Ward committees and local stakeholders had to identify recipients to receive two coupons for redemption at much reduced cash prices, for inputs specified on the coupon. There has been considerable variation over time and between

areas in the criteria determining selection of beneficiaries, numbers of coupon recipients and numbers of coupons received per recipient (Denning, 2009)

Several constraints and limitations have been pointed out on the voucher system, regarding how they are organized and managed. For example, delay in voucher of redemption, very poor are not reached, farmers do not have an easy access to fertilizer, misuse of voucher, government bureaucracy (Dorward & Chirwa, 2011). Many cases have been reported in the country due to poor distribution of fertilizer to the farmers. In Morogoro region and Mbozi district in Mbeya region reported misuse of voucher thus farmers and distributors of fertilizer do exchange vouchers without fertilizer. Sumbawanga reports show some farmers do sell vouchers to the fertilizer distributors to gain income instead of top up money to value of voucher in order to get fertilizer (Mwananchi,2010). Report in different area in Tanzania shows that farmers do buy fertilizer at normal price from private enterprises due to insufficiencies in the distribution channels including delaying of coupons to the farmers (Denning, 2009).

2.3 Production of maize in Tanzania 2002-2011

Table 2.1 below is a profile average production of maize in regions starting with the highest production of maize to the lowest production of maize. Maize is the main food crop grown in Tanzania and most important traded food in agricultural market, with an estimated annual production at average of 3.155million MT of maize (ACT, 2007).

Maize is the staple food of the majority of Tanzanians providing 60% dietary calories to more than 37million Tanzanians. Therefore, maize shortage has been equated with food insecurity and household income in the country (ACT, 2007). The negative shake in production of maize in Tanzania has proportional linkage with famine existence in Tanzania, so maize covers meals to most majorities of people.

The Southern Highland regions of Iringa, Mbeya, Ruvuma and Rukwa are the most important producers of maize, they account for 35.9% of the national output. However,

growth has been high in the Kibaigwa Corridor representing Arusha, Dodoma, Singida, Manyara and Morogoro while the Southern Highland registered modest growth rates.

Due to logistical advantage and quality, the Kibaigwa corridor has taken the Dar es Salaam market that traditionally was supplied by maize from Southern Highland. Number of comparative disadvantages with Kibaigwa are observed in maize from Kibaigwa corridors maize are said to be tasty and have higher flour recovery ratio compared to that from Southern Highland. With shorter distance and lack of competing stocks, transport charges from Dar es Salaam are lower.

Table 2.1: Production of Maize 2002-2011 in Tanzania regions

Region	000MT	Percent
Iringa	445.50	13.5
Mbeya	326.92	9.9
Manyara	233.36	7.1
Rukwa	212.72	6.4
Shinyanga	206.36	6.2
Ruvuma	203.31	6.1
Tanga	184.12	5.6
Arusha	179.18	5.4
Mwanza	173.13	5.2
Morogoro	169.80	5.1
Kigoma	136.81	4.1
Tabora	136.66	4.1
Dodoma	133.44	4.0
Kilimanjaro	126.84	3.8
Mara	110.13	3.3
Kagera	93.54	2.8
Singida	77.34	2.3
Lindi	64.68	2.0
Mtwara	46.91	1.4
Coast	46.88	1.4
Dar-es-Salaam	2.00	0.1
Total	3,309.43	100

Source: NBS and MAFC (2012).

As table 2.1 above shows, Iringa is the leading region and Coast regions are the last in production in Tanzania. The first four regions of Iringa, Mbeya, Manyara and Rukwa are leading area for subsidized fertilizer in the country. In this regard; I examine how subsidized fertilizers have impacted the production of maize and household income in the area of Sumbawanga municipality in Rukwa region. Rukwa region is the fourth region in maize production in Tanzania (ACT, 2007).

2.4 Theoretical Framework

This chapter seeks to address the theoretical rationale on the impact of fertilizer in the production and household income. First of all, I will start describing fertilizer as an input technology in the production function.

2.4.1 The theory of production: technology in the production function

Production is what firms do. Firms turn inputs which are also called factors of production into outputs. The theory of production describes and predicts the relationship between inputs to the production process and the resulting output as described by a production function. Production functions indicate the maximum output (Q) that firm can produce for every specified combination of inputs. For simplicity, I assume that there are two inputs, that is, labour and technology and thus I can then write the production function as;

$$Q=f(\text{Labour, Technology})$$

Where Q= Output and f = function of

This equation states that the quantity of output depends on the quantities of the two inputs labour and technology (fertilizer in my case). The production function could describe the maximum crop that a farmer can obtain under a given set of weather conditions with specific amount of farm labour and fertilizer. At recommended quantities, fertilizers used in maize production do shift the production rightward (Brue, 2005). In other words, keeping other variables constant, application of a certain quantities of fertilizer per acre would shift the farmer's production possibility curve (PPC) rightward.

2.4.2 Subsidized agricultural fertilizer in Tanzania

Agriculture in Tanzania is the leading and crucial source of employment of about 80 percent of the population works in this sector and account 25 percent of GDP (World Bank, 2007). There are about 3.5 million farmers in Tanzania cultivating more than 4 million hectares of land (URT 2008).

In Tanzania agricultural inputs like fertilizers are mostly used in the production of maize than any other crops estimating 75 percent of consumption, where 25 percent are used in the cash crops like tobacco, tea and cotton (URT, 2008) The unemployment rate in Tanzania in 2006 was estimated to be about 11 percent is due low investment in agricultural facilities like fertilizer use (World Bank &URT, 2008).

Tanzania's maize is mainly produced by smallholder farmers. Around 65 percent of Tanzania's households grow maize; this is key source of their income in daily food. Agriculture depends mainly on fertilizer use for more productivity of maize. Thus, through subsidies of fertilizer, farmers can improve production and income (World Bank, 2009).

Maize is an important food and cash crop in smallholders farming systems and contributing about 95percent of the total estimated national production. The remaining 5 percent is produced by medium and large farmers in Tanzania who use fertilizer intensively due to capital they belong (LGTI, 2000).

In the first years following the 1961 independence, agricultural output expanded rapidly in Tanzania. Fertilizer delivery and production systems were well functioning and world market prices were favorable to farmers' income and so the country adapted the use of fertilizer to improve production to farmers (World Bank, 1991).

More responsibility is given to the private sector both on the production side as well as on the marketing side. Today, a multi channel marketing system exists where private traders operate alongside with governmental agencies in provision of fertilizer subsidy to

farmers. This public private partnership helps to improve the use of fertilizer in production especially maize. About a decade ago, reforms were still in progress including re-introduction of the subsidy on agricultural inputs (fertilizer); simplification of the tax structure in agriculture, further privatization and liquidation of parastatals, and the promotion of private banking (Cooksey, 2002).

Havnevik (1988) found that in the years 1993–95, the average annual maize production of 2,443,000 tones was only 19.5 per cent higher than the estimated average production in the ‘crisis years’ 1983–86, of 1,945,000 tones, while population had grown by almost 30 per cent between the two periods in Tanzania.

Currently, in Tanzania smallholders are the main producers of food crops. In 2007/08, approximately 88 per cent of the total agricultural area in Tanzania was under smallholdings, which accounted for 97.8 per cent of total maize production, 97.3 per cent of total paddy production. In order to improve the production, fertilizer has been used through subsidy programme since 2006 by smallholdings. The crop sector plays an important role in the Tanzanian economy, providing jobs, sustenance and income to over 4 million rural households growing crops (World Bank 2008).

Studies indicate that receiving subsidized fertilizer in a given year may have positive effect on household level of maize production and income (Duflo, 2007). For example, (Dorward & Chirwa 2011) found that, receipt of subsidized fertilizer over the prior three seasons in production of maize also had a significant positive effect on current years maize output and household income.

Experience from Kenya is that the Kenyan Ministry of Agriculture recommends for her people to use fertilizer for maize production because evidence from experimental farms indicates that fertilizer increases yield from 4 percent to 100 percent (KARI, 1993). Furthermore, lessons from Malawi fertilizer subsidy programmes indicate that fertilizer subsidy is the main driver of the agricultural sector in production and increases income to farmers (FSP, 2007)

2.4.6. Fertilizer consumption of maize in Africa

Analysts of fertilizer use in sub-Saharan Africa was mainly in cash crops primarily cotton, sugar, tea, and coffee receive the bulk of fertilizers. Although this was true in the mid-1970s (Kasseba, 1989), and continues to be true in some countries particularly countries in West Africa where cotton is important, and in Kenya, for sub-Saharan Africa as a whole, fertilizer consumption has shifted to cereals, particularly maize in Tanzania, Malawi and Ghana. (Kasseba, 1989)

Maize drives fertilizer consumption in much of southern Africa. In East Africa, cereals (maize) also dominate fertilizer consumption, although the pattern and increases trend is more in maize and other cereals which account for the majority of total fertilizer consumption, in most maize-producing African countries, the proportion of maize fertilizer consumption in total consumption by cereals tends to equal or exceed the proportion of maize production. Maize productions consume seventy percent of fertilizer supplied in Sub-saharan Africa with Tanzania being first.

Since the mid-1960s, 50 to 75 percent of the crop yield increases in non-African developing countries have been attributed from fertilizers use (Viyas 1983). Fertilizers also complement other major inputs and practices (e.g., improved seeds, better water control) that have had the greatest impact on yield to production and social development in income to society (Smaling 1993; Stoorvogel 1991, Smaling 2006, and Janssen 1993). Improved organic techniques of nutrient supply will undoubtedly contribute to future soil health and productivity to the crops maize of small farmers hence income improvement (Kumwenda, 2010).

Based on the experience of other developing countries, where fertilizer consumption aggregate has increased far more rapidly than in sub-Saharan Africa; such expansion rates will not be easy to achieve in an economically efficient fashion. Deliberate effort is needed like subsidization of agriculture inputs such as fertilizer and improved seed. The production per acre of maize in sub-saharan Africa had increased to 25 sacks of 100kg in maize due to use of fertilizer in production (Shepherd, 1989).

Although in Africa productivity in maize at region-wide have increased but consumption on fertilizer is slowly increased, fertilizer use on cereals crops in general, and on maize in particular, has become relatively more important. The production of Maize in planted area has remained lower than for developing countries in Asia and Latin America.

This slow improvement in use of fertilizer in Africa had brought upwards production of maize compared to the pre time where fertilizer was not traditional practice in farming productivity, the improvement of soil nutrients in Africa was proportional with higher output in production (Dorward & Chirwa 2011).

