SUGARCANE GROWING AND HOUSEHOLD FOOD SECURITY: A CASE STUDYOF MAFUBIRA SUB- COUNTY; JINJA DISTRICT.

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN GEOGRAPHY OF KYAMBOGO UNIVERSITY

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DECLARATION

I **Waibi Mohamedi** do declare that the findings presented in this research dissertation are original and have never been submitted to any other institution for award of an academic degree or any other award.

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Date……

APPROVAL

We certify that this research work **Sugarcane growing and household food security**: A **case study of Mafubira Sub county Jinja District** has been compiled under our supervision and that it is now ready for examination.

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DEDICATION

I dedicate this work to my parents**, Mr. Lugirago Abu Baker** and **Mrs. Namusisi Lugirago**, for all the sacrifices that you have made for me to get to this point in my life, even when it meant that you had to go out of your way and be uncomfortable for your children to succeed. May the good Lord keep you and guide you in all your endeavors.

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LIST OF ABBREVIATIONS AND ACRONYMS

CVI Content Validity Index

EC Electoral Commission

FAO Food and Agriculture Organization

GDP Gross Domestic Product

KCB Kiira College Butiki

KESREF Kenya Sugar Research Foundation

LC1 Local Council One

MOFPED Ministry Of Finance, Planning and Economic Development

NEMA National Environmental Management Authority

NMS National Medical Stores

SSA Sub Saharan Africa

UBOS Uganda Bureau of Statistics

UNICEF United Nations International Children Education Fund

USA United States of America

USCTA Uganda Sugarcane Technologists Association

USDA United States Department of Agriculture

WFP World Food Program

ABSTRACT

The major purpose of this study was to establish the relationship between sugarcane growing and household food security in Mafubira Sub-county, Jinja District. The study was guided by three objectives namely: to establish the effect of land allocation to sugarcane growing on household food security, to find out the expenditure of income from sugarcane growing with regard to household food security and to examine the challenges associated with sugarcane growing in relation to household food security. The study adopted a descriptive research design. The target population was heads of sugarcane growing households and Village Chairpersons of sugarcane out growers association. The study relied mostly on primary data that was collected using questionnaires, interview guide, focus group discussion guide and observation guide. The study generated both qualitative and quantitative data. The quantitative data was analysed by tabulating and computing percentages while qualitative data was analysed by coding and establishing common themes that emerged in the process of interacting with participants. The findings show that sugarcane farmers owning land less than ten acres are more vulnerable to food insecurity. The findings also show that sugarcane growing plays an important role in the livelihood of farmers as it generates income used to purchase food, acquire more land, pay school fees for children, access to better health care, construction of decent homesteads and access to agricultural loans. The study further established that sugarcane growing contributes to environmental degradation through encroachment on marginal land and increased soil exhaustion due to monoculture. From the findings the study concluded that sugarcane growing had a negative effect on household food security among people in Mafubira Sub-county. This is because much of the land had been taken up by sugarcane growing leaving small plots for food crops. Based on the findings of this study, it is recommended that there is need to pass an ordinance to encourage people owning land less than five acres to practice mixed farming, crop diversification and using modern scientific methods of farming.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Achieving household food security is a significant yet an escalating challenge all over the world. The global food security status has been worrying for years and it remains a puzzle and an embarrassment to many developing countries. It is estimated that nearly one billion people around the world are experiencing alarming rate of food crisis and majority of these live in Sub Saharan Africa, Uganda inclusive (FAO, 2017).

Uganda produces more food than it consumes but poverty still limits people's access to nutritious food especially in the north and eastern part of the country (FAO, 2017). Other causes of malnutrition are fast-growing population expected to reach one hundred million by 2050 without corresponding to increase in food production (UBOS, 2016). Also the presence of the world's third largest refugee population from South Sudan, Burundi and Democratic Republic of Congo pose further challenges to food security (USDA, 2016). The number of households who are unable to meet their dietary needs is persistently rising. Substantial efforts to combat hunger and malnutrition to achieve Sustainable Development Goal two have been frustrated (UNICEF, 2017).

By independence, Uganda could easily feed its population as it produced enough cereals and root tubers. However, frequent dry spells as a result of climate change, spread of pests, lack of extension services and increase in growing industrial crops has had this trend change with cases of increased vulnerability to food insecurity (WFP, 2017). In Uganda 19.7% of the population live below the poverty line and 39% are chronically undernourished. It's also estimated that 10.9 million people in Uganda are experiencing acute food shortage of which 1.6 million are in a crisis situation with famine on a much wider scale (UBOS, 2016). Eradicating malnutrition and achieving global food security is an ambitious goal for Uganda but with the current rate of progress, improvements in crop yields are getting smaller each year posing a looming state to food insecurity (FAO, 2017).

Uganda Bureau of Statistics, (2016) reports that in Jinja district the situation of food insecurity is continuously worsening and is likely to go on for decades if no serious interventions are done. More land is allocated to sugarcane growing at the expense of food crop production. This has increased the problem of food insecurity and malnutrition. In Mafubira sub county labour substitution has reduced food production. People spend most of their time working in sugarcane plantations, weeding, and harvesting, transporting sugarcane to factories and following payments from sugar factory at the expense of food crop cultivation resulting into consistent food insecurity.

FAO, (2017) indicates that 87% of households in sugarcane growing areas of Eastern Uganda do not have adequate and nutritious food to meet their dietary needs. Mafubira Sub County has 39.4% of population having chronic food insecurity. This Percentage is higher than that at national level. Global Hunger index ranks Uganda at the position of 103 worldwide with 32% of the population in a massive food crisis. Despite many intentions emphasizing food production, food insecurity remains a persistent problem as a result the number of hungry and malnourished people is increasing drastically in Mafubira sub-county (Kyalya, 2013). This is why this study was carried out to establish the implications of sugarcane growing on household food security in Mafubira sub-county, Jinja district.

1.2 Statement of the problem

Sugarcane growing has increasingly gained importance in Uganda. In Mafubira Sub County, every household is struggling to engage in sugarcane growing to satisfy the growing demand for sugar in the region. The assumption is that sugarcane growing would improve household income hence food security. Unfortunately, the income got from sugarcane growing is not translating to household food security. Households continue to experience episodes of food insecurity despite large plantations of sugarcane. Where as one would expect positive relationship between income got from sugarcane growing and food security, this is not the case with Mafubira sub County.

Sugarcane is perennial and a monoculture crop in nature which cannot be planted with other food crops. This reduces on the size of arable land for food production hence deepening food security crisis. The long gestation period of sugarcane compromises community livelihoods in terms of income and food security. The food security prospects of Mafubira sub County are expected to worsen as sugarcane growers take longer to be paid and yet they have to meet their livelihood expenditures including food security. The study therefore focused on establishing the relationship between sugarcane growing and household food security in Mafubira Sub County, Jinja district.

1.3 Objectives of the study

1.3.1 The general objective

The overall objective of this study was to establish the implications of sugarcane growing on household food security in Mafubira sub county, Jinja district.

1.3.2 Specific objectives of the study were:

i. To establish the effect of land allocation to sugarcane growing on household food security in Mafubira sub county, Jinja district.
ii. To find out the expenditure of income from sugarcane growing with regard to household food security in Mafubira sub county, Jinja district.
iii. To examine the challenges associated with sugarcane growing in relation to household food security in Mafubira sub county, Jinja district.

1.4 Research questions

The study was guided by the following key questions

i. What is the effect of land allocation to sugarcane growing on household food security?
ii. How much income from sugarcane growing is spent on food?
iii. What are the challenges associated to sugarcane growing in relation to household food security?

1.5 Scope of the study

1.5.1 Geographical scope

The study was conducted in Mafubira sub County, Jinja district. This was because it is one of the leading sugarcane growing Sub County in Jinja district and Busoga region as a whole. It is a rural sub county where sugarcane growing takes place despite the continued food insecurity as was reported by UBOS, (2016).

1.5.2 Time scope

The study was limited to the period 2010-2018. This was the period within which Mafubira sub county, experienced massive food shortages reflected in terms of limited food supplies, increased food prices, declining household level food stocks despite a significant increase in sugarcane production (kyalya, 2013)

1.5.3 Content Scope

The subject matter of the study was basically hinged on the study topic of "Sugarcane growing and household food security in Mafubira sub County". The study was specifically to focus on effect of land allocation to sugarcane growing on household food security, find out the expenditure of income from sugarcane growing with regard to household food security and to examine the challenges associated with sugarcane growing in relation to household food security.

1.6 Significance of the study

The study is may be very important in establishing the problems of household food security in sugarcane growing areas. It is in line with the Uganda National Development Plan two, Uganda's vision 2040 and the Sustainable Development Goal two of ending hunger and all forms of malnutrition by 2030.

The study findings may help policy makers especially those in ministry of agriculture animal industry and fisheries on how to make appropriate policies with regard to sugarcane growing and household food security.

To the citizens the study findings may be important to them in adjusting sugarcane growing in a manner that will help them have adequate food in their home stead.

To the future researchers, they may use the study findings as a source of reference in their studies hence suggests gaps in their proposed studies.

1.7 Conceptual framework

A conceptual framework refers to a network of inter linkages of themes in a phenomena under study (Amin, 2005). Figure 1.1 shows the conceptual framework derived from literature review for sugarcane growing and household food security. It shows that the independent variable is sugarcane measured in terms of the land allocated for sugarcane growing, expenditure of income from sugarcane growing and challenges associated with sugarcane growing. The intervening factors between sugarcane growing and food security are soil, time taken to grow sugarcane and availability of labour. While the dependent variable is food security measured in terms of food availability, food access, food utilization and food stability.

A conceptual framework showing sugarcane growing on household food security

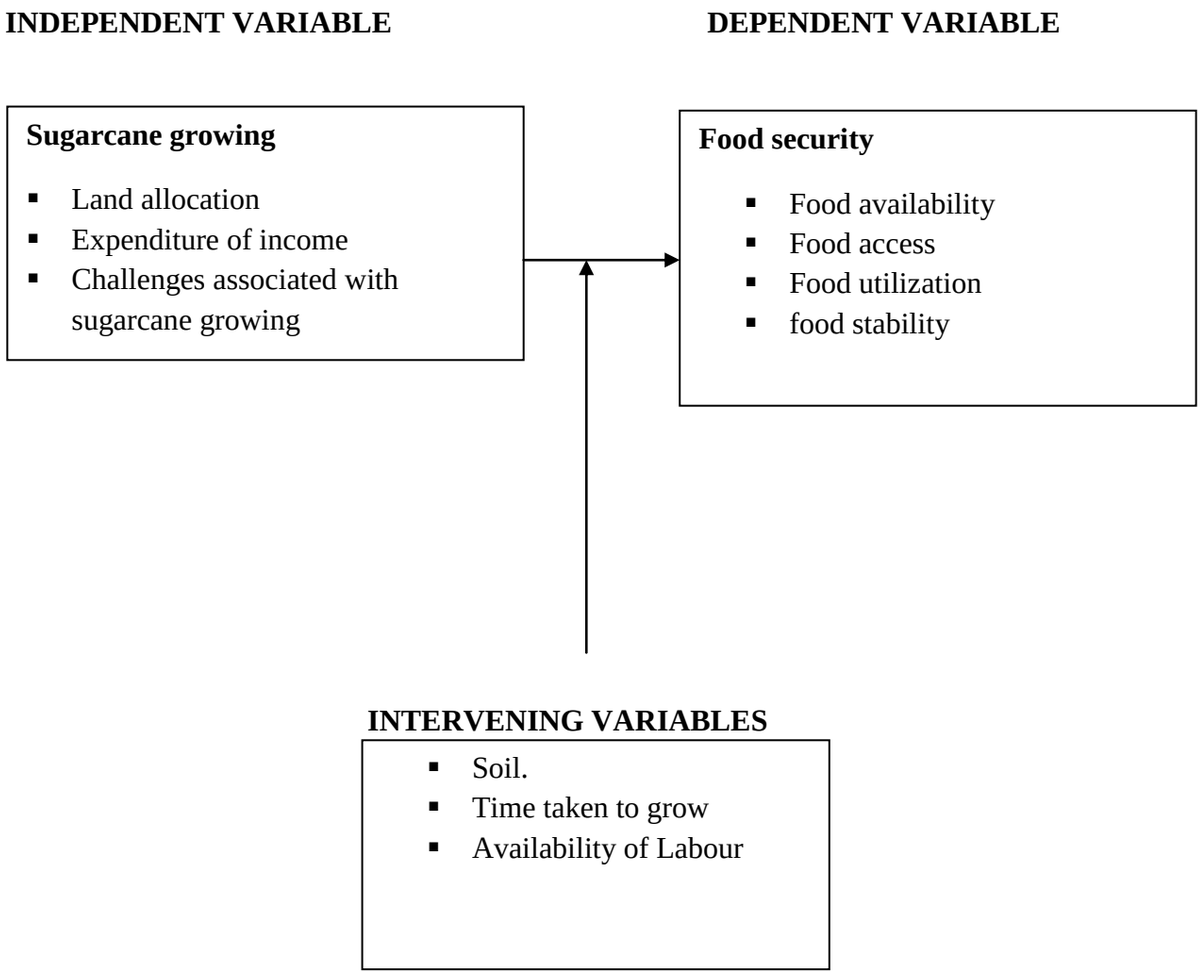


Figure 1.1: Conceptual framework (derived from literature research).

1.8 Definition of key concepts

Household food security refers to the ability of the household to secure, either from its own production or through purchases, adequate food for meeting the dietary needs of all members of the household. Households are food secure when they have year-round access to the amount and variety of safe foods their members need to lead active and health lives. In this study a household is food secure if they feed on three meals a day such

as breakfast, lunch and super as well as having a diversified balanced diet like carbohydrates and protein related foods. Also a household is food insecure if they have one or two meals a day and feed mainly on carbohydrate related foods. This definition highlights four dimensions of food security such as food availability, food accessibility, food utilization and food stability.

Food availability concerns the ability of households to have enough food of appropriate quality which is provided via domestic production or food aid on consistent basis. Food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade. Food availability was measured in terms of availability of adequate quantities of food of appropriate quality such as carbohydrates and protein related foods, adequate food stock levels, acquire more land for crop cultivation and sugarcane farmers growing other crops.

Food accessibility concerns the ability of households or individuals to secure appropriate food for a nutritious diet in the market place or from other source (gifts, transfers, etc). This depends on the access of individuals or households to adequate resources like income. It was measured in terms of farmers purchasing food, prices of food and sugarcane as well as time taken by the factory to pay sugarcane farmers.

