

**EFFECT OF MARKET ACCESSIBILITY ON HOUSEHOLDS' FOOD SECURITY  
IN ACHOLI SUB REGION-UGANDA**

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## **CHAPTER ONE**

### **INTRODUCTION TO THE STUDY**

#### **1.0 Introduction**

This study focuses on the effect of market accessibility on households' food security in Uganda, with particular emphasis in Acholi Sub region, Northern Uganda. In the study, market accessibility is the independent variable while households' food security is the dependent variable. Availability, Accessibility, and Stability are study measures of Households' food security while market accessibility is measured by farmer's Organizations, road network, Information Communication Technology (ICT) utilization, and income as a moderating variable shown in the conceptual framework.

This chapter presents the background to the study, the problem statement, purpose of the study, objectives of the study, research questions, hypotheses, and conceptual frame work, and significance, justification of the study, scope and operational definitions of the terms used in the study.

#### **1.1 Background**

The background is presented in four sections: Historical, Theoretical, Conceptual and Contextual background as guided by Amin (2005).

##### **1.1.1 Historical Background**

The problem of households' food security date back before the 20<sup>th</sup> century triggered by a complex web of factors, majorly civil wars, floods, and drought thus accessing markets was difficult in such devastations. The destruction of infrastructures including communication lines, roads and railway networks resulted into high transportation costs leading to food shortages in the markets and high food prices making it hard to transport or purchase food from the markets (Shaw, 2007). In 1920s, 9 million people died of food shortage in Europe

and more 7 million in East Asia. Between 1970 and 1980, close to 50% of the population in less developed countries suffered food insecurity, and a third of children less than five years suffered from severe malnutrition amidst several food assistance programs at the time (Jenkins, 2001). In 1900s similar death (42,500 people) occurred in Africa due to lack of sufficient food (Boon, 2009) as food supply was very low and food prices were very high. Only organized farmers benefited from the escalated demand and high food prices.

World over, the situation was worse, household food insecurity as a result of low market access was noted in Ireland in 1945 when food was shipped to England away from Ireland because prices were so high and only the people of England could afford purchasing food at such high prices (WIT, 2008). In 1941 between 100,000 to 200,000 people died of hunger in Greece and Bangladesh as farmers could not deliver foods to the markets especially as individuals (Kesternich et al., 2012). Consequent to the challenges of accessing markets and severe food insecurity, many farmer organizations were formed worldwide. In 1917/18 and 1919, the Board of grain supervisors and the Canadian Wheat Board was formed in Canada to aid in marketing of grains (Champ, 2002).

Africa just like in other continent, household food insecurity was mostly a result of low income, poor road network, farmer's Organizations and communication that reduced exchange entitlements and hiked the prices of foods in many African countries such as Angola, Liberia, Zaire, Sierra Leon, and Mozambique. Many farmer organizations closed down with political instabilities especially in the 1970s and 1980s (FAO, 2013). In Ethiopia, the 1970s' Wollo famine worsened the situation by increasing households' food insecurity as people could not access foods from the market (Devereux, 2002). In 1990 for example, most of the African countries scored low (20 –40 of foods index) in the Global Food Index report (IFPRI, 2012), and by the beginning of 2005, more people were affected by household food

insecurity. While other International agencies such as World Food Program and other organizations/institutions were providing food aid to food insecure households, the problem of household food security remained unsolved (Shaw, 2007). The increase in food prices required farmers to have stock and join farmer's Organizations to access major markets. In this regard market information become extremely very important to many organizations and institutions especially in 2007-2008 in determining households' food security (FAO, 2014). This called for organization of farmers for easy market access to improve food security. In Serbia the first cooperative association was formed in 1946, 1904 in Bosnia (Zivkov, 2013).

Although in Uganda, food aid and other assistance were available to the households during war times, food aid rations were limited in dietary calories (Nkutu, 2008). Distribution of this food aid was also affected by poor road network and improper communication for timely deliverance of food to the distribution points. In Northern Uganda, the 25 years LRA insurgency forced over 2 million people in internally displaced camp (IDP), destroyed the infrastructure network, and paralyzed socio-economic activities including farmer organizations. As a result household food insecurity intensified due to lack of income, poor road network and lack of communication systems.

In Acholi sub region, as LRA civil war forced people into IDP camps, families abandoned their land, agricultural production and farmer's Organizations were either diminished or destroyed. Households' were allowed to visit their farms on few occasions under serious protection and surveillance. In the absence of farmer's Organizations, traditional farming practices changed from agriculture and livestock keeping to dependence solely on food aid by organizations such as the world food program and other agencies, which was inadequate for households' food security (Nkutu, 2008).

Subsequently, the size and quality of food aid rations in Acholi Sub region composed of cereals, beans and vegetable oil tremendously declined. This created severe household food insecurity. By 2007, over 80% of the households could not afford to meet adequate food consumption as markets were not accessible due to low income, poor road network, fewer farmers' Organizations and ICT adoption was still low by then (Nkutu, 2008). For example between 1998 and 2008, the number of fixed internet subscribers in Uganda was only 22,000, and by 2004 only 25% of the population used either private or public phone services (Mulira et al., 2010). Although households resorted to reducing the number of meals per day as a way to solve household food insecurity, the problem of household food security persisted to date.

### **1.1.2 Theoretical Background**

The theoretical views of food security gained ground from Malthus theory "An essay on the principle of population" in 1798. Malthus asserted that food shortages arise from an imbalance in nature, where growth in population surpasses food production given that natural resources are fixed and subject to diminishing returns (Malthus, 1798). The theory can however be criticized for ignoring the role of technology and application of modern inputs which according to Dreze & Sen (1989) are significant in boosting production and food security. The theory may also be irrelevant in the present situation where some areas suffer hunger and food insecurity amidst high food production.

While the theory does not give answers to why food insecurity exist amidst high food production (Kwon, 2012), Malthus's theory became a cornerstone in understanding the causes of hunger and food insecurity. In 1977, Sen developed a Food Available Decline (FAD) approach as an explanation for food shortages and hunger. Sen shows that food shortages mainly arise due to decline in available foods (Pattanaik, 1991).

In 1981, Sen's view on causes of hunger and food shortages changed from Food Available Decline (FAD) to Failure of Exchange Entitlement (FEE). Sen's theory of entitlement is described as E-mapping conceptualized on production entitlement, exchange entitlement, and transfer entitlement. While Sen did not completely drop the idea that famine is a result of FAD, he much asserted that famine is a factor of access and thus an exchange decline degenerated by food available decline and inadequate food distribution, constrained by a number of factors including inadequate infrastructure. He suggested that

Sen further suggested that the effect of famine differ according to the level of income and socio-economic groups. For example the poor are more likely to suffer more from famine than the rich because of low purchasing power as a result of low income. This is however contended by Kula (1989) that even the rich starved and suffered from hunger during most of the famines mentioned in the theories.

While Sen highly believed that famine and food shortages are caused by failure of exchange entitlements, and markets provide an avenue of distributing food, availing household income, and improving food security (Tembo,2009), the concepts of market accessibility and households' food security are not directly embraced in the theory. Further, the theory did not recognize the role of collective social organizations like farmer organizations in improving food distribution and access to food as emphasized by Dreze & Sharkey (2011) in their model of the determinant of food access and households' food insecurity.

The model of determinant of food access shows that households' food insecurity is higher in rural households, households with low collective social functioning and social capital, households with a membership to a minority group, households with low income, and low education (Dreze& Sharky, 2011).

Considering the conceptual relationship of the dependent and independent variables the study will be guided by the model of food insecurity and determinant of access to food resources (Sharky, 2011), and Sen (1981)'s theory of entitlement as both theories assert that household food insecurity is a consequence of lack of access to food due to low income, infrastructure, and collective social functioning.

### **1.1.3 Conceptual Background**

The study is conceptualized on the effects of market accessibility on households' food security. Market accessibility is the independent variable while food security is the dependent variable.

#### **Market Access**

Traditionally, the concept of market access was viewed from an international angle. It was defined as the extent to which a country permits imports under different conditions focusing on tariffs and non tariff barriers including regulations of import services. Nevertheless, recent developments view market access beyond trade policies (Hugo, 2006). For example, Mugambi (2013) define market access as the capacity of households to reach a given market, indicated by storage facilities, rules and regulations, market information, transportation and transport facilities, road type, time, and distance. In support, IFEMA (2011) shows that the market is accessible when there is availability of infrastructures, market information. Jordan (2011) looks at market access in terms of physical access to the market measured by transportation cost/transaction costs, and consequences of remoteness.