Skarnstein (2007) points out that the lowest quantities of fertilizer consumption since 1973 to 2000s have been reported to be 9kg per acre. The effect of low fertilizer use due to removal of subsidies following liberalization, resulting in low maize output hence low income to household has been reported (Hawasii, 1999 & the Word Bank, 2000).

Fertilizer subsidies are public policy interventions that are currently receiving a great deal of attention and funding in Sub-Saharan Africa (SSA). The goal of fertilizer subsidy programs as articulated by many African governments is to improve production, farmers' incomes and national food security by increasing food production. To achieve these goals, the subsidy must raise total fertilizer use.

The degree to which a subsidy program raises total fertilizer use depends on the extent to which it crowds out farmers' purchase of commercial fertilizer in production of maize (Dorward & Chirwa 2011). There is evidence that such subsidized programme confer sustained benefits to farm household recipients who support that fertilizer subsidies play an important role in reducing rural poverty and vulnerability in societies (Gilbert, 2011).

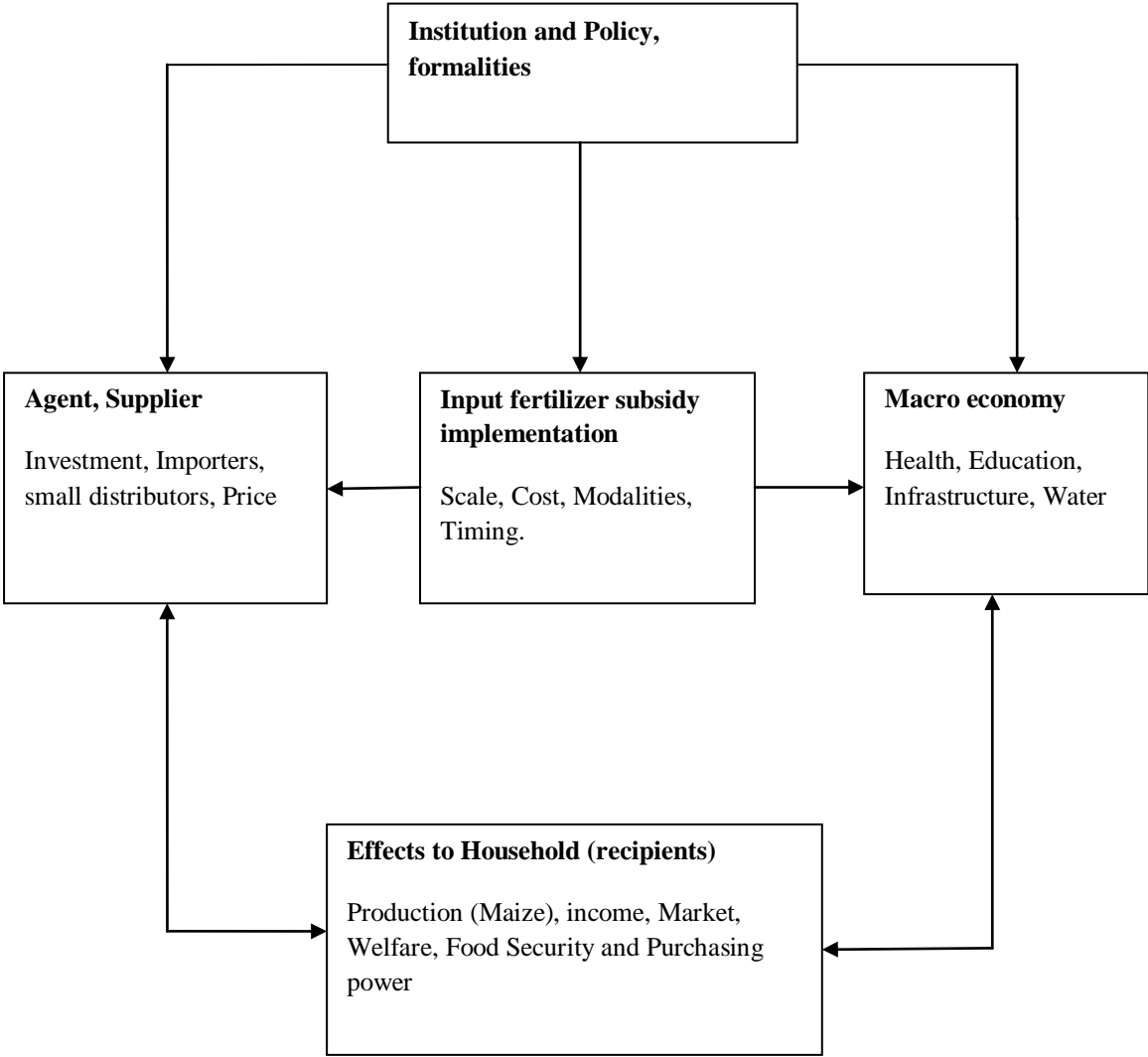
2.5 Conceptual Framework

Use of fertilizer leads to increase in production of maize, whereby high production level in maize due to fertilizer use may increase income, food security, and welfare and hence decreases vulnerability living condition to at household level. Therefore use of fertilizer

in maize production leads to highest production in maize and household income which bring confidence, investment and innovation. One way of improving small farms productivity is through application of fertilizer particularly in production of maize hence household income improves and purchasing power at household level.

Most policies of agriculture in Tanzania aim at improving the livelihood of society. So the fertilizer subsidy policies in combination of other agriculture policy can contribute to the improvement of living standard of smallholders' farmers. Thus, it is essential to analyze the farm household as a unit within the context of local economy; community and maize production and income (Ellis, 2000). In addition, the extent of integration of different types of smallholders' farmers with other agents' private sector importers, larger and small distributors, whether national or international can be impacted by policy changes. Figure 2.1 below summarizes the integration of institutional factors and economic factors and their impact on production and income.

Figure 2.1: Conceptual framework



Source: Adopted and Modified from Dorward and Chirwa (2011).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a description of the research design and methodology that was used to gather and analyze the data. Research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurements and analysis of data. Description of this research design involves the overview of study area, types of research design, types of research methods used in gathering the data, population, sample and sampling and research technique used (Kothari, 2004).

3.2 The study area

Sumbawanga municipality was chosen for the study because is one among the fertile area in Rukwa region, but yet improved in production of maize due low use fertilizers due to higher price of product which lead to the introduction of subsidize fertilizer programme to help farmers in production with lowest cost as priorities being given in budget of agricultural sector to improve the use of fertilizer in area. Maize is vital economical back borne to majority of people in Sumbawanga where they depend in their living condition and welfare of health, education, and basic needs in life. Though fertilizer improvement in use of maize production is improvement of people of Sumbawanga,

Sumbawanga Municipality lies between latitude 07⁰48' to 08⁰31' south of equator and longitude 30⁰29' to 31⁰49' east. Sumbawanga District Council borders it on all corners of the compass. Accessibility to the Municipality is by use of Sumbawanga – Tunduma road, Sumbawanga – Mpanda road and Sumbawanga – Kasesya road. Kasesya is a border Town in North – Eastern Zambia

The air link between Sumbawanga municipality and the rest of the country is at a very rudimentary stage; there is only a small airport that caters for small airplanes only. Tunduma township is located 240 km to the southeast and is along the Dar es

Salaam – Kapiri – Mposhi (TAZARA) railway line. Mpandatownship is also 240km to the west and is the terminal station of the central railway line branching southward from Kaliua, a small township in Tabora region. (Appendix V)

3.2.1 Land area

Sumbawanga Municipal Council administers land area of 1329 sq km of which the Municipal proper is 36.56 sq km. Generally, the soils are of the freely drained sandy texture in most of the areas although clay types can also be found associated with anthills. Loamy soils are also found along the valleys and streams.

3.2.2 Climate, vegetation and topography

Sumbawanga Municipal Council enjoys a dry sub-humid climate for the most part of the year. The average temperature is 27⁰C, a dry cool temperature starts from May-October and the coolest season is June – July with a temperature falling to 16⁰C and even 5⁰C. Rains start in November and end in April. On average Sumbawanga Municipality gets moderate rainfall between 900mm – 1000mm per year. The rains are usually accompanied with frequent lightings.

The vegetation has been highly modified by man's activities especially heading, cultivation and harvesting of forest products. Hence the vegetation at present consists mostly of grasslands and bushes with woodlands occurring on slopping areas and hilltops. Sumbawanga Municipal Council is located at an average altitude of 1700 m above sea level; however, the highest altitude of 2461 m above sea level is attained at Malonje, 25 km southeast of Sumbawanga Municipality.

3.2.3. Administration,

Sumbawanga Municipal Council is divided into 2 divisions of Itwelele and Lwiche. The Municipal has 15 wards of which 7 are external wards with 25 villages and 8 internal wards with 120 Streets in one constituency, Sumbawanga urban. According to the 2002 Population and Housing Census, Sumbawanga Municipality has a population of 209,793 appendix VI (NBS, 2013).

The study was conducted in Sumbawnga Municipality in three external wards known as sub rural ward of Pito, Milanzi and Kasense wards. The area is endowment with good soil in plantation of crops like maize which is flat area with reliable rainfall in all season with no weather problem for twenty years with exception of year 2011 record 750mm of rainfall.

3.3 Research design

The survey research design was carried out. The survey allows collecting a large amount of data from a sizeable population for generalization effectiveness (Adam & Kamuzora, 2008). Data was obtained by using questionnaire, observation and interviews with approaches of qualitative and quantitative methods.

3.3.1 Population

In this study, the target wards were Pito, Milanzi and Kansese with all 15 villages found in wards. The wards selected have both type of farmers who used subsidized fertilizer, market price fertilizer and those do not use fertilizer.

3.3.2. Sample Size

A total of 160 respondents were chosen for the study where 150 respondents were selected randomly in three wards with sample of 15 in each village. In addition, I conducted interviews with 2 agricultural input dealers in each ward who supply inputs to farmers and made consultation with maize business man in agriculture. Moreover, I conducted interviews with one agricultural extension officer from each ward and one municipal agriculture officer as table 3.1 here indicates.