Food utilization refers to sufficient quantity and quality of food in takes. In this study it was measured in terms of adequate diet, construction of decent houses, access to better health care, education of children and number of meals consumed in a day such as breakfast, lunch and super.

Food stability concerns the ability of households or individuals to at all times have constant food supply. That's why in this study, food stability was conceptualized as a situation which involves use of modern farming methods like intercropping and use of fertilizers, access to loans, fire out breaks or political stability, pests and diseases through adverse weather conditions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explores the conceptualization of the study as derived from the study background and the available literature. Literature is presented using themes which are derived from the research objectives and research questions.

2.2 Global trends in sugarcane growing

The world demand for sugar is the main driver of sugarcane agriculture, which accounts for 80% of sugar produced (Oyugi, 2016). The rest is produced from sugar beets that grow in temperate regions. Brazil has the largest area under sugarcane cultivation in the world, representing one third of global harvested area and production (FAO, 2017)

The sugarcane industry is responsible for quite a substantial percentage of the agricultural industry's Gross Domestic Product (GDP) in Sub Saharan Africa (SSA). South Africa makes the largest contribution to the sugarcane industry, accounting for almost 35% of the region's total output. SSA relies greatly on its agricultural industry whereby approximately 75% of employment is provided by agriculture. There are 28 countries that produce sugarcane, 11 of which can be at an output capacity of more than 200,000 tones (Vermeulen, 2011). The other countries include Mozambique, Mauritius, Cameroon, Swaziland, Peru, Egypt, Senegal, Malawi, Sudan, Ethiopia, Zambia and Tanzania (Oyugi, 2016).

The composition of the sugar industries in terms of size and scale vary amongst SSA countries. Sugarcane is grown on large estates or by smallholders and subsistence farmers. Large estates (nucleus) generally produce the bulk of sugarcane but smallholders contribute quite substantially in some countries (Oyugi, 2016). In Mauritius, approximately 26,000 smallholders contribute roughly 30% of sugarcane supply while in South Africa 12% is produced by approximately 45,000 small holder farmers and the rest is produced by 1,729 large scale growers (Vermeulen, 2011). In the Kenya scenario, there are about 250,000 small farmers who supply

92% of sugarcane to the sugar millers, while the remainder is supplied by factory-owned nucleus estates (Oyugi, 2016).

Sugarcane growing and its trade have also increasingly gained importance in Uganda. This is aimed at achieving Uganda's Millennium Development Goal one of eradicating extreme poverty and hunger (MOFPED, 2013). Similarly to attain the Sustainable Development Goal two of ending hunger, achieve food security, improved nutrition and promote sustainable agriculture (MOFPED, 2015). Uganda is 35th producer of sugar in the world and area under sugarcane cultivation is 54,911 hectares (FAO, 2016). Sugarcane processing contributes 6.5% of Uganda's industrial production growth rate. Uganda has surplus sugar of 36000 metric tons of sugar it can export to the East Africa Community Countries (Uganda Sugarcane Technologists Association [USCTA], 2017). Apart from providing sugar, a vital food, sugarcane growing provides direct employment to over 20,000 and 50,000 direct and indirect employments respectively. As well as providing electricity to the national grid through molasses at Kakira sugar works (USCTA, 2017). Busoga region is the largest producer of sugarcane in Uganda with approximately 300,000 tons of sugar annually. Busoga region covers districts of Jinja, Iganga, Kamuli, Kaliro, Bugiri, Luuka, Mayuge, Buyende, Namutumba, Bugweri and Namayingo respectively. Sugarcane growing has increased by 16.2% in Busoga region, accounting to 13000 out growers. This has led to limited food access, food utilization to the local people and under mined food stability system as well as food availability (UBOS, 2016).

2.3 Household food security.

Chebii (2009) indicates that there are many definitions and models of food security, but these all agree that the key characteristics of household food security is secure access at all times to sufficient food. This leads to the now generally accepted definition of food security of FAO, (1996) which states that food security is a situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. At the household level, food security refers to the ability of the household to secure, either from its own production or through purchases, adequate food for meeting the dietary needs of all members of the household (Barret, 2010).

Households are therefore food secure when they have year-round access to the amount and variety of safe foods their members need to lead active and healthy lives (FAO, 2009). From all these definitions, four dimensions of food security can be drawn out. Households will be food secure when sufficient food is available, people have access to it (largely a matter of incomes and food prices), food is well utilized (largely a matter of people being in good health to make use of nutrients), and availability, access and food utilization are stable. It is no wonder that the now generally accepted four dimensions of food security are; food availability, food access, utilization and stability (FAO, 2009). These are described in the subsequent subsections.

2.3.1 Dimensions of food security

Chebii (2009) identified the major measures of food availability using household food inventory, food procurement. Food access can be measured in terms of the hunger experiences by individuals within a household or of the household's dietary diversity. Lastly he described that food utilization can be measured using anthropometric parameters such as height, weight and nutrition status.

2.3.1.1 Food Availability

Olaniyi (2011) defines food availability as the physical appearance of food in large amounts. Gregory et al. (2005) further describes food availability as mainly relates with supply of food through production, distribution and exchange. USDA (2016) describes food availability as when all people have sufficient quantities of food available on a consistent basis. In the current study, food availability was defined as the ability of households to have enough food of appropriate quality which is provided via either domestic production or food aid. It was measured in terms of availability of adequate quantities of food of appropriate quality and adequate stock levels among households.

2.3.1.2 Food Access

Olaniyi (2011) defines food access as a sufficient purchasing power or ability to acquire quality food at all times. Gregory et al. (2005) describes that food accessibility refers to the affordability and allocation of food as well as the preferences of individual and households. Food access is ensured when household and all

individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends on income available to the household, on the distribution of income within the household, and on the price of food (USDA, 2016). Food access also depends on purchasing power of the household whether has enough income to buy food at prevailing prices has sufficient land and other resources to grow its own food (Garret and Ruel, 1999).

2.3.1.3 Food utilization

Tweeten (1999) refers to food utilization as the metabolism of food by individuals. While Olaniyi (2011) defines it as demands sufficient quantity and quality of food in takes. It is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, and diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individual (FAO, 2009). In the current study, food utilization will be defined as the utilization of food through clean water, adequate diet, sanitation and health care to reach nutrition well-being (all physiological needs are met to achieve a sound nutritional status and growth). Thus it incorporates food safety and quality issues, the intake of sufficient at the individual level and also the conversation efficiency of food by the body. Food utilization was measured in terms of access to safe and clean water, access to improved sanitation and percentage of children affected by malnutrition.

2.3.1.4 Food stability

Since a population, household or individual must have access to adequate food at all times to be food secure, they cannot risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). So the stability concept therefore concerns both the availability and access dimensions of food security. For instance if someone take in adequate food today, he or she will still be considered food insecure if he or she has inadequate access to food on a periodic basis, risking a deterioration of his or her nutritional status. Adverse weather conditions, pests and diseases, political

instability or economic factors (unemployment, rising food prices and fire out breaks) may have an impact on your food security status (FAO, 2009). In the current study, food stability was defined as the ability of households or individual to at all times have constant food supply. That's why in this study, food stability is conceptualized as a situation which involves constant food supply, safety of food crops and use of modern farming methods like irrigation, intercropping and application of fertilizers.

2.4.1 Effect of land allocation to sugarcane growing on household food security

Studies carried out on the perennial crops impact on food security are scanty, available ones include Wiggins, Henley and Keats, (2015) in their study on competitive or complementary industrial crops and food security in Sub Saharan Region stressed that food production is affected with more individuals engage in industrial crops in Sub-Saharan region. The more industrial crops like sugarcane are grown the less the food production. Most farmers offer more hectares for industrial crops at the expense of food crop. Growing perennial crops like sugarcane affects women access to land, their attitude towards farming food crops, which increases food security. However, this study was not specifically addressing concerns in Mafubira Sub County; secondly it was not empirically studied the way this study was. Hence creating a geographical scope gap the study intended to address.

Chebii (2009) in a study about the impact of sugarcane growing on household food security in Belgut division of Kenya established that the allocation of land holdings between different crops show that with the introduction of sugarcane growing acreage under food crops has declined while that of sugarcane increased. This meant that food shortage has to take precedence and creating a health risk due to food scarcities. This has reduced the traditional role of women as responsible for ensuring that there is adequate food in homes. However, this study used only quantitative technique as both qualitative and quantitative methods was applied in this study hence creating methodological gap.

Musayi and Netondo (2012) in a study about effect of sugarcane farming on diversity of vegetable crops in Mumias Division, Western Kenya revealed that sugarcane farming is one of the major contributors to vegetable

spices diversity erosion. This meant that sugarcane growing would in one way or the other have affected on having a balanced diet as vegetables were highly depleted. However, this study was carried out on sugarcane and vegetable growing creating content gap hence this study was on sugarcane and household food security.

Baxter and Schaefter (2013) carried out a study concerning who is benefiting? The social and economic impact of three large scale land investments in Sierra Leone they established that households were affected by sugarcane plantations lost land to grow food crops. Furthermore smallholders (whether independent producers or out growers) had also converted land from food crops to the sugarcane growing, but often this was very much a free choice. Similarly, in Mozambique, out growers of sugarcane were reluctant to follow company guidelines to plant food crops, they wanted to convert all their land to cane given the high returns this was revealed in a study about smallholder sugarcane production in Xinvane, Mozambique by (Jelsma et al., 2010). Lastly Sugarcane growers in the sugar belt of Mumias, Kenya also rapidly expanded production of sugarcane which resulted into low food crop growing hence increased food shortage (Wegulo and Obilinji, 1999). However these studies were carried out in Sierra Leone, Mozambique and Kenya hence creating a geographical scope gap which this study planned to address.

Sugarcane is planted and harvested through most of the season. Sugarcane farmers have significantly smaller percentages of their land in food crops compared with non-sugarcane farmers (Kennedy, 1989). Accordingly, the agricultural households during the long rains of 1996 used only 44 percent of land for crop production; he says clearly if more land was put into production their income would increase. In 1996, sugarcane farmers devoted 47.8 percent of their land to sugarcane farming. However this study was carried out in 1986 and 1996 hence creating a time gap which this study planned to address.

The 161 sugarcane producers in the Kaleya Smallholder Company in Kenya, was reported by agronomy department at the Kenya Sugar Research Foundation [KESREF], (2012) reckons that, in view of the fact that sugarcane takes 18-24 months to mature, the farmer must obtain income from other crops. To compound the situation, sugarcane yields are low and continue to decline in cane growing zones of Kenya despite availability

of improved varieties that have been developed and transferred to farmers and millers from research. One of the factors leading to this is continuous sugarcane monoculture (KESREF, 2012). This land use monoculture is associated with loss of natural vegetation and cropland (Wafula *et al*., 2010). However this study was carried out in Kenya hence creating a geographical scope gap which this study intended to address.

The productive capacity of agricultural lands generally decreases after several seasons of a cane crop as sugarcane has a high demand for nutrients. Given that 50% of the crop is harvested, there is continuous mining of nutrients from the soil with successive crops, leading to a decline in land productivity and depressed yields (KESREF, 2012). Soil nutrients will be stressed further as more land is converted into sugarcane plantations. As a result, there is need to reconcile competing resource uses and resource users and to ensure full consideration of social and environmental aspects are crucial to minimize the risks. However, intensifying sugarcane monoculture only serves to spin the cycle as in due time, the yields will have declined again due to maximum utilization of natural resources, namely soil nutrients. While large scale commercial agriculture has succeeded in feeding the world, it has in the process also contributed to deforestation, loss of wetlands, soil erosion, biodiversity losses, and increased carbon emissions in many countries which result into food insecurity (Millennium Ecosystem Assessment, 2005). The expansion of sugarcane plantations is cited as presently the major source of food insecurity in the Busoga sub-region. Similarly, in Swaziland, sugarcane out-growers particularly the poorer ones were unable to meet their food requirements after converting all their land to rain-fed sugarcane (Terry et al, 2007). The widespread conversion of wetland, forest, and arable crop land areas, leading to a commercial sugarcane plantation land matrix in the Busoga sub-region, is resulting in the loss of biodiversity; yet, biodiversity is fundamental to agricultural production and food security (Thrupp, 2000). However these studies were carried out in the years 2000, 2005 and 2007 hence creating a time gap which this study planned to address.

2.4.2 Expenditure of income from Sugarcane growing with regard to household food security

Wiggins et al (2015) in their study on competitive or complementary industrial crops and food security in Sub Saharan region argued that when land has been acquired from farmers to form estates, the compensation paid

may help to improve access to food directly or indirectly. Compensation trend analysis also revealed that food and land availability, and livestock numbers had reduced in the last 10 years. This confirms other studies by Sparovek et al. (2006) in a study on environmental, land use and economic implications of Brazilian sugarcane expansion found out that commercial agriculture of non-food crops can negatively affect food security because farmers are interested in getting income. It should also be noted that households' vulnerability to climate change impacts and food insecurity tends to increase as cash crops displace the traditional safety nets (Belcher, 2005). These studies were carried out in Sub Saharan Region, United States of America and Brazil hence creating a geographical scope gap which this study planned to address.

Kennedy (1989) in a study about the effects of sugarcane production on food security, health and nutrition in Kenya reported that household food security is not jeopardized by commercial sugarcane growing. Although commercial sugarcane cultivation provides local jobs, they are mainly seasonal casual labourer jobs with little income for those involved. The casualization and seasonal employment with labourers being repeatedly hired on short-term (seasonally) absolve employers of the responsibility of providing benefits, such as pension contributions, health and social services, and employment security (Hess et al, 2016). The casualization and seasonality of sugarcane employment does not expose people to food insecurity, since they get time to grow food crops. Allows farmers to invest on any remaining land or to open up a non- farm business. Conversely, where land is transferred and compensation not adequate, these claims create more food reduction since spending on food would be high. Alternatively, in Mafubira Sub County it is not yet ascertained whether money offered can help farmers to get out of food security. However Kennedys study was carried out in Kenya where conditions may not necessarily be the same as those in Mafubira Sub County, hence creating a geographical scope gap in which this study intended to address.

Chebii (2009) in a study on the impact of sugarcane on household food security in Belgut division in Kenya further established that while food demands are high due to family sizes, food purchases are high due to family numbers. Food purchases are low due to unpredictable incomes accruing to sugarcane farmers. However, this

study was to ascertain whether a similar situation prevails with that of Mafubira Sub County since it was carried in 2009 creating time gap which this study intended to address.