#### **Farmers' Organization**

Farmers' organizations are farmers' groups with well defined membership aimed at linking their members to the outside world (Collin and Rondot, 2001). Nyang et al., (2010) define a farmer organization as a privately formed association or group of people organized by its

members for social economic needs and aspirations of its members based on transparency, democracy. Farmers' organizations are categorized into farmers associations, unions and federations, pre-agricultural cooperatives, and Farmers' groups with a general assembly (IFAP, 1992). Farmers' organizations offer several support to their members including collective production and marketing services like supply of farm inputs, processing of agricultural products, providing market information, and marketing of agricultural output (Stockbridge et al., 2003).

### **Road network**

Rijn (2005) relates road network to accessibility. A road network is accessible if it is well located, connects to centers, takes an appropriate time, and requires minimal cost to reach the centers. Meanwhile Asif (2012) describe a road network as a system with greater measured in terms of cost, time, and length.

### **ICT utilization**

ICT is defined as tools that “capture, store, process, share, display, protect, and manage information” (Amy, 2012). ICT includes technologies such as; radios, internet, GIS, computers, and cell phones are used for collecting, editing, storing, and dissemination of information in different ways. In this study ICT is limited to radios, computers, and phones used to access markets by acquiring and transferring market information from one source to another (Mhlanga, 2006).

### **Household income**

According to Amanda (2014, 1), household income refers to income received from all household's members of 15 years and above irrespective of the relationship to the family head. (ILO, 2004), defines household income as the total sum of all monetary and in kind receipts received by a household annually or frequently from sale of goods and services excluding irregular or wind fall receipts. Household income is measured by a number of

variables including household consumption expenditure, investment, and savings (FAO, 2011).

### **Food Security**

The world Food Summit report of 1996 define food security as “ A situation 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” (FAO, 2002). The definition takes care of all the four dimensions of; Availability, Accessibility, Stability, and Utilization. However in this study only availability, access, and stability will be the only key measures for household food security.

### **Food availability**

(FAO, 2011) defines availability in terms of sufficient quantities of food of suitable quality, supplied through domestic production or imports, including food aid. Kracht (1981) defines sufficient as enough food for life, health and growth of the young and for productive effort. Shn (1989) also defines sufficiency food, as that, which is enough to supply the energy needed for all family members to live healthy, active and productive lives. Food availability at household level it includes foods from owns production and that bought from local markets (Oxfarm, 2010). Mahadevan & Hoang (2015) however note that availability of food in markets only benefits those with economic means to purchase it.

### **Accessibility**

Demetre et al., (2011), defines access as the households’ ability to acquire enough food of sufficient quality that meets all its household members’ nutritional requirements for an active and productive life. Food accessibility refers to one’s ability to access sufficient resources (entitlements) to enable him or her get the right foods for a nutritious diet ( FAO,2011). WFP (2009) also defines food access as the ease at which a household can frequently obtain the

right amount of food from production, trade, borrowings, food assistance or gifts. Thus food access can be looked at in terms of physical, economic/financial, and socio-cultural dimensions.

### **Stability**

The World Food Summit (1996) says that stability must be present “at all times” in terms of availability, access and utilization for food security to exist. Kuwornu (2013) refers stability to stability in supply of sufficient food throughout the year.

### **Utilization**

(FAO, 2006) Utilization refers to adequate utilization of food through adequate diet, clean water, sanitation and healthcare to reach a state of nutritional wellbeing where all physiological needs are met. Food utilization implies proper biological utilization of food Kuwornu (2013).

#### **1.1.4 Contextual Background**

As food prices rose sharply between 2006 and 2011, the issue of feeding the world came to the forefront of both the development and the international trade agenda as reflected in the new post-2015 sustainable development agenda.

By 2050 the world’s population will reach 9.1 billion, 34 percent higher than today. Nearly all of this population increase will occur in developing countries where there are poor road networks, ICT infrastructure and low income. Urbanization will accelerate, with about 70 percent of the world’s population expected to be urban compared with 49 percent today. The market demand for food will as well escalate. For example the demand for cereals will increase from 2.1 billion tones (2009) to 3 billion tones in 2050(FAO, 2015). Smallholder farmers will need to be organized for better and informed decision making, access to improved inputs, information, and extension services (Farming First, 2012).

According to FAO-UN, 2015 – 16 page 8, global markets are often segmented, with implications for the potential destinations of traded commodities. For example, the rice market is segmented along regional lines, with the bulk of trade occurring in the developed countries. The soybean market and the more complex cattle markets are also notable for the absence of low-income countries, reflecting these countries' limited market access of such higher-value food products.

The same report shows that Southern Asia is facing major problems in accessing markets for food. While farmer organizations play a significant role in accessing markets by increasing income and nutrition, the growth and performance of farmer organizations is still inadequate. In Serbia, only 39.7% of farmers have membership to agricultural cooperatives. The performance of cooperatives in Bosnia and Herzegovina is also poor. Only 20% of the cooperatives make profit, 30% operate at a loss, and 50% are at breakeven (Goranzivkov, 2013). The poor performance of farmer organizations has contributed to low income and households' food security due to low market access. In Venezuela, 80% of the population cannot afford the basic local food consumption basket, and 39% of the population eats only two or less meals a day due to low income OVS (2015). A survey conducted by CFSVA 2008 in Cambodia revealed that one in five rural villages has no market, which makes selling of food in the market and purchasing of food and farm inputs very difficult and costly contributing to household food insecurity. The report shows that in Canada, 71.6% of households cannot afford to purchase food in the market (Tarasuk, 2012), while 40.9% of American households are food insecure due to limited access to the market (USDA, 2014).

In Africa, the situation is not any different, the greatest food security challenges overall remain low access to markets and limited physical and distributional access constrained by sluggish income growth, poor ICT utilization, inadequate farmer organization, and road

infrastructures (Mawazo, 2012). For example, 500,000 people in Mauritania cannot access and maintain their food consumption basket (Kieran, 2015). In Cairo, 25% of the population, 43% in Egypt and 55.8% in Liberia are food insecure due limited market accessibility and high transport cost (IFPRI, 2013). Farmer organizations are also inadequate. In Egypt agriculture cooperatives contribute only 32% to the global market share. Farmers face challenges accessing market information, and farm inputs due to weak transport infrastructure (ILO, 2013). In Ghana, only 13% of farmer organizations are involved in marketing, and 24% support farmers to access farm inputs (Asibey-Bonsu, 2012).

In Malawi and Ghana, poor road infrastructure and ICT are cited as a key obstacle to food security (Tembo & Simtowe, 2009; Yaro 2013). Global Information and early warning report of July, 2015 listed Kenya, Uganda, and South Sudan among 29 African countries that suffer from lack of access to food, which is a key indicator of food insecurity. As a result, food availability remains low, even though energy and protein supplies have improved. Food utilization remains a major concern, as indicated by the high anthropometric prevalence of stunted, underweight, overweight and obesity children less than five years of age. The region continues to face challenges in improving dietary quality and diversity, particularly for the poor. The stability of food supplies has deteriorated, mainly owing to political instability, war and civil strife that limit market access.

In Uganda, although the government is working together with different agricultural organizations such as NARO to achieve food security in the country through different policy frameworks such as the National Agriculture Policy (2013), Agriculture Sector Development Strategy and Investment Plan (2010/11-2014/2015), Food and Nutrition Policy (2006) and Uganda Food and Nutrition strategy (2005), low access to markets especially in rural areas

remains a major constraint to household food security. For instance, 66% of the households in Uganda face food insecurity due to market inaccessibility resulting from inadequate sluggish income and high transport cost (Owino, 2014). Households' participation in farmer organizations is also very low (16.2%) resulting into low income, low productivity, and food insecurity (Adong et al., 2013). According to the UN FAO (2015, 50), 25.5% of the population in Uganda is undernourished. About four in every ten persons (38%) in Uganda are food energy deficient, and 9% of these consume one meal a day UNHS (2014).

According to the Global food security index report (2015) Uganda scored 79 out of 109 of food affordability. The report adds that 78% of the population lives far away from the market center and 25% from a nearby market (Douglas & Richard (2010). While there is an improvement in the number of paved roads, 3489.6 is still low compared to the rest of the countries in the East African Community except Burundi (UBOS, 2014; EAC, 2012).

The Poor road networks not only affects transportation costs, but also limit access to market information and thus low utilization of ICT. Sekabira (2012) observes that only 22% of the farmers in Uganda with ICT use it for market information services. Utilization of mobile phones to access market information is low (23.92%) while utilization of internet to access market information is still insignificant.