Table 3.1: The list of villages selected in wards in the municipality

Source of data	Village	Number of respondents
Pito ward	1. Malagano	15
	2. Pito	15
	3. Katumba	15
	4. Tamasenga	15
Milanzi ward	1. Milanzi	15
	2. Mlanda	15
	3. Nambogo	15
Kasense ward	1. Kasense	15
	2. Chipu	15
	3. Mtimbwa	15
Agricultural input dealers	Pito	2
	Milanzi	2
	Kasense	2
Extension officers	Pito	1
	Milanzi	1
	Kasense	1
Municipal agricultural officer	Sumbawanga Municipal	1

Source: Field Survey, 2012

3.3.3 Sampling techniques

Simple random sampling was used to ensure that samples are drawn from each stratum. In each village, every member had a chance to be selected especially to get sample of 150 respondents. Purposely, the research chose respondents who seemed to be key informants. These included one municipality agriculture officer, one extension officers from selected wards, and two agricultural input dealers from each ward

3.4 Type of data used in the study

The study used two main data sources namely primary and secondary data sources.

3.4.1 Primary data

The main two instruments for collection of primary data in this research included interview and the questionnaire. The interview questions comprised of open questions so as to give the farmers the room to give detailed explanations or reaction. Refer to an appendix III for the copy of interview question. In the questionnaire, both closed and

open questions were used. The closed question was very helpful in collecting data for quantitative analysis while the open questions gave room for description/explanation in Kiswahili and English through face to face interviews.

3.4.2 Secondary data

Secondary data was obtained from extensive review of the existing documents, reports and earlier research work done in the area of study and data from ministry of agriculture on the distribution of voucher system. This data was collected for two independent periods; first, from 2003 to 2006, the period without voucher system and from 2007 to 2012 with voucher system through social economic survey reports.

3.5 Data analysis

All quantitative data obtained from questionnaire analyzed by using Statistical Package for Social Science (SPSS) as program. Descriptive statistics such as percentage and means were used in the analysis to support empirical evidence. Test for differences between group means was performed using Independent sample t-tests. Computations of farmers' revenues for year 2012 were done in relation to price per bag of maize and amount of quantities produced per care.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 Introduction

The chapter reports the study findings after analyzing the data obtained from the field. The presentation starts with background information and characteristics of the respondents' particularly farmers who are beneficiaries of the subsidized fertilizer with the control groups of users of market fertilizer and non-users of fertilizer. Then, the chapter continues with presentation of findings for each of the four research questions given in chapter one.

4.2 Descriptive information about survey respondents

Total numbers of 150 respondents were interviewed from which 50 were beneficiaries of subsidized fertilizer, 50 respondents who used market price fertilizers and then 50 respondents who did not use fertilizer at all.

4.2.1. Age and Sex of respondents

The sample consisted of 89(59.3%) male and 61(40.7%) female as shown in Table 4.1 below. Large proportions of the respondents were within the age group of 36-45 years accounting for 86%. These are most active groups in production with decision-making at household level in societies. The other respondents belonged to the age group of 16-35 and 55-77 years with 28.7% and 14% respectively

Table 4.1: Age and sex of respondents

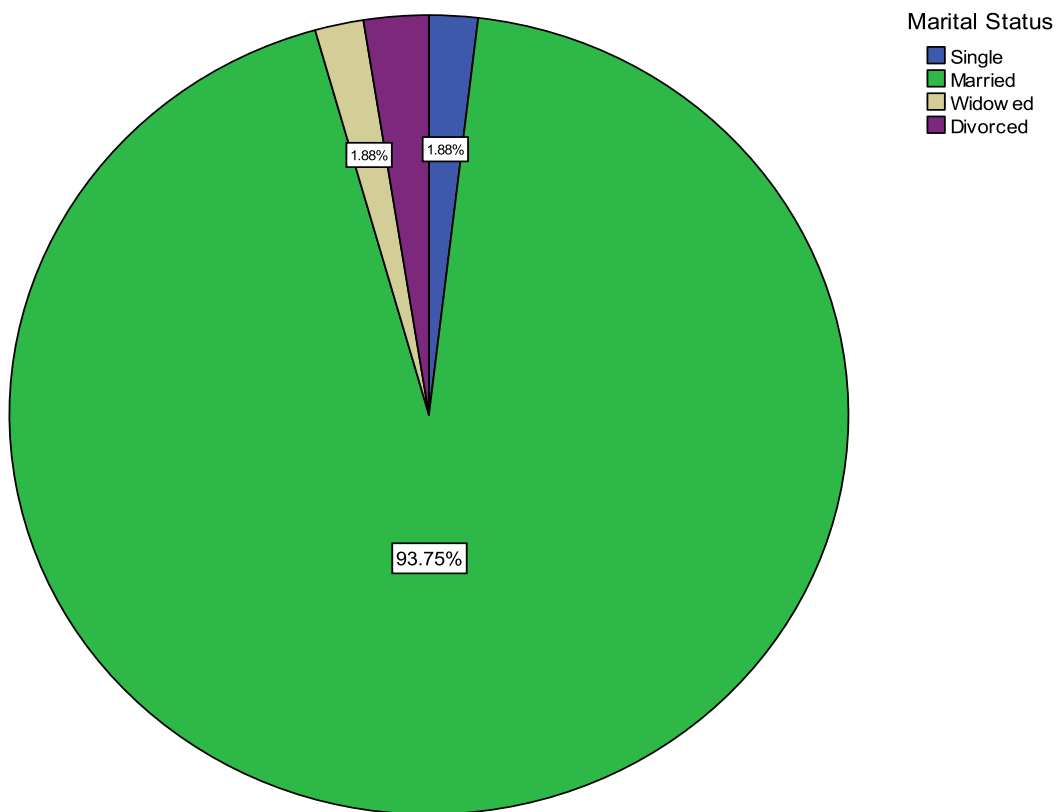
Characteristics		Frequency	Percent
Sex	Male	89	59.3
	Female	61	40.7
Age	18-35	43	28.7
	36-54	86	57.3
	55-77	21	14

Source: Survey data (2012)

4.2.2 Marital status of respondents

Marriage is a common phenomenon and important part of life. This is indicated by the fact that 93.75% of all respondents in the sample were married. Figure 4.1 below summarizes respondents by their marital status. In addition, 1.6% of all respondents were not married; 3.8% widowed and 0.85% divorced. The respondents requested for the subsidized fertilizer so as to have more production in maize and increases income in support their struggles to improve the living situation and to provide the best for their families. With the fact that many respondents have married than few respondents in the study area.

Figure 4.1: The marital status of respondents in the field



Source: Survey data (2012)

4.2.3. Educational status of respondents

The table 4.2 below shows that a large proportion of respondents (86.7%) had primary level of education. Few secondary education 4%, college education 3.3%, adult education 2.7% and 3.3% had no formal education. Many primary schools in villages had poor performance in education and thus many pupils could not pass for the secondary education which brought them to early marriages.

Table 4.2: The education level of respondents

Level of Education	None	5	3.3
	Adult Education	4	2.7
	Primary	130	86.7
	Secondary	6	4
	College+	5	3.3

Source: Survey data (2012)

Majority of farmers can read, write and be trained in adoption of simple technologies for farming with use of agricultural inputs like fertilizers. Shenduli (1998) pointed out that knowing how to read and write is sufficient for adoption of technologies whose dissemination require simple leaflets, pamphlets, posters, newspapers or other simple written materials.

Table 4.2 implies that majority of the population do not go beyond primary education. Education level attained by the population can lead to positive or negative effects upon maize production URT (2005), findings reveal that universal primary education is commonly in village in Tanzania.

4.2.4 Household composition of respondents

It should be noted that while family size may determine the level production, findings indicated that agricultural subsidized inputs were given to the household regardless of family size.

Table 4.3: Household family size

Family size	Frequency	Percent
1-4	4	2.5
5-7	80	53.1
8-10	42	29.4
>10	24	15.0

Source: Survey data (2012)

As indicated in Table 4.3 above, 53.1% of respondents had a family size of between 5 and 7 members. 29.4% of respondents had family size of between 8 and 10 members; while 15% of respondents in the sample had family size of more than 10 members.

4.2.5 Household land size of respondents

Land size is the crucial factor in the production process which need to be fertilized in order to increases the production as study advocated.

Table 4.4: Land size of respondents

Numbers of acres	Frequency	Percent
1-3	110	68.8
4-6	36	22.5
>7	14	8.8

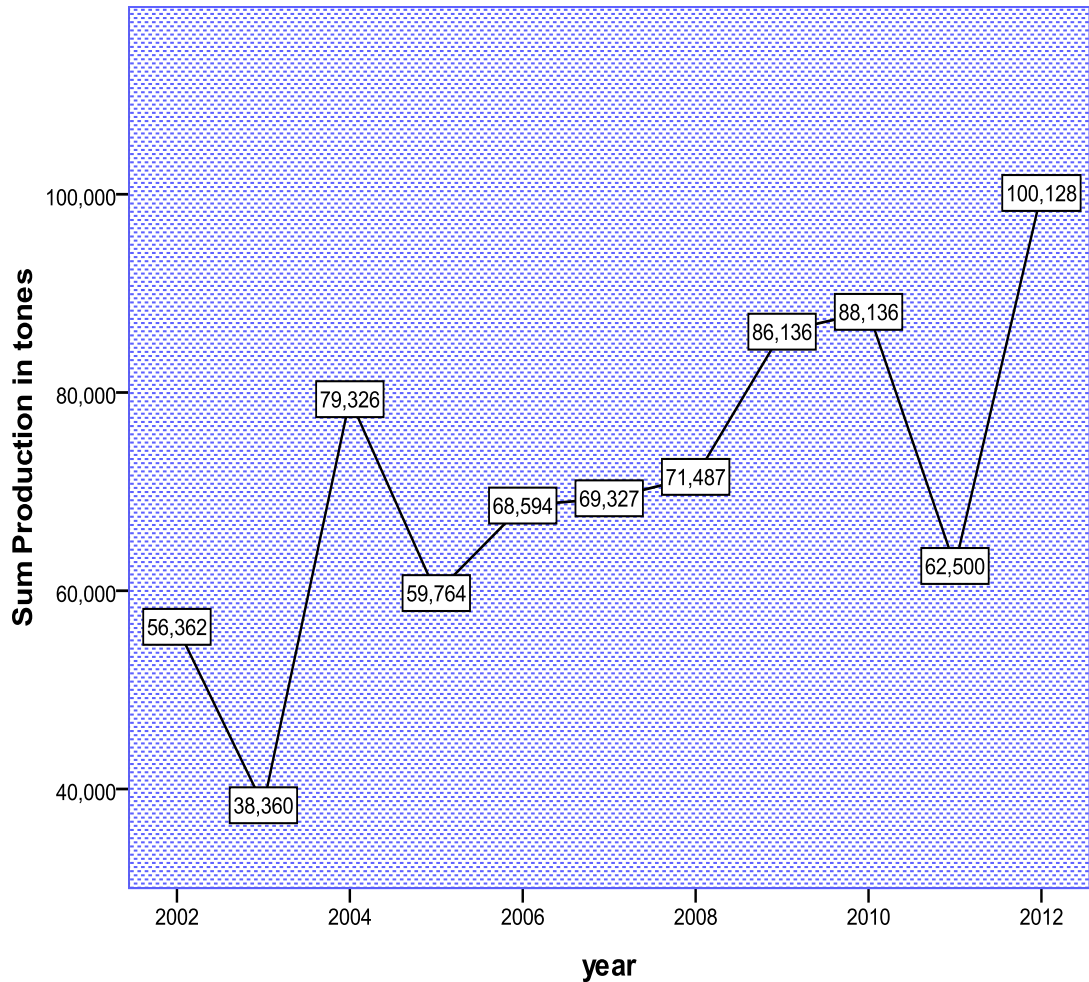
Source: Survey data (2012)

Distribution of land size cultivated by the respondents shows that 68.8 %(110) had the land size of 1-3 acres; 22.5 %(36) had the land size of 4-6 acres and 8.8 %(14) had more than seven acres as indicated in table 4.4.