Mwavu, Kalema, Bateganya, Byakagaba, Waiswa, Enuru and Mbugga (2016) in a study about agro biodiversity of home gardens in a commercial sugarcane cultivation land matrix in Uganda established that due to the impact of sugarcane growing incomes derived from sugarcane are inadequate to meet for their food demands. Alternatively this study did not apply descriptive design which was a center of focus in this study, hence creating a methodological gap which this study intended to address.

A research study on contract sugarcane farming and farmers incomes in the Lake Victoria basin of Kenya was conducted by Waswa et al. (2012) concluded that overall, most farmers engage in sugarcane farming to raise income for the education of their children, acquisition of additional property, notably, land and construction of decent family shelters now that thatching grass has been eliminated through conversion of land to farming. Site specific differences in the benefits are also a reflection of differences in the felt needs, general community cultural orientations and education levels. For instance, many farmers earn their income only to exhaust it on re-payment of debts accrued during the more than 18 months of waiting to harvest the sugarcane. Repayment of debts reduces the farmers' propensity to buy or grow food for their own subsistence, hence the persistent food insecurity and malnutrition. As a result, a cycle of poverty is born that continues and end which makes food insecurity chronical. However, this study never showed that a descriptive design was used hence creating a methodological gap which this study intended to address.

According to Mtshali (2002) in a study about household livelihood security in rural Kwazulu-Natal, South Africa pointed out that sugarcane growing has played a great role of multi-livelihood strategies of rural development. Similarly Madhanapall (2012) in a study of small-scale grower projects: a catalyst for rural development in Natal, South Africa argued that farmers use the income from sugarcane to pay for food and education. Sugarcane as a cash crop therefore makes an important indirect contribution to food security as it allows for families to purchase much-needed food staples. Lastly Govereh & Jayne (2003) in a study of cash

cropping households, cash crops can have other spill-over benefits on food crop production for example by improving farmers' access to resources such as fertilizers and agricultural loans. This potential benefit of sugarcane income warrants further investigation. However this study was carried out in South Africa hence creating a geographical scope gap which this study planned to address.

2.4.3 Challenges associated with sugarcane growing in relation to household food security

Wiggins et al. (2015) carried out a study on competitive or complementary industrial crops and food security in Sub Saharan Region emphasized that current developments of industrial crops in Sub-Saharan Africa are generally creating problems of pests and diseases which affects more of the food securities in the land. This may lead to variable harvests, volatile prices in market which consequently impacts on food security in a negative direction. However Wiggins study was carried out on industrial crops and food security this created content gap since this study was on sugarcane growing and food security.

Musayi and Netondo (2012) in a study on effects of sugarcane farming on diversity of vegetable crops in Mumias division western Kenya indicated that ninety percent of the farmers attributed delayed payments by factory increases food insecurity. In other scenarios the quality of sugarcane seeds being of poor quality created problems of farmers incurring great losses to the extent that incomes earned were too low to meet family demands and food requirements. However this study was on sugarcane growing and diversity of vegetable crops hence creating content gap which this study intended to address.

Further, Spiertz (2013) in a study about challenges for crop production research in improving land use productivity and sustainability in USA revealed that the conditions of biophysical constraints, growing crops that consume soil nutrients to total depletion always cause a challenge in the areas of farming or growing food crops to have limited food supply in families. However, this study was not carried out in a developing world context where Mafubira lies, hence creating a geographical gap which the study intended to address.

Mblinyi and Semakafu (1995) in a study of gender and employment in sugarcane plantations in Tanzania argued that sugarcane farmers are paid low prices not commensurate to the value of cane sold to the factory

and makes farmers to receive low income from sugarcane sales which cannot sustain the home demands leading to rising food insecurity. Another study was carried out by Shumba (2011) on assessment of sugarcane out grower schemes for bio fuel production in Zambia and Zimbabwe pointed out that prices of sugarcane keep on changing and fluctuating which reduces the farmers income and even the casual labourers are also paid less money which cannot afford to cover their caloric expenditure hence accelerates food insecurity. There is also delayed payment by factory to farmers as it takes two to three weeks for the farmer to receive cash. Since these studies were carried out in Tanzania, Zambia and Zimbabwe this created a geographical scope gap which the study intended to address.

Wafula et al. (2010) in a study of agro biodiversity endangered by sugarcane farming in Mumias and Nzoia Sugarbelts of Western Kenya noted that sugarcane growing requires high inputs over time which has spillover effects on the disposable incomes of the crop. Also input suppliers in Kenya deducted high and increasing amounts from sugarcane suppliers to cover their costs, not all of which appeared justified, leaving farmers with less income than expected. Contract sugarcane farming is a costly business to ordinary farmers due to the deductions the company undertakes, particularly from the main crop. A study carried out by Waswa *et al.* (2009) on contract sugarcane farming and farmer's incomes in the Lake Victoria Basin, Kenya noted that farm inputs are deducted by the company or sugar factory cost farmers up to 71% loss in profits. This has been the case all round in the sugarcane growing areas with farmers constantly embroiled in debt as the production costs constantly overweigh the proceeds from sugarcane. Farmers are only paid for the raw sugarcane tonnage presented on arrival at the millers' weighbridges while the millers retain proceeds from all the by - products. Since these studies were carried out in Kenya, this created a geographical scope gap which the study intended to address.

Encroachment on marginal land like swamps, forests and game reserves for farming in Uganda is as a result of increasing population with decreasing land size. By 1965 average land size in Uganda per individual was 7.5 acres, in 1970 was 5.85 acres. The decreases in sizes of land farmed were said to have come about mainly through land sub division to cater for family members coming up due to age. This was pointed out by

Langlands (1974) in a study on Uganda in maps 4: the economic response and land use. According to Bwalya (2013) in a study of comprehensive Africa agriculture development programme to reduce food security emergencies in Africa reported continued encroachment of marginal lands to grow commercial crops like sugarcane, cocoa, rubber and palm oil increased on global warming accelerating food insecurity. Africa is epitomized as the most vulnerable continent to climate change and food insecurity in the whole world which is increasing per annum. Since these studies were carried out in 1974 and 2013 this created time gap which this study intended to address.

According to Kipsisei (2011) in a study on environmental degradation and social conflict in Transmara district, South rift valley of Kenya pointed out that sugarcane growing has greatly enhanced the interactions of neighbouring communities namely Masai and Luo in Transmara Sub County, by fostering peace in a political hotspot that has experienced ethnic strife between the two communities since time immemorial. On the other hand Oyugi (2016) in a study on social economic impacts of sugarcane farming on livelihoods and the biophysical environment in Transmara Sub County in Kenya noted the fight which broke out in September 2014 in Shankoe area between the Masai and Luo lasted for longer through burning sugarcane farms covering over 13000 hectares and also stealing sugarcane from the plantations. The strife from the two warring tribes caused a backlog at Transmara Sugar Company Limited everything came to a standstill by burning sugarcane farms, cane trucks and killing plantation farm workers. Ethnic clashes between the two communities during the 1996 and 2007 general elections lasted for almost a month and several properties destroyed and loss of people's lives. At the end of fiasco, Kilgoris was a ghost town, rival communities having been driven out of town, houses and farms torched with no food produce as the area was proved impenetrable hence worsening the food security situation. Since all these studies were carried out in area of nomadic pastoralists in Kenya this created a geographical scope gap which this study planned to address.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

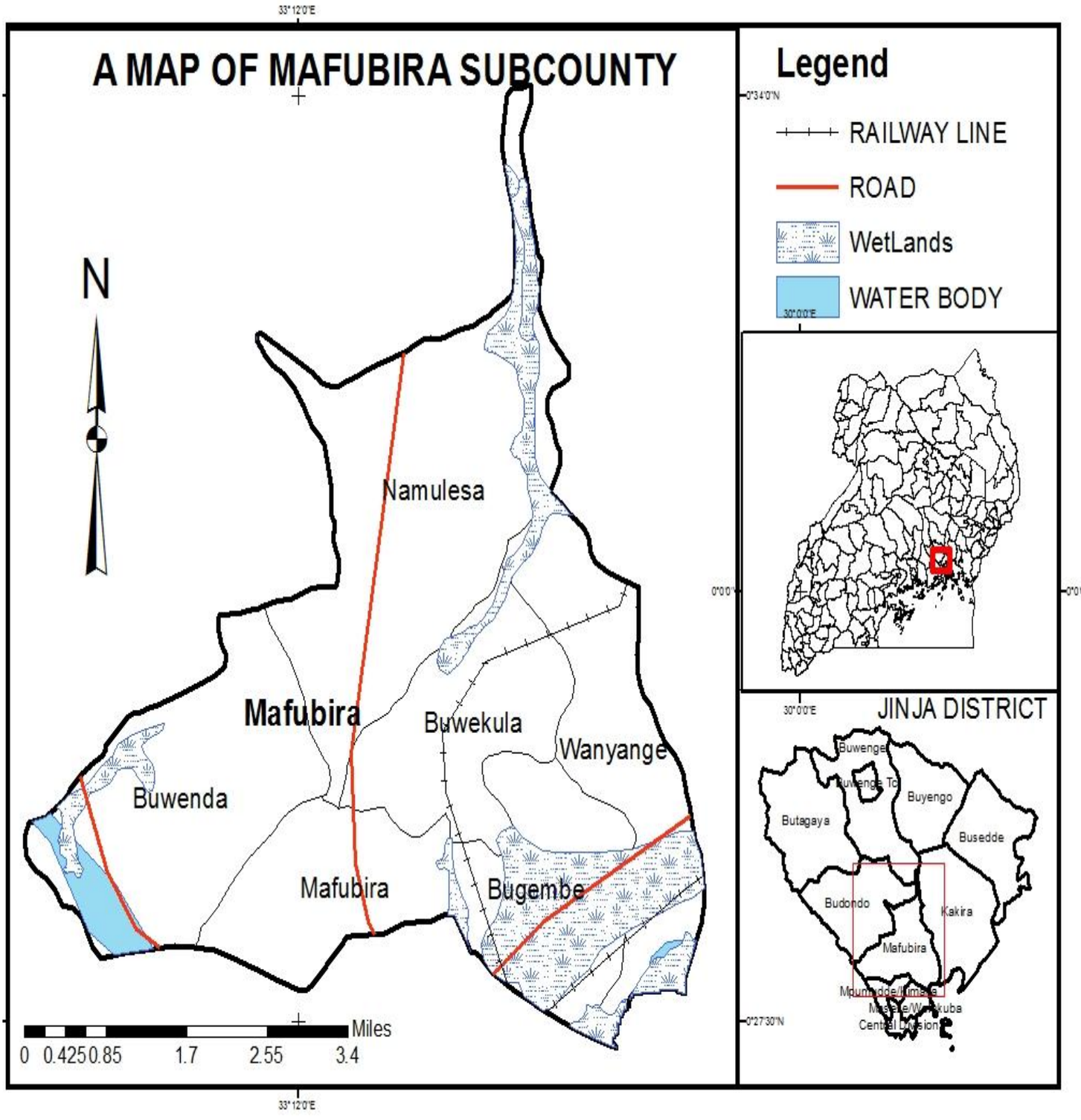
This chapter describes the procedures that were followed in conducting the study. The section describes research design, population, sample size, sampling techniques, data collection methods, data collection instruments, and data collection procedure as well as data quality and data analysis.

3.2 Study area

3.2.1 Location.

The study was conducted in Mafubira Sub County located within Eastern Uganda Busoga sub region in the northern part of Jinja district covering a land area of 51.8 square Kilometers as indicated in figure 3.1. Jinja district is 80 kilometers east of Kampala city. Jinja district is bordered by Kamuli district to the North, Luuka district to the East, Mayuge district to the south east, Buvuma district and Lake Victoria to the south, Buikwe district to the west, Kayunga district to the North West and the entire Western direction is bordered by River Nile. The coordinates of the district in terms of Latitude and Longitude are (0.5^0N, $33^{0.}2^1$E) and the district has land area of approximately 678.7 square kilometers and 19 square kilometers are covered by water bodies.

Figure 3.1 AMAP SHOWING LOCATION OF MAFUBIRA SUB COUNTY IN JINJA DISTRICT



3.2.2 Topography.

Jinja district has the highest point of 1342 meters or 4285feet at Kisuriji to the north east, with average height above sea level of 3832feet or 1200 meters for the entire Jinja district and it's dotted with several isolated flat topped hills. Mafubira Sub County has the highest point at Igenge hill with 1320 meters or 4214 feet above sea level with scattered flat topped hills such as Wanyange, Butiki and Buwenda and the entire sub county is a plateau land (Sengendo, 2016). The landscape is as a result of a number of ancient denudation processes which have left a series of old erosion levels. As a result of these changes an elevated and dissected plateau consisting of a series of several flat topped hills and wide interlocking valleys break up the low hills (National Environment Management Authority [NEMA], 1997).The landscape is generally rolling and undulating with vertical gully heads and flat valley bottom swamps including streams flowing to River Nile such as kiko stream to the East and Tabu stream to the west of the district. The area has gentle slopes in the eastern and southern parts of the district.

3.2.3 Geology and Soils.

Jinja district including Mafubira Sub County in particular is underlain by metamorphic rocks of the Precambrian age. With a few exceptions most of the geological formation consists of the basement complex system as the oldest, Overlain by a succession of sedimentary strata which have undergone a variable degree of metamorphosis (NEMA, 1997).

Jameson (1970) describes that the nitosols which are dark and fertile clay soils in Jinja district in particular Mafubira Sub County were formed from parent material partly or wholly from basic amphibolites rocks that are neutral. The soil texture is varied from place to place ranging from red lateritic, deep red or brown loam clay soils which are very productive. Mafubira Sub County in Jinja district is partly dominated by nitosols and ferrasols. These soil types are characterized by mature soils, well defined soil profile, with stable structure, low erodibility and high fertility hence described as the '*fertile crescent region of Uganda'* (Sengendo, 2016).

3.2.4 Vegetation

The entire Jinja district and Mafubira Sub County inclusive was covered by tropical rain forests, but after introduction of sugarcane growing most of them have been cleared to create room to establish large scale plantation farmland such as Butamira forest reserve was degazeted to Madhvani group of companies to expand Kakira sugar estate (NEMA, 1997). The tropical rain forests have disappeared completely and have been replaced by cultural vegetation such as small scale farmland within the Northern and Eastern part of the district. Except in the southern area of Mafubira Sub County is covered by tropical rain forests at Kisima and Rwabitoke islands on Lake Victoria and to the West along River Nile. The flat topped hills are dominated by short grass vegetation, cassia, acacia, planted pine, cypress and eucalyptus forests such as Buwenda, Igenge, Wanyange, Nsube and Butiki hills. Permanent swamp vegetation covers 1.63% of the district land area mainly in the zone fringing River Nile and the shores of Lake Victoria. It is mostly undifferentiated, but predominantly covered with Cyprus papyrus and miscanthus violaceous (Sengendo, 2016).