According to Mercy corps (2015), Acholi sub region is characterized by poverty and food insecurity. Majority of the districts are distant from the market with poor road network. Despite initiatives to increase income and access to markets, food security in the region have remained low. In Amuru district for example, 48% of the population is food insecure (FANTA, 2010), in spite of being nearly self sufficient in rice production\_1,700kg/acre (ACF, 2014). Food exports to Sudan leading further limits food availability in the region by escalating food prices. Access and food stability is also unreliable because of low

households' income and climatic changes (IPC, 2014). Road infrastructure in rural areas is also still inadequate, constraining transport and access to market information. As a result, the local people cannot easily access the market to sell or purchase foods which also affects the performance of farmer organizations. By 2013, only 23.5% of the households in Acholi sub region had membership to a farmer organization.

Okello(2011) further observed that access to markets for smallholder farmers is greatly influenced by availability of market information such as Information Communication Technology (ICTs) facilitated system like mobile phone SMS to farmers, produce marketing group, strategic marketing billboard with market information, radio talk show, and other ICTs tools. Lack or asymmetry of market information is thus considered to be one of the major constraints to smallholder farmers' access to markets (Okello, 2011). Up-to-date or current market information enables farmers to negotiate with traders from a position of greater strength.

## **1.2 Statement of the Problem**

For long, food security has been documented as a prime determinant of a healthy life, influencing all aspects of society including education, health care, and agriculture. In 2014, it was integrated into the Sustainable Development Goals for the post- 2015 development agenda (FAO, 2015). Studies indicate that accessing markets promote food security by distributing food from areas of abundance to deficit, hence availing households with income and access to a variety of nutritious foods at all times (Hugo, 2006; Tembo, 2009). Nevertheless, while 95% of the population in Acholi Sub region is engaged in agriculture, with a high potential for trade within and outside the region for sustainable households' food security, it is still unknown why the population continue to experience food insecurity. For

instance, 12 percent of the households in Acholi Sub region experience stress food insecurity with high levels of malnutrition (30 percent stunting, 18 percent underweight, and 7 percent is wasting) (IPC, 2014). Households eat one meal in a day with limited dietary diversity (FANTA, 2011; IPC, 2014). According to ACF, 2014; Mercy corps 2015, accessing markets in Acholi sub region is fueled by a number of factors including poor road net work, high transport cost, and inadequate and unreliable market information.

Without a solution to increase access to food at all times, the state of food insecurity in Acholi Sub region will continue to exist. Improving market access perhaps is a possible solution to food insecurity in Acholi sub region but currently, little if any, research has been done in Uganda specifically in Acholi sub region to investigate the effects of market accessibility on households' food security. In order to understand the effects of market access on households' food security it is imperative to conduct a study in Acholi sub region on this subject, and this forms the basis for this study.

### **1.3.Purpose of the study**

The purpose of the study is to examine the extent to which market accessibility influence households' food security in Acholi Sub region-Uganda.

### **1.4 Objectives of the study**

Specifically the objectives of the study are too;

1. Establish the effect of farmers' organizations on households' food security in Acholi Sub region
2. Investigate the effect of road network on household food security in Acholi sub region.
3. Establish the effect of ICT on household food security in Acholi sub region

4. Examine the effect of households' income on household food security in Acholi sub region

### **1.5 Research Questions**

1. To what extent is food insecurity in Acholi sub region due to inadequate farmer' organizations?
2. To what extent is food insecurity in Acholi sub region due to poor road network?
3. To what extent is food insecurity in Acholi sub region due to low utilization of ICT?
4. To what extent is food insecurity in Acholi sub region due to inadequate income?

### **1.6 Research hypothesis**

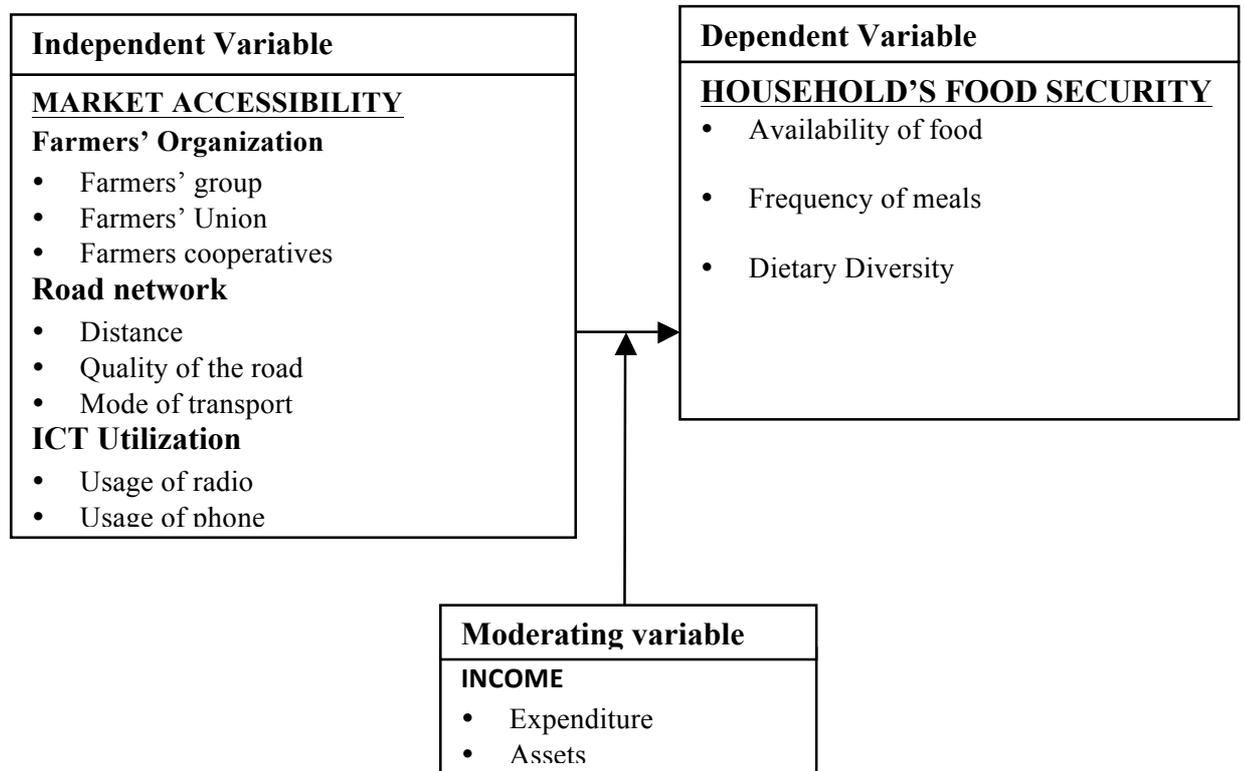
The study will be centered on the following research hypothesis;

1. Food insecurity in Acholi sub region is due to inadequate farmers' organizations
2. Food insecurity in Acholi sub region is due to poor road infrastructure network
3. Food insecurity in Acholi sub region is due to low utilization of ICT
4. Food insecurity in Acholi sub region is due to inadequate households' income.

### **1.7 Conceptual framework**

The study is conceptualized on the premise that household food insecurity in Acholi sub region depends on the extent of households' access to markets as described in the figure below;

**Diagram 1. Conceptual framework illustrating the effect of Market accessibility on Households' food security**



Source: Drawn by the researcher with the knowledge of Sharky (2011) and Sen (1981)

As indicated on the conceptual framework, households' food security is determined by the extent to which households access to input and output markets. Accessibility to markets enables households to supply food in the market exposing households to variety and sufficient foods and inputs at cheap prices at all times. Accessing markets may require membership to farmers' organization, adequate road network, and ICT utilization. Nevertheless, both access to markets and household' food security are influenced by households' income.

### 1.8. Significance of the study

Empirical results and study recommendations will be used by policy makers to formulate new policies. The study will therefore benefit both government and local leaders in making informed decisions. Furthermore, study recommendations will guide all market stakeholders

including farmers in Acholi sub region on how to improve market access for sustainable food security.

Not so much research has been done to establish the effects of market access on households' food security in Uganda, specifically in Acholi sub region. The study findings and recommendations will therefore act as a reference for future research in the studied area.

The study will further enable the researcher to acquire a doctorate of philosophy in Economics from Mbarara University.

### **1.9 Justification of the study**

Many regions continue to suffer from food insecurity and its effect yet food is in abundance and wasted in other parts of the country. About 40% of the food is wasted (Ruhunda, 2012), meanwhile 25.5% of the population in Uganda is undernourished (FAO, 2015). While the problem of food insecurity is general, the northern region suffers the greatest prevalence of food insecurity compared to other parts of the country. About 54% of the population in the North is energy deficient (UBOS, 2013) and 12% of the population in Acholi Sub region is food insecure (IPC, 2014).

The study falls suit at a time when the global population is predicted to grow by 2.3 billion between 2009 and 2050, requiring an increase in overall production by 70% and market demand is expected to grow with the increase in urbanization from about 49% to 70% (FAO, 2015). While the market is predicted to be a major coping mechanism for food shortages, market accessibility is constrained by low income, inadequate road network, and low utilization of ICT tools.