4.3 The trend of maize production in the pre and post fertilizer subsidies 2002-2012

Figure 6 below shows trend and pattern of maize production in Sumbawanga municipal before and after agricultural subsidies between year 2002 and 2012. In the past ten years, maize production in Sumbawanga has varied considerably, ranging from a high of 100,128 produced tons in 2012 to a low of 56,362 tons in 2002.

Figure 4.2: The trend and patterns of maize production in year 2002 to 2012



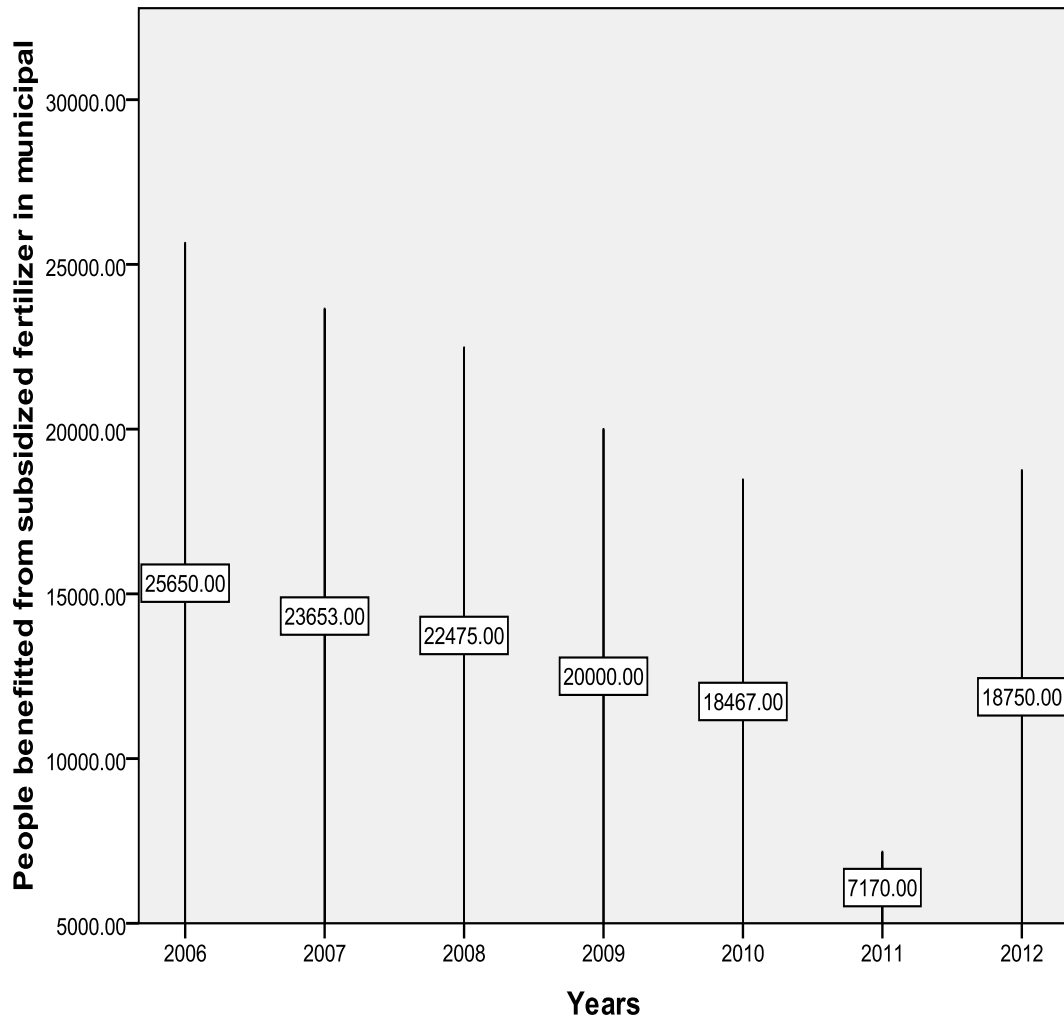
Source: Sumbawanga Municipality Agricultural Department (2012)

With a consideration to the time lag before the program could take off well; there is an increasing trend in maize production since the introduction of the program in 2006 with an exception of year 2011 which recorded a sharp decline. This of course poses a challenge regarding causal attribution. The study went on searching for the reasons of the sharp decline in productivity for this specific year. Findings revealed that the very year was characterized by two distinctive features. First, there was a severe bad weather due to limited rainfall. Normally, Rukwa region records an annual average rainfall of 900-1000mm. unfortunately; the year 2011 recorded an annual rainfall of 750 mm. But, secondly, due problems and challenges in the distribution of agricultural inputs through

the voucher system in the previous five years (i.e.; 2006, 2007, 2008, 2009, and 2010); the government thought of reforms in the distribution modality in 2011. In doing so, there was a delay in the distribution process in order to crosscheck the anticipated cheating between the supplying agents and some farmers. This can be evidenced by a sharp decline in the beneficiaries of subsidized fertilizer in 2011 as will be indicated shortly in figure 4.3.

Despite the ambiguity brought about by the sharp decline in productivity in 2011; still data suggests clearly that the post fertilizer subsidy period has an annual average of 77,758 tons compared to 58,453 tons in the pre-fertilizer subsidy period. This may suggest that the fertilizer-subsidy programme established in 2006 has increased the production of maize in the study area. The production trend went proportionally with number of people benefited in voucher system from 2006 to 2012 as shown in figure 4.3. On the other hand, data from Sumbawanga agricultural department indicates that a total of 136,165 farmers have already been recorded as beneficiaries of subsidized fertilizer through the voucher system since 2006.

Figure 4.3: Beneficiaries of subsidized fertilizer in Sumbawanga Municipal 2006-2012



Source: Sumbawanga municipal Agricultural Department (2012)

As displayed in figure 4.3 above, in the municipal there are variations in the distribution of voucher (coups) from year 2006 to the 2012. The year 2006 recorded a total number of 25,650 beneficiaries followed by 23,653 in year 2007, 22,475 in year 2008, 20,000 in year 2009, 18,467 in year 2010, 7,170 in year 2011 and 18,750 in year 2012. Generally, the data indicates an average of 19,452 beneficiaries of voucher in Sumbawanga Municipal.

In year 2006, the people benefitted were 25650 and it was highest numbers of people in the program due to the fact that it was a starting with promotion period. The following year 2007, was characterized by reduced beneficiaries to 23653 people mainly due to the budget constraints. These constraints went on to the next years of agricultural seasons.

Year 2011, recorded a rapid decline with 7170 beneficiaries below the annual average of 19,452. The experience shows that vouchers were few due to the amendment and changes of agents of fertilizer in the countries due to the anticipated corruption practices in previous years. This may be an additional evidence for the sharp decline in maize production reported before in figure 6. In the year 2012, there was an increase to number of people receiving vouchers to 17,650 people compared to the last year of amendment in 2011.

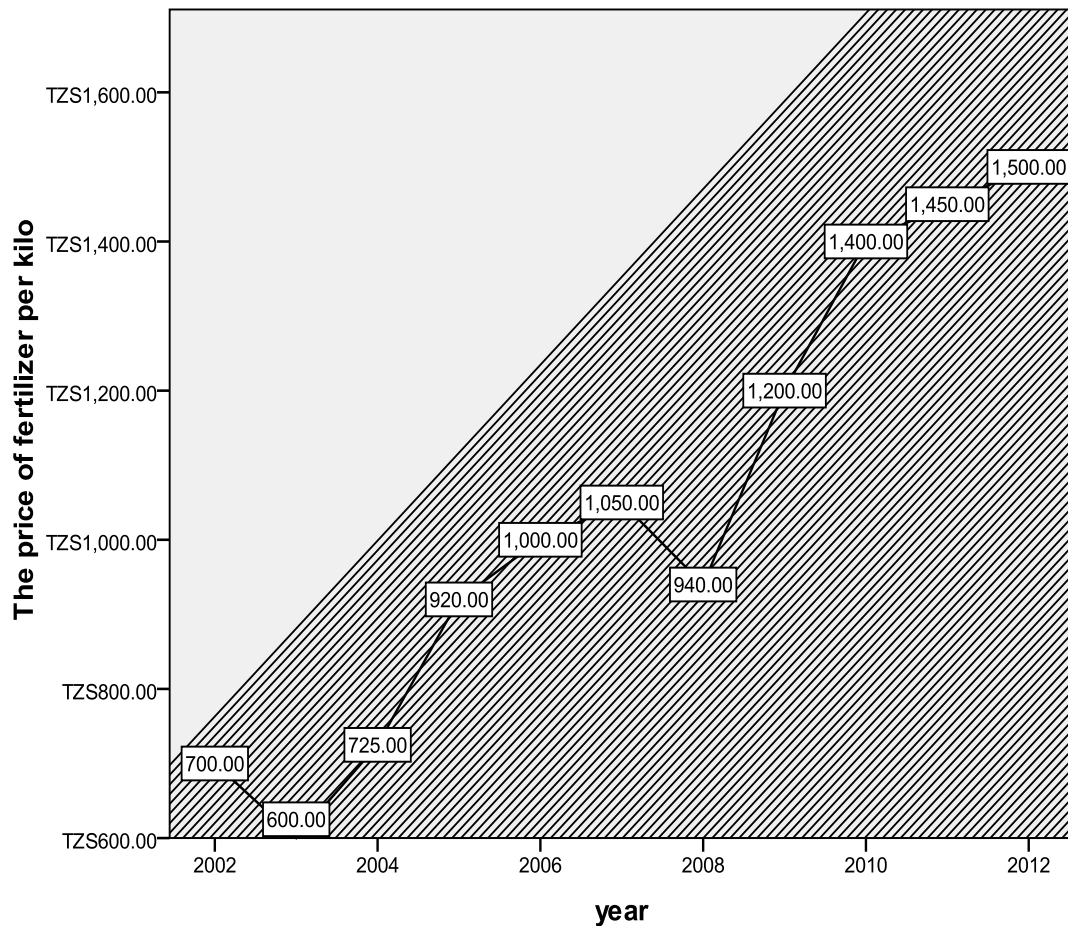
The distribution of vouchers in production of maize is distributed country wide as said by Prime Minister when addressing a general meeting of agricultural committee in Dodoma that