3.2.5 Climate.

Jinja district and Mafubira Sub County in general experiences tropical climate being modified by relief, vegetation and nearness to water bodies such as Lake Victoria and River Nile. The rainfall pattern is bimodal having two seasons. The first rain season starts from March to June with peak in April. Second rain season is from September to December, peak in October with dry spells between January to March and July to August. The area receives heavy annual rainfall between 1250mm to 1500mm. The average annual maximum temperature does not exceed30 degrees centigrade and the minimum annual temperature is not below 12.5 degrees centigrade. The hottest temperatures are experienced in March and the coldest temperature in July. Jinja district almost has equal length of day and night throughout the course of the year with mean annual evaporation of between 1450mm to 1600mm (Sengendo, 2016).

3.2.6 Population

The population of Jinja district was 228,520 people in 1980. The 1991 national census estimated the district population at 289,500 people. The next census in 2002 put the population at 387,573 people, with growth rate of 2.5% and population density of 571 persons per square kilometer. The population of Jinja district has kept on increasing drastically and steadily as recent national population census in 2014 estimated the population at 471,242 people with the population density of 694 persons per square kilometer. The current population projection is 507,700 people, population density of 745 people per square kilometer with an annual population growth rate of 3.1%. The population structure by gender with 248,900 males and 258,800 females. The rural population is projected at 321,400 people and 186,300 urban populations. The current population of Mafubira Sub County is 78,676 people, with 37,628 males and 41,048 females. The population density for Mafubira Sub County is 1,519 people per square kilometer and a rapid population growth rate of 4.5% higher than that at district level (UBOS, 2016).

3.3 Research Design

Paulin (2007) defines a research design as a plan of data collection and what data to gather, from whom, how and when to collect data, and how to analyze the data obtained. This study adopted a descriptive study design, because it sought to investigate views of farmers on the relationship between sugarcane growing and food security hence the need to generate as much primary data as possible. The study used both qualitative and quantitative approaches to get deeper views and perceptions of respondents about the study variables. As well as collecting a series of narrative answers from them as indicated in the specific research question. The two approaches were used to collect, present and interpret data. This allowed triangulation which enhanced the validity and reliability of the study.

3.4 Study Population

The study population is the total members of a defined class of people, objects, places or events selected relevant to the study (Amin, 2005). The target population for this study included all the 362 sugarcane growing

household heads in the two villages of Wakalenge and Nakabango. These were considered key participants in the study to have enough and credible knowledge about issues of sugarcane growing and household food security in Mafubira Sub County, Jinja district. These categories of people were also selected in order to capture diverse experiences from them and came up with reliable information on household food security among sugarcane growers and two village chairpersons of sugarcane out growers from Wakalenge and Nakabango. In total the study population was 42 sugarcane farmers involved in the study because they are the ones directly involved in sugarcane growing. Village chairpersons of sugarcane out growers association were selected because these are ones responsible for monitoring sugarcane activities in the area.

3.4.1 Sampling techniques

Gay (1996) defines sampling as the process of selecting a number of individuals (a sample) from a population, preferably in such a way that the individuals selected represent the larger group from which they were selected. Having defined the population, the researcher then employed purposive and simple random sampling techniques to obtain the study sample.

3.4.1.1 Purposive sampling technique.

Purposive sampling, otherwise called judgment sampling, is the process of selecting a sample which is believed to be a representative of a given population (Gay, 1996). In this method Village chairpersons of sugarcane out growers association in the study area of Wakalenge and Nakabango were selected by virtue of their position as administrators since each village has one chairperson, they were automatically selected. They are the ones who are directly responsible for monitoring, advising and provide expert knowledge to farmers. These acted as key informants as they were believed to be reliable and knowledgeable about the topic under study.

3.4.1.2 Simple random sampling technique.

According to Gay (1996) simple random sampling is the process of selecting a sample in such a way that all individuals in the defined population have an equal and independent chance of being selected for the sample. This was used to select the parishes and villages. This was because of being cost effective in terms of money

and time saving in terms of collecting data, high level of flexibility, accurate and free of bias. The parishes in the sub county were identified and enumerated to get a sampling frame for the parishes at sub county level. The parishes in Mafubira Sub County are: Buwekula, Buwenda, Namulesa and Wanyange.

A number was assigned to each parish, write the number and the name of the parish on a piece of paper, fold it and place in a bag. Then choose at random two pieces of paper without replacement to represent the two parishes where the study was conducted. The selected parishes were Buwenda and Namulesa.

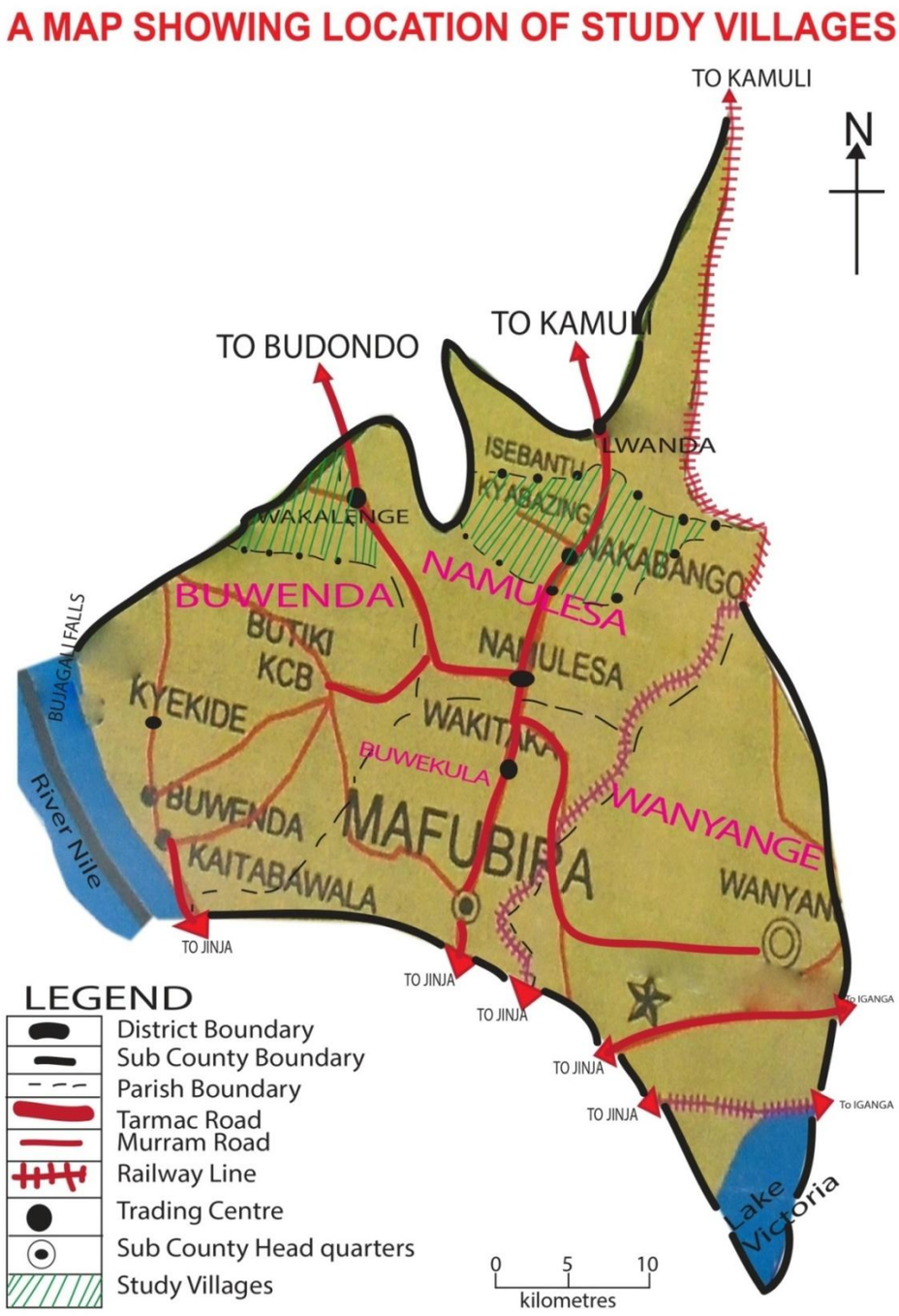
The villages or local council one's (LCI's) in each of the selected parishes were identified and enumerated to get a sampling frame for (LCI) local council one's or villages.

The villages or local council ones (LC1) in Buwenda parish are: Butiki-Kyekide, Butiki-Matala, Buwenda, Idhogolo, Kaitabawala, Kyekide, Matala and Wakalenge.

The villages or local council ones (LCI) in Namulesa parish are: Isikwe, Kagogwa, Kakusu, Lwanda, Mpumuda, Nakabango, Namulesa, Namungarwe, Sakabusolo, Wabulenga A and Wabulenga B.

A number was assigned to each LCI, write the number and name of the village on a piece of paper for each parish selected, fold it and place in the bag. Then choose at random one piece of paper without replacement to select one village in each parish where the study was conducted. The selected village randomly in each parish was Nakabango in Namulesa parish and Wakalenge in Buwenda parish. This is indicated in figure 3.2 showing the location of study villages of Nakabango and Wakalenge in Mafubira Sub County.

Figure 3.2 is a map showing location of study villages.



Source: **EC**, (**2016**).

3.4.1.3 Sample size.

Simple random sampling was used to select individual household heads in each village. A list of these household heads of sugarcane growers was written down alphabetically per village with the help of village sugarcane out grower association officials and local council one executive member of Wakalenge and Nakabango. The formula for selecting the individual household head was = N/n (Amin, 2005). Every 9th household head on the list was selected in each village to obtain the sample size. For each selected household head was interviewed.Table3.1 below shows selection of household heads for sugarcane growers in study areas of Wakalenge and Nakabango.

Table 3.1 Selection of household heads for sugarcane growers in each village and their sample.

Village	**Number of sugarcane growers household heads (N)**	**Sample size (n)**	**Sampling techniques**
Village Chairpersons of sugarcane out growers Association	2	2	Purposive sampling
Nakabango	182	20	Simple random sampling
Wakalenge	180	20	Simple random sampling
Total	**364**	**42**	

Source: **NMS**, (**2016**).

3.5 Data Sources.

3.5.1 Primary Sources.

Data was collected from sugarcane growers of the two villages of the study area, village chairpersons of sugarcane out growers association of Nakabango and Wakalenge who were both Interviewed, filled in

questionnaires and formed focus group discussions. There was direct observation of sugarcane plantations and food crop gardens in the area of study.

3.5.2 Secondary sources.

Data was got by reviewing recent publications, official documents, text books and vital sources from internet, Newspapers, Journals, Atlases and Magazines. Data was also collected from Uganda Bureau of Statistics, reports from Uganda Sugarcane Technologists Association, World Food Program as well as Food and Agricultural Organizations.

3.6 Data collection instruments

This study used interview guide, focus group discussion guide and observation guide as well as questionnaire.

3.6.1 Questionnaire

Questionnaire is a document containing a formulated series of questions especially for statistical study. It is one of the self-report techniques used to solicit information from respondents/subjects (Gay, 1996). It was used to generate both qualitative and quantitative data. Semi-structured questionnaire with both closed and open-ended questions were administered to the selected respondents in the area of study. In order to generate quality data, questionnaires were only administered to household head sugarcane farmers and village chairpersons of sugarcane out growers association in the two selected study villages of Wakalenge and Nakabango. The questionnaires were standardized, in English and subject to interpretation in a language that the respondent preferred. The open-ended items in the questionnaires enabled respondents to express their opinions freely and in detail about the subject under study without biasing them with pre-determined answers by the researcher. The questionnaire was used because respondents fill them at their own convenience and are also appropriate in collecting large amount of data in a short time. As well as information can be obtained fairly, easily and the questionnaire responses are easily coded to facilitate analysis.

3.6.2 Interview guide

Gay (1996) defines an interview as the oral, in-person, administration of a set of probing questions to each member of a sample. An interview guide was administered to all sugarcane farming household heads and village chairpersons of sugarcane out growers association of Wakalenge and Nakabango with a set of probing questions to each member of a sample. The interview guide was used because it allows getting deeper views and perceptions of respondents about the study variables. The interview guide also helped in bridging link created in the questionnaires through understanding the perceptions of the respondents better because it was a social encounter which caters for respondents who were more willing to talk than write as they would prefer to remain anonymous.

3.6.3 Focus group discussion guide

This instrument was applied because of its ability to enable researcher gather valuable information which is not possible with a questionnaire (Gay, 1996). This was mainly used to household head sugarcane farmers who were in two groups of ten people per village. The researcher constructed a focus group guide that was applied in discussion with the different relevant themes of study to household head sugarcane growers in Nakabango and Wakalenge villages. It was used to obtain wider perspectives and views of the sugarcane farmers in relation to the topic of study. It also enabled the researcher to gather valuable information in a short time which was not possible with other methods.

3.6.4 Observation guide

Direct observation was mainly carried out to see gardens of food crop, sugarcane plantations as well as the infrastructure from benefits of sugarcane growing and degraded land in Nakabango Village due to result of sugarcane growing. This method was used in order to reinforce and crosscheck the accuracy of data collected using the other methods like questionnaire and interview guide. This is because information from observations emerges from what is actually happening rather than from pre conceived notions. First-hand information was got concerning the area of study.

3.7 Data quality control

This was handled to test on validity and reliability of research instruments used as follows:

3.7.1 Validity

Validity is the extent to which the instruments used during the study measure the issues they are intended to measure (Amin, 2005). Validity of instruments was ensured through the use of experts from Kyambogo University for pre-testing the instruments. These experts were supervisors of this research from the department of Geography and social Studies and also from the department of sociology and social administration who were requested to rate items as either relevant or irrelevant. This helped to get clear and proper judgments on the content validity to execute the pilot run. The following formula was used to ascertain validity of the instruments. The Content Validity Index (CVI) as:

$$CVI = \frac{\text{Number of items rated relevant}}{\text{Total number of items}}$$

Items with validity co-efficient of atleast 0.7 are accepted as valid in research (Kothari, 2004). The items in the questionnaire were rated to be relevant to the study. CVI=28/35=0.8.