Acholi sub region is particularly selected because compared to other Northern Sub regions; it was more affected by the LRA insurgency. Besides, while the region has a high potential for agricultural production and trade it is vulnerable to low production, and economic activities.

## **1.10 Scope of the study**

### **Content scope**

The study will focus on examining the effect of market accessibility on households' food security, a study of Acholi sub region in Northern Uganda. Specific areas of analysis shall include the effect of; farmers' organizations, road network, and ICT utilization on households' food security in Acholi sub region. While the definition of food security is grounded on four dimensions (Availability, Access, Stability, and Utilization), in this study, Utilization will be excluded in defining households' food security.

### **Geographical scope**

The research will be carried out in Acholi Sub region in Northern Uganda. Acholi Sub region lies in the center of the northern part of Uganda, bordered by South Sudan in the East, Lango in the South, and West Nile in the West. Acholi sub region is composed of 8 districts; Gulu, Kitgum, Pader, Agago, Lamwo, Amuru, Nwoya, and Omoro districts (MowT, 2012). The study will however cover only 4 districts (Gulu, Kitgum, Lamwo, and Amuru), mainly affected by food insecurity (IPC, 2014).

### **Time scope**

The study will cover the period 2007 to 2017, a period of reliable peace since the NRA government and LRA peace talks in 2006. It is also a period of considerable reconstruction in northern Uganda.

### **Operational definitions**

#### **Market Accessibility**

In this study market access refers to the ability of a household to have both physical and economic access to input and outputs market to sale or buy food/farm inputs. Market

accessibility is measured by the ability of a household to access the market through farmers' organizations, road network and ICT tools.

### **Food Security**

Food security in the study refers to a situation when all households in Acholi sub region have physical and economic access to sufficient variety of nutritious foods in the market at all times for a healthy and active life. Households' food security will be measured using a multidimensional approach, indicated by availability of food, dietary diversity, and frequency of meals consumed by a household in a day. The multidimensional approach will minimize the possibility of understating the proportion of households that are food insecure if one indicator is used (Mahadevan& Hoang (2015); Maxwell et al, 2013).

### **Farmers' organization**

In the study farmers' organization refers to any farmers' group formal or informal with registered members and well defined objectives including achieving market access and households' food security. Membership to a Farmers' group, Farmers' Union, and Agriculture cooperatives will be key indicators of farmers' organizations in Acholi Sub region.

### **Road network**

In the study road network refers to a road system described by good quality roads with accessible connections to towns/centers. Road network is therefore measured by distance, mode of transport, and nature of the road.

### **ICT utilization**

In the study ICT utilization is defined as the application of information technologies to access market information, make market transactions including mobile money services, and reach out to clients. This will be measured by usage of radio, computers, and phones.

## **Households' Income**

In the study this refers to total sum of monetary and in kind receipts received frequently by all household members above 18 years. Household expenditure and assets easily converted into cash (domestic animals, and domestic birds) will be used to measure households' income.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this chapter, literature on market accessibility and households' food security is reviewed. Specifically the chapter reviews literature on study theories, the effect of farmers' organization, road network, ICT utilization, and households' income on households' food security.

#### **2.2 Theoretical Review**

Theories are very important in framing the study. They guide in identifying research questions and hypothesis, which shape the methodology of the study for data collection (Creswell, 1994). On this note, the study will be guided by Sharky (2011)'s model of access and the entitlement theory (Sen, 1981).

##### **The theory of Entitlement**

The theory of entitlement was developed by Sen (1981) in his book "poverty and hunger". According to the theory, while people are entitled to production resources, inheritance and transfer, trade and own labour entitlements, food shortages arise mainly due to decline in exchange entitlements due to a number of factors including under developed infrastructure and limited income given differences in physical and natural endowment.

Sen believed famine can exist amidst food availability as long as an identifiable group of people have limited access to available food or suffer a food exchange failure. The theory recognizes the role of infrastructures and social systems in food distribution. Nevertheless, accessing markets and thus households' food security is constrained by low purchasing power due to low income resulting from poverty.

Over years, Sen's theory of entitlement has attracted a lot of interest and criticism among different researchers. For example, while Sen (1981, pg 75-78) believe that income highly determines one's level of entitlement and hunger, Kula (1989) contend that famine can also occur in periods of high income as long as there is no food to buy. De Waal (1989) also notes that poverty has not got a significant relationship with famines. Osmani (1993) also shows that choices of people's entitlements depends more on one's test and preferences and not necessarily income.

(Anderson & Cook, 1999) adds that achieving food security is a holistic approach. It requires having consistent safe foods available in stores, acceptability of food sources and anxiety of food availability or supply. An analysis of households' food security should therefore consider both demand and supply factors.

### **Conceptual model of Determinants of access to food resources**

Developed by Sharkey (2011), the model of food insecurity and determinants of access to food resources is conceptualized on factors determining access to food and how these affect household food security. According to the model, access to food and therefore food security depends on personal characteristics, the context of residence, and perceived social functioning through plausible intervening variables like distributional economies, reciprocal economies, and access to food programs. The theory also gives an insight to the role of income in determining access to food and households' food security.

The aforementioned theories however lacks a connection of market accessibility to households' food security despite the role markets play in promoting access to food and households' food security. Further, the contribution of organizations and infrastructures like road network and ICT is not adequately documented yet are decisive in influencing access to food in the food supply chain.

## **2.3. Review of Empirical Studies**

### **Effects of market access on food security**

Globally, empirical evidence on the effect of market access on food security has been ambiguous, making the area more interesting. A study by Oxfam (2015) on market access and food security in the central region of Colombia found that producers with market access have higher levels of food consumption, sell more output to a wide range of channels, experience more income, and are able to grow more food compared to those with no or limited access to markets. A study by the WFP (2009) state that participation of households in the market depends on the level of market access indicated by factors like infrastructures, income, and access to market information. Accordingly, recent studies have shown that improvements in market access increases agricultural productivity and efficiency (Sanjaya, 2011). Rural farmers with better market access and more favorable agro-ecological conditions can more readily grow higher-value crops hence ensuring food security (Benin et al., 2007).

A study on food security and market assessment in the crisis areas of North-West Frontier Province (NWFP) and Federally Administered Tribal Areas (FATA) in Pakistan revealed that about 50% of the traders experience low sales volume and high crop wastage because of the difficulties faced accessing markets mainly due to high procurement prices, and transport costs. In addition, the study discovered that half of the population surveyed does not eat adequately and 1.3 million out of 6.3 million face severe food insecurity because of failure to obtain food in the market (WFP, 2010).

Nonetheless, study conclusions on food security are based on the effects of transport cost and prices which only cover part of the indicators of road network, and therefore are not sufficient in determining market access. Including factors such as ICT and income in studying market access can give a broader understanding of market access and food security.

According to Mawazo et al., (2012), ICT enables farmers to reap from escalated market prices by increasing their bargaining powers and access current market information. On the other hand, income facilitates market access and boost purchasing power (Webb et al., 2006). Including ICT and income in analyzing market access and household food security enhances a broader understanding of the effect of market access on household food security.

Another study in Thailand, on market access and agricultural productivity in Doi Inthanon villages revealed that market access positively affects input use and agricultural productivity given an increase in infrastructure development. The study was carried out on 69 farms from five villages by analyzing the 1996/7 to 1998s production seasons (Angella & Mathius, 2002).

While productivity is a component of household food security (Dreze, 1989), the study gives no connection of market access and household food security. Agriculture productivity is a necessary but not a sufficient condition for household food security (Headey, 2011). Besides, the survey data of 1996-1998 used in the analysis is rather old for the current situation. The relevance and applicability of study conclusions in the present situation may therefore not be certain.

In the United States, a study by Charlotte & Kristin (2010) on the role of markets and trade in food security suggest that markets play a great role in increasing production, and access to food by redistributing food from areas of deficit to surplus through trade, which minimizes the effects of scarcity on price volatility and food security. Meanwhile it is true that markets distribute food from surplus to deficit areas, availability of food in the market does not guarantee food access by all households.

Brown (1992) shows that access to food can be limited by inadequate information even amidst high income levels. FAO (2011) suggest that for a person to have access to food, he or

she should have the ability to access sufficient resources (entitlements) to enable him or her get the right foods for a nutritious diet. Furthermore, although the report gives relevant future insights on market and food security, its conclusions and recommendations relies on secondary data from various publications subject to a number of errors generated in the process of conducting and analyzing the studies (Nate, 2015). In addition, the report was developed in context of a developed country imposing a need for a study based on primary data in the context of a developing country.