The use of fertilizer and other farm inputs declined, along with agricultural production. But today, Tanzania approaches agricultural development on its own terms. To improve the agricultural sector, Tanzania launched a voucher programme in 2005-06, enabling smallholder farmers to obtain improved seed and fertilizers with highest production. [Prime Minister's speech at Dodoma, 5th May, 2012]

4.4 Difference in price of a kilo between subsidized and non-subsidized fertilizer 2006-2012

Findings revealed that there is no stability of price of a kilo of fertilizer to both subsidized and non-subsidized fertilizer owing to the fluctuation of Tanzania shillings towards dollars in the world market as figure 4.4.

Figure 4.4: The price of one kilo of fertilizer for years 2002 to 2012

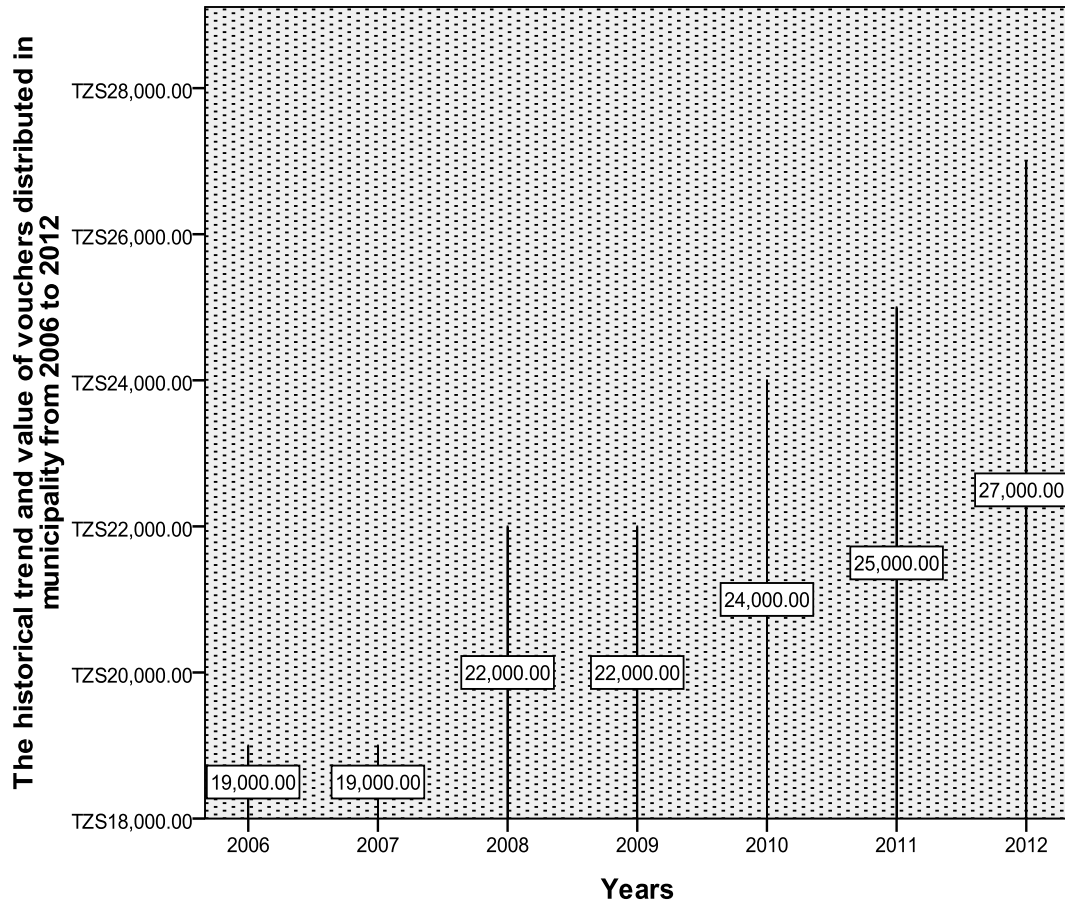


Source: District Agricultural Department (2012)

Generally, in Tanzania the average market price of kilo of fertilizer was 1500TZS for a period between 2002 and 2012. In 2002 year the price kilo of fertilizer was 750TZS, in year 2003 was 600TZS per kilo, in year 2004 was 725TZS, in 2005 was 920TZS, in year 2006 was 1000TZS, in year 2007 was 1050TZS, in year 2008 was 940TZS, and in year 2009 was 1200TZS. In year 2010 was 1400, in year 2011 was 1450 and year 2012 was 1500.

Such upward trend in price discourages most farmers and eventually leaves those with high purchasing power to obtain fertilizer at market price as noted by one of respondents

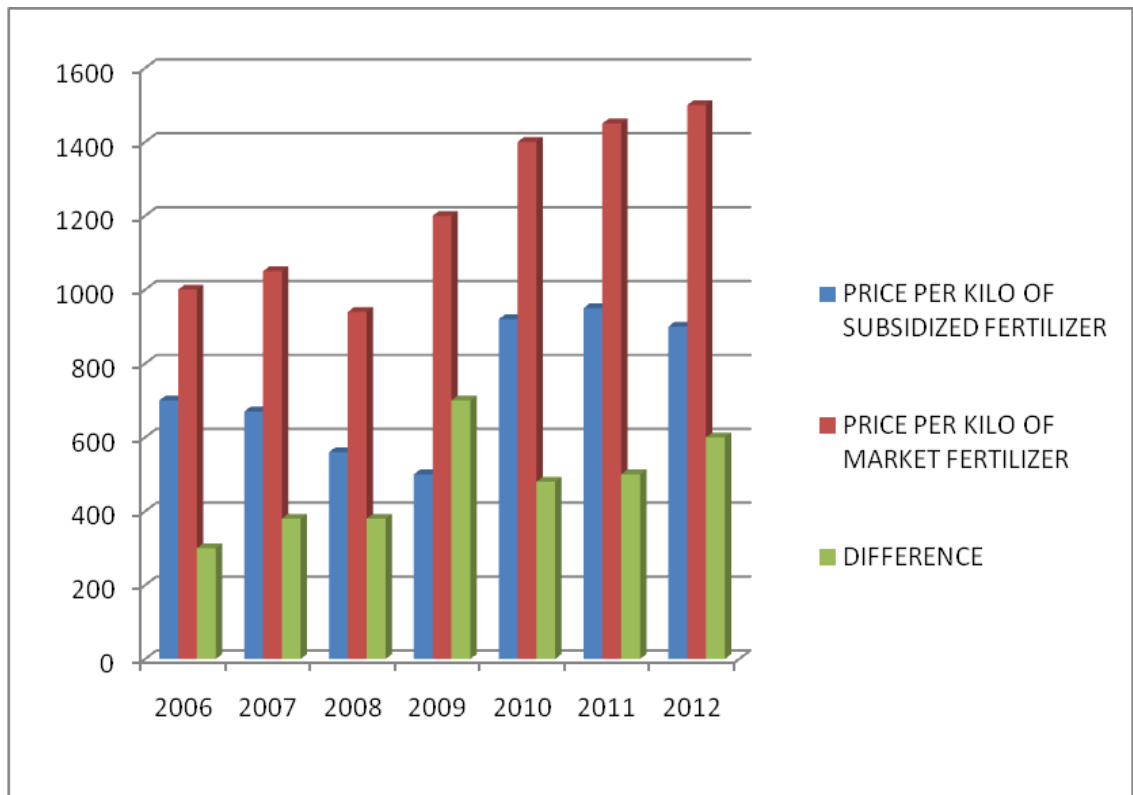
Figure 4.5: The trend and history of value of vouchers.



Source: District Agricultural Department (2012)

Figure 4.5 shows that in year 2006 the value of voucher was 19,000 TZS per 200 kilo of fertilizer of Dap and Can fertilizer and year 2007 was 29000 TZS. In year 2008 was 22,000 TZS while in year 2009 was 22000. In year 2010, the value of vouchers was 24,000TZS, in year 2011 the value was 25,000 TZS and in year 2012 was 27,000 TZS. Generally, the value of vouchers went together with the distribution of five bags of maize seeds which had 10 kg which is standard and applicable for one acre in Sumbawanga Municipality.

Figure 4.6: The price difference in kilo between the subsidized and market fertilizer



Source: District Agricultural Department (2012)

The subsidy programme has helped much to lower the price of fertilizer in the study area as figure 4.6 shows. In year 2006, the price of a subsidized kilo of fertilizer was seven hundred shilling while that of a market price per kilo was one thousand; a difference of three hundred shillings.

In year 2007, it was 670 TZS per kilo of subsidized fertilizer while market fertilizer was 1050 TZS with a difference of 380 TZS. In year 2008, it was 560 TZS per kilo of subsidized fertilizer while 940 TZS per kilo of market price fertilizer with difference of 380 TZS. In year 2009, the difference was 700 TZS where by the kilo of subsidized fertilizer was 500TZS and market fertilizer was 1200. In year 2010, the price of subsidized fertilizer per kilo was 920 TZS compared to the 1400TZS market fertilizer with the difference of 480 TZS. In the year 2011, the subsidized fertilizer was sold at

950 TZS per kilo compared to the 1450 TZS of market fertilizer with a difference of 500TZS; and lastly in year 2012, the price of market fertilizer was 1500TZS per kilo while a subsidized fertilizer was 900 TZS with difference of 600TZS.