The CVI was found to be 0.8 for the set of questionnaire making the items relevant to the study objectives. This was high enough for the concerned instruments to yield the required data. The instruments were consequently adopted and administered to the subjects.

Subsequently the researcher used a number of methods to corroborate each set of data to reduce errors and increase validity so as to conform to the study conceptual framework. Qualitative validity was established through confirmability of data. After transcribing data from the interview, the interviewee was given back the information for confirmation of the transcribed data to establish authenticity.

3.7.2 Reliability

Reliability of the instrument was determined using Test-Retest method refers to the degree to which scores are consistent over time (Gay, 1996). This method was to establish whether or not the score a person obtained on a test at some moment in time are the same score that person would get if the test were administered some other time. The instruments were pilot-tested in a non-study area of Nakalama Sub County in Iganga district which has similar rural characteristics to those in the study area. This area was preferred by the researcher because he is a native, so it was cheap in terms of transport costs and time saving to test the instruments. Twenty sugarcane house hold heads were selected in Nabirye and Namundudi villages by considering ten in each village and one village chairperson of sugarcane out growers association for pilot testing (Test-Retest method). The results of this are illustrated in the table 3.2.

Table3.2 Pilot testing results

Participants	**Sample**	**Frequency of consistency**	**Percentage of consistency**
Sugarcane farmers	20	18	90
Village chairperson of sugarcane out growers association	2	2	100
TOTAL	22	20	90.9

Source: **Researcher**

A consistence level of (90.9%) was considered high enough for the instruments to be reliable for the study.

3.8 Data analysis.

Data analysis involves application of one or more techniques so as to enable the researcher to test a hypothesis or answer the stated research question (Gay, 1996). In the study, both qualitative and quantitative data was collected.

3.8.1 Qualitative data analysis

Qualitative data that was got from in depth interviews were transcribed, translated, analysed, categorized and organized according to themes of the study conceptual framework in order to identify common responses in line with objectives of study. Qualitative data was descriptive and obtained from interviews and focus group discussion. This data was presented in accordance with the objectives of the study and helped to substantiate findings from quantitative data and some of it in form of direct quotations and narratives from the respondents. Data from the interviews was recorded transcribed, categorized, read and re-read before using the verbatim information from sugarcane farmers and Village chairperson of sugarcane out growers association of Nakabango and Wakalenge during discussion of results.

3.8.2 Quantitative data analysis

Data from questionnaires was analysed by computing frequency distributions, percentages and there after presented in form of frequency table, pie charts and bar graphs. The raw data collected was based on the study objectives and research questions which was coded and subjected to researchers' assessment and data obtained.

3.9 Ethical considerations

The study was carried out following ethical procedures. An introductory letter was got from Kyambogo University introducing the researcher before respondents. Consent was sought from respondents before interviews, focus group discussions, questionnaires were conducted as well as photographs for observations were taken. In addition, each questionnaire contained an opening introductory statement requesting for the respondents cooperation in providing the required information for the study. The respondents were further assured of the confidentiality of the information provided and that the study findings were used for research purpose only for fear of the implications arising from the research findings. Plagiarism was avoided through recognizing authors by acknowledging them in the work. This means that findings were presented in their original form the way it was adopted in the field.

CHAPTER FOUR

DATA PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter provides the general overview of the findings with the use of descriptive statistics. This chapter presents the respondents' view on sugarcane growing and household food security in Mafubira Sub-county Jinja District. Descriptive statistics were used to present the collected information, Frequency distribution tables were used to present the data. Frequencies (f) and percentages (%) were used to discuss the findings. A total number of 42 respondents were interviewed using structured interview guide and given questionnaires.

4.2 Social demographic characteristics of the respondents

4.2.1 Gender of respondents

Findings on gender of the respondents show that (86%) of respondents were male compared to (14%) who were female. This shows that more men are involved in sugarcane growing because they want to earn income to manage the home. Few women are involved in sugarcane growing because for them they are interested in food crop cultivation as seen in figure 4.1

Figure 4.1: Gender of respondents

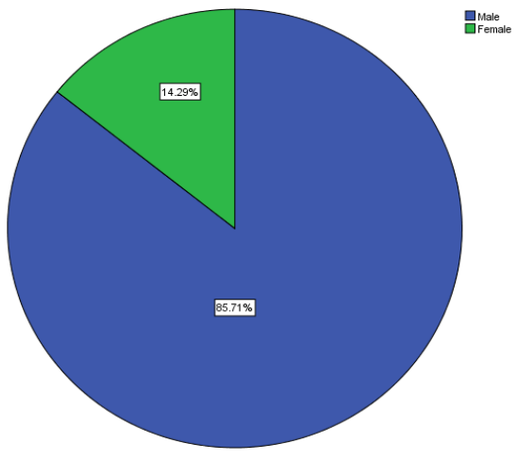


Figure 4.1 shows that the percentage of male sugarcane growers was (86%) compared to their female counterparts which was at (14%). The high percentage for males is because in the native Busoga community, the male is the sole custodian of the home and family property especially owning land and inheritance. As such

they are in charge of the decision making process which includes how to utilize land resource and also manage income from sugarcane sales. Men are mainly interested in growing cash crops other than food crops hence leading to food shortages. These findings show that few women growing sugarcane are widowers who have inherited their husbands land. This shows that more male respondents were involved in the study hence gender imbalance with regard to socio-economic decisions. This has implications on decisions on what type of crops to be cultivated on the land and the acreage to be cultivated for a particular crop, even decisions on food security crops is mainly made by males. This negatively affects household food security since males are mainly interested in crops that earn money. These findings agree with those of Chebii (2009) in a study about the impact of sugarcane growing on household food security in Belgut division of Kenya established that the allocation of land holdings between different crops show that with the introduction of sugarcane growing acreage under food crops has declined while that of sugarcane increased. This meant that food shortage has to take precedence and creating a health risk due to food scarcities. This has reduced the traditional rule of women as responsible for ensuring that there is adequate food in homes.

Respondents were asked to indicate whether sugarcane growing affects women access to land, the responses indicated that (33.3%) agreed that sugarcane growing allows women to access land. The women who have access to land are mainly windows where their late husband's left for them land and they are in control of it to grow food crops mainly hence food availability in such homesteads. While majority of respondents (66.7%) indicated that sugarcane growing does not allow women to access land. This is because men are the ones who have powers on land ownership and prefer growing sugarcane due to its economic gains and this has caused food shortage. To support this finding a woman who was interviewed stated that:

> *"I had to lose my allocation of 1 acre of food production family land because I had reached my menopause therefore not producing any child so my master (husband) cultivated the land with sugarcane".*

The account one woman gave was:

> *"They were digging in their garden with her children when a tractor came and they were told to stand aside. They watched as their food crops were destroyed and her master (husband) planted sugar cane in its place".*

Also another woman had this to say:

> " *My husband died and left me with 14 acres of land but the children have taken all of it and planted sugarcane".*

Further still a key informant explained that:

> " *The deceased, father to 8 boys had 2 wives in the same home, he divided all his land giving each boy his share while he still lived and left his family home and the surrounding land for his wives and girls. Unfortunately his heir, supported by his biological sons declared a war to chase the eldest wife and all her daughters from the land so that they can keep it t themselves and use it for sugarcane production. All their inherited land is already cultivated with cane".*

The findings show that women have no powers over land and control of the land is mainly by men. It is the man to decide which crop to be grown and where, women just follow directives from their husbands who have a negative attitude on food crop cultivation which has chronically led to food shortage. Similarly, the research finding show that most women (66.7%) expressed some form of '*force*' used by their husbands or sons to cultivate the land; they expressed their desperation when the same males neglected them and expected them to still produce food in spite of having no land to do so. They all stated that it is the women's business where you get the food for the children because the man would simply not care. The widows are worst affected since as soon as their husbands die, all the property usually land is allocated to the boys leaving them and usually their daughters landless and sometimes homeless which has resulted into acute food shortages in such incidences. The current findings concur with Wiggins, et al. (2015) in their study on competitive or complementary

industrial crops and food security in Sub Saharan Region stressed that food production is affected with more individuals engage in industrial crops in Sub-Saharan region. The more industrial crops like sugarcane are grown the less the food production. Most farmers offer more hectares for industrial crops at the expense of food crop. Growing perennial crops like sugarcane affects women access to land, their attitude towards farming food crops, which increases food security.

4.2.2 Age distribution of respondents

The findings show that (5%) of the respondents were aged between 20 to 29 years, (31%) aged between 30 to 39 years, (26%) aged between 40 to 49 years,(24%) aged between 50 to 59 years and (14%) aged above 60 years respectively as seen in figure 4.2

Figure 4.2: Age distribution of respondents

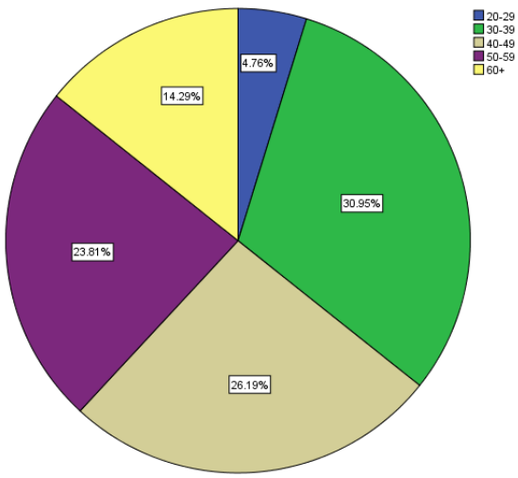


Figure 4.2 shows that (62%) of the respondents were aged between 20 and 49 years compared to (38%) of the respondents who are aged above 50 years respectively. This shows that majority of the respondents involved in sugarcane farming are relatively youth. This could be attributed to the fact that the youth are more energetic hence involved in cane farming due to labour intensive and large manual work required. This has resulted into deterioration of household food security.

Also the youth are interested in getting cash by growing sugarcane so as to develop and have improved standards of living. This has led to reduction in food crop growing causing food scarcity. These findings concur with those of Baxter and Schaefter, 2013 carried out a study concerning who is benefiting? The social and economic impact of three large scale land investments in Sierra Leone they established that households were affected by sugarcane plantations lost land to grow food crops. Furthermore smallholders (whether independent producers or out growers) had also converted land from food crops to the sugarcane growing, but often this was very much a free choice. Similarly, in Mozambique, out growers of sugarcane were reluctant to follow company guidelines to plant food crops, they wanted to convert all their land to cane given the high returns this was revealed in a study about smallholder sugarcane production in Xinvane, Mozambique by (Jelsma et al., 2010). Lastly Sugarcane growers in the sugar belt of Mumias, Kenya also rapidly expanded production of sugarcane which resulted into low food crop growing hence increased food shortage (Wegulo and Obilinji, 1999).

Findings show that only (16.7%) of the respondents believed that sugarcane growing cannot lead to food reduction. The results indicate that sugarcane growing has accelerated food availability, stability and utilization. While majority of the respondents (83.3%) indicated that Sugarcane growing in the area has led to reduction in food production. This was concurring with the key informant who pointed out that:

> *"Even among the commercial sugarcane growers, only two in every 10 households reported food adequacy and that nearly 21 in every 25 households reported sugarcane growing as the main cause of food insecurity in the area."*

The findings show that sugarcane growing has accelerated the rate of food insecurity in the area by limiting food availability and accessibility among the farmers.

The study findings established that majority of respondents (83.3%) agreed that land allocated to sugarcane growing lead to reduction in food production. This shows that sugarcane growing limited food crop production hence affecting food security in the area. These findings concur with Chebii (2009) on a study of the impact of

sugarcane growing on household food security in Belgut division, Kenya which revealed that the allocation of land holdings between different crops reduced with the introduction of sugarcane growing acreage under food crops has declined while that of sugarcane increased. This meant that food shortage has to take precedence and creating a health risk due to food scarcities.

4.2.3 Education Level of respondents

The respondents were asked to indicate their level of education to which they responded as indicated in figure 4.3.