Anderson (2006) by examining market access and food security dilemmas of developing countries shows that, wealth countries are more food secure and are benefiting more from produce markets facilitated by government support in infrastructure and subsidies in rural areas. While the study report identified infrastructure and subsidies as key constraints to achieving food security, it ignored the role of ICT in achieving household food security despite its role in facilitating market access (Mawazo et al., 2012).

Another study in China by Fung Zhong( 2001) on the impact of market integration on china's food security based on a secondary analysis of data from 1965 to 1998 showed that market integration enhance food security through reduced transportation cost. The first limitation of this study is reliance on secondary data which makes it unreliable (Nate, 2015). Secondly the study is too old for one to maintain the study conclusions. The relationship between market access and household food security was also not directly observed.

In Africa, a study by Chamberlin(2011) found that a number of small scale farmers in sub Saharan Africa suffer from challenges of market access due to high levels of remoteness, poor access to information and high costs of marketing. Conversely farmers face low demand for their output, and high input cost leading to low production. Unfortunately, the above arguments are drawn from a study in context of a developing country; study setting and

applicability of results differ in context of a developing country (Myers, 2000). Further, the effect of such challenges on household food security was not directly observed.

Tembo (2009) in his study on the effect of market access on household food security in Malawi observed that improved access to market through reduced cost improves access to input and output markets, resulting into improved household food security. In the study, food security was measured by caloric intake. Nevertheless, According to FAO (2011) the definition of food security is holistic. It includes all the four dimensions (Availability, access, stability, and utilization). Caloric intake alone does not therefore adequately measure food security.

Dreze and Sen(1989) also shows that the link between caloric intake and nutritional wellbeing depends on a number of factors. In addition, the study gives a narrow scope of content in describing the determinants of market access, subjecting it to bias. While road network is a good indicator of market access, other factors like income and ICT would give a better understanding of market access. For example WFP (2009) asserts that inadequate information may undermine availability of food in the market. When information is inadequate, farmers are exploited by buyers and traders.

In Tanzania, Aloyce (2014) in an evaluation study on the impact of National Agricultural input Voucher Scheme on productivity and food security of smallholder farmers conducted on 300 farmers, revealed a positive correlation between the input scheme, productivity, and food security. Although the study is valid in the present context, the sample of 300 farmers is inadequate to give reliable national conclusions. This implores a need for a more representative sample, specifically on market access and household food security.

Another study in Kenya on the impact of market access on input use and agricultural productivity in Machakos on 100 farmers revealed that increase in market access increases productivity although large farmers benefit more(Kamara,2004). The study ignored the demand side, and the sample size was rather too small to generate conclusive results, indicating a gap for another study.

In Uganda, a study by ACF on food security and livelihood conducted on 402 households in two districts of (Otuke and Lira) of Lango Sub countries in Northern Uganda found that food insecurity is high in remote and market inaccessible areas indicated by frequency of meals and low household dietary diversity due to long distances from the market. Although the study draws some conclusion on market access and household food security, it does not give a detailed connection and understanding of the effects of market accessibility on household food security, a gap this study intends to cover.

### **Effect of farmer organizations on household s' food security**

A study on farmers' organizations in Guinea found that farmer organizations promote households food security by providing avenues to smallholder farmers to access the market, the study further found a positive correlation of membership to a farmer organization and increase in households income. The study further revealed that farmer organizations are capable of increasing productivity (Tolno et al., 2015).

According to ILO (2013) agricultural cooperatives improve income and households' food security. In Western Cameroon, cooperatives improved annual households' income and food security from US\$430 to US\$3,000, and access to quality food from 14% to 76% in the same period. In Egypt, 4 million people derive their income from cooperative activities.

A study on five farmer marketing organizations in Uganda, Kenya, and Tanzania found that farmer organizations improve food security through improved market access. Accessing the

market enable farmer organizations' members to generate income, reduce post harvest waste and losses which are key in achieving households' food security (Nyang, 2010). Further, rural farmer organizations through facilitating access to farm inputs and market information contribute to households' food security (FAO, 2013).

Nonetheless, another study by zivkov(2013) found that the performance of farmer's organization is still inadequate. In Serbia, only 39.7% of farmers have membership to cooperatives and in Bosnia and Herzegovina 30% of the cooperatives are making losses, 20% make profit, and 50% have breakeven. In Uganda, only 16.2% of the households are registered to a farmer group and only 23.5% in Acholi sub region (Adong, 2013).

### **Effects of road network on households' food security**

A study by Africa Development Bank (2011) on infrastructure and agricultural productivity in Africa shows that agricultural productivity is highly dependent on good road network that link farmers to food and input markets. Well-developed infrastructure reduces the transportation cost and depresses food prices by encouraging movement of food from surplus to areas of deficit.

The study recommended increased investment in maintenance and construction of roads to facilitate market access cost. Nevertheless, the study was based on a narrow subject scope by only looking at the supply side, ignoring the effect of road network on consumption, hence household food security. According to Tembo (2009, page 2), Poor road network translates into long distances and high transport cost which results into high input and food prices, reduced purchasing power, and thus household food insecurity. The study recommended Policy makers to encourage policies that increase market access such as road rehabilitation and maintenance policies for increase in household food security.

Yiridoe, Bonti-Ankomah, & Martin (2005) emphasize that to achieve food security households should have sufficient availability and adequate access to physical food supplies through their own production, market or other sources, and that those food supplies be appropriately utilized to meet the specific dietary needs of individuals. While the study is relevant and valid in understanding market access and household food security, emphasizing distance as a major proxies for market access limits it in scope.

Chapoto(2011), shows that distance has got a weaker effect on farmers access to market but significantly affect access of farm inputs. The accuracy of the study results is also questioned on use of secondary data obtained from the National Integrated Household Survey of 2004, which is subject to various methodological errors and biases. Conducting a cross section study design based on primary data is ideal in minimizing survey errors. Further, incorporating other proxies of road network like means of transport broadens the study scope and makes it conclusively reliable.

Another study by Valerija et al., (2006) on road infrastructure and regional development in Croatia, shows that the effects of road infrastructure on development are both direct and indirect. Direct effects include reduction in transport cost resulting from low fuel consumption, use of better means of transport, improved regional access, and movement, translating into improved productivity. Indirect benefits of improved road infrastructure include bulkiness of transported output, increased competitiveness, reduced size of transport cost, and reduced travel time. Although the study indicated that improved road infrastructure improves supply flows by reducing travel time and cost, the study ignored the role of road network in enhancing household food security through increased access to food and input markets. Despite the fact that hunger one of the indicators of socio-economic development.

In Kenya, one of the major causes of food insecurity in Kenya is underdeveloped road network. Food is not easily distributed from surplus to deficit points as farmers are unable to access markets resorting to selling to middlemen at farm gate prices (Emagoror, 2014). Tanga et al., (2014) study on the impact of improved road infrastructure on the livelihood of rural people in Lesotho, using a sample of 300 respondents found that improvement in road network enable people to access scarce services from areas of abundance through reduced costs and time to the main centers.

Limao(1999) in his study on infrastructure, geographical disadvantage and transport cost found that reducing transport cost significantly affects trade flows. When transport cost reduces by a half, trade volume increases by 5 digits, an indication that transport cost is still a very big challenge in Africa, mainly affecting land locked countries. The study focus was limited to transport cost which is just one component of road infrastructure. While the study discusses the effect of transport cost on trade flows, an analysis of food security was understated.

#### **Effects of ICT on household food security**

Anselme(2012)'s study on the impact of ICT use on access to markets of pineapple smallholder farmers in Benin suggest that ICT tools like phone saves cost and time in accessing markets by availing significant market information, which makes small farmers more competitive and generate more income. Use of phones also improves acquisition of farm input and marketing of farm output. The study thus recommended use and adoption of ICT in rural areas to promote cash crop production and marketing.

Although the study was relevant, it was limited in study variables. It only looked at the use of a phone, and did not give considerations to other ICT tools like computers and radios and their level of utilization in accessing markets and improving food security. As Bello (2014)

suggests, while studying ICT for market access, it is important to incorporate both old and new ICT tools to arrive at conclusive results on the effect of ICT.

(Chorudhmy, 2001) note that while phones can easily reduce the regional gap to the market, internet connectivity spreads to a wider area and if used together both mobile phones and internet connections are more effective in achieving rural food security. In addition, it only looked at one commodity in the market (Pineapples). According to Brooks (2011), the success of innovation systems depends on diversity on crops, agricultural practices, and livestock knowledge. It also ignored the role of consumers' access to market in influencing supply. Such study gaps generate a need for a detailed study, specifically looking at ICT utilization, including computers, mobile phones, and radios, linking it to household food security.