Generally the findings indicate that the price per kilo of fertilizer between the subsidized fertilizer and market fertilizer had average of five hundred shilling. So for one acre which traditionally consumes 100kg of fertilizer in the study area; there will be an average of 50000TZS difference in cost between subsidized and market fertilizer.

4.5 The difference in household’s productivity per acre of maize between users and Non-users of fertilizer

The findings indicate that users of fertilizer had an average of 15 bags of maize while non-users of fertilizer had an average of 6 bags per acre. These findings suggest that users of fertilizers produced more bags of maize per acre than non-users of fertilizer by a difference of ten bags per acre.

Table 4.5: The difference in productivity of maize between users and non-users of Fertilizer.

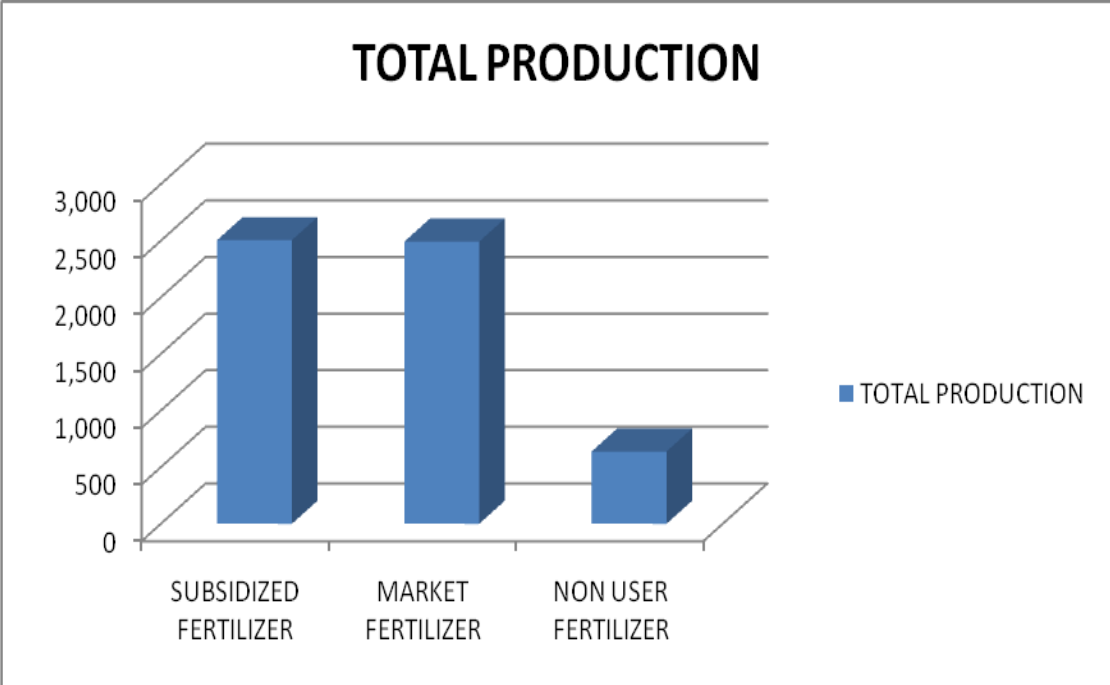
Group of farmers	Mean	N	t-statistic	df	Sig
Users of fertilizer	15.13	100	12.708	148	.000
Non-users of fertilizer	6.16	50			
Total		150			

Source: Survey data (2012)

A t-test for difference in means of productivity between users and non-users of fertilizer was performed. As indicated in Table 4.5 above, the results of this test revealed that there is a significant difference in productivity between the two groups of farmers. Specifically, the results indicated that the difference in mean score productivity was significant at 99% confidence level ($p < 0.01$). This implies that other things being equal, users of fertilizers are likely to produce more bags of maize per acre than non-users.

Traditionally, the study found that the users of fertilizer do apply 100kg on average per acre which gives the average production of 15 sacks of maize. More importantly, empirical data indicates that both users of subsidized and non-subsidized fertilizers produce more bags of maize than non-users. Figure 11 summarizes the productivity of maize between users of subsidized fertilizer, market price fertilizer and non-users.

Figure 4.7: Production of maize from respondents

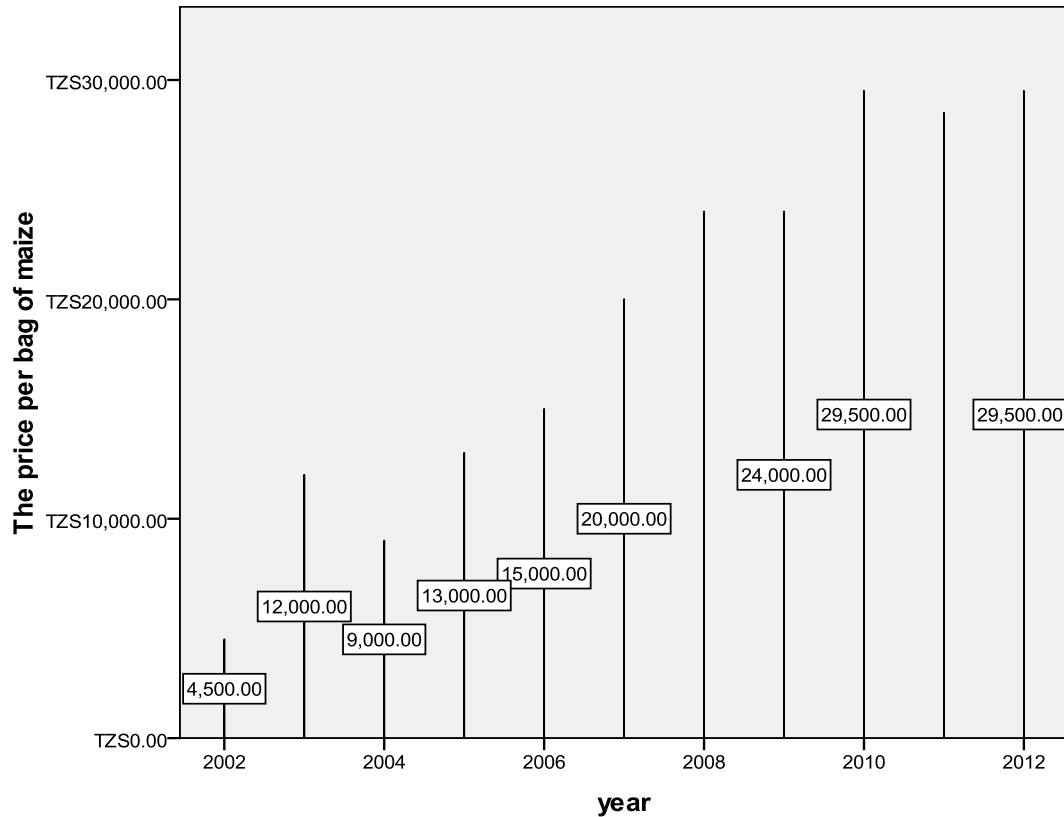


Source: Survey data (2012)

Figure 4.7 shows total production of 2505 sacks of maize from 50 famers who used subsidized fertilizer; 2492 sacks from users of market price fertilizer and 638 sacks from non-users of fertilizer. These findings were expected because the application of fertilizers in farming will yield more productivity regardless of whether the fertilizer was supplied on the basis of subsidized price or market price.

The annual average price per sack of maize of 100kg for years 2002 to 2012 was 17000TZS as indicated in figure 12 below.

Figure 4.8: The Price per sack of maize 2002-2012



Source: Sumbawang municipality Agricultural Department (2012)

The prices of maize per sack in Sumbawanga municipality have been varying from year to year. Figure 4.8 shows the price of maize per sack of 100kg in different years from 2002 to 2012. In year 2002, the price of a sack of maize was 5,400 TZS, in year 2003 the price was 10, 000 TZS, in year 2004 the price was 9000 TZS, in year 2005 the price of maize per sack was 12,000 TZS, in year 2006 the price was 15000 TZS, in year 2007 the price was 18000 TZS per sack, in year 2008 it was 23000 TZS, in year 2009 it was 24000 TZS and the price 29500 TZS has remained the same for three consecutively years of 2010, 2011 and 2012.

4.6: The difference in household’s income generated from maize between users of subsidized fertilizer, users of market price fertilizer and non-users of fertilizer.

The computation was based on a single year, i.e.; 2012. The aim of this computational process was to compare the possible variations in incomes between the three groups of farmers. More specifically, I intended to examine the significance of a government subsidy relative to an indirect tax. The income of each group was computed from the following formula

$$Y = \text{price} * \text{quantity}$$

Where,

Y = income for year 2012 per acre

Price = price for year 2012 per 100 kg bag of maize

Quantity = production in bags for year 2012 per acre

Table 4.6: Approximated income of respondent per acre in 2012

Type of farmers	Price of maize in bag in 2012(P)	Average production per acre 2012(Q)	Revenue PxQ
Non-users	29500	6	177000
Users of market	29500	15	442500
Users of subsidy	29500	15	442500

Source: Survey data (2012)

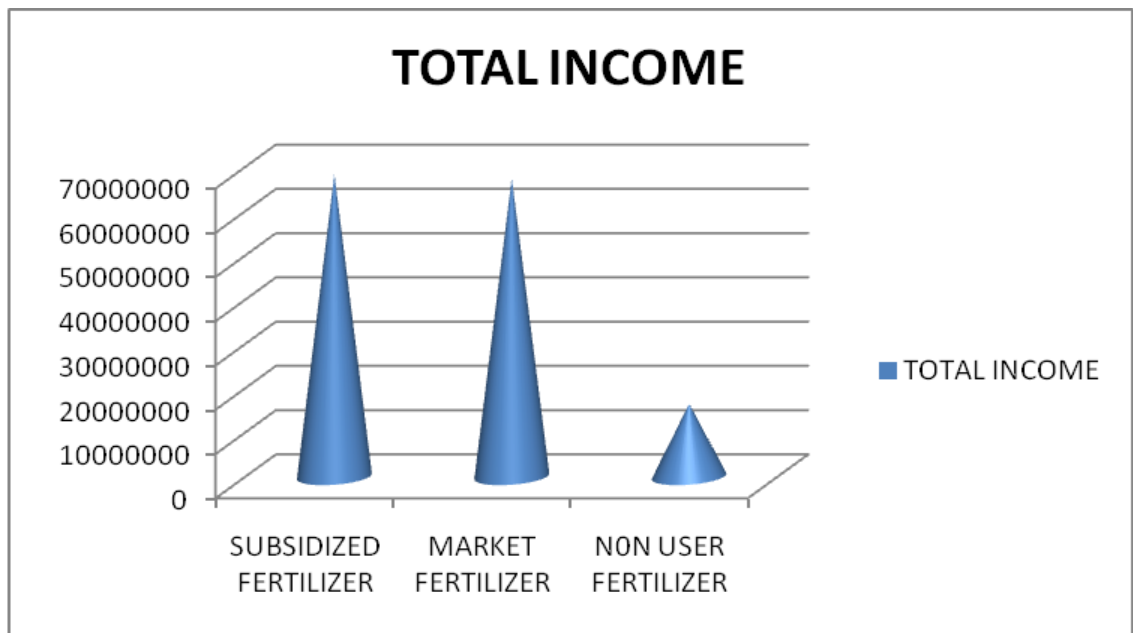
The net income will be different due to difference in cost of fertilizer. Despite that users of market price and users of subsidized fertilizer have equal gross income as table 8 demonstrates but their net income will necessarily differ due to difference in the cost of production.