Figure 4.3: Education Level

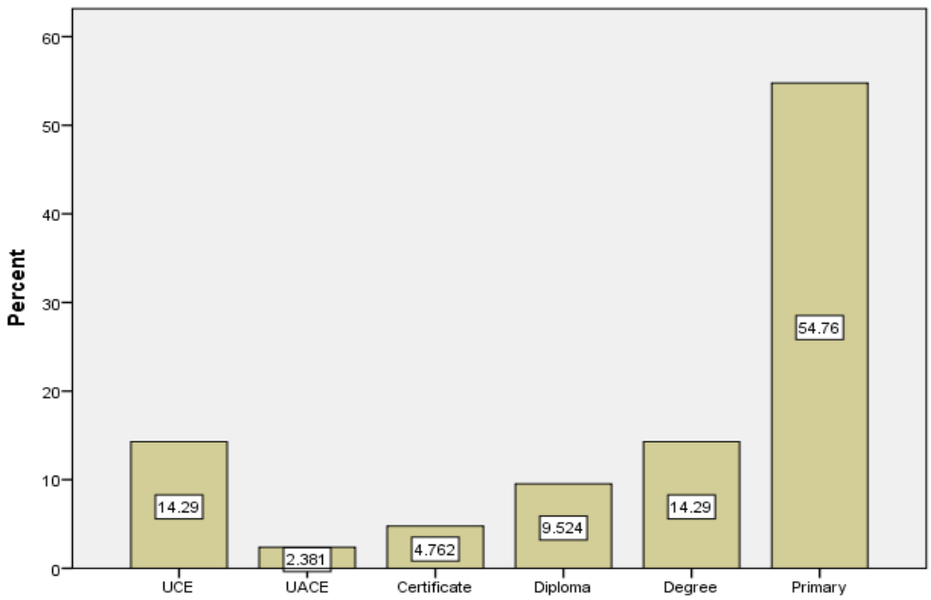
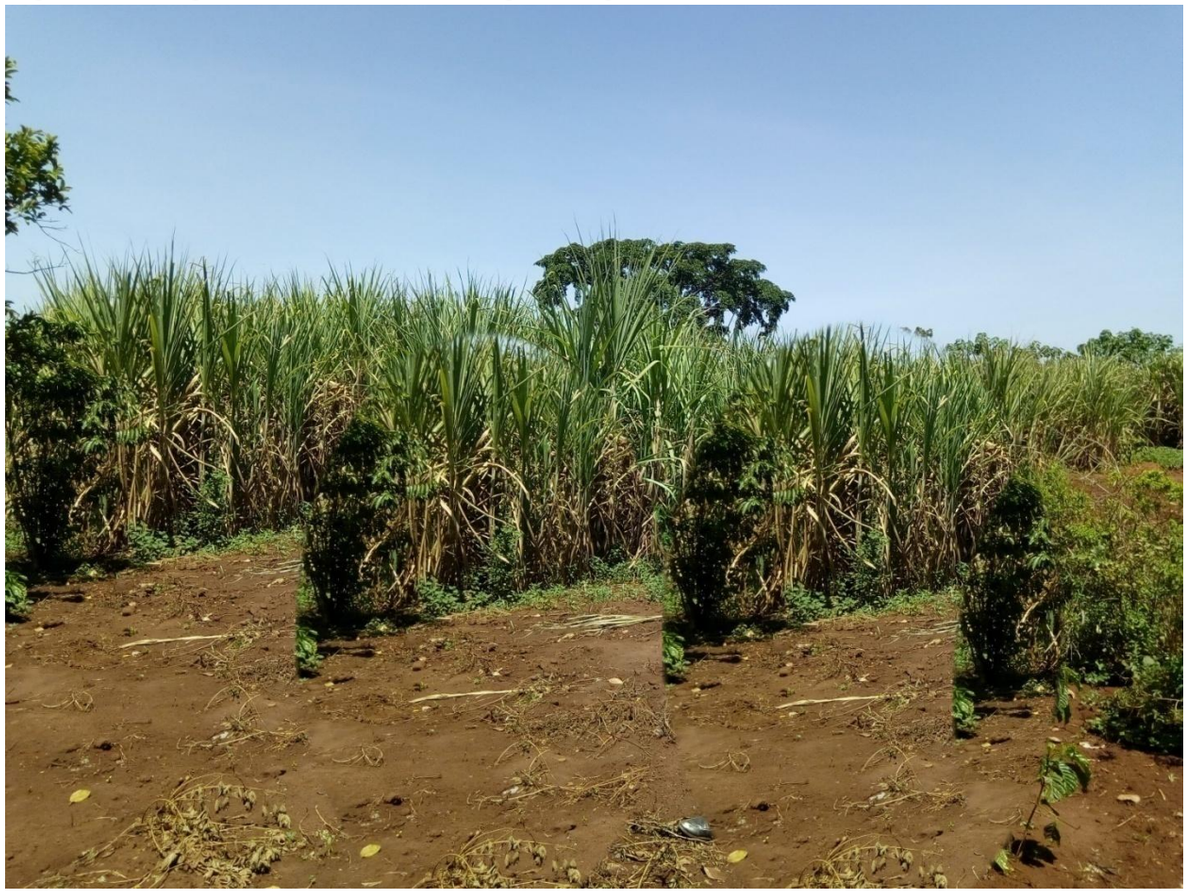


Figure 4.3 shows that (55%) of the respondents had primary school education compared to (45%) of the respondents had attained above post-primary level of education. Most of the respondents had only primary educational qualifications. Asked whether the level of education had influenced the decision to indulge in sugarcane growing, the key informants said it had influenced. (45%) of the respondents were educated above primary level and therefore they take extreme caution before indulging into sugarcane growing as they study

the optics and options. Also most of them reside far away from home where they per take white collar jobs, as sugarcane growing comes as an afterthought, when they feel they have invested a lot in their day to day life.

The household low educational attainment narrows their possibility of depending on other sources of livelihoods that requires higher education hence keeping them majorly in subsistence agriculture that undermines food security. This has resulted into farmers practicing poor methods of farming which result into soil exhaustion due to sugarcane over cultivation leading to reduced food crop yields hence worsening the household food security situation. This is evidenced with similar findings show that majority of the respondents (76.6%) indicated adequate soil exhaustion due to sugarcane over cultivation lead to low food crop yield as a result of loss of soil nutrients hence limiting food production. This is due to sugarcane monoculture in the study area. This is illustrated in figure 4.4 shows reliable evidence of an area were the soils have been degraded and left bare hence exposing the land to erosion which is susceptible to further degradation. The soils have lost nutrients which cannot support crop growth hence resulting into reduced crop yields and food stability. This discourages farmers from growing food crops.

Figure 4.4: Degraded land in Nakabango Village



These findings are in line with those of Spiertz (2013) in a study about challenges for crop production research in improving land use productivity and sustainability in USA revealed that the conditions of biophysical constraints, growing crops that consume soil nutrients to total depletion always cause a challenge in the areas of farming or growing food crops to have limited food supply in families.

4.4 Effect of Land allocation to sugarcane growing on household food security

In line with the first objective of the study which sought to establish the effect of land allocation to sugarcane growing on household food security. The answers to this objective were derived from questionnaire in section C. The table 4.1 shows land devoted to sugarcane and food crop growing.

Table 4.1: land devoted to sugarcane and food crop growing (n=42)

Land size owned (acres)	Frequency	Percentage of farmers	Percentage of land allocated to sugarcane growing	Percentage of land allocated to food crop growing
1-4	28	66.7%	62.5%	37.5%
5-9	12	28.6%	72.2%	27.8%
10-14	2	4.8%	78.6%	21.4%

Source: Researcher

The results show that most of the respondents (66.7%) owned land between 1 to 4 acres allocate (62.5%) of the land to sugarcane growing with only (37.5%) of the land to food crop growing where feeding on type of food which is carbohydrates in nature hence food insecure. Similarly, (28.6%) of the respondents owned land between 5 to 9 acres allocate (72.2%) of the land to sugarcane growing and (27.8%) of the land to food crop growing hence feeding only on carbohydrate type of food resulting into food insecurity. Lastly only (4.8%) of the respondents owned land above 10 acres respectively allocate (78.6%) of the land to sugarcane growing with (21.4%) of the land to food crop growing where feeding on both protein and carbohydrate related type of diversified food hence food secure. These findings were in line with the interview from key informant who stated that:

> ”M*ost farmers in Nakabango village have small plots of land which make them food insecure since they cultivate on subsistence scale”.*

In a similar incident another key informant had this to say;

> ”*Most farmers in Nakabango village have allocated more land to sugarcane growing up to the door steps especially those with small plots of land”.*

The findings show that most of the farmers allocate more land to sugarcane growing than food crop which has undermined household food availability and stability. They leave small plots of land for food crop growing and use poor farming methods which lead to low crop yields hence causing food shortage. These findings agree with those of Jelsma et al. (2010) in a study on smallholder sugarcane production in Xinvane, Mozambique pointed out that in Mozambique, out growers of sugarcane were reluctant to follow company guidelines to plant food crops, they wanted to convert all their land to cane given the high returns.

The results indicate that overwhelming majority of farmers (95.3%) own land less than ten acres, were experiencing episodes of food insecurity. They could not provide food for their households and yet they did not have surplus from the farms. They further added that what they got was consumed at family level and was not even enough for the whole year. They were reported to be feeding mainly on one type of food that was carbohydrate related. The results show that only (4.7%) of the farmers own land between 10 to 14 acres were found to be food secure throughout the year and were feeding on a variety of food both carbohydrate and proteins. This finding was in support by one of the respondents who had this to say:

> “F*armers with large number of acres of land for sugarcane growing are more food secure than those owning land on small plots”.*

The findings show that farmers who cultivate sugarcane on a large scale are food secure because they have a lot of other land which they use to cultivate food crops. While those with small plots of land have allocated the entire land for sugarcane growing leaving minimal land for food crop production hence food insecurity. The findings agree with those of Musayi and Netondo (2012) in a study about effect of sugarcane farming on diversity of vegetable crops in Mumias Division, Western Kenya revealed that sugarcane farming is one of the

major contributors to vegetable spices diversity erosion. This meant that sugarcane growing would in one way or the other have affected on having a balanced diet as vegetables were highly depleted.

The results indicate that on average majority of the farmers allocated (71.1%) of land to sugarcane growing than food crop. This has epitomized most households as being vulnerable to food insecurity because they leave small plots of land for food crop growing which cannot sustain them. Other farmers cultivate food crops along the road reserves which are destroyed by grazing animals and road users hence increasing on food insecurity. This was in line with the interview by a key informant gave the following remarks that:

> *"Food production in this area has deteriorated after the farmer's involvement in sugarcane farming, most farmers are engaged in sugarcane farming hence have no land to cultivate their own food crops"*

A respondent also stated that:

> *"Sugarcane farms have taken so much of fertile land leaving very small plots for food crop growing".*

The findings show that farmers have large sugarcane plantations covering wide area than food crop fields which has limited food availability and stability hence accelerating food shortage. This is further displayed in figure 4.5 which shows large sugarcane plantation in Wakalenge village.

Figure 4.5: Sugarcane plantation in Wakalenge village

Figure 4.5 shows largely planted area with sugarcane plantation as evidence to back up the respondents' view that the entire land is allocated to sugarcane growing. This shows that sugarcane growing is covering a wide area at the expense of food crop growing thereby increasing on food insecurity of the area hence limiting food availability.

Similar, findings revealed that most of the farmers allocated (71.1%) of land to sugarcane growing than food crop growing, thus posing a looming threat to food security. This is more especially for small scale farmers who commit their entire land to sugarcane growing. They leave small plots of land for food crop growing on subsistence scale which cannot sustain the home until the next harvest season. These findings concur with Wiggin's et.al. (2015) on a study of competitive or complementary industrial crops and food security in Sub Saharan Region where they stressed that food production is affected with more individuals engage in industrial crops in Sub-Saharan region. The more industrial crops like sugarcane are grown the less the food production. Most farmers offer more hectares of land for industrial crops like sugarcane at the expense of food crop.

Findings show that on average (28.9%) of the land is allocated to food crop growing and there is no adequate encroachment on marginal land. This was because some farmers their land does not reach the swampy area and they have no forest to destroy to plant the crops. While on average most of the land (71.1%) is allocated to sugarcane growing. This has led to destruction and encroachment on marginal land like forests and swamps resulting into reduced rainfall and accelerated soil erosion leading to low crop yields. This finding was in support of one of the key informant who had this to say:

> "*Sugarcane growing has led to clearance of wetlands, forest cover (trees are cut) and digging all anthills to allow proper growth of sugarcane. This has increased on prolonged drought and destruction of ecology resulting into low crop yields".*

The findings show that sugarcane cultivation has led to wetland destruction and increased deforestation with their associated problems to create more land for cane growing. This has resulted into prolonged dry spells as a result of climate change which enhances the spread of pests like fall army worm reduces food production.

While large scale commercial agriculture has succeeded in feeding the world, it has in the process also contributed to deforestation, loss of wetlands, soil erosion, biodiversity losses, and increased carbon emissions in many countries (Millennium Ecosystem Assessment, 2005). The widespread conversion of wetland, forest, and arable crop land areas, leading to a commercial sugarcane plantation land matrix in the Busoga sub-region, is resulting in the loss of biodiversity; yet, biodiversity is fundamental to agricultural production and food security (Thrupp, 2000). Both findings agree with the current research findings where (71.1%) of the land allocated to sugarcane growing there is encroachment on marginal land which leads to low food crop production.

4.5 Expenditure of income from sugarcane growing with regard to household food security

In line with the second objective of the study which sought to find out the expenditure of income from sugarcane growing with regard to household food security. The answers to this objective were derived from questionnaire. The summary of the findings is presented in table 4.2.

Table 4.2: Income earned from sugarcane growing (n=42)

Annual range of income earned from sugarcane sales	**Frequency**	**Percentages**
1,000,000-5,000,000	28	66.7%
5,000,001-10,000,000	12	28.6%
10,000,001-20,000,000	2	4.8%
TOTAL	42	100

Source: Researcher

The results reveal that majority of the farmers (66.7%) earn less than five million shillings a year with only one meal per day during the last two months before food crop harvesting hence being food insecure. Similarly (28.6%) of the farmers earn between five million to ten million shillings per annum with two meals in a day hence food insecure. Lastly only (4.8%) of the farmers earn between ten million to twenty million shillings a year with three meals per day hence food secure. These findings were in agreement by the interview with the key informant who pointed out that:

> ” *Farmers are increasing on the number of acres of sugarcane growing so as to earn more money. Other farmers have resorted planting sugarcane to all the land up to their houses”.*

The findings show that farmers earning less than ten million shillings a year cannot meet the food demands of their households due to other basic needs which take a lot of income hence being food insecure. That's why farmers are increasing on acreage for sugarcane cultivation to reap more so as to have food availability and stability. Unfortunately this has failed due to low pay of sugarcane causing food shortage. Similarly, the findings are in agreement with Mwavu et al. (2018) in a study about expansion of commercial sugarcane cultivation among smallholder farmers in Uganda established that due to the impact of sugarcane growing incomes derived from sugarcane are inadequate to meet for their food demands.

Further findings reveal that a paltry (4.8%) of the farmers are food secure only those earning more than ten million shillings per year. The farmers are able to stock food hence food secure. This finding was in agreement with one of the key informant who had this to say:

> "F*armers with large number of acres of sugarcane plantations earn more money and are food secure than those growing cane on a small scale".*

Another key informant from Wakalenge had this to say:

> *"I don't need to go to the mines to work like other men. This is gold (pointing at the soil); this is where I can earn a living to support my family, right here."*

The findings show that most of the farmers use the income from sugarcane to buy food so as to have food availability, access and stability. It also shows that sugarcane growing is vital to life of people in the area because it has transformed their social life. Some men have been able to marry more than one wife and drinking alcohol. This has undermined food security because they cannot provide food for a whole year causing food shortages. These findings concur with Madhanapall (2012) in a study of small-scale grower projects: a catalyst for rural development in Natal, South Africa argued that farmers use the income from sugarcane to pay for food and education. Sugarcane as a cash crop therefore makes an important indirect contribution to food security as it allows for families to purchase much-needed food staples.

Similar, results show that (95.3%) of the farmers are food insecure the income they earn is less than ten million shillings which is not sufficient to buy food for households and meet other home needs. This has undermined food availability, access, utilization and stability among the sugarcane farmers. This finding is in line with Mwavu et al. (2016) in a study about agro biodiversity of home gardens in a commercial sugarcane cultivation land matrix in Uganda established that due to the impact of sugarcane growing incomes derived from sugarcane are inadequate to meet for their food demands.

The answers to objective two were also derived from the questionnaire in section D. The summary of the findings is presented in table 4.3.