In Mississippi, a study carried out in Oregon on the role of ICT in improving food security management, revealed that the use of ICT makes it easy for food assistance programs to provide food at minimal cost, hence ensuring food security (Amy, 2012). Nevertheless, while phones and computers are relevant in facilitating food security management, their role was understated in analyzing the role of ICT in food security management.

Lashgarara et al., (2011) assert that new ICT technologies are not widely embraced in rural areas. Yaghoobi (2011) suggest that when integrated together with other new old technologies like radios, ICT can benefit farmers in production, supply, and marketing. It is therefore imperative to conduct a study analyzing the effect of ICT utilization including both new and old technologies on household food security.

Another study on the role of ICT in Agricultural sustainability and food security in Nigeria found out that, while old media communication channels such as workshops, radios, and

word of mouth, are traditionally recognized, they are not widely utilized in promoting agricultural food security and sustainability. Therefore, integrating them with new ICT tools like phones, and internet may be of need in enhancing food security and agricultural sustainability (Bello, 2014). Such recommendation implies a need to conduct a study analyzing utilization of both old and new ICT technologies and its effect on household food security.

Similarly, Lashgarara et al., (2011) in examining ICT tools to identify the ones appropriate for improving food security found that all categories of ICT technologies; the old technology, new technology, and very old technology have got an impact on food security, although new technologies are more effective in ensuring food security. The study however suggests use of old technologies in rural areas where access to new technologies is low. While the study is concerned of low access of new technologies in rural areas, the concern is not statistically evident. A study on ICT utilization and household food security in a rural setting is required.

Lashgarara et al., (2008) state that ICT utilization increases food security in several ways including availing market information, encouraging diversification of agriculture, and making small farmers more acquainted to agricultural businesses through web information. The study recommends developing policies that support investment in ICT infrastructure. Although the study is relevant, it does not articulately analyze the determinants of ICT utilization like radios, and computers in enhancing household food security.

Kuchrik (2011) also shows that Utilization of ICT networks aid in the dissemination of information and accessing agriculture inputs, which improve agricultural productivity. ICT reduces the distance between remote and urban areas. And if used efficiently together with Geographic Information Systems (GIS) ICT can reduce the food security gap by locating and linking areas of food surplus to deficit. While the study is valuable in identifying the role of

ICT utilization in improving agricultural productivity, it ignored the role of ICT utilization in enhancing household food security through increased access of the market for consumption.

Shamiso(2012) from his study on the impact of ICT on rural livelihoods shows that farmers travel long distances in search for markets but the search is constrained by poor physical infrastructure and high transaction costs. Utilization of ICT networks aid in the dissemination of information and accessing inputs which improve agricultural productivity. While food security and livelihoods are interlinked (Anderson & Cook, 1999), a connection between ICT and food security was omitted, a gap this study intends to fill.

### **Effect of Income on market access and households' food security**

Tarasuk et al., (2014) study on household food insecurity in Canada found that income has got a significant effect on household food security, and that households' food security depends largely on the source of income. The same study shows that 45.3% of the households with low income are food insecure.

In Egypt, a study report by IFPRI (2013) revealed that income poverty and access to food are significantly correlated. 25% and 43% of the population in greater Cairo and Lower Egypt is food insecure mainly because of low economic access to food. As a result, 56% are on the borderline of poor dietary consumption while 35% face poor dietary diversity.

According to ADB (2013) study of food security in Asia and pacific regions, as income grows the consumption food basket also grows with more nutritious products like meat, milk, and eggs. In the same way, countries with a high GND per capita have higher dietary diversity due to various food sources. And also, increase in household income reduces the proportion of grains in total caloric intake per capita.

Alessandro & Jing (2011) further found out that low income affects highly constrains poor households in accessing the markets. The poor are unable to transport their commodities to markets because of the higher transport cost which reduces supply and increases aggregate demand. This results into high commodity prices, and reduces the purchasing powers of those with low income.

Uche (2008) shows that farmers with a steady income access market information more easily than those with lower income. Poor households face low production making them more vulnerable to food insecurity. Increase in income is associated with increased consumption and reduction in malnutrition. High household income gives poor households the opportunity to access the market if markets are well functioning with limited access constraints, high prices may transform into higher income and high food consumption (IFAD, 2013).

While the studies suggest that income has an effect on household food security, Brown (1992), state that increase in income may not guarantee household food security as the income may be spent on other non food items such as education or non nutritious items like sugar. Most of the study conclusions have been developed in the context of a developed country. According to Myers (2000), study settings and results differs in study contexts. A study on the effects of income and households' food security is therefore required in the context of a developing country to yield suitable conclusions and recommendations.

### **Household food security**

Although the area of household food security is widely reviewed, there has not been conclusive evidence on the determinants of household food security, and the focus has been more divergent. While some studies such as Keshav (2014) were based on socio economic factors, others like USDA (2015), Kuwornu John et al., (2013), Makombe et al., (2010), looked at economic factors. Likewise, results on the determinants of household food security

and causes of household food insecurity are also inconclusive. For example, a study by Mequanent et al., (2014) on 70 households found that 42.9% of the population in Ethiopia is food insecure. Nevertheless, education level, family size, use of oxen, and farm inputs were key determinants of household food security in rural Ethiopia. The study also revealed that households that suffer food shortages at the initial stage cope by selling their live stocks, borrow grains and cash from relatives, and cut meals. On the other hand, those suffering severe food shortages resort to skip meals, eat unpreferred meals, and reduce the size of meals consumed in the household. Nonetheless, accuracy and reliability of study results and conclusions is questionable given a small sample of only 70 respondents, as a small sample size will lead to a large variability and bias in study results (Amin, 2005).

In Tanzania, a study in Dodoma municipality found that 93% of the households in unplanned settlements are food insecure while only 6.4% are food secure as a result of low purchasing power due to low income following low economic activities. While the study results suggest that increasing income would increase the purchasing power and therefore food security, (Dreze and Sen, 1989) contend that the link between caloric intake and nutrition well being depends on a number of factors besides income.

Besides, while access to dietary diversity is a necessary condition for nutritional adequacy, it is not a sufficient condition for nutritional well being (WFP, 2009). Therefore, much as purchasing power significantly affects market access and therefore food security, the effect of ICT utilization and road network in influencing market variables such as prices, and demand is also paramount. Wee (2013) notes that ICT plays four major roles of accessibility (Transport, socio networks, Individual demand and preferences, land use), each having an effect on the market outcomes. Fedaku and Mequanent (2010) found market access significantly correlated with household food security.

According to Bahiigwa (2002), household food insecurity in Uganda is caused by poor rains, pests and diseases. The study further shows that, the probability that a household is food secure depend on the distance a household is away from the market centre. In this case, households near markets are more food secure compared to those away from the market. Whereas household food security is gauged on all the four indicators of food security (Availability, access, stability, and utilization), study results mainly address availability from the supply point of view. Although food availability is a necessary condition for household food security, it is not a sufficient condition for food access (Brown, 1992). Furthermore, (Sharma, 1992; Fracesco, 2012) state that while production is a major determinant of food availability, access to food available foods is a key determinant of household food security. Therefore exploring the effect of market access on household food security is essential.

A study by Brown (1992) on how to improve food security of the poor shows that household food security can be attained by increasing availability and access of foods in the local and community markets. Nevertheless, accessing available foods in the market requires well-functioning market systems characterized by good communication flows and infrastructures. He further states that the poor face more challenges accessing foods in the market due to low income. And thus increasing household income can reduce household food insecurity. Meanwhile income is a good measure of household economic wellbeing; assets give a better understanding of households' vulnerability to food insecurity (Francesco, 2012). While the study is relevant, considering the year in which it was conducted, it is very old and study results may not be applicable in the current period.

A study by ACF (2011) shows that poor infrastructure and low income are major causes of household food insecurity in Acholi sub region. Due to low income, households face difficulties accessing other foods such as milk, fish and meats from the markets.

Consequently, consumption is highly monotonous with limited dietary diversity. While the study shows a significant correlation between income and dietary diversity, it is not certain that when income increases households would have dietary diversity as the money could be spent on nonfood items (WFP, 2009). While the study mentions difficulties households face in accessing foods in market, the effect of market access on household food security is not clearly articulated and quantified.

## **2.4 Synthesis of Literature**

Within reviewed literature, market access, and food security have mainly been analyzed from a narrow perspective. Conclusions on market access are majorly based on supply analysis, focusing on agricultural productivity and trade volume which is just one indicator of food security(availability) leaving out consumption (Aderibigbe (2010); Gollin et al.,(2010); Valerija (2006); Kamara (2004)). What's more, studies have been inadequate in explaining the role of ICT utilization, and income in determining market accessibility and households' food security.