As noted before in figure 4.6; for year 2012 the price of kilo of fertilizer was 1500TZS at market price higher than price of subsidized fertilizer of 900TZS. Consequently, assuming an average of 100kg of fertilizer per acre which is a normal application in the study area; one may deduce that for each acre of maize for year 2012, the farmers who used subsidized fertilizer earned 60000 TZS (i.e.; 600/= pr. kilo x100kg) above users of

market price fertilizer. More importantly, users of subsidized fertilizer get a package of 10 kg of seeds with a market value of 37500 TZS. So, for every acre of maize, the users of subsidized fertilizer possessed additional income of 97500 TZS above the farmers who used market price inputs for the year 2012.

These computations are based on the fact that market price fertilizer consist of an indirect tax which is a cost to a farmer, while is subsidy is a benefit and incentive to the farmers of subsidized fertilizer. The income of three groups is summarized in figure 12 below

Figure 4.9: Total gross income earned by respondents



Source: Survey data (2012)

From figure 4.9 above, total gross income for all groups was 151,976,000 TZS. This was obtained after calculating the price of one sack of maize and number of sacks produced. Comparatively, 68,277,000 TZS was from the subsidized fertilizer group, 67,321,000 TZS from the market fertilizer group and 16,378,000 TZS from the non-users of fertilizer. There is still difference in the gross income of 956,000 TZS between the subsidized and market fertilizer users. But the difference can be large to these groups when cost of production is considered.

Furthermore, I went on analyzing the statistical significance difference in net income per acre between users and non-users of fertilizer assuming only the cost of fertilizer.

First of all, the gross incomes per acre of the three groups for year 2012 were computed. Then assuming the cost of fertilizer only, the net income for the 3 groups was also computed as indicated in Table 9 below

Table: 4.7: Farmers’ net income assuming cost of fertilizers only

Groups	Bags per acre 2012	Price per bag 2012	Gross income^a 2012	Cost of fertilizer in 100kg 2012	Net income^b 2012
Users of subsidized fertilizer	15	29500	442500	90000	352500
Users of market-priced fertilizer	15	29500	442500	150000	292500
Non- users of fertilizer	6	29500	177000	0	177000

Source: Survey data (2012)

a Gross Income = Price (P) * Quantity (Q)

b Net Income = Gross Income – Cost of fertilizer

I went on analyzing the statistical significance difference in incomes between users of subsidized fertilizer, market fertilizer and non-users of fertilizer. This analysis was essentially important in order to answer research question four. Since the interest was to test if there is significant differences in incomes among the three groups; the appropriate analytical statistical technique chosen was Analysis Of Variance (ANOVA). The results of this analysis are shown in Table 10 below.

Table: 4.8: Difference in net incomes among the three groups of farmers

Groups	Sum of squares	Df	Mean square	F	Sig
Between the groups	100.013	2	50.007	7501.00	.000
Within the groups	.980	.147	.007		
Total	100.993	149	.82329		

Source: Survey data (2012)

As indicated in Table 4.8 above, the between group variations is larger than within group variations implying that the difference exists. The results indicate that the value of F-statistic of 7501 was significant. These results suggest that there is a significance differences in net incomes earned from maize production between users subsidized fertilizer, market price fertilizer and non-users of fertilizer. Specifically, the differences in net income between the three groups were statistically significant at 99% confidence level ($p < 0.01$).

Despite the increases in income in the users of fertilizer, findings from study area indicated that there are many challenges in price of fertilizer which barriers to production. The price as main indicator to income has been reported is source of cost in production.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter is a reflection and discussion of findings presented in chapter four. The discussion is organised according to the research objectives and questions highlighted in chapter one.

5.2. Trend of maize production

The trend and pattern of maize production in study area, findings indicated that a post subsidy period was characterized by increasing trend of maize production compared to pre-programme period. This suggests that the government's intervention of agricultural input subsidy programme has increased productivity in the study area. This finding supports evidence from previous studies in Sub-Saharan countries such as Malawi and Kenya that use of fertilizer in maize production would increase productivity, increase income, reduce food poverty and food security (Hawassi,1999;Skarstein 2005; Dorward, 2011)

5.3 Price of fertilizer

In the case of prices of fertilizer in Tanzania, findings suggested that there has been increasing trend in prices of fertilizer for a period between 2002 and 2012. In this particular period, the average market price per kilo of CAN and DAP fertilizers was 1500 TZS. On the other hand, in a period of 7 years of subsidy programme; the average price of a subsidized kilo of CAN and DAP fertilizers was 1000 TZS.

The quick reflection from these findings is that the government should continue in allocating more budgets for subsidy programmes in order to give relief to rural farmers who can not afford to purchase fertilizer from the market. Such subsidy programmes may be part of a general objective of efforts in the fight against poverty in Tanzania

5.4 Productivity of users and non-users of fertilizer

In regard to productivity between users and non-users of fertilizer, findings suggested that users of fertilizers produced more bags of maize per acre compared to non-users. Specifically, users of fertilizer in Sumbawanga Municipality produced approximately 1000kg of maize per acre above non-users. The reflection of these findings is that application of fertilizer is important and proved for increasing productivity. Therefore, subsidy programmes are very effective and hence the government should consider more allocation of resources in order to reach many poor rural farmers. More importantly, the government can rely more on mechanisms such as fiscal policies, infrastructural development and effective distribution channels in order to ensure that agricultural inputs reach farmers on time.

5.5 Household income

Furthermore, findings revealed that farmers who used subsidized agricultural inputs earned more income than non-users of fertilizer and users of market priced fertilizer. Comparatively, although logically users of subsidized fertilizers and users of market priced fertilizers earn the same amount of gross income; but they differ in the cost of production associated with input prices. For example, other things being equal, using year 2012 as a case, and assuming average application of 100kg of fertilizer per acre which is a standard application in the study area; findings revealed that users of subsidized fertilizers earned 60,000 TZS per acre above users of market priced fertilizers.

A quick reflection from these findings is that a subsidy is an incentive and gives a direct benefit in terms farmers' income and a cost for farmers who use market priced inputs. From a rational producer point of view, all farmers would like to use subsidized fertilizers. However, due to limited budget allocated to subsidy programmes and delay in distribution channels; most farmers become obliged to rely on market supply or end up not using all. Therefore, if they rely on market priced fertilizer, they have to bear the extra cost of production which is the difference in price of inputs between market price and subsidized price.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Summary and Conclusions of findings

The study was guided by the following four research questions

- i. What is the trend and pattern of maize production in the pre and post fertilizer subsidies in Sumbawanga Municipal?
- ii. What is the difference in price between a subsidized and non-subsidized kilo of fertilizer in Sumbawanga Municipal for a period between 2006 and 2012?
- iii. Is there a significant difference in household's productivity per acre between users and non-users of fertilizer in Sumbawanga Municipal?
- iv. Is there a significant difference in household's income generated from maize between users of subsidized fertilizer, users of market price fertilizer and non-users of fertilizer assuming the cost of fertilizer only and that price of output is fixed and market-determined?

First, a period after subsidy programme exhibited higher production of maize than a period before the programme. The year 2012 revealed that production under the subsidy programme has improved.

Second, in the case of prices of fertilizer, findings revealed that there has been an increasing trend in price of fertilizer. More specifically, the trend shows an average of 1500 TZS for market fertilizer and average of 1000TZS for subsidized fertilizer that gives an average difference of 500 TZS

Third, there were difference in production between the users of fertilizer and non-users of fertilizer for the year 2012; but there was no any difference between user of subsidized fertilizer and market price fertilizer. The main reason was that fertilizers were of the same quality and ingredients but the difference was only on the purchasing price.

Fourth, the income for three groups was significant difference in year 2012; this different was much observed in cost of fertilizer, especially in two groups of user of subsidized fertilizer and market fertilizer where subsidy is profit and privilege to beneficiaries farmers and cost to market fertilizer but non users of fertilizer had no cost of buying fertilizer with low production lead to low income group in production.

A general observation from the study area is that subsidy programme is important and should be promoted in order to stimulate development in Tanzania. In this regard, such intervention programmes are necessary in the implementation of national strategies for poverty reduction. The study showed that such programme can promote productivity, increase household income, reduce food poverty and promote economic growth and human development in general.

6.2 Policy implications

Based on the findings of the present study, the following policy implications are given

- i. The government must increase the budget of subsidized fertilizer to farmers because it help the farmers to increases the production and income hence reduce various kind of poverty such as income poverty and food security in the society. The budget constraints in the agricultural sector can be enhanced through reducing public expenditure on non-productive luxurious goods such as vehicles for bureaucrats and instead such budget should be allocated to agricultural sector where big impacts and results can be found.
- ii. The government may consider changing the programme from subsidy to credit programme and allow farmers to pay after harvest. This may help the programme to reach many farmers without limitation on the amount of inputs. This can also help to minimize the misuse of vouchers and corruption between government officials and agents.
- iii. The government can improve accessibility of fertilizer to most farmers by providing import permits to private companies; improve rural infrastructure and

monitoring effectively the distribution channels. This can help to increase the amount of fertilizer in the market, reduce price, increase number of beneficiaries and promote accessibility in time.

6.3 Areas for Further Research

Based on findings in this study and methods applied, I recommend that future researchers undertake critical correlation studies to examine the impact of subsidy programme on productivity and other development indicators such as incomes and food security. Such studies need to consider more causal and interpretive approaches in order to predict future economic outcomes, deeper understanding and advice for policy change.