Table 4.3: Farmers expenditure from sugarcane growing to household food security (n=42)

Income from sugarcane growing	**Able**		**Not able**	
	Number of farmers	**Percentage**	**Number of farmers**	**Percentage**
Buy food	36	85.7%	6	14.3%
Buy land	30	71.4%	12	28.6%
Access loans and construct decent houses	26	61.9%	16	38.1%
Education and health care	27	64.3%	15	35.7%
Farm inputs and high yielding crop varieties	22	52.4%	20	47.6%

Source: Researcher

The findings show that only (14.3%) of the farmers indicated that they are not able to feed their households. This is because some household heads are irresponsible and do not take care of the family members they spend

their money on drinking alcohol leave the duty of providing food and other basic needs to the wife hence increasing on food insecurity. In support of this finding, during interview session, a respondent made the following remarks:

> *"I only see my husband at harvest time when he collects the sugarcane and do not see him again till the next harvest…..I have to stay in the swamp all the time trying to find food but he divided the small swamp area between me and my co-wife before he married a third woman in town so it is now too small to produce the required food for the family. He does not buy any food or anything for us, even the children have stopped attending school."*

The findings show that some sugarcane farmers after harvesting they abandon their families and marry more wives by renting for them in the nearby trading centre's. This leads to food insecurity in the neglected homes. Contrary findings reveal that most of the respondents (85.7%) indicated they are able to buy food for their households from the money they earn from sugarcane. They buy plenty of food which lasts for short time when still food secure but cannot last for a year hence causing food shortage. This was evidenced during the interview session; a farmer from Wakalenge had this to say:

> "*If you want to die a poor man, grow food crops only but if you want riches and acquire more wealth grow sugarcane and use its money to stock food".*

Also another key informant said:

> "Most *people in this area now days buy food from the market, shops and grinding mills. They no longer have granaries to store food".*

The findings show that most of the farmers use the income got from sugarcane to buy food so as to have food availability, access and stability. Also sugarcane growing has improved farmers livelihood conditions. Sugarcane as a cash crop therefore makes an important indirect contribution to food security as it allows for household to purchase much-needed food staples but the food cannot last for a whole year causing food

shortage since they allocate more income to acquire other basic needs. In contrast, the findings are in disagreement with Mwavu et al., (2018) in a study about expansion of commercial sugarcane cultivation among smallholder farmers in Uganda established that due to the impact of sugarcane growing incomes derived from sugarcane are inadequate to meet for their food demands.

Also the study finding show majority of farmers (71.4%) indicated that from sugarcane earnings, they are able to buy more land to cater for both sugarcane and food crop growing. This has led to increased acreage of land for sugarcane growing. The finding was supported by an interview with a key informant made the following remarks:

> *"I can't do anything big with my pension money. But with the sugarcane money I can buy land and expand on my farm if I want to. Sugarcane is the king of money."*

Another key informant pointed out that:

> *"I cannot waste my land to plant maize which is at Sh 200 per Kilogram. I rather wait for sugarcane of 18 months to mature and reap big".*

The results indicate that sugarcane growers obtain a lot of money which is used to improve their standards of living as well as acquiring basic needs. Sugarcane growing also provides farmers with more income to acquire assets as well as means of being food secure for short time. Food crop growing has been neglected causing food shortages in most households. These findings agree with this research study on contract sugarcane farming and farmers incomes in the Lake Victoria basin of Kenya which was conducted by Waswa et al. (2012) concluded that overall, most farmers engage in sugarcane farming to raise income for the education of their children, acquisition of additional property, notably, land and construction of decent family shelters now that thatching grass has been eliminated through conversion of land to farming.

The results show that (38.1%) of the respondents do not need the credit facility like agricultural loans. This is because most farmers fear the high interest rate from these loans. This has made some farmers loose all the

proceeds from sugarcane sales to these credit facility providers hence worsening the food security situation. While majority of respondents (61.9%) indicated have access to agricultural loans from both banks and sugar factories and able to construct decent houses. This finding was in line with key informant who reported that:

> *"There are some benefits of sugarcane growing. Among them are that farmers have been given an opportunity to grow sugarcane as a cash crop to access loans, there is lamp sum money for development, there is high cash flow used to access social amenities and have been improved in the area".*

Another key informant stated that:

> " *Sugarcane growing provides money used to buy food, more land, other assets and constructing good houses at home".*

The findings show that sugarcane growing has provided income used to buy food hence making farmers more food secure. Also farmers are able to acquire assets which have improved on the wealth of farmers. But farmers spend less income on food compared to other basic needs hence making them food insecure. The findings are also evidenced by figure 4.6 showing house construction by a sugarcane grower on the right background and others who have already built decent houses after sale of sugarcane. Similarly, figure 4.7 shows electricity installed in a home stead of sugarcane grower and some goats grazing in the right middle ground. This is in line with views of some respondents.

Figure 4.6 shows a house for sugarcane grower under construction in Nakabango village

Figure 4.7 shows house construction and electricity installed in home stead for sugarcane grower in Wakalenge village.

The findings show that sugarcane growing has played a great role to the development of the rural areas. Income got from sugarcane sales are used for developmental purposes like buying land, livestock and constructing rental houses as well as getting better social services like electricity hence improving on farmer's standards of living. These findings further indicate that sugarcane growing is more valuable to farmers with a lot of associated benefits in terms of food availability, utilization, stability and also improving the well being of farmers which has resulted into transformation of rural areas. Despite all these benefits farmers spend little income on food which has worsened the food security situation. The improvement of farmers' access to agricultural loans and construction of decent houses was lauded by (61.9%) of respondents. The agricultural loans sugarcane farmers are able to expand their plantation farms and minimal to cater for food crop production as well. The findings concur with Govereh & Jayne (2003) in a study of cash cropping and food crop productivity in South Africa stated that other than sugarcane growing contributing income to households, cash crops can have other spill-over benefits on food crop production for example by improving farmers' access to resources such as fertilizers and agricultural loans.

The findings reveal that (35.7%) of the respondents indicated they are not able to educate their children and access better health care. This could be that they obtain insufficient funds from sugarcane growing which cannot sustain their basic needs and food security. While majority of the respondents (64.3%) indicated they use income from sugarcane to pay school fees or tuition for their children and access better health care. This was in support of one of the key informant who said:

> " *Growing sugarcane has helped me to educate all my four children up to University and I can afford to buy all basics I need in life".*

The findings indicate that sugarcane farmers are able to pay fees to educate their children and also cater for medical bills which have enhanced their well being. Some farmers cultivate sugarcane specifically to raise fees for their children and in such cases farmers experience food insecurity because they allocate little funds for food. Similar study findings reveal that majority of the respondents (64.3%) are able to educate their children

and get better health services. This shows that sugarcane farmers have improved livelihood and standards of living. The findings are in line with Waswa et al. (2012) where they stressed that most farmers engage in sugarcane farming to raise income for education of their children, acquire additional property notably land and construction of decent shelters now that thatching grass has been eliminated through conversion of land to farming. Further the findings also concur with Madhanapall (2012) who argued that sugarcane as a cash crop makes an important contribution to rural development, use the income from sugarcane to pay for food and education. Sugarcane growing makes an indirect contribution to food security as it allows families to purchase much needed food staples.

The results show that (47.6%) of the farmers indicated that they are not able to buy farm inputs like fertilizers and improved food crop varieties. This is due to high costs of these inputs which make it expensive and costly for farmers to acquire them, this has resulted into low crop yields leading to food insecurity. While nearly half of the farmers (52.4%) indicated they are able to buy farm inputs like fertilizers and improved food crop varieties to increase on food stability of their households so as to have high crop yields. This was in line with views of one of the key informant explained that:

> ” *Sugarcane growing is monoculture in nature, it exhausts soils. To have high crop yield you need buy fertilizers and quick maturing high quality food crops”.*

The findings show that sugarcane farmers are able to buy fertilizers, herbicides and pesticides as well as other agro-chemicals to increase on crop yields to be food secure. Farmers also buy quick maturing crop varieties to increase on food production. Similarly the study findings show that (52.4%) of the farmers are able to buy farm inputs and improved food crop varieties so as to have food availability and stability. These findings agree with those of Govereh & Jayne (2003) in a study of cash cropping and food crop productivity in South Africa argued that other than sugarcane contributing income to households, cash crops can have other spill-over benefits on food crop production for example by improving farmers’ access to resources such as fertilizers and agricultural loans. This potential benefit of sugarcane income warrants further investigation.

4.6 Challenges associated with sugarcane growing in relation to household food security

In line with the third objective which sought to establish the challenges associated with sugarcane growing in relation to household food security. The answers to this objective were derived from questions 1-3 in section E of the questionnaire. The summary of the findings is presented in table 4.4.

Table 4.4: Challenges associated by sugarcane growing with regard to household food security (n=42)

Challenges associated with sugarcane growing	**YES**		**NO**	
	Number of Respondents	**Percentage**	**Number of Respondents**	**Percentage**
Low prices	31	73.8%	11	26.2%
Delayed payment	27	64.3%	15	35.7%
High input costs	30	71.4%	12	28.6%
Rise in food prices	28	66.7%	14	33.3%
Pests	22	52.4%	20	47.6%
Fire outbreak	19	45.2%	23	54.8%
Takes a lot of time to mature	25	59.5%	17	40.5
Soil exhaustion	32	76.2%	10	23.8%

Source: Researcher

Findings above show that majority of the respondents (73.8%) indicated with the statement low prices of sugarcane reduce the rate of stocking food at home.

This finding was supported by one of the key informant who explained that:

"The *prices of sugarcane have reduced from Sh 176s000 to Sh. 128000 per ton which has reduced the farmer's income and purchasing power".*

The findings show that as the prices of sugarcane go down, it reduces farmer's income to buy food hence exposing them to food insecurity. Also farmer's standard of living becomes low leading to under development in the rural areas and increased malnutrition. Similarly the findings indicated that majority of the farmers (73.8%) are paid low prices of sugarcane hence reducing the rate of stocking food at home. This undermines food availability and stability. These findings are in line with Mblinyi and Semakafu (1995) in a study of gender and employment in sugarcane plantations in Tanzania argued that sugarcane farmers are paid low prices not commensurate to the value of cane sold to the factory and makes farmers to receive low income from sugarcane sales which cannot sustain the home demands leading to rising food insecurity.

The results show that (35.7%) of the farmers indicated that delayed payment by the factory cannot lead to food shortage. This is because some farmers intercropped sugarcane with other food crops which are quick maturing such as beans and maize to be food secure as well as to ensure food availability and stability. Also other farmers cultivate food crops such as cassava, sweet potatoes to ensure food stability and food availability. While most of the farmers (64.3%) indicated delayed payment by the factory lead to food shortages. This was evidenced by the key informant reported that:

"There were common financial issues raised by the sugarcane farmers that they dealt with. Such issues included delayed payments and poor mode of payment which affected and hiked inputs, reduced costs of sales to the molasses, and delayed payment hence reducing the purchasing power of stocking food at home. "

The findings show that sugarcane farmers are delayed to be cleared to supply cane to the factory because they need to acquire a permit which takes almost two to four weeks. There is also a lot of bureaucracy to obtain a permit and even after supplying the cane to the factory it takes more than two weeks before receiving cash. All these undermine the food security status of the farmers. The research findings indicated that (64.3%) of the

farmers are delayed to be paid their money by the factory hence leading to food shortage. This is because the farmers after supplying cane to the factory it is not automatic that you receive the money instantly. These findings are in agreement with a study carried out by Shumba (2011) on assessment of sugarcane out grower schemes for bio fuel production in Zambia and Zimbabwe pointed out that prices of sugarcane keep on changing and fluctuating which reduces the farmers income and even the casual labourers are also paid less money which cannot afford to cover their caloric expenditure hence accelerates food insecurity. There is also delayed payment by factory to farmers as it takes two to three weeks for the farmer to receive cash.

The findings show that (28.6%) of the respondents indicated that sugarcane growing does not require high input costs. At times this is because sugarcane plantations are established on virgin marginal land which has fertile soils that support both cane and food crop growth hence food availability. While majority of respondents (71.4%) indicated sugarcane growing requires high input costs and this reduces productivity of food crops due to infertile soils resulting into food shortage. This finding was supported by a farmer from Wakalenge village pointed out that:

> *"Growing sugarcane takes a lot of expenses like cost of fertilizers, herbicides, land preparations for planting, labour, transport and the income is not that much. But half a loaf of bread is better than no bread."*

The finding show that were the land was already used for cane growing it needs use of agro-chemicals to increase on soil fertility to have increased crop yields but in most cases farmers cannot afford to buy these agro chemicals which reduces food production hence causing food insecurity. Similar study findings revealed that sugarcane growing requires high input costs. This is why (71.4%) of the respondents agreed that sugarcane growing is very expensive and costly in terms of buying fertilizers, seedlings, ploughing the land, weeding, harvesting and transporting the cane to factory. This is in agreement with Wafula et al. (2010) in a study of agro biodiversity endangered by sugarcane farming in Mumias and Nzoia Sugarbelts of Western Kenya noted that input suppliers in Kenya deducted high and increasing amounts from sugarcane farmers to cover their

costs, not all of which appeared justified, leaving farmers with less income than expected and the less income translates into reduced purchasing power for food stuffs, therefore leading to food insecurity.

The study established that most of the farmers 76.2% indicated sugarcane growing consume soil nutrients leading to soil exhaustion due to over cultivation. This results into low crop yields hence reduced productivity causing food shortage because the soils have lost fertility and no other food crop can be grown. Since sugarcane growing is monoculture in nature therefore the soil looses fertility leading to low food production hence limiting food availability and stability. The findings concur with this study carried out by Spiertz (2013) in a study about challenges for crop production research in improving land use productivity and sustainability in USA revealed that the conditions of biophysical constraints, growing crops that consume soil nutrients to total depletion always cause a challenge in the areas of farming or growing food crops to have limited food supply in families.

The results show that only (33.3%) of the farmers indicated there is no increase of food prices. This is because some farmers cultivate food crops which sustain them for a whole year. Therefore they may not be able to know the prices of food due to food availability in their households. While (66.7%) of the farmers supported that there is an escalating food price because farmers buy food expensively especially after poor harvest of food crops and the last two months before the first harvest season begins which leads to food shortages in most households. This was much in line of the interview with the key informant said that:

"Now day's people of Namulesa buy food from the market, grinding mills and shops at high prices".

The findings show that food prices rise due to high demand for food crops as a result of reduced food crop production. This has worsened the food security prospects of the area as many households have mainly resorted to growing sugarcane than food crops.