Additionally, while theories in reference recognize the significance of access to households' food security, little importance has been put on the market despite its contribution to improving income and households' food security. Further, while ICT is very important and a major advancement in lengthening the market supply chain, its contribution to market accessibility and households' food security is not addressed in the model, a contribution this study will make.

Existing literatures did not also uncover any published research on the effect of market accessibility towards food security in Acholi sub region. This therefore means that explicit encouragement are needed to fill this knowledge gaps and arrive at benchmark practices on ensuring food security in Acholi sub region.

## CHAPTER THREE

### METHODOLOGY

#### **3.0 Introduction**

This chapter describes in detail the methods and tools that will be used in data collection and analysis. In particular, the chapter presents the research design, study population, sample size, sampling techniques, data collection methods, data collection instruments, validity and reliability, procedure of data collection, data analysis and measurement of variables.

#### **3.1 Research design**

The researcher shall use a cross section descriptive survey design, incorporating both quantitative and qualitative research approaches. The cross section research design is opted for because the study will involve a large number of respondents and data will be collected from the respondents at once. This will also help to reduce on time and costs on the part of the researchers. Cohen et al., (2010) reveals that cross sectional studies are cheaper, quicker, and easy to administer with minimal control effects. A descriptive research design is chosen because it can capture major issues of the study and allows deeper understanding of study variables (Sekaran, 2000). Meanwhile, incorporating both qualitative and quantitative research approaches is helpful in enhancing reliability (Desscombe, 1998).

#### **3.2 Study Population**

Acholi Sub region has got 8 districts with a population of about 1,701,600(UBOS, 2014). Over 90% of the population lives in rural areas, and 95% of the population derives their livelihood from Agriculture(IPC,2014).

The study target population will include; District officials, local leaders, market distributors and vendors, market representatives, and households. This is selected because they are among the majority affected by the incidence of food insecurity.

### **3.3 Study Sample and sampling procedures**

This covers the sampling techniques, sampling procedure and sample size of the study as described below;

#### **3.3.1 Sampling Techniques and procedures**

The researcher shall employ two techniques of sampling; Simple random sampling and purposive sampling techniques. Purposive sampling will allow the researcher to study cases that have the required information with respect to the objectives of the study, while simple random sampling technique will ensure that each of the respondents has equal chances of being selected and included in the study without bias (Mugenda, 1999).

Purposive sampling technique will be used in selecting study districts, Sub counties, parishes, and villages. Further, purposive sampling will be used in selection of key informants. Particularly, the technique will be applied in selecting district officials, local leaders, and market representatives. On the other hand, simple random sampling will be used in selection of households.

#### **3.3.2. Sample size and selection**

Sampling will follow a three stage procedure. The first stage will involve selection of study districts and sub counties, the second stage will involve selection of parishes and villages, and lastly selection of households and key informants.

In the first stage, 4 out of 8 districts in Acholi sub region will be purposively selected including; Kitgum, Lamwo, Gulu, and Amuru district. While all the 8 districts have got similar characteristics, the selected 4 districts are distinct from the rest of the districts in terms of their population size, location, and level of social economic activities. For example, Kitgum has a big population size compared to its neighboring districts of Pader and Agago districts. Gulu is centre to all districts in Acholi sub region with high level of economic

activities, meanwhile Amuru and Lamwo districts have got a high agriculture and trade potential because of their strategic location to Southern Sudan. Besides, the 4 selected districts are the most affected with food insecurity (IPC, 2014).

In the second stage, two sub counties and two parish will be selected per district be selected based on the level of social economic characteristics. In particular, one of the study sub county should be characterized by high levels of economic activities (Urban) and the other characterized by agriculture and remoteness (Rural). Therefore the choice will enable us make a comparative analysis of the selected area.

Lastly, 384 households; 152 households from Gulu, 68 in Amuru, 97 in Kitgum, and 67 in Lamwo will be randomly selected for the study. Households will be selected from 2 villages, per parish, per Sub County. Selection of households will be done using systematic simple random sampling guided by the local council register. In this case every  $k^{\text{th}}$  number on the household register will be selected by dividing the total number of households by the targeted sample.

The following proportionate stratification formula will be used to generate the district sample size.  $n_h = (N_h/N)*n$

Where;  $n_h$  is the target sample size,  $N_h$  is population size,  $N$  is the total population size, and  $n$  is the total sample size.

On the other hand, 106 interviewees (10 District officials, 48 local councils, 48 market vendors) will be purposely selected with the guidance of production and marketing officer. Besides, 32 Focused Group Discussions will be conducted in the study area. That is, 1 per village, 4 per sub county, and 8 per district. Nonetheless, the overall study sample selection

will be guided by the Krejcie and Morgan table developed in 1970 by Amin, (2005). The following table shows the study population and sample size.

**Table 1.** Population, Sample size and sampling technique

S/N	District	Population Size	Sample Size	Sampling technique
1	Gulu	418300	152	Proportionate sampling
2	Amuru	188600	68	Proportionate sampling
3	Kitgum	267600	97	Proportionate sampling
4	Lamwo	185000	67	Proportionate sampling
	<b>Total</b>	<b>1,059,500</b>	<b>384</b>	

### 3.4 Data source and collection methods

#### 3.4.1 Data source

The researcher shall use both primary and secondary data sources. Secondary data will be obtained mainly from the Uganda National Household Survey reports, while primary data will be obtained directly from the field.

#### 3.4.2 Data collection instruments

##### Questionnaire

A structured questionnaire will be used in collecting primary data. To control the limitation of language barrier, the researcher will hire two research assistants well conversant in both Luo and English to assist in administering the questionnaire. The questionnaire will be therefore translated, and administered in Luo language with assistance of two research enumerators for a period of 24 days.

The questionnaire is chosen above other instrument because it saves time, money, and also gives respondents a chance to answer questions at their convenient time. Besides if used questionnaires save time (Amin, 2005).

### **Interview Guide**

With the support of an interview guide, unstructured interviews will be purposively conducted to capture information that may not be easily collected using a questionnaire. District officials, local leaders, and market representatives will be interviewed. The interview guide will assist in extracting oral information from the questionnaire with ease (Sekaran, 2000).

### **Observation Checklist**

An observation guide or checklist will be used to assist capture relevant information on the study variables (Drury, 1992). In using the observation method the researcher will be able to capture data that respondents may not be aware of or unwilling to share with the researchers.

### **Focused Group checklist**

A Focused Group Discussion (FDG) checklist will be developed to aid in getting a detailed context of market accessibility and households' food security. Bryman (2008) shows that focused group discussions enables researchers to follow discussions within a group and how individuals in a group discuss with each other.

### **Documentary Review guide**

To obtain secondary data through documentary review, a documentary guide indicating the list of relevant secondary data on the effects of market accessibility on household food security in Uganda, and Acholi sub region will be used. Secondary data obtained from reports such as statistical abstracts, and Uganda National Household Surveys will supplement other sources of data and guide the researcher in making informed conclusions (Amin, 2005).

### **3.5. Data quality control**

According to Amin (2005), testing for validity and reliability ensures quality control in the study variables.

**Validity control**

To control for validity, five of each of the study tools will be given to five people with expertise in the study area to evaluate the validity of each item in the tool. The experts will be required to tick relevant, or not relevant for all questions in the tool. The results will be computed to obtain a Content Validity Index (CVI). According to Amin(2005), the tool is valid if it has a CVI of 0.7 and above.

**Reliability control**

To test for reliability, the researcher will conduct a pretest on 30 respondents in Nwoya District, which is outside the study sample frame. Thereafter, using SPSS, the data will be processed, and the Cronbach Alpha Coefficient will be determined to check for accuracy, consistency, and reliability. An alpha coefficient of 0.5 and above will indicate reliability (Amin, 2005).

**3.6 Data collection Procedures**

As a data collection procedure, the researcher will obtain an introductory letter from; UTAMU, and the Chief Administrative Officers (CAO) of the study Districts. Thereafter; the researchers will contact and introduce themselves to the area Local Councilors (LCs) and the production and marketing officer to seek for guidance in selecting respondents for data collection.

**3.7. Data analysis**

Data analysis will follow the objectives and research questions presented in earlier sections. The collected data will be summarized, coded, captured, entered, and then analyzed using a computer assisted software program – STATA to generate frequencies, correlations, regressions, and t-tests. Correlation results will help us check for the relationship between market access and household food security, the regression results will assist in analyzing the

direction of the effects, while the t-tests will inform us about the magnitude of the effects or relationships (Amin, 2005).