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APPENDICES

APPENDIX II: QUESTIONNAIRE FOR THE BENEFICIARIES AND NON BENEFICIARIES OF SUBSIDIZED FERTILIZER

Dear sir/Madam

I am a student of Master of Science in development policy (Msc. DP) at Mzumbe University pursuing a dissertation to determine the impact of subsidized fertilizer on maize production and household income in Tanzania a case of Sumbawanga municipality, Rukwa. The research is for academic purpose only and all information provided remains confidential and any inconvenience is highly regretted.

To this end I kindly request that you complete my questionnaire, although your response is of the utmost importance to me.

Yours sincerely,

QUESTIONNAIRE

Respondent Number.....

Section A- Background information

Please answer the following questions by ticking (√) the relevant block or writing down your answer in the space

1. Ward/Village

2. Sex; 1. Female, 2. Male

3. Age:

Years	Code	
18-25	1	
26-32	2	
33-40	3	
41 and above	4	

4. Marital Status:

Single	1	
Married	2	
Widowed	3	
Divorced/Separated	4	

5. Level of Education

None	1	
Adult Education	2	
Primary	3	
Secondary	4	
College +	5	

6. What is your occupation?

7. How many are you in family?.....

7. (a) How much income did you get from the sale of maize in year 2012?

(b) What is the main source of income in your family?

Maize production	1	
Other crop than maize production	2	
Livestock production	3	
Wages	4	
Business	5	
Both 1 and 2	6	
Both 1, 2 and 3	7	
Both 1 and 3	8	

8. If yes in Qn 7 (b) with code 1 above in maize production. Which agricultural inputs do you use agricultural?

Subsidized fertilizer	1	
Manure fertilizer	2	
Market fertilizer	3	
None	4	

9. Does your household have enough food throughout the year?

Yes	1	
NO	2	

10. Did you buy fertilizer?.....

11. (a) for how long have you been using fertilizer or manure?.....

(b) How long have not using fertilizer or manure?.....

12. (a) Are you aware about subsidized fertilizer?

(b) Where did you get information about subsidized fertilizer?

(c) Why did you not use subsidized fertilizer?

I did not get	1	
I was not given	2	
No voucher distributed	3	
Was complicated	4	

13. (b) for how long have you been using subsidized fertilizer?.....

14. If you don't get subsidized fertilizer what inputs do you use?

Market fertilizer	1	
Manual fertilizer	2	
None	3	

15. How many acres did you cultivate in 2012?

16. Did you apply fertilizer to all, 1. Yes..... 2. No.....

17. (a) Did you apply subsidized fertilizer to all acres?.....

(b) How many acres did you not use subsidized fertilizer?

18. How much fertilizer did you use per acre in 2012?.....

19. How much did you pay per subsidized 50 kg of fertilizer?

20. How much did you pay per 50 kg of fertilizer?.....,

21. for how long have you been using market fertilizer or without fertilizer?.....

22. How many bags (sack) did you produce per acre in 2012?

23. What was the price of a bag of maize (100kg) in 2012?

Or how much did you sell per 100kg in 2012?

24. What constraints did you face for subsidized fertilizer?

1)

2)

3)

Thank you for your cooperation

APPENDIX II: INTERVIEW FOR ADMINISTRATIVE OFFICERS

Dear sir/Madam

I am a student of Master of Science in development policy (Msc. DP) at Mzumbe University pursuing a dissertation to determine the impact of subsidized fertilizer on maize production and household income in Tanzania a case of Sumbawanga municipality, Rukwa. The research is for academic purpose only and all information provided remains confidential and any inconvenience is highly regretted.

To this end I kindly request that you complete my questionnaire, although your response is of the utmost importance to me.

Yours sincerely,

Pascal Sanga

Student

Section A- Background information

Please answer the following questions by ticking (√) the relevant block or writing down your answer in the space

1. Ward/Village

2. Sex; 1. Female, 2. Male

3. Age:

Years	Code	
18-25	1	
26-32	2	
33-40	3	
41 and above	4	

4. Marital Status:

Single	1	
Married	2	
Widowed	3	
Divorced/Separated	4	

5. Level of Education

None	1	
Adult Education	2	
Primary	3	
Secondary	4	
College +	5	

6. What is your occupation?

7. How many are you in family?.....

7. (a) How much income did you get from the sale of maize in year 2012?

(b) What is the main source of income in your family?

Maize production	1	
Other crop than maize production	2	
Livestock production	3	
Wages	4	
Business	5	
Both 1 and 2	6	
Both 1, 2 and 3	7	
Both 1 and 3	8	

8. If yes in Qn 7 (b) with code 1 above in maize production. Which agricultural inputs do you use agricultural?

Subsidized fertilizer	1	
Manure fertilizer	2	
Market fertilizer	3	
None	4	

9. For how long (years) have you worked with farmers?.....

10. How many vouchers have been so far disbursed for the entire district to farmers since 2007?

11. Did you distribute of vouchers/coup on time?

12. What is the historical trend of maize production in your district? (5 years before subsidies and 5 years after)

13. What is the historical trend of prices of maize per back for the last 10 years

14. What challenges do you face in the implementation of the Voucher system for subsidized fertilizer?

- (1)
- (2)
- (3)
- (4)
- (5)

15. What measures have you taken to deal with the challenges you have mentioned?

- (1)
- (2)
- (3)
- (4)
- (5)

16. What measures do you suggest for the improvement of the program?

- (1)
- (2)
- (3)
- (4)
- (5)

Thank you for your cooperation

APPENDIX III: INTERVIEW GUIDE FOR MAIZE BUSINESS

Dear sir/Madam

I am a student of Master of Science in development policy (Msc. DP) at Mzumbe University pursuing a dissertation to determine the impact of subsidized fertilizer on maize production and household income in Tanzania a case of Sumbawanga municipality, Rukwa. The research is for academic purpose only and all information provided remains confidential and any inconvenience is highly regretted.

To this end I kindly request that you complete my questionnaire, although your response is of the utmost importance to me.

Yours sincerely,

Pascal Sanga

Student

Section A- Background information

Please answer the following questions by ticking (√) the relevant block or writing down your answer in the space

1. Ward/Village

2. Sex; 1. Female, 2. Male

3. Age:

Years	Code	
18-25	1	
26-32	2	
33-40	3	
41 and above	4	

4. Marital Status:

Single	1	
Married	2	
Widowed	3	
Divorced/Separated	4	

5. Level of Education

None	1	
Adult Education	2	
Primary	3	
Secondary	4	
College +	5	

6. What is your occupation?

7. How many are you in family?.....

7. (a) How much income did you get from the sale of maize in year 2012?

(b) What is the main source of income in your family?

Maize production	1	
Other crop than maize production	2	
Livestock production	3	
Wages	4	
Business	5	
Both 1 and 2	6	
Both 1, 2 and 3	7	
Both 1 and 3	8	

8. If yes in Qn 7 (b) with code 1 above in maize production. Which agricultural inputs do you use agricultural?

Subsidized fertilizer	1	
Manure fertilizer	2	
Market fertilizer	3	
None	4	

9. How many years have you been in agricultural business?.....

10. What price of kilo of maize do you buy from farmers 2012?

11. How much maize in tons did you bought in the last 10 or 5 years

12. What was the price per bag of maize for the last 10 years

13. What challenges of price do you face in the business of maize from farmers?

1.
2.
3.
4.
5.

APPENDIX IV: INTERVIEW GUIDE FOR AGENTS OF FERTILIZER

Dear sir/Madam

I am a student of Master of Science in development policy (Msc. DP) at Mzumbe University pursuing a dissertation to determine the impact of subsidized fertilizer on maize production and household income in Tanzania a case of Sumbawanga municipality, Rukwa. The research is for academic purpose only and all information provided remains confidential and any inconvenience is highly regretted.

To this end I kindly request that you complete my questionnaire, although your response is of the utmost importance to me.

Yours sincerely,

Pascal Sanga

Student

Section A- Background information

Please answer the following questions by ticking (✓) the relevant block or writing down your answer in the space

1. Ward/Village

2. Sex; 1. Female, 2. Male

3. Age:

Years	Code	
18-25	1	
26-32	2	
33-40	3	
41 and above	4	

4. Marital Status:

Single	1	
Married	2	
Widowed	3	
Divorced/Separated	4	

5. Level of Education

None	1	
Adult Education	2	
Primary	3	
Secondary	4	
College +	5	

6. What is your occupation?

7. How many are you in family?.....

7. (a) How much income did you get from the sale of maize in year 2012?

(b) What is the main source of income in your family?

Maize production	1	
Other crop than maize production	2	
Livestock production	3	
Wages	4	
Business	5	
Both 1 and 2	6	
Both 1, 2 and 3	7	
Both 1 and 3	8	

8. If yes in Qn 7 (b) with code 1 above in maize production. Which agricultural inputs do you use agricultural?

Subsidized fertilizer	1	
Manure fertilizer	2	
Market fertilizer	3	
None	4	

9. How many years have you been in agricultural business?.....

10. What was the price of fertilizer for the last 5 years

11. What was the price of fertilizer per kilo in 2012?.....

12. What is the current market price of fertilizer?.....

13. What challenges do they face in the distribution using voucher system

- 1).....
- 2).....
- 3).....
- 4).....

Thank you for your cooperation

APPENDIX VI
RUKWA REGION, SUMBAWANGA MUNICIPAL DISTRICT/COUNCIL
POPULATION

<i>SN</i>	<i>WARD/ SHEHIA</i>	<i>TOTAL</i>	<i>MALE</i>	<i>FEMALE</i>	<i>HOUSEHOLD SIZE</i>
0	Total	209,793	100,734	109,059	4.8
1	Malangali	6,743	3,270	3,473	4.6
2	Mazwi	6,197	2,907	3,290	4.1
3	Izia	19,463	9,064	10,399	4.5
4	Katandala	12,685	5,937	6,748	4.2
5	Old Sumbawanga	23,298	11,128	12,170	4.7
6	Kizwite	16,187	7,662	8,525	4.7
7	Ntendo	13,324	6,525	6,799	5.3
8	Senga	6,793	3,430	3,363	5.4
9	Mollo	15,707	7,640	8,067	5.2
10	Pito	15,561	7,495	8,066	5.2
11	Milanzi	13,482	6,588	6,894	5.2
12	Matanga	9,521	4,701	4,820	5.3
13	Kasense	11,201	5,411	5,790	5.1
14	Majengo	15,447	7,394	8,053	4.7
15	Chanji	24,184	11,582	12,602	4.7