The research findings indicated that (66.7%) of the respondents experienced increasing food prices. This was because the supply of food crop production is low since most farmers are mainly involved in sugarcane growing hence creating high demand for food resulting into erratic prices due to food scarcity. These findings

are in line with those of Wiggins et al. (2015) carried out a study on competitive or complementary industrial crops and food security in Sub Saharan Region emphasized that current developments of industrial crops in Sub-Saharan Africa are generally creating problems of pests and diseases which affects more of the food securities in the land. This may lead to variable harvests, volatile prices in market which consequently impacts on food security in a negative direction.

Results show that nearly half of the farmers (52.4%) indicated sugarcane growing creates problems of pest and diseases which affect food production resulting into food shortage. The findings show that sugarcane plantations act as homes for pests such as birds and rats that destroy food crops before harvesting and post harvesting loses leading to low food crop production respectively. The rats continue destroying crops during storage causing more post harvest loses hence undermining food security. This was much in support by the interview with a key informant in Wakalenge village who had sugarcane plantation close to his house said:

> "S*ugarcane plantations are habitant for rats and snakes, many rats invade my house to eat maize in the bag and rats eat my sweet potatoes in the gardens, also snakes kill my goats and chicken".*

The findings show that when farmers fail to control pests through spraying pesticides and use of agro chemicals this results into destruction of food crops hence increasing on food insecurity.

Wiggins et al. (2015) carried out a study on competitive or complementary industrial crops and food security in Sub Saharan Region emphasized that current developments of industrial crops in Sub-Saharan Africa are generally creating problems of pests and diseases which affects more of the food securities in the land. This may lead to variable harvests, volatile prices in market which consequently impacts on food security in a negative direction. This is in line with the current study where (52.4%) of respondents agreed with the statement that sugarcane growing creates problems of pests and diseases which affect food production.

The result revealed that (54.8%) of respondents indicated fire outbreak is not one of the challenges associated with sugarcane growing in relation to food security. The findings show that some farmers have never faced a

problem of fire out break due to constant patrolling, monitoring and security on the farm. While (45.2%) of the respondents indicated fire outbreak is one of the problems facing sugarcane growers. Some farmers their plantations have been destroyed by fire making loses hence resulting into food shortage. This was supported by the key informant pointed out that:

"*Fire outbreaks are intentionally set by enemies of the farmer during dry season to make losses".*

The findings show that sugarcane plantations are burnt by some people who do not wish others well and this result into destruction of large estates hence undermining food security. At times during dry season the sugarcane plantations may be burnt accidentally due to nearby bush burning taking place. This result into farmers making loses hence causing food insecurity.

The findings indicate that (45.2%) of the farmers face a problem of fire out breaks on sugarcane plantations which is set intentionally by enemies of farmers to make loses during dry season and this undermines food stability. These findings are in line with those of Oyugi (2016) in a study on social economic impacts of sugarcane farming on livelihoods and the biophysical environment in Transmara Sub County in Kenya noted the fight which broke out in September 2014 in Shankoe area between the Masai and Luo lasted for longer through burning sugarcane farms covering over 13000 hectares and also stealing sugarcane from the plantations. The strife from the two warring tribes caused a backlog at Transmara Sugar Company Limited everything came to a standstill by burning sugarcane farms, cane trucks and killing plantation farm workers. Ethnic clashes between the two communities during the 1996 and 2007 general elections lasted for almost a month and several properties destroyed and loss of people's lives. At the end of fiasco, Kilgoris was a ghost town, rival communities having been driven out of town, houses and farms torched with no food produce as the area was proved impenetrable hence worsening the food security situation.

The study established that (59.5%) of the farmers indicated sugarcane takes long to mature hence cannot provide for them throughout the year due to its perennial nature causing food insecurity. Sugarcane takes a period of 15 to 18 months before harvesting making it periodical for the farmer to be food secure and this has

worsened the food security situation. This was much in support of interview by key informant who had this to say:

> "*The last two months before harvesting sugarcane, farmers are very poor and food insecure due to many prolonged debts accrued".*

The finding show that sugarcane growing is perennial and does not support the growing of other food crops this has continuously increased on food insecurity. The harvesting is also seasonal therefore the remaining months of the year the farmer is in abject food insecurity.

The study findings indicated that (59.5%) of the farmers stated that sugarcane takes long to mature hence cannot provide for year hence accelerating food insecurity. The findings are in agreement with a research study on contract sugarcane farming and farmers incomes in the Lake Victoria basin of Kenya was conducted by Waswa et al. (2012) concluded that overall, most farmers engage in sugarcane farming to raise income for the education of their children, acquisition of additional property, notably, land and construction of decent family shelters now that thatching grass has been eliminated through conversion of land to farming. Site specific differences in the benefits are also a reflection of differences in the felt needs, general community cultural orientations and education levels. For instance, many farmers earn their income only to exhaust it on re-payment of debts accrued during the more than 18 months of waiting to harvest the sugarcane. Repayment of debts reduces the farmers' propensity to buy or grow food for their own subsistence, hence the persistent food insecurity and malnutrition. As a result, a cycle of poverty is born that continues and end.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter elucidates conclusions and recommendations of the study. More importantly the chapter is vital in showing the extent to which the study objectives have been realized and in the answering of research questions raised in chapter one of this study. The study recommendations and areas of further research.

5.2 Study Conclusions

In view of the findings of this study, the following conclusions were made: Sugarcane growing had a negative effect on household food security among people in Mafubira sub-county Jinja district. This was because much of the land had been taken up by sugarcane growing leaving small plots for food crops. It was also concluded that cash income from sugarcane farming was not sufficient to meet household's food needs especially those owning land less than ten acres. This showed that sugarcane farming was not very beneficial to the farmers with less than ten acres of land since it could not provide for them food throughout the year.

This study has shown that sugarcane growing plays an important role in the livelihoods of sugarcane farmers in Mafubira sub-county, as it contributes to household food security and provides money for purchase of food, acquire more land for food production, paying school fees for the children, access to better health care, constructing decent houses and farmers are able to access agricultural loans to cater for sugarcane production high input costs.

The study has shown that sugarcane growing in Mafubira Sub County has contributed to environmental degradation through encroachment on marginal land such as swamps and forests this has resulted into climate change. As well as accelerating soil exhaustion due to monoculture leading to loss of soil nutrients resulting into reduced crop productivity hence undermines the food security situation.

5.3 Recommendations

In view of the findings of this study, the following recommendations are made in an effort to improve household food security among sugarcane farmers in Mafubira Sub County:

It is recommended that by-laws and policies should be set up regarding sugarcane growing; every household head with less than five acres of land should be reserved for mixed farming to provide food crop production and keeping poultry, piggery, cows to provide manures to increase on crop yields to have food sustainability. Non-edible cash crops including sugarcane, cotton, coffee and cocoa should be grown commercially on the excess land above five acres to ensure steady household incomes for the family. While at the same time farmers should be growing food crops as they wait for their cash crops to mature so that they are food secure.

Farmers should be sensitized to carry out crop diversification by growing high income crops such as tomatoes, water melon, vegetables (cabbage, greens and green pepper), onions, passion fruits, mushrooms, pumpkins, beet root and carrots. This will help farmers to increase on their earnings and improved standards of living as well as growing food crops hence food secure.

The farmers should be encouraged to carry out scientific methods of farming such as intercropping, agro-forestry, use of fertilizers, practice crop rotation to increase on soil fertility and food sustainability. Farmers should be encouraged to plant fruit trees such as avocadoes, mangoes, pawpaw's and jack fruits for nutrition and sell to earn income. This fruit tree act as wind breaks and leaves that fall act as mulch and organic manure to increase on soil nutrients and soil fertility.

Farmers should be encouraged to embrace government policies of Operation Wealthy Creation by enjoying the free high yielding food crop seedlings distributed and cross breed cattle which give more milk and meat as well as fish farming to those surrounding wetlands or swamps. This will help farmers to increase on their earnings and being able to sustain food security.

5.4 Suggestions for further study

Based on the findings of the study, the following areas were suggested for further studies

1. A study should be conducted to establish the relationship between sugarcane growing and household food security among sugarcane growers and non sugarcane growers.
2. A study should be conducted on sugarcane growing and climate change since sugarcane growers destroy marginal lands.
3. A study should be conducted on sugarcane growing and environmental degradation since sugarcane growing increases environmental destruction.

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Appendix A: Questionnaire for sugarcane farmers.

Kyambogo University

P.O BOX 1

Kyambogo, Uganda

2/4/2019

Dear Sir/Madam,

This questionnaire is carried out as part of the educational requirements for the award of a Master of Arts in Geography of Kyambogo University. It is on account that since you are one of the sugarcane growers in this area; you have been randomly selected to participate in this questionnaire. Also remember that the responses given will be used for academic purposes only and that they will be treated with utmost confidentiality. Also remember that the entire instrument is anonymous.

Your positive response will be highly appreciated.

Yours faithfully,

Waibi Mohamedi

Village……. ……. Parish……

SECTION A: DEMOGRAPHIC PROFILE OF PARTICIPANTS

A1 Gender: [ ] Male [ ] Female

A2 Education level: [ ] Primary Education [ ] UCE Education [ ] UACE Education

[ ] Certificate Education [ ] Diploma Education [ ] University Education

[ ] Others specify…….

A3 Age: [ ] 20-29 [ ] 30-39 [ ] 40-49 [ ] 50-59 [ ] 60 years and above

SECTION B: HOUSEHOLD FOOD SECURITY

B1 Do you buy food for your household? [ ] YES [ ] NO

B2 what is your major source of food?

[ ] Market/ shop [ ] Farm [ ] Donations [ ] others specify……

B3 If the major source of food is the market, how many months do you buy food?

B4 Do you have adequate food? [ ] YES [ ] NO

B5 when did you start growing sugarcane?

B6 which food crops can be intercropped with sugarcane without reducing its production?

B7 Has sugarcane farming affected food availability? [ ] YES [ ] NO

B8 If yes how? [ ] Malnutrition [ ] Exclusive breast feeding [ ] High food prices [ ] others specify…… ….

B9 Has sugarcane farming provided you with steady source of income?

B10 Is the income you obtain from food crop sales enough to cater for your needs?

SECTION C: EFFECT OF LAND ALLOCATION TO SUGARCANE GROWING ON HOUSEHOLD FOOD SECURITY

C1 How many acres of land do you have?

C2 How was this land acquired?

[ ] Purchase [ ] Family land [ ] Inheritance [ ] others specify ……..

C3 Do women own land for sugarcane and food crop growing?

C4 How many acres of land do you allocate for sugarcane growing?

C5 How many acres of land do you allocate to food crop growing?

C6 Do you have adequate food? [ ] YES [ ] NO

C7 If not for how long do you experience food insecurity?

C8 what food do you feed on?

C9 what is the state of food security in your household?

C10 How has sugarcane growing impacted on land?

[ ] Deforestation [ ] Loss of wetlands [ ] Soil erosion

[ ] Loss of biodiversity [ ] Soil degradation [ ] others specify……..,

SECTION D: EXPENDITURE OF INCOME FROM SUGARCANE GROWING WITH REGARD TO HOUSEHOLD FOOD SECURITY.

D1 How many acres of sugarcane do you harvest in a year?

D2 How much do you earn in one acre of sugarcane?

D3 how do you spend income you obtain from sugarcane growing?

[ ] Buy food [ ] Education and Health care [ ] Buy land [ ] Buy farm inputs [ ] others specify…… ……..

D4 How do you finance your sugarcane growing activities?

[ ] Own financial resource [ ] Agricultural loans [ ] others specify……..

D5 whom do you borrow from?

[ ] Bank [ ] Sugar factories [ ] Farmers cooperatives [ ] others specify…….

D6 Does sugarcane growing allows farmers to cultivate other food crops?

[ ] YES [ ] NO

D7 If yes what are the food crops you grow?

D8 How many meals do you have a day?

[ ] Breakfast [ ] Lunch [ ] Super

D9 what has been the impact of sugarcane growing on food security?

SECTION E: CHALLENGES ASSOCIATED WITH SUGARCANE GROWING IN RELATION TO HOUSEHOLD FOOD SECURITY.

E1 what challenges do you face as a sugarcane farmer in relation to food security?

[ ] Low prices of sugarcane [ ] Delayed payment by factory [ ] High input costs

[ ] Soil exhaustion [ ] Pests [ ] Food shortage [ ] High prices of food

[ ] Fire out breaks [ ] Long gestation period [ ] others specify……

E2 Does sugarcane growing allows farmers to be self sustaining?

[ ] YES [ ] NO

E3 If not what can be done to make it sustaining?

Thanks for your contributions

s

APPENDIX B: Interview guide to Village Chairpersons of Sugarcane out Growers Association

1 Which crop is mostly grown in this area?

2 Why do farmers mainly grow sugarcane?

3 Do farmers get more income from sugarcane to be food secure?

4 What are the problems associated with the growing of sugarcane in relation to food security?

5 What do you comment on the extent to which the challenges facing sugarcane growing impacting on food security?

APPENDIX C: Focus group discussion guide to sugarcane growers

1 What is the trend of sugarcane growing in this area?

2 How much land do you have?

3 How much land do you allocate to sugarcane growing?

4 How is the land allocated to sugarcane growing impacting on food security?

5 What is the allocation of income from sugarcane growing to household food security in this area?

6 How much do you earn in one acre of sugarcane?

7 How do you spend your money from sugarcane sales?

8 What is the general food security situation in this area?

9 How has sugarcane growing affected food security situation in this area?

10 What are the challenges associated with sugarcane growing in relation to household food security in your area?

APPENDIX D: INTERVIEW GUIDE TO SUGARCANE GROWERS

1 How much land do you have?

1-4 acres….. 5-9 acres….. 10-14 acres…..…..

2 How much land do you allocate to sugarcane growing?

3 How much land do you allocate to food crop growing?

4 What are the most common grown food crops?

5 What is the state of food security to those allocating more land to sugarcane?

1-4 acres……..5-9 acres……10-14 acres……

6 For how long do you experience food shortage if you own land of?

1-4 acres……. 5-9 acres……. 10-14 acres…..……..

7 How is the land size allocated to sugarcane growing influence on food security?

8 What are the benefits of sugarcane growing on household food security?

9 How much do you earn in one acre of sugarcane?

10 How many acres of sugarcane do you harvest in a year?

11 How do you spend your money from sugarcane sales?

12 What are the challenges facing sugarcane growers in relation to household food security?

APPENDIX E: Observation check list

OBSERVE

1Sites and sizes of garden

2 Intercropped gardens

3 Sugarcane plantations

4 Degraded lands

5 Other economic activities on land.