**Econometric model**

To investigate the effect of market accessibility on households’ food security, the following food security model is specified guided by Akinola, et al., (2006) food security models.

$$FS_i = \alpha_0 + \beta m_i + \gamma x_i + \mu_i \dots\dots\dots 1$$

Where;

$FS_i$  = Households’ food security

$m_i$  = Market access, captured by farmers’ organization, road network, and ICT utilization, and  $\beta > 0$ ,  $x_i$  is a vector of exogenous variables expected to influence market access and households’ food security. These include households’ characteristics such as age, sex, education, households’ size, number of adults,

$\gamma$  is a vector representing the marginal impact of each component  $x_i$  on  $FS_i$

We are suspicious that there may be an endogeneity problem that may influence the measurements of households’ food security causing bias estimates and inconsistency.

That is  $E(uix_i) \neq 0$

In case of endogeneity, the problem will be solved by including Instrumental Variables (IV) or use a two stage least square estimates (2SLS). Because market access is a binary response variable, therefore not continuous, it will be predicted using a limited dependent variable model such as Tobit, probit or logit model (Pender, 2005).

Analysis of study objectives will be guided by the general multiple regression models indicated as equation 1, adopted from Mugambi (2013).

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## APPENDICES

### APPENDIX 1 QUESTIONNAIRE

#### THE EFFECT OF MARKET ACCESSIBILITY ON HOUSEHOLDS' FOOD SECURITY IN ACHOLI SUB REGION IN NORTHERN UGANDA

Dear Sir/Madam, I am part of the team carrying out a study on the above subject. The study is purely academic and your responses will be treated strictly confidential for the purpose of this study. I therefore humbly request for your time to answer the following questions.

#### SECTION A: BACKGROUND INFORMATION

*Please put a tick in the suitable box corresponding to your response*

1. District.....

2. Location: 1. Rural  2. Urban

3. Sex: 1. Male  2. Female

4. Age: 1. below 18  2. (18 -35)  3. (36-60)  4. Above 60

5. Highest level of education

1. No formal schooling  2. Prim  3. Seco  ry 4  rtiary  Other  
(Specify)

6. Occupation

1. Farming  2. Business  3. Causal labor  4. Employed . None

7. Income status (average per month)

1. Below 50,000/=  2. (50,000-100,000/=)  3. (110,000-150,000/=)

4. (160,000-200,000/=)  5. above 200,000/=

8. Number of household income earners 1. None  2. 1-2  3. 3-5  4. above 5

10. Total Household Expenditure (average per month)

1. Below 20,000/=  2. (20,000-50,000/=)  3. (60,000; 100,000/=)

4. (110, 000-200,000/=)  5. Over 200,000/=

11. How much of total household expenditure is spent on food per month?

1. Below 20,000/=  2. (20,000-50,000/=)  3. (60,000; 100,000/=)

4. (110, 000-200,000/=)  5. Over 200,000/=

12. Source of food for consumption

1. Market  2. Own production  3. Family and Friends  4. Other

(Specify).....

13. Do you sell some of your produce?

1. Yes  2. No

14. If yes, which of the following is the point of sale?

1. Home  2. Village market  3. District main market  4. Other

(Specify).....

## SECTION B: MARKET ACCESSIBILITY

### FARMER ORGANISATIONS

1. Have you ever heard of any farmer Organization in your area?

a. Yes  b. No

2. If yes, please mention it.....

*Please continue and choose the most suitable response option for the following questions*

#### Likely response options

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Strongly Agree(SA)</b>	<b>Agree(A)</b>	<b>Disagree(D)</b>	<b>Strongly</b>	<b>Not</b>

S/N	Farmer Organization	Response option				
		SA	A	D	SD	NS
3	I belong to a farmer group					
4	I belong to a farmer union					
5	I belong to a farmer cooperative					
6	We have a farmers' union in our village					
7	I belong to an informal farmers' organization outside this village					
8	I have never heard of any farmers' in this village					
9	Our Farmer organization provide us with market information					
10	Our farmer organization help us to market our output					
11	Our farmer organization enable us to access farm inputs					
12	Our farmer organization have helped me market in bulk					

13	Our farmer organization support me in processing my products					
14	Our farmer organization support collective labour in food production					
15	Farmer organizations in this village are not active					
16	Farmer organizations have not been helpful in accessing input/output markets					

### ROAD NETWORK

17. How do you describe the road network in your area?

a. Very Poor  b. Poor  c. Fair  d. Good  e. Very Good  f. Excellent

	Road Network	Response option				
		SA	A	D	SD	NS
18	Transport cost to the main market is not so much					
19	The distance to the main market is not so long					
20	I go to the market by foot					
21	Accessing public transport to the main market is very easy					
22	Travel time to the main market is not so long					
23	Our road to the main market is paved					
24	Our road to the main market is all seasoned					
25	Without a vehicle, I can spend less than 2 hours to reach the main market					
26	The road to the main market get muddy after rain					
27	My home is not very far from the main input market					
28	It is not difficult to reach the main market with a bicycle					
29	I have no problem accessing main market					

### ICT UTILIZATION

30. Which of the following ICT tools do you own?

a. Phone  b. Radio  c. Computer  d. None of the above

	<b>ICT Utilization</b>	SA	A	D	SD	NS
31	I often use a radio to get market information					
32	I often use a computer to access market information					
33	I often use a phone to get market information					
34	I use a phone to market my produce					
35	I use a radio to market my produce					
36	I use a computer to market my produce					
37	The phone has helped me to access modern farm inputs					
38	Using a phone in this village is difficult due to network problems					
39	Accessing radio channels in this village is difficult					
40	I have never used my phone to access market information					
41	I have never used the radio to access market information					
42	I have never used a computer to access market information					
43	Using a computer in this village for market information is very difficult					
<b>HOUSEHOLD INCOME</b>						
		SA	A	D	SD	NS
44	I spend too much on food for my household					
45	My expenditure on farm inputs is so high					
46	My household expenditure on food have increased since the last harvest					
47	I usually spend much when I sell food in the market					
48	Accessing food from the main market is not so expensive for me					
49	My household earnings have improved this month					
50	My income savings have improved this month					
51	I am happy with my savings					
52	Having savings has helped me to access the market since the last harvest					
53	I own domestic animals like goats, cattle, sheep, etc					

54	I own domestic birds like chicken, ducks, turkey, etc					
55	I can sell my animals/birds anytime					
56	I have ever sold my animals/birds to be able to buy food in the market					
57	I have ever sold my animals/birds to enable me sell my food in the market					

<b>FOOD SECURITY</b>		<b>Response</b>				
		SA	A	D	SD	NS
58	My food harvest is usually enough for my household					
59	We use modern farm inputs in food production					
60	I have been eating once a day for the past 7 days					
61	I have been eating twice a day for the last 7 days					
62	I always eat more than twice in a day					
63	Our household have no problem with food availability					
64	I have not been worried of food for the past 30 days					
65	We always have variety of food items to choose from					
66	We normally eat what we like, when we like					
67	We have never slept hungry since the last harvest					
68	we have never missed eating our staple foods					
69	We can afford to change diet at least two times in a week					
70	We have never eaten wild foods during off peak season					
71	We have food stock to take us through to the next harvest					
72	We have never borrowed food from other people in the last 30 days					
73	Our meals are always nutritious					
74	We can get food without any problem					
75	What we harvest is more than what we can eat					
76	we have no problem accessing available foods					
77	we usually eat a balanced diet					
78	We produce more than two crops at ago					

**THANK YOU SO MUCH FOR YOUR TIME**

## **Appendix 2**

### **Interview guide**

#### **Market accessibility**

1. Do households in this village have access to markets? If not what are the five main challenges households' faces in accessing markets in your village?
2. How does low income constrain households in accessing markets in this village?
3. Do you think households in this village adequately use ICT to access the market? If not please explain why
4. Do you believe the road network in this village support easy access to markets? If not how are they inadequate?
5. Suggest possible recommendations to improve market access in your village

#### **Household food Security**

1. How would you describe the food security situation in your village? If not good mention five major causes of food insecurity in the area
2. On average how many times do people consume food in a day? Please estimate
3. Do households produce enough food to take them to the next season? If not how do they cope with food shortage in off peak season?
4. What is your view of a balanced diet? Do you believe households in this area consume a balanced deity? If not please explain why.
5. Suggest five ways of improving food security in your village

**THANK YOU FOR YOUR TIME**

### **Appendix 3**

#### **FDG Checklist**

What is your position?

What can you say about food security in your area?

What can be done to improve food security in your area?

How does market accessibility affect food security in your area?

How does income influence market accessibility and households' food security in your area?

What can be done to improve market access in your area?

## Appendix 4

### Research Work plan and Timeframe

<b>Activity</b>	<b>Duration</b>	<b>Years of completion</b>
Proposal development	September-April	2016
Proposal presentation	May	2016
Proposal defense	July-August	2016
Data collection	Oct-Nov	2016
Data analysis and report writing	Dec-April	2016/17
Thesis presentation and approval	May	2017
Graduation	-	